Interaction rituals and technology: A review essay

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ABSTRACT

This article aims to advance research on interaction rituals (IR) and technology. Its starting point is interaction ritual theory, a key micro-sociological approach that postulates IRs as the micro-interactional glue that holds social life together. This approach sees IRs as requiring bodily co-presence among interactants, thus casting doubt over the ritual potential of technology-mediated interaction. In recent years, however, studies have begun problematizing this view through investigations of technology-mediated IRs (TMIR). Counter to IR theory, these studies show that IRs can take place in lieu of bodily copresence and that technologies offer new op-portunities for and create distinctively novel forms of rituals and communities. Crucially, how-ever, this emerging literature has an under-theorized understanding of user-technology relationships, which leaves significant gaps in our understanding of IRs and technology. To advance the field, it is suggested that future research should consider: a broader ecology of technologies; heterogeneous users, uses, and circumstances; cultural coding and domestication; and the technologies of face-to-face interaction. This can facilitate a more fundamental reap-praisal of the relationship between IRs and technology, which, in turn, can improve our under-standing of both TMIR and IR more generally.

1. Introduction

Picture the last time you were engrossed in an interaction. Maybe you were immersed in conversation with a friend, moved by the sadness at a funeral, or absorbed in a concert with your favorite band. In any case, you were engaging in an *interaction ritual* (IR): a focused encounter in which you were emotionally in sync with the other participants. According to *interaction ritual theory*, IRs have profound social importance by (re)producing communities and giving people a sense of belonging, meaning, and vitality (Collins, 2011, 2020a); without IRs, people become depressed, demoralized, and devoid of the energy needed to maintain social life (Collins, 2020c). IRs are therefore the glue that holds social life together, making IR theory a key resource for understanding social order.

IR theory famously theorizes IRs as requiring 'bodily copresence'—the assembly of people in the same physical place—for IRs to contribute to social ordering. This stance casts significant doubt over the ritual potential of technology-mediated interaction. The chief proponent of IR theory, Randall Collins, argues that *technology-mediated interaction rituals* (TMIR) are inherently second-rate for generating 'emotional energy' and solidarity between people. According to Collins, society faces a bleak future if TMIRs are to replace face-to-face encounters. In his words, "If people are deprived of embodied interactions, we can expect they will be more depressed, less energetic, feel less solidarity with other people, become more anxious, distrustful, and sometimes hostile" (Collins, 2020c, p. 496). This is an alarming prediction in light of current societal developments, with face-to-face encounters seeing increasing competition from

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social media, remote working, the digitalization of public services, and similar trends towards technology-mediated interactions—all of which have been exacerbated further by the COVID-19 pandemic (cf. Brilli et al., 2022).

Against this backdrop, this article discusses the relationship between IRs and technology. Aiming to take stock of existing research and propose a course for future inquiry, the article is organized into three parts. The first section lays out the key principles of IR theory along the lines suggested above and highlights its strengths as a micro-sociological theory of social order and motivation. The second section moves on to consider a novel line of research that engages explicitly with IR theory's assumptions about bodily copresence and the ritual limitations of technology-mediated interaction. Discussing the possibility, intensity, and novelty of TMIRs, these studies show—counter to IR theory—that interaction rituals *can* take place in lieu of bodily copresence and that technologies offer new opportunities for and create distinctively novel forms of rituals and communities. This timely and promising line of research thus suggests that IR theory underestimates the ritual potential of technology-mediated interaction, although significant questions remain about the ritual *intensity* of TMIR.

At the same time, however, the third section argues that studies of TMIR are limited by an under-theorized understanding of user-technology relationships. Building on insights from fields such as media and communication studies, human-computer interaction, digital anthropology, and science and technology studies, it is argued that future research should consider: a broader ecology of technologies; heterogeneous users, uses, and circumstances; cultural coding and domestication, and the technologies of face-to-face interaction. Without acknowledging these issues, studies are likely to make imprecise or over-generalized claims about the ritual potential of TMIR, and to exaggerate the difference between bodily copresent and technology-mediated interaction. Conversely, by addressing these issues head-on, studies will be equipped to engage in more nuanced discussions of the relationship between IRs and technology, which, in turn, can improve our understanding of both TMIR and IR more generally.

2. Interaction ritual theory

IR theory is a key approach to the study of micro-interaction in contemporary sociology. The theory is most fully developed in Randall Collin's (2004) *Interaction Ritual Chains*, in which he synthesizes insights from Durkheim (1915) and Goffman (1982) to provide a general theory of the inputs, outputs, and mechanisms of IRs (see also Collins, 1975, 1981, 1988, 1998, 2009, 2011, 2015, 2020a, 2020b, 2020c; van der Zeeuw et al., 2018; Weininger et al., 2018).

Collins conceptualizes interaction rituals broadly by combining the Durkheimian and Goffmanian understandings of the term. Whereas Durkheim (1915) took rituals to be periodic, religious ceremonies involving large groups of people, Goffman (1982) shifted the focus to small-scale, informal, and secular encounters in everyday life. Collins includes both within his analytical gaze. For him, IR is "a mechanism of mutually focused emotion and attention producing a momentarily shared reality, which thereby generates solidarity and symbols of group membership" (Collins, 2004, p. 7). This definition cuts across a range of conventional divisions in the field of ritual studies, as it encompasses both religious and secular, special and mundane, planned and spontaneous, and large- and small-scale interactions.

Uniting all these types of interaction is a shared set of inputs, outputs, and mechanisms (Collins, 2004, pp. 47–49; see Fig. 1). Concerning *inputs*, the key elements are:

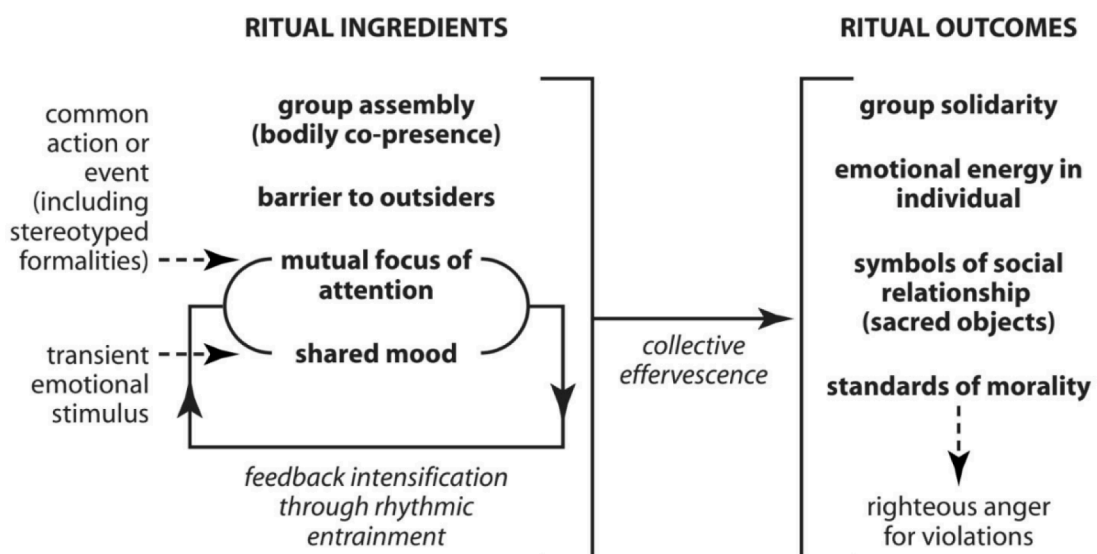(1) *Group assembly (bodily copresence):* two or more people assemble in the same physical place.

Fig. 1. Collins' (2004: 48) model of interaction ritual. Reprinted with permission from Princeton University Press.

(2) *Barriers to outsiders:* the participants have a sense of who is included in and excluded from the interaction; the barriers can be physical (a church) or symbolical (group-specific aesthetics, specialized knowledge, formal membership requirements).

(3) *Mutual focus of attention:* the participants focus on a common object or activity and communicate this to each other so that they become mutually aware of each other's focus.

(4) *Shared mood:* the participants develop a shared emotional experience in and of the interaction.

The key *mechanism* of IR theory is seen in the mutually reinforcing feedback loop between inputs 3 and 4 (mutual focus and shared mood), described by Collins as follows:

> "As the persons become more tightly focused on their common activity, more aware of what each other is doing and feeling, and more aware of each other's awareness, they experience their shared emotion more intensely, as it comes to dominate their awareness." (2004, p. 48)

Collins refers to this as the 'mutual focus/emotional entrainment mechanism'. 'Entrainment' is an engineering term for how one substance becomes entrapped or caught up by another substance—in this case, how individuals become caught up in a collective emotional moment, referred to by Durkheim as 'collective effervescence'. In such cases, "[p]articipants feel sadder in the course of a funeral, more humorous as part of a responsive audience at a comedy show, more convivial during the buildup of a party, more engrossed in a conversation as its rhythms become established" (Collins, 2004, pp. 107–108).[1] In turn, this experience of collective effervescence leads to four *ritual outputs* or outcomes:

(1) *Group solidarity:* a strengthened feeling of group membership. This is achieved as the entrainment process provides a common experience for interactants to build on. As one commentator describes it:

> "In order for the situation to be seen as a ritual and thus capable of engendering solidarity, we must mutually realize that we are both entrained. I have to see that he is also drawn into the events, and he has to see that I am likewise engaged. When we arrive at that mutual understanding and when we establish a common sense of mood, it breaks down the barrier between us and provides us with a common experience upon which we can start to build our interpersonal interaction." (Ling, 2008, p. 18)

(2) *Emotional energy* (EE)*:* EE expresses itself as feelings of "confidence, elation, strength, enthusiasm, and initiative in taking action" (Collins, 2004, p. 49) and represents "the personal side of having a great deal of Durkheimian ritual solidarity with a group" (Collins, 2004, p. 108). EE is a long-term emotion, an 'underlying tone' (Collins, 2004, p. 106), to be distinguished from the short-term emotions that arise during the ritual itself. Accordingly, even if the short-term emotion of a funeral is sadness, the long-term emotion might be an increased sense of community and the strength to move on.

(3) *Group symbols*: these are actions, artifacts, emblems, jargon, people, places, slang, or any other 'symbolic carrier' that, through processes of collective effervescence, become markers of group membership and invested with varying degrees of Durkheimian 'sacredness' (examples of highly sacred symbols can range from objects such as flags and religious texts to people such as ritual leaders and celebrities). Once established, these sacred symbols serve as "reservoirs of shared energy that can be rejuvenated in further cycles of interaction" (Ling, 2008, p. 10). Thus, as long as they are periodically 'renewed', engagement with such sacred symbols can help group members recharge their group solidarity and emotional energy outside of the ritual encounter itself.

(4) *Moral standards:* these are shared norms and values that promote a sense of "rightness in adhering to the group, respecting its symbols, and defending both against transgressors." (Collins, 2004, p. 49) These standards can be in concordance with mainstream societal values, or in direct opposition to them (as in racist or neo-Nazi subcultures; cf. Törnberg & Törnberg, 2022).

Importantly, these outputs are associated with *successful* IRs, where the four inputs "successfully combine and build up to high levels of mutually focused and emotionally shared attention" (Collins, 2004, p. 49). Success, however, is not a given: An essential insight provided by IR theory is that rituals can also fail. In such cases,

> […] there is a low level of collective effervescence, the lack of momentary buzz, no shared entrainment at all or disappointingly little. There [… is] little or no feeling of group solidarity; no sense of one's identity as affirmed or changed; no respect for the group's symbols; no heightened emotional energy—either a flat feeling unaffected by the ritual, or worse yet, a sense of drag, the feeling of boredom and constraint, even depression, interaction fatigue, a desire to escape. (Ling, 2008, p. 51)

Failed rituals thus damage solidarity and drain the participants' emotional energy (Collins, 2004, p. 53), and when recurring, such failures can lead to feelings of alienation and marginalization, stimulating people to withdraw socially or, if triggered, engage in violence, riots, or other forms of upheaval (cf. Collins, 2009). Ritual success or failure should not be understood dichotomously, however, but as a gradual phenomenon, spanning a continuum from pure elation to total alienation. A key aspect of IRs is therefore their *ritual potential*; that is, *the degree* to which they successfully (re)produce solidarity, morality, group symbols and emotional energy in participants.

Related to these issues of ritual success and failure is IR theory's interest in interaction ritual *chains*: that is, how people move through *successions* of IRs in (varyingly successful) attempts to 'recharge' their emotional energy and group solidarity. To understand

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[1] Collins emphasizes that effervescence denotes not "happy excitement" but rather "high absorption in emotional entrainment, whatever the emotion may be" (2004, pp. 107–108)

these movements, Collins adopts an emotional version of rational choice theory in which people are seen as maximizers not of utility but emotional energy. People are thus described as EE maximizers who traverse an 'interaction market' in search of "the highest EE payoffs that they can get, relative to their current resources" (Collins, 2004, p. 151).

This idea of an interaction market also links to IR theory's understanding of social stratification. Contrary to consensus-oriented theories of rituals as reproducing a stable, unified society, IR theory sees rituals as (re)producing "a pattern of stratified and conflicting groups" (Collins, 2004, p. 41). IRs are here seen as having "a double stratifying effect" (Collins, 2004, p. 41), operating through the twin principles of inclusion/exclusion and domination/subordination. The first, inclusion/exclusion, refers to how access to the most energizing IRs can be limited, either formally through strict membership criteria or informally by people having varying economic or cultural resources to stage or participate in the most rewarding IRs. The second principle, domination/subordination, refers to the potential for situational stratification of individual IRs, with some participants occupying more central and active positions than others. As those in the ritual 'center' gain greater emotional energy than those who are less central and active, situational domination tends to have a spiraling effect, with dominant persons reproducing their power from situation to situation. The result tends to be an emotional version of the Matthew effect, where those high in EE grow higher and those low in EE grow lower (Collins, 2004, p. 131).

Further reflecting Collins' background as a conflict theorist (see Collins, 1975), IRs are also considered key mechanisms in processes of conflict and dominance. In Collins' words, "effective conflict is not really possible without the mechanisms of social ritual, which generate the alliance and the energies of the partisans" (2004, pp. 41–42). In other words, any oppositional group—be it progressive activists or far-right nationalists—must go through successful rituals if it is to coalesce into a group of motivated members. IRs also shape the goals of conflict, "the things that people fight over" (Collins, 2004, p. 42), through their creation of sacred symbols and a moral obligation to protect these symbols against disrespectful outsiders.

In sum, then, IR theory sees IR as a micro-sociological mechanism for generating both the 'glue' that holds social groups together and the 'energy' to initiate social change and dominate others. In accounting for such heterogeneous outcomes, IR theory clearly differs from the functionalist theories of ritual that long dominated anthropological and sociological accounts, where rituals were seen to simply *reflect* macro-structures as part of a society's "apparatus for maintaining order" (Collins, 2004, p. 7). In contrast, IR theory argues that rituals contribute to *constitute* groups and their symbols, values, and moral standards, often in highly stratified and conflictual ways. This makes IR theory an essential resource for studying the complex interplays between interaction, emotion and social order, whose versatility is demonstrated in studies of everything from teaching (LeBlanc, 2022) to diplomacy (Holmes & Wheeler, 2019), football games (Hill et al., 2021), megachurch services (Wellman Jr. et al., 2014), startup accelerators (Krishnan et al., 2021), and restorative justice hearings (Rossner, 2011).

3. Technology-mediated interaction rituals

Following Collins' (2004) *Interaction Ritual Chains,* a key debate in IR studies has been the status of technology-mediated interaction. Given his emphasis on bodily copresence, Collins is explicitly dismissive of the ritual potential of technology-mediated IRs (Collins, 2004, pp. 53–64, 2011, 2020a, 2020c). His statements on this issue are somewhat inconsistent, however. At times he seems to emphasize that IRs *only* succeed in bodily copresent encounters, as when he proclaims, "Ritual is *essentially* a bodily process. Human bodies moving into the same place starts off the ritual process" (Collins, 2004, p. 53; italics added). In most other places, however, Collins expresses the primacy of bodily copresence in *relative* terms, acknowledging that technology can provide "some of the sense of shared attention and emotion" while insisting that "the strongest effects are reserved […] for full bodily assembly" (Collins, 2004, p. 60). Inconsistencies aside, there is little doubt that Collins views 'full-channel communication' in bodily copresent IRs as best suited for producing strong ritual outcomes. In short, bodily copresence "makes it easier for human beings to monitor each other's signals and bodily expressions; to get into shared rhythm, caught up in each other's motions and emotions; and to signal and confirm a common focus of attention and thus a state of intersubjectivity" (Collins, 2004, p. 64). Face-to-face interaction is therefore considered the essential medium for IRs and the primary research object of IR theory.

Collins is far from alone in emphasizing the social importance of face-to-face interaction. A similar view is evident in the works upon which Collins builds most closely, those of Goffman and Durkheim (as discussed in Ling, 2008). The world-building effects of bodily copresent interaction have also been—and continue to be—a common theme in interactionist social theory more generally, as evidenced in classical accounts in social phenomenology (Berger & Luckmann, 1966; Schutz, 1967), symbolic interactionism (Blumer, 1969) and ethnomethodology (Garfinkel, 1967; Suchman, 2007). Indeed, the view can arguably be traced back as far as to Socrates' critique of writing, which was grounded in his understanding of face-to-face dialogue as the "blueprint for the ideal transferal of ideas, knowledge and information" (Vries, 2014, p. 59; see also Derrida, 1998; Ong, 1982).

During the past decades, however, a range of studies have sought to apply IR theory to various forms of technology-mediated interaction, building either on the work of Collins or his intellectual predecessors, Goffman and Durkheim. These studies have advanced our knowledge on three key issues—the *possibility, intensity*, and *novelty* of TMIR—each of which will be reviewed in the following sections.

3.1. Possibility

A basic yet important finding across studies of TMIR is that IR theory is indeed applicable to technology-mediated interaction. The theory has been applied successfully to understand interaction via mobile phones (Ling, 2008; 2014), social media (van Haperen et al., 2020), discussion boards (DiMaggio et al., 2018; Maloney, 2013; Törnberg & Törnberg, 2022), online dating platforms (Nexø & Strandell, 2020), and live-streaming services (Jodén & Strandell, 2021)—showing, in all cases, that TMIR has the potential to produce

the ritual outcomes of solidarity, morality, group symbols, and emotional energy.

To account for the possibility of technology-mediated IRs, studies have suggested a series of factors that enable entrainment in lieu of bodily copresence. One factor is *shared interests and experiences*, which facilitate engagement and mutual focus between interactants. Collins (2004, p. 151) himself has acknowledged the matching of "membership symbols" as an important ignition mechanism for emotional entrainment, even if this is not included in his model of IR. However, studies of TMIR highlight a salient point that largely escapes Collins' discussion of IR theory, namely that technology-mediated interaction makes it easier for like-minded individuals to meet. This is seen, for instance, in Maloney's (2013) study of pro-anorexic discussion boards, where the ability to meet other hard-to-reach 'pro-ana' individuals online is found to facilitate the generation of group solidarity and emotional energy.

Several studies also show how *shared knowledge and conventions* (DiMaggio et al., 2018; Jodén & Strandell, 2021; Nexø & Strandell, 2020; Törnberg & Törnberg, 2022) can compensate for TMIRs offering less than full-channel communication. For instance, DiMaggio et al. (2018) argue in their study of online message boards that innovations such as hashtags, emojis, and acronyms increase the amount of emotional information that text-based communications can convey. In addition to expanding 'narrow bandwidths', this "command of online genres may in itself reinforce shared identity" (DiMaggio et al., 2018, p. 85) by acting as membership symbols and barriers to outsiders. In making these arguments, DiMaggio and colleagues build on psychological studies that show how our imaginative faculty enables us to mentally enrich low-broadband communication; as these studies suggest, "the lines between seeing and doing, and between imagining and experiencing social situations, are thinner and more precarious than once believed" (DiMaggio et al., 2018, p. 109).

Similar to DiMaggio and colleagues, Nexø and Strandell (2020, p. 3) argue that Collins' model of IRs fails to account for "the shared cultural expectations necessary to recognize and engage in the right behavioral patterns, group boundaries and objects of attention important to specific interactions". Specifically, the authors highlight the importance of culturally shared cognitive schemas, which provide interactants with shared expectations, interpretive frameworks, and behavioral guidelines—all said to be 'missing parts' of IR theory that, according to Nexø and Strandell, are necessary for establishing a mutual focus and building up emotional entrainment in the way Collins envisions.[2]

A series of studies also emphasize the importance of responsivity between interactants (DiMaggio et al., 2018; Knorr Cetina, 2009; Knorr-Cetina & Bruegger, 2002; Rettie, 2009). A key example is Knorr Cetina's study of global currency trading, which highlights the importance of *response presence*—"responding without inappropriate delay" (2009, p. 74)—and how this helps facilitate intersubjectivity among participants, even in the absence of bodily copresence. Similarly, Rettie (2009) emphasizes the importance of 'shared time' between the interacting parties and argues that synchronic media enable mutual monitoring by participants, thus compensating for the lack of physical copresence.

In sum, then, these studies find that IRs can take place without bodily copresence. Accordingly, face-to-face interactions should be seen as "special (albeit especially important) cases of the broader range of phenomena to which [IR theory] applies" (DiMaggio et al., 2018, p. 82).

3.2. Intensity

While studies agree that TMIRs are *possible*, findings differ concerning the ritual *intensity* of technology-mediated interaction. 'Intensity' here refers to the strength of the mutual focus/emotional entrainment mechanism described in Section 2—that is, the extent to which the ritual participants succeed in creating a mutually reinforcing loop between mutual focus and shared mood—which, in turn, determines the extent to which the participants leave the IR with a strengthened sense of solidarity, emotional energy, sacred symbols, and moral standards. In short, the greater the intensity, the stronger the ritual outcomes of an IR.

Some studies suggest that TMIRs can be equally intense as face-to-face IRs. For instance, in their study of gaming streams on *Twitch. tv* (an interactive livestreaming service), Joden and Strandell claim that "online interactions can produce similarly intense social emotions and experiences as offline interactions" (2021, p. 5), in part because "the mutual awareness of synchronized physical behavior can be effectively substituted with digital mechanisms such as synchronized viewer reactions" (2021, p. 17). Similarly, when surveying the literature, Van Haperen et al. (2020) highlight several examples of high-intensity TMIRs online, including anonymous hacking and 'trolling' operations and high-level coordinative activities in multiplayer games.

Other studies reach more moderate conclusions. Ling (2008) studied mobile phones (before the arrival of smartphones) and concluded that mobile communication offers low-intensity IRs that are suited mainly to *maintaining* and not *creating* solidarity. Ling also observes that the nurturance of solidarity through mobile communication often comes at the cost of establishing solidarity with the strangers we meet face-to-face, for instance when we text or call a friend instead of engaging with those in our bodily copresence. In other words, the mobile phone tends to privilege the maintenance of established bonds *over* the creation of new bonds, a phenomenon Ling (2008) refers to as 'bounded solidarity'.[3]

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[2] While relevant for the 'static' model of IRs (2004, p. 48; Figure 1 in this manuscript), the critical remarks of Nexø and Strandell are arguably less valid when considering IR theory more generally. In short, while the 'static' model treats cultural-cognitive resources solely as an output of IRs, they are elsewhere treated as both input and output. For instance, Collins describes how 'mutual focus' is facilitated by Goffmanian 'frames' (1988, pp. 203–204, 2004, p. 24) and by interactants having "similar conversational or cultural resources" (1981, p. 999). This dual view of cultural-cognitive resources is reflected in the 'dynamic' model of IRs presented later in *Interaction Ritual Chains* (2004, p. 147), where Collins includes a series of feedback loops that are absent from the 'static' model on page 48.

[3] See also Schroeder and Ling (2014) on 'neo-mechanical solidarity'.

Some also find evidence of *failed* TMIRs. This is most evident in the work of Vandenberg and colleagues on live-streamed concerts during the COVID-19 pandemic (Vandenberg, 2022; Vandenberg et al., 2021). For instance, in a study of rave concerts streamed on Facebook Live, these authors find that the streams produce limited effervescence because of "the omission of visceral elements of a physical audience" (Vandenberg et al., 2021, p. S141). Similarly, Vandenberg (2022) explores a broader range of live-streamed concerts on Twitch, finding again that the streams fail to make participants emotionally entrained with each other. Based on these findings, she argues that large-scale IRs are difficult or impossible to pull off online, attributing this to a more general difference in how entrainment is accomplished in large- and small-scale IRs:

> For smaller gatherings, the participants synchronize through actively discussing the same topic. Rhythmic entrainment is built predominantly through a shared discourse and effective turn-taking (although body language is important to assess the sincerity and emotional state of the speaker). When the group gets too large and it becomes no longer possible to synchronize with each participant individually, the manner under which rhythmic entrainment is established must take another form (Ling 2008). Hence, for large-scale interaction, rhythmic entrainment is based on visual cues (moving bodies and emotional expressions) and the overall noise of an excited crowd." (Vandenberg, 2022, p. 6)

Vandenberg thus argues that bodily copresence is more important for the creation of collective effervescence in large-scale IRs, which creates fundamental problems for large-scale TMIRs. In her words, "Large-scale [ritual] interactions (characteristic of physical events) are not just weaker but arguably also not possible online." (Vandenberg, 2022, p. 19). She claims that previous studies overlook this fact because they have failed to take intensity seriously, either by neglecting the issue altogether or measuring intensity through unreliable methods such as semi-structured interviews. In contrast, Vandenberg (2022) herself relies on a combination of interviews and video-footage of users as they engage with the streams, which, she argues, allows her to appraise visible changes in emotion—or more precisely, the lack of change in emotion as the users watched concerts online.

The studies of Vandenberg and colleagues are thus a critical reminder to take ritual intensity seriously when studying TMIR. They also offer sobering conclusions about the ritual potential of technology-mediated interaction, especially for large-scale IRs. That said, these studies also illustrate some problematic tendencies in discussions of IRs and technology. Two critical remarks seem in place.

Firstly, we might question the representativeness of Vandenberg and colleagues' cases. Not only are concerts just one among several types of large-scale IRs, but many of Vandenberg's research subjects also used the concert streams mainly for background listening (Vandenberg, 2022, pp. 16–17). In contrast, Joden and Strandell (2021) found evidence of *successful* large-scale gaming streams on Twitch—a discrepancy that might be ascribed to a less nuanced treatment of 'intensity' (as suggested by Vandenberg), but which seems equally likely to stem from the fact that Joden and Strandell studied a different type of large-scale IR (gaming streams that do not have the same 'real-world' equivalents as concert streams) and a different type of ritual community (those who *enjoy* watching gaming sessions being streamed online). In other words, Joden and Strandell's research subjects were engaging with a *novel* type of IR, specifically suited to their interests, which likely made them more motivated to focus on and engage with the streams and less likely to compare the streams negatively to a real-world counterpart.

Secondly, we might also ask whether the theoretical emphasis on high-intensity IRs blinds us to the social functions of less intense IRs. For instance, as shown in Ling's (2008) study of the cellphone, low-intensity IRs serve an important role in *maintaining* social solidarity (while being less suited to *producing* solidarity[4]). Given the processual focus of IR theory, there is also a possibility that low-intensity TMIRs can be socially efficacious because of their relative *availability and frequency*. This is suggested by Van Haperen et al. (2020, p. 310), who propose that "the sheer number of online rituals without bodily copresence makes up for what they lack in immediate intensity." A similar argument is made by McCaffree and Shults (2021), who argue that social cohesion in modern societies is maintained through 'distributive effervescence', consisting of less intense but more frequent encounters. Thus, a case can be made that what TMIRs lack in intensity, they make up for in increased frequency—especially in our age of 'deep mediatization' (Couldry & Hepp, 2018), where the ubiquity of mediated interaction means that we are engaging almost constantly in IRs (cf. Licoppe, 2004; Madianou, 2016).

In summary, the issue of TMIR's intensity remains a contentious one. There is limited agreement beyond the fact that the TMIRs under study seem to be of lesser intensity than bodily copresent rituals (all else being equal). Besides theoretical disagreements, this lack of consensus seems to follow, in part, from the fact that the studies explore different media, platforms, genres, and use cases, *without* situating their cases within the broader ecology of technology-mediated interaction, which hampers comparisons and theory-building. Thus, the closest we have to a systematic assessment is the following hypotheses by DiMaggio and colleagues, who suggest:

> […] online rituals are most likely to work to the extent they entail ongoing interaction
> • in real time;
> • among people with a history of face-to-face interaction, or, at least, biographical knowledge of one another;
> • about topics in which participants are intensely interested;
> • accompanied by visual information as well as text;
> • supported by complementary offline communications; and
> • bounded, with a beginning and an end." (DiMaggio et al., 2018, p. 109)

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[4] Collins (2011, 2020a) takes Ling's findings to suggests that *all* TMIRs are more suited to maintaining rather than creating solidarity. However, the validity of this argument is questionable in light of repeated findings on how social bonds are created through technology-mediated interaction (cf. Boellstorff, 2015; Steinkuehler & Williams, 2006).

Still, these are hypotheses, and the issue of intensity leaves many questions unresolved. This is therefore an area of inquiry that future studies of TMIR should address more systematically.

3.3. Novelty

Beyond possibility and intensity, studies of TMIR also discuss how technology-mediation offers novel opportunities for IRs and creates distinctively new forms of IRs and communities. These discussions break more radically with existing theorizing on IRs, as they—to various extents—go beyond comparisons with face-to-face IRs and explore TMIRs in their own right.

Several of these findings have already been hinted at above. For instance, the fact that TMIR offers *increased opportunities for engaging in IRs* is shown in the study of Van Haperen and colleagues, which demonstrates that Instagram posts "allow people to engage with the [Black Lives Matter] movement even when they are not embedded in activist environments" (2020, p. 295; see also Schroeder & Ling, 2014, p. 797). Furthermore, the fact that TMIRs offer possibilities for *establishing novel communities*, centered around interests that are difficult to live out with people in one's physical proximity, is shown in Maloney's (2013) study of pro-anorexic communities online. TMIRs are also shown to offer like-minded people distinctively *novel ways of interacting* with each other, as shown in Joden and Strandell's (2021) study of gaming streams on Twitch.[5] These are all ways in which TMIR provide novel opportunities for people to (re) produce solidarity, morality, group symbols, and emotional energy.

Beyond these abovementioned findings, several studies also argue that technological developments have created complex entanglements of copresent and mediated IRs, thus troubling the boundary between the two (DiMaggio et al., 2018; Knorr Cetina, 2009; Ling, 2008). According to this line of reasoning, computers, mobile internet and telephony, social media, and other communication technologies now permeate almost all aspects of contemporary social life, making it hard to sustain a view of 'pure' face-to-face interaction. Knorr Cetina offers the most provocative statement on this, arguing that "the face-to-face domain […] simply no longer has the structural importance it once had" (2009, p. 63). In its place, Knorr Cetina (2009) offers the concept of 'synthetic situations' to capture a novel form of copresence in which the physical 'here-and-now' is augmented by screen-based projections from remote locations. In her view, such synthetic situations are becoming increasingly prevalent, representing a key focus for interactionist studies. A similar point is made by Boyns and Loprieno (2013), who link such arguments about entanglement to Collins' notion of IR chains, arguing that a key task for future studies is to trace people's complex movements *between* copresent and technology-mediated IRs.

Finally, whereas the abovementioned studies explore whether and how IRs take place *through* technology, a small subsample of theoretical contributions discuss whether people can engage in IRs *with* technology (Campos-Castillo & Hitlin, 2013; Henry, 2020; Scheve, 2014). These authors thus question another key premise of IR theory, namely that IRs occur exclusively between human interactants.[6] A key contribution is Von Scheve' (2014) article on the ritual potential of machine-based interaction. His point of departure is research in psychology and human-computer interaction, which shows that people tend to attribute 'mindlike' qualities to certain artifacts (cf. Reeves & Nass, 2003; Turkle, 2017). Von Scheve is particularly interested in *artificial companions*, a type of social robot that is purposively designed to form emotional bonds with its users. He hypothesizes that such companions can produce strong ritual outcomes in their users, and stresses that exploration of this possibility will be a crucial way forward for IR theory and social theory more generally.

Another, more 'indirect' contribution to discussions of IRs and non-humans is made by Campos-Castillo and Hitlin (2013), who argue for redefining the key concept of copresence from 'the physical proximity of others' to 'the *perception* of mutual entrainment'. In other words, they advocate for understanding copresence in *subjective* terms (from the perspective of a perceiving individual), rather than in socio-physical terms (with emphasis on human bodies in physical proximity to each other). Conceived as such, copresence has two key building blocks: (1) A's *actual* entrainment with B and (2) A's *belief* that B is mutually entrained with him-/herself (Campos-Castillo & Hitlin, 2013, p. 169). Crucially, this model allows for copresence to take place in interactions with non-human interactants, be it mediated communication with computer programs (cf. Reeves & Nass, 2003), imaginary conversations with human or nonhuman entities (cf. Cerulo & Barra, 2008; Sharp, 2010) or parasocial interactions with media personalities (cf. Giles, 2002).[7] Campos-Castillo and Hitlin thus heighten the importance of *perceived* copresence and treat bodily copresence as one among several variables that contribute to this perception. By resonating with several of the above findings, this subjectivist model of copresence might seem viable for future studies of IRs. At the same time, however, we might question whether such subjectivist models underestimate the informational and emotional richness of face-to-face interaction: According to Collins' neuro-physiological view, such interactions offer more optimal conditions for generating mutual focus and emotional entrainment because "[h]umans are hard-wired in their nervous systems to become easily entrained with the bodily rhythms and emotions of persons they encounter in full-channel

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[5] Note that Joden and Strandell do *not* ask whether IRs on Twitch are equally intense as copresent IRs; instead, they observe that gaming streams are popular and employ IR theory to understand the differences between successful and unsuccessful streams. In other words, their study is framed exclusively around the online context, with TMIRs being compared to *each other* rather than some bodily copresent 'measuring rod'.

[6] This is a common assumption in the social sciences, which have generally been characterized by a 'human-only tradition' (Cerulo, 2009).

[7] There is potential for engagement between the perceptual accounts of copresence and Collins' writings on thinking as an 'internal ritual' that can produce ritual outcomes in lieu of direct interaction with actual people (Collins, 1998, 2004).

communication" (Collins, 2011).[8] Reconciliation of these viewpoints thus remains a challenge for studies of IR to address.[9]

4. Advancing the field

As the previous section shows, studies of TMIR have made several advances in our understanding of IRs and technology. Most crucially, they demonstrate that IR theory is applicable to interactions without bodily copresence, and that TMIRs offer new opportunities for and create distinctively novel forms of IRs and communities.

Despite these advances, however, the literature on TMIR is limited by an under-theorized understanding of user-technology relationships; as a result, we are seeing imprecise or over-generalized claims about the ritual potential of TMIR, and exaggerations of the difference between bodily copresent and technology-mediated interaction. To elaborate on this point, this final section situates studies of TMIR against the broader literature on technology-mediated interaction, which spans fields such as media and communication studies, human-computer interaction, digital anthropology, and science and technology studies, and which offers more multi-faceted accounts of the ways in which people interact both through and with technology. Building on insights from these fields, the following subsections sketch four challenges that studies of IR and technology need to address if they are to provide more up-to-date understandings of TMIRs and IRs more generally.

4.1. A broader ecology of technologies

As suggested already, studies of TMIR have made little effort to situate their cases within a broader ecology of technologies, leading to imprecise and over-generalized claims about the ritual potential of TMIRs. Future studies should therefore explore a wider range of technologies, showing greater appreciation of the specificities of the technologies in question (for a useful typology, see Baym, 2015).

Going forward, research is particularly encouraged to examine three clusters of cases. Firstly, as existing research has mainly covered text- or audio-based TMIRs, more research is needed on so-called 'immersive' technologies. One promising case is 'virtual worlds' (Boellstorff et al., 2012), in which users take on avatar forms, embody a graphical world and engage in real-time interactions with other users (e.g., *Second Life, Fortnite, World of Warcraft*). These worlds have repeatedly been found to offer highly immersive experiences (cf. Boellstorff, 2015; Boyns & Loprieno, 2013; Nardi, 2010), often going beyond what is possible to experience 'offline' (e. g., using magic or fighting monsters in *World of Warcraft*), which means that they hold greater promise than previously explored cases for finding evidence of high-intensity TMIRs.[10] Another promising case is the emergence of 3D virtual reality worlds (also known as 'social VR'), which give the impression of being embodied in a three-dimensional space. As commentators describe immersion in VR as perhaps "the most intense media experience we can have" (Evans, 2019, p. 5), VR worlds can offer a particularly illuminating case for exploring the ritual potential of TMIRs.[11]

Secondly, more research is needed on machine-based interactants. As reviewed above, non-human IRs have only been suggested as a theoretical possibility, with no research empirically exploring the ritual potential of this type of interaction. A strategic case might be so-called artificial intelligence (AI) companions, which have recently become commercially available. In contrast to the artificial companions highlighted by Von Scheve (2014), AI companions use machine-learning to 'learn' from and adapt their responses to the user's input (Biundo et al., 2016), which means that they can become increasingly competent interactants. Emerging findings show that these 'emotional chatting machines' can generate significant "positive energy" in their users (Skjuve et al., 2021, p. 11), thus suggesting that this can be a particularly relevant case for investigating the ritual potential of non-human interactants.

Lastly, studies of TMIR should also not forget 'old' and unidirectional broadcast media. While these were key cases in Collins' (2004) discussion of IRs and technology-mediation, broadcast media have received almost no mention in subsequent studies of TMIR (but see Döveling, 2009). This is unfortunate, especially considering the rich tradition of studying 'media events' (Katz & Dayan, 1985) and 'media rituals' (Couldry, 2005) outside of sociology. These studies adopt a broader historical perspective and argue that broadcast media such as television are "the source of much of the symbolic imagery and shared values in our culture" (Bell, 2009, p. 245), serving as modern equivalents to the large-scale Durkheimian ceremonies which have been documented in anthropological and historical sources. Future studies should therefore engage with such established work, as well as newer technological developments, to ensure a more comprehensive view of the technologies involved in TMIR.

4.2. Heterogeneous users, uses, and circumstances

Besides a multiplicity of technologies, future studies should also recognize a multitude of user-technology relationships. Hitherto,

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[8] An in-depth discussion of the neurobiological basis of IRs is offered by Heinskou and Liebst, who criticize the "tendency to black box, or at times belittle, the physiological mechanisms shaping embodied aspects of face-to-face encounters" (2016, p. 19). Similar ideas are discussed in the novel field of neuro-sociology (cf. Kalkhoff et al., 2016, pp. 248–251).

[9] See also Zhao's (2003) distinction between *mode of copresence* (the spatiotemporal conditions in which human interactions take place) and *sense of copresence* (the subjective experience of being with another).

[10] While a few TMIR studies focus on virtual worlds, these generally pay limited attention to the mechanisms and outputs of the TMIRs in question (cf. Simpson et al., 2018).

[11] Another interesting case is augmented reality. This involves real-time integration of digital information in the user's environment and is speculated to potentially *enrich* face-to-face encounters (Villani et al., 2012).

studies of TMIR have shown limited interest in how technology use and preferences can vary between people and circumstances. Instead, most studies practice a form of latent technological determinism by assuming that technologies "affect *all* people in *all* situations the same way" (boyd, 2014, p. 15). To avoid such deterministic analyses, students of TMIR should look to more relational theories of user-technology relationships. By highlighting how the same technology can have different effects for different users across different circumstances, such theories can enable more fine-grained understandings of the ritual potential of TMIR.

A key relational resource is newer forms of affordance theory. Affordances are the possibilities for action that a technology or artifact offers a living being (Kammer, 2020, p. 337). While often assumed to be intrinsic features of technology, recent theorizing stress more relational and conditional understandings of affordances (cf. Davis, 2020; Nagy & Neff, 2015). A central example is Davis' (2020) 'mechanisms and conditions framework', which encourages researchers to substitute the deterministic question of 'what do objects afford?' with the relational and conditional question of '*how* do objects afford, *for whom,* and *under what circumstances*?' This allows the analyst to capture more nuanced relationships between technologies and their effects on humans, focusing both on the features of technology (e.g., whether it offers synchronous communication) *and* on the capabilities, interests, and circumstances of the people using it (e.g., whether they master and prefer synchronous communication).

Building on such relational theories, students of TMIR should explore *a broader range* of user-technology relationships. A promising path forward would, for instance, be to study TMIRs involving people who struggle with face-to-face interaction because of disabilities such as social anxiety, autism, or chronic fatigue syndrome. The relationship between IRs and such disabilities has received almost no mention in existing scholarship on IRs, which is a striking omission in light of the theory's focus on embodiment. Indeed, IR theory (and most studies guided by it) assumes non-disabled and neurotypical individuals engaging with technology; a common assumption across interactionist theorizing, which, by privileging 'full-channel communication', typically presupposes that interactants are *willing* and *able* to utilize all communicative channels (Ellis & Kent, 2011). In the broader field of media and communication studies, however, the issue of disability and technology-use has received greater attention, with several studies finding that technology-mediated interactions can be important sources of sociability for people with disabilities. For instance, Boellstorff (2015) shows how text-based interaction in the virtual world *Second Life* is valued by many users with autism and similar disabilities for allowing them "to be competent social actors to a significantly greater degree than in the actual world" (2015, p. 147).

Other strategic cases might include technology-use by marginalized or isolated people. For instance, Wong (2020) found that 'hidden youth' in Hong Kong and Scotland, who are widely assumed to be socially withdrawn, are in fact highly social online, preferring such interactions both because they offer "more variety, flexibility, convenience, and fluidity than face-to-face interactions" (2020, p. 1237), and because they consider themselves marginalized from face-to-face forms of sociation.[12] Studies might also explore the relationship between TMIR and gender (Ferguson, 2020), ethnicity (Gross, 2022), and transnational relationships (Madianou, 2016). These can all help reveal the heterogeneity of user-technology relationships, thus allowing for more fine-grained assessments of the ritual potential of TMIRs.

In a slightly different vein, this relational turn can also involve a 'return' to issues of stratification, domination, and conflict, which are key to Collins' version of IR theory (see Section 2) but mostly absent from studies of TMIR. Indeed, as extant research focuses predominantly on the extent to which TMIRs succeed in generating solidarity and emotional energy for a group *in toto,* we lack insight into the nature of TMIRs as stratified and stratifying social processes. To redress this, future research is encouraged to explore the relationship between TMIRs and issues such as: *situational stratification* (e.g., whether those hosting Twitch streams gain greater amounts of emotional energy than those 'passively' watching the streams [as per the discussion about large-scale IRs and ritual intensity in Section 3.2]); *online interaction markets* (e.g., how platforms like Twitter or virtual worlds like Second Life are themselves stratified spaces, with limited access to the most rewarding TMIRs); *symbolic influence and manipulation* (e.g., how savvy ritual leaders such as politicians or influencers can use TMIRs to consecrate particular symbols and moral standards in order to advance their own agendas); *emotional domination*[13] (e.g., how some participants can 'feed off' of the emotional energy of others through practices such as online bullying, 'gaslighting', and 'trolling'); *digital exclusion* (e.g., how disabled people are barred from using certain communication technologies or applications and what consequences this has for their solidarity and emotional energy); and *the (re)production of oppositional communities* (e.g., how TMIRs contribute to (re)producing adversarial groups such as 'incels' and the 'alt-right' movement online[14]). In exploring these and similar issues, research can shed important light on the relationship between TMIR and stratification—a key aspect of IR theory that is surprisingly under-studied in TMIR research to date.[15]

4.3. Cultural coding and domestication

The third challenge concerns a largely neglected dimension in IR theory. Following cultural sociology (Alexander et al., 2006), our

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[12] Wong (2020) distinguishes between *push* and *pull* factors of technology-use—a notion that usefully supplements Collins' idea about interaction markets by sensitizing us to how technology-mediated interactions can be attractive not just because of a lack of alternatives (push) but also interactional preferences (pull).

[13] Collins (2017) describes 'emotional domination' as a subtype of IR in which the dominant party 'hogs' all the emotional energy.

[14] A good example of research on TMIR and adversarial groups is Törnberg and Törnberg's (2022) study of radicalization processes on the neo-Nazi Internet forum *Stormfront*.

[15] Given the grand explanatory ambitions of IR theory (cf. Collins, 2004, p. 45), it is striking how limited studies of TMIR have been in their theoretical focus, concentrating mostly on whether and to what extent the model in Figure 1 can be applied to understand technology-mediated interaction.

experiences with TMIR will be colored by shared cultural codes that influence how we interpret and assess the interactive mode in question. Theorizing on TMIR has shown limited appreciation of this fact. As a result, 'failed' IRs are often attributed solely to technological features, rather than being seen as a complex interplay between technologies, users, and the cultural context in which they interact.

Cultural coding ranges from positive to negative, utopian to dystopian. On the one hand, it is not uncommon that technology-mediated relationships

> […] can seem strange—even a little shameful. We do not talk about them much, let alone consider their contribution to and impact on our societies, our communities, and ourselves. The implication is that they are not normal, not authentic, or that they exist on the fringe of the social world—odd, false, and inconsequential. (Chayko, 2012, p. 2)

On the other hand, technology-mediated interaction is often also coded as promising, exciting, or revolutionary (Mosco, 2004), particularly by subcultures that are highly fascinated by technology. When used by such 'enthusiasts', technologies are more likely to be approached with curiosity and given the benefit of the doubt whenever technical issues arise (cf. Skjuve et al., 2021), thus increasing the likelihood of positive ritual outcomes. Given such variations, the issue of cultural coding requires empirical investigation on a case-by-case basis, by use of culture-sensitive theories and methods (cf. Alexander et al., 2006)

Cultural codes can also change. Online dating has gone from being a matter of concern to a matter of course (Hine, 2015, pp. 8–9), and teenagers of today are more open towards interactions with robots than are older generations (cf. Turkle, 2017). The potential for such changes is often overlooked in studies of new technologies, thus exacerbating the tendency to attribute 'failed' TMIRs to 'inherent' limitations of technology (cf. Aagaard, 2022). To avoid this 'presentist' fallacy, studies of IRs and technology can benefit from engagement with processual perspectives such as domestication theory, which centers on how users appropriate and 'tame' technologies on both micro (Berker et al., 2006) and macro levels (Smits, 2006). Domestication theory understands such taming as a three-partite process, consisting of *cognitive work* (where users learn about the technology's uses and features), *practical work* (where users figure out how the artifact can be embedded in their daily routines), and *symbolic work* (where users interpret the artifact and work to align its inscribed meanings with their own symbolic universe) (Sørensen et al., 2000). In terms of TMIR, these processes intersect crucially with the ritual potential of technology-mediated interaction: In short, cognitive and practical work is key for users to tailor conventions and practices to the medium at hand, and symbolic work is essential for users to negotiate the issues of uncertainty, oddity, or stigma that often accompany interactions with novel technologies. While domestication processes succeed to various extents (cf. Lüchau & Grønning, 2021), the basic idea of domestication is crucial for understanding how technologies that are initially perceived as 'clunky', 'weird' or 'lacking' can come to be seen as 'functional', 'natural' and 'valuable' after some time of tinkering.[16] Thus, by attending to cultural coding and domestication, researchers can gain important insight into key ritual 'ingredients' that are currently overlooked in the IR model.

4.4. The technologies of face-to-face interaction

Finally, a more radical note. By accepting Collins' distinction between bodily copresent and technology-mediated interaction, and by marking the latter as a separate phenomenon (with its own acronym, TMIR), this article risks perpetuating a problematic view of human-technology relationships.

In general, IR theory takes 'technology-mediated' to mean interactions involving *communication* technologies—a notion that is largely continued in studies of TMIR (although some also include *companion* technologies, i.e., those artifacts we interact *with*). What this overlooks, however, is how *all* forms of interaction can be said to be 'technology-mediated' in the sense of being intertwined with mundane devices, artifacts, and objects. Whenever we neglect this, we tend to assume an unfounded chasm between technology-mediated and bodily copresent interactions, with the latter being seen as a form of primordial, unmediated togetherness.[17] Such a view has been problematized by a range of theoretical traditions, such as actor-network theory (Latour, 2005), digital anthropology (Geismar & Knox, 2021), and post-phenomenology (Rosenberger & Verbeek, 2017), which all insist that face-to-face encounters are overflowing with objects and technologies—all of which make their presence felt by allowing, encouraging, blocking, forbidding, or otherwise shaping the interaction in question (Latour, 2005, p. 72). Hints of this are actually given in several studies of IR, such as when they highlight the role of drugs for effervescence at rave parties (Vandenberg et al., 2021), the importance of stadium design for

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[16] A simple example of domestication is how some musicians discovered new affordances of digital concerts during the Covid-19 pandemic, such as the potential to create intimacy with the audience by holding smaller concerts from one's living room—an experience "that cannot be produced on a stage" (Hylland, 2022, p. 8), as one organizer described it. This example also ties back in with the discussion of the novelty of TMIRs (see section 3.2) and shows how successful TMIRs often depend on avoiding what is sometimes referred to as 'the trap of replicating reality' (i.e., trying to make an online equivalent of an offline phenomenon instead of taking advantage of the distinct affordances of the medium in question; see The Journal WSJ, 2022)

[17] In addition to the mediated aspects of face-to-face interaction, media scholars have highlighted the embodied nature of technology-mediated interaction. As Hine (2015, p. 41) explains, people "do not necessarily think of 'going online' as a discrete form of experience, but […] instead often experience being online as an extension of other embodied ways of being and acting in the world".

the atmosphere at football matches (Hill et al., 2021), or the use of cameras to project images of audience members on large screens in megachurches (Wellman Jr. et al., 2014). These are all ways in which bodily copresent rituals are permeated by easily-overlooked technologies, all of which contribute to the production of ritual outcomes in mundane and often taken-for-granted ways.[18] When combined with the abovementioned arguments about the intertwinement of face-to-face interaction and *communication* technologies, the pressure to recognize this material dimension of IRs grows even bigger. Indeed, this has long been argued by critics of inter-actionism, who contend that technology-mediation should be seen as "an all-pervasive element of every interaction" (Klowait, 2019, p. 617) rather than a 'special case' to be treated separately.

To grasp this material dimension of IRs and avoid a naïve, primordial distinction between face-to-face and technology-mediated interaction, IR theory could benefit from closer engagement with sociomaterial perspectives (cf. Latour, 2005). IRs would then be conceptualized as comprising not the universalistic ingredients of Collins' model but rather heterogeneous arrangements of socio-material elements. 'Sociomaterial elements' here means everything that impacts on the interaction in question, including the social characteristics of the participants, the place in which they meet, the size and composition of their gathering, the norms and 'feeling rules' (Hochschild, 1983) that govern their conduct, the symbols they use to communicate, their previous history of interacting, the use of music, alcohol, drugs or other 'ritual amplifiers', and, indeed, the particular medium or technology through or with which they interact—the presence of which must be determined empirically on a case-by-case basis. Thus, in contrast to IR theory's highly abstract model of ritual inputs and mechanisms, modeled on an idealized view of face-to-face interaction, a sociomaterial approach would facilitate a more open-ended and empirically sensitive study of the many ways in which sociomaterial elements combine and interact to produce an array of IRs (paraphrasing Collins, 1988, p. 199, we might refer to these elements as *the sociomaterial means of emotional production*).

Compared to the previous points, this fourth suggestion undoubtedly represents a more radical way forward for IR theory. The theoretical differences between 'classic' interactionism and sociomaterial perspectives are significant, and there is no straightforward way of reconciling the two (cf. Klowait, 2019)—as evidenced, for instance, in the tension between the nomothetic or generalizing ambitions of IR theory and the more ideographic or particularistic orientation of sociomaterial theory.[19] Still, there can be significant

Table 1
Key challenges for advancing research on IRs and technology.

Challenge	Problem	Solution	Questions
A broader ecology of technologies	TMIR studies have explored a limited set of cases and made little effort to situate these against the broader ecology of technologies; this leads to imprecise and over-generalized claims about the ritual potential of TMIRs	Examining a more comprehensive set of cases (e.g., 'immersive' technologies, machine-based interactants, and broadcast media)	How do technologies differ in their ritual inputs, outputs, and mechanisms? What are the key variables for distinguishing between the ritual potential of technologies (e.g., synchronicity, informational richness)?
Heterogeneous users, uses, and circumstances	TMIR studies assume that technologies affect all people in all situations the same way; this overlooks how the ritual outcomes of TMIR can vary significantly between groups, use cases, and circumstances	Adopting relational theories of human-technology relationships that can help researchers appreciate how the same technology can have different effects for different users across different circumstances	How does the ritual potential of technology-mediated interactions vary with different users, uses and circumstances? What role(s) do technologies play for people who struggle with face-to-face interactions?
Cultural coding and domestication	TMIR studies overlook how experiences with technology-mediated interaction are colored by cultural codes and domestication processes; the 'failure' of a TMIR is then reduced to some inherent problem with the technology in question	Adopting culture-sensitive theories and methods that can sensitize researchers to issues of cultural coding and change	How do participants interpret the technologies through or with which they interact? Do their interpretations change over time? What cultural codes shape these interpretations? How do perceptions of ritual failure and success vary with different cultural codes?
The technologies of face-to-face interaction	TMIR studies pay little attention to how all forms of interaction are 'technology-mediated' in the sense of being intertwined with mundane devices, artifacts and objects; the field is thus built on a problematic distinction between bodily copresent and technology-mediated interaction	Adopting sociomaterial perspectives that can help researchers see all IRs as comprised of heterogeneous arrangements of sociomaterial elements	How do sociomaterial elements combine and interact to produce the IRs under study? What do the findings of such studies reveal about the relationship(s) between technology-mediated and face-to-face interaction? How can we reconcile the meta-theoretical tensions between IR theory and sociomaterial perspectives?

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[18] Collins is not blind to such mundane examples of technology-mediation; at one point he even refers to alcohol and drugs as 'technologies of ritual production' (2004, p. 150). It is fair to say, however, that these mundane technologies have received insufficient attention both in IR theory and interactionist theorizing more generally.

[19] In contrast to Collins' (2004) grand explanatory theory of IR, sociomaterial theorizing would stress the complexity and unpredictability of IRs as sociomaterial 'assemblages'. For illustration, consider Orlikowski and Scott's (2008) argument that studies into the effects of technologies tend to produce "disparate, fragmentary, and apparently conflicting results" (2008, p. 441) because what appears to be distinct technologies are actually 'constitutively entangled' with a broader arrangement of sociomaterial elements, all of which interact in complex ways to produce emergent outcomes.

gains in bridging the two perspectives, perhaps most crucially because a sociomaterial turn can help rework IR theory from the ground up and allow for a more refined understanding of 'technology-mediation' and its relationship to face-to-face interaction. Further engagement between IR theory and sociomaterial perspectives therefore stands out as a key challenge for future research to address.

5. Conclusion

This article has sought to advance research on IRs and technology by taking stock of existing research and proposing a course for future inquiry. Its starting point has been IR theory, a micro-sociological approach that sees IRs—focused interactions in which you are emotionally in sync with the other participants—as a key micro-sociological mechanism for generating both the 'glue' that holds social groups together and the 'energy' to initiate social change and dominate others.

As IR theory sees IRs as requiring 'bodily copresence'—the assembly of people in the same physical place—there has been significant doubt over the ritual potential of technology-mediated interaction. In recent years, however, this view has been problematized through a series of investigations of TMIR. These studies have advanced our knowledge on the three key issues of the *possibility, intensity*, and *novelty* of TMIRs: firstly, by showing that it is *possible* for TMIRs to produce the ritual outcomes of solidarity, morality, group symbols and emotional energy; secondly, by nuancing our understanding of the ritual *intensity* of TMIR (although this remains a contentious issue), and thirdly, by demonstrating how technology-mediation offers *novel* opportunities for IRs and creates distinctively new forms of IRs and communities.

Together, these studies suggest that IR theory suffers from what we may call *copresentism*: a tendency to take face-to-face meetings as the benchmark of all interaction, against which all other forms are measured and deemed lacking. By insisting on bodily copresence as the 'gold standard', IR theory one-sidedly emphasizes the limitations of technology-mediated interactions—thus overlooking their distinct qualities and affordances. As a result, technology can arguably be considered a 'residual category' in Collins' version of IR theory: a 'theoretical afterthought' that is outside the theory's explicit and systematic line of argument (Alexander, 1987, pp. 15–16).

While studies of TMIR have helped shed light on this theoretical bias, this novel line of research is also limited by an under-theorized understanding of user-technology relationships. To redress this, the article has proposed that future studies should consider: *a broader ecology of technologies* (to avoid making over-generalized claims about the ritual potential of TMIRs); *heterogeneous users, uses, and circumstances* (to recognize a multiplicity of user-technology relationships and understand how the same technology can have different effects for different users across different circumstances); *cultural coding and domestication* (to appreciate how our experiences with TMIR will be colored by shared cultural codes and domestication processes), and *the technologies of face-to-face interaction* (to avoid perpetuating an unfounded chasm between technology-mediated and bodily copresent interactions). While not forming a coherent research program, these are all productive 'problematizations' (Alvesson & Kärreman, 2011) that can help us reappraise the relationship between IRs and technology, an exercise that, in turn, can help improve our understanding of both TMIR and IR more generally—to the benefit of researchers, technologists, policymakers, and everyone else with stakes in technology-mediated interactions.

Declaration of Competing Interest

None.

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