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Master's thesis

The differences between online and offline communication

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Abstract

This study set out to develop and test a new procedure and methodology for uncovering the differences in style of expression between face-to-face and computer-mediated communication media that might help explain the seemingly higher conflict proneness of online interactions. 36 groups of three Dutch student participants discussed, in a repeated measures format, controversial statements via chat, video-chat and face-to-face. After each communication medium condition, participants filled out a questionnaire measuring their interactional experiences. Results show that, as compared to FtF interactions, discussing in CMC led participants to experience less flow, understanding, solidarity, and more polarization. To explore the mechanisms underlying these findings, we exploratively coded the content of the interactions. We found that online communicators stated their opinions more forceful, made less fun, engaged less in searching for common understanding, and were somewhat more disagreeing than offline. These results point to the importance of conversational form in steering interactional outcomes. We conclude that it is possible to meaningfully manipulate, measure, and compare CMC with FtF interactions.

Keywords: small group discussion, social media, conflict, flaming, subtle dynamic social cues, conversational form, computer-mediated communication, face-to-face communication

Introduction

Inviting your friends over for a drink via WhatsApp, reacting on the picture of your niece's horse via Instagram, commenting on a television broadcast figuring a politician you loathe via Twitter, sharing experiences on a forum for people who, like you, love cats, expressing your condolences to the family of your diseased colleague via Facebook, flirting with potential partners via Tinder, or updating your blog with a complaint about your delayed train. These are just a few examples of the myriad ways in which you might interact with other people via social media on a daily basis.

Across the broad range of social interactions that ordinary people have, online conversations are by no means consistently pleasant. At the surface, computer-mediated communication (CMC) interactions seem to be prone to conflict. What may begin as a small difference of opinion or misunderstanding can quickly escalate into a major issue online. Whether the topic concerns "Zwarte Piet", US presidential elections or women's rights, exchanges on social media are often unpleasant: the tone is coarse, positions are polarized and extreme. More generally, research has shown that social media users frequently post aggressive or insulting comments (Hutchens, Cicchirillo, & Hmielowski, 2015; Papacharissi, 2004; Upadhyay, 2010). Traditional measures to curb undesirable online behavior rely on top-down regulation (e.g., mediation, blocking), but this is costly, difficult, and easily violates freedom of expression. This makes it far more desirable to promote social regulation *within* online communities: online social self-regulation. It appears that the social self-regulation that controls our everyday offline interactions breaks down online. A better understanding of why this happens could provide input as to how online social regulation can be improved.

New insights in the kinds of conversational processes that help regulate social interactions in offline face-to-face (FtF) conversations suggest that the flow (i.e, the extent to which a conversation is experienced as smooth, efficient, and mutually engaging) plays a

central role (Koudenburg, Postmes, & Gordijn, 2013; 2017). The purpose of the present research is to examine how "normal" social interactions between strangers take place, both offline and online. Are there differences in the style of expression across media that are consistent with the assumption that online interactions are more prone to conflict? And can we develop a way to study the flow of these conversations in a meaningful way, given that those media differ from each other in so many different ways? Exploring this is the overarching purpose of this study.

Relevance

Within a digitizing society, online aggressiveness can have far-reaching consequences for social relationships and norms, not only online but also offline. Social tensions between certain (opinion) groups can arise or exacerbate online and people can suffer psychologically from online interactions. In fact, research has indicated that cyberbullying is more pervasive and has longer lasting consequences than face-to-face bullying (Park, Na, & Kim, 2014). Further, there is a potential for online to offline carry-over of conflictual behavior that fosters polarization and extremism. In a poll among American teens that use social media, 26% of them reported having fought with a friend offline over something that occurred online (Lenhart, Anderson, & Smith, 2015). Other recent research found that exposure to online prejudice not only stimulated people to post more prejudiced comments themselves, but also negatively influenced their attitudes about the target group (Hsueh, Yogeeswaran, & Malinen, 2015). Relatedly, exposure to uncivil blog comments led people to take more polarized positions on the discussed issues themselves (Anderson, Brossard, Scheufele, Xenos, & Ladwig, 2014).

As our online world increasingly merges with our offline lives, it becomes clear that it is of pivotal importance to gain insight into the micro-dynamics of CMC that might play a role in polarization and conflict generation. That is exactly what this study aims for. In order

to better understand the processes behind the breakdown in online regulation of social behavior, the differences between CMC and FtF conversations will be explored. Specifically, we will examine the role that the relative lack of subtle dynamic social cues in text-only online environments plays in increasing conflict and polarization.

Prior Research

Starting 30 years ago, a substantial literature has emerged on hostile and aggressive interactions via text-based CMC, which has mainly focused on the hypothesis that computer-mediated channels are more prone to such "flaming" than others (Cummings, Butler, & Kraut, 2002; Burgoon et al., 2002; Kiesler, Siegel, and McGuire, 1984; Nardi & Whittaker, 2002; O'Sullivan & Flanagin, 2003; Sproull and Kiesler, 1991). The general reasoning is that the absence of aural and visual cues in CMC leads to a decrease in social constraint and an attendant *reduced impact of social norms* (O'Sullivan & Flanagin, 2003). In other words, anonymity, due to an absence of normative influence, is causing online disinhibition: reduced suppression of underlying fantasies, needs, and affect in an online environment (Suler, 2004).

Evidence for this is inconsistent however. Contrary to the online disinhibition literature's assumption, research found that social norms develop relatively rapidly and straightforwardly in online settings. It has even been shown that, in intra-group settings, online anonymity *strengthens* adherence to social norms as a result of processes of depersonalization and attendant stronger group identification (Postmes & Spears, 1998; Postmes, Spears, Sakhel, & de Groot, 2001; Tanis & Postmes, 2007). It appears that neither anonymity nor media characteristics inhibit the formation of positive social norms or relationships (Postmes, Spears, & Lea., 1998; Walther, 1996). Moreover, flaming is often considered normative in the contexts in which it occurs (e.g., particular web forums known for hard talk) and in these environments is a consequence of relational disputes such as a disagreement or perceived offense (Hutchens et al., 2015; Hwang, Lee, Kim, Zo, & Ciganek,

2016; Lea, O'Shea, Fung, & Spears, 1992; Moor, Heuvelman, & Verleur, 2010; Postmes, Spears, & Lea, 2000).

In sum, the literature on polarized CMC interactions provides no consistent evidence that anonymity causes aggressiveness, although it is possible that medium characteristics such as anonymity play a role in the casual processes. When it occurs, flaming often results from processes of escalation in dynamic social interactions. In particular, flaming occurs when (a) there is an inability to resolve disputes, and (b) social norms develop that condone hostile and aggressive interactions. This stands in sharp contrast with earlier scholars assuming an online breakdown of social norm adherence: social norms are not at all absent but seem prone to take an undesirable form online (i.e., stimulating aggressiveness and hostility). However, and rather surprisingly, no research to date has tackled the question that logically follows from these discoveries: *Why* do these flaming norms develop online?

Underlying Processes

Social norm formation. As mentioned above, prior research points to the ease with which social norms emerge in online interactions (Postmes et al., 1998). In all forms of interaction individuals are guided by communicative norms that help them to construct and interpret messages. Indeed, research found that both content and form of online communication is informed by norms (Postmes et al., 2000). These norms play a key part in the social (self-)regulation of online behavior (Postmes et al., 1998; Wood & Smith, 2014). For groups that have no ground in a shared preexisting identity (such as gender or race), the properties of the group and the accepted behavior within it need to be inferred from one’s own and especially others’ behavior (Postmes et al., 2000). This means that group members deduce norms and conventions for the intra-group interaction from the consistencies they discern as that interaction unfolds. That is, besides static social cues (that are implied in the larger culture) there are dynamic social cues that constantly (re)shape norms over the course

of the interaction by the feedback that communicators provide each other with. Online, users rely disproportionally on message content to infer social norms (beliefs about how they and others ought to behave) and display rules (norms about how to express feelings or emotions). This contributes to the formation of online (sub)cultures (Wood & Smith, 2014).

Thus, in an attempt to match their own behavior to the norms of accepted conduct present, members of newly formed online groups look at the only cue to accepted behavior that *is* present: language. It is this process we want to study, because a recent discovery suggests that in everyday FtF conversations norms form in more subtle ways than previously understood.

Subtle regulatory cues. Recent research sheds a new light on how social regulation takes place in everyday real-life social interactions. This research has found that people use very few overt (i.e., explicit) signals of disapproval when they perceive norms are violated (Koudenburg et al., 2013; 2017). Instead, a brief interruption of the flow of the conversation appears to be a frequently used and effective means to socially regulate. Specifically, when disapproval is conveyed, this is often done through brief silences, nods and/or frowns: subtle dynamic social cues (Koudenburg et al., 2017). This corresponds with classic studies showing that people who ostentatiously jump a queue are rarely sanctioned: the most frequent response to blatant violations of social norms is that violators are ignored (Mann, 1969; Milgram, Liberty, Toledo, & Wackenhut, 1986). It appears that recipients are highly sensitive to even a brief disruption of the flow of a conversation, which signals to them that there is a problem at the social level: solidarity and/or consensus are in peril (Koudenburg et al., 2013). In an effort to solve this problem so as to secure their social acceptance and inclusion, they become strongly motivated to attune to social information (Baumeister & Leary, 1995; Gardner, Pickett, & Brewer, 2000; Pickett, Gardner, & Knowles, 2004) and to conform to the social norms they observe (Cialdini & Goldstein, 2004; Koudenburg et al., 2013; Turner, 1991;

Williams, Cheung, & Choi, 2000). This process is very important as it enables people to signal their disapproval and nudging their conversational partners towards more socially acceptable (normative) behavior without having to engage in overt conflict and collaterally damaging their social relationships (Koudenburg, Postmes, & Gordijn, 2011; 2013; 2017). Thus, subtle signals that provoke disruptions in the conversational flow appear to be of utmost importance in regulating social norms in everyday FtF conversations. Conversely, when conversations between previously unacquainted people take a smooth and coordinated form (flow), this is accompanied by increased feelings of belongingness, mutual understanding, and harmony (Koudenburg et al., 2011; 2013; 2017). This line of research forms an important departure from the existing literature, which tends to focus on conversational content (*what* is being said verbally and nonverbally), by bringing form (*how* things are being said) center stage and showing how micro-characteristics of conversations influence more macro-level processes.

These recent discoveries raise questions about the regulation of social norms online, where the use of body- or paralanguage is futile and where flow disruptions are almost unavoidable because media are a-synchronous (e.g., email) or semi-synchronous (e.g., chat). That is, online users who want to signal disapproval cannot use the subtle dynamic social cues that they rely on most in offline interactions to regulate within-group behavior. Online users are more or less forced to become consciously aware of the myriad of signals that they emit and receive unconsciously in offline interactions but are missing in this relatively impoverished environment. In their search for disambiguation, they may rely more heavily on written language. The introduction of the emoji seems to give only partial solace as researchers find that their interpretation is far from set in stone (Miller et al., 2016). We suggest that they compensate by being more explicit in communicating their opinion and by using overt expressions of disapproval.

This explicit language might however easily be misinterpreted by message receivers as signals of extremity and/or disrespect. Indeed, research found that the accuracy of message interpretation decreases as media becomes less rich (e.g., from video via audio to text), while people's interpretational confidence remains stable (Hornung, 2015). Accordingly, the explicit messages may heighten the chance of hostile responses and inadvertently foster polarization between sender and receiver. Having numerous exposures to extreme behaviors without observing the subtle corrections that this behavior normally elicits, participants and bystanders may naturally infer that extremity and conflict is "normal", fostering the development of corresponding social norms and display rules that promote further polarization and hostile exchanges. Indeed, previous research found that the more extreme the expressions of the group members are, the more polarized the prototype of the average member of that group becomes, which in turn leads members to conform to this prototype by showing more polarized behavior (McGarty, Turner, Hogg, David, & Wetherell, 1992). The influence of these new norms will arguably be especially pronounced due to the proneness of online media to frequent flow disruptions, attendant feelings of social threat and increased sensitivity to social norms. Flaming is the result.

Hypotheses

This process can be translated in the following four hypotheses:

1. Compared with FtF conversation, the a- or semi-synchronous nature of CMC makes flow disruptions and attendant threats to belongingness and mutual understanding more frequent.
2. Compared with FtF conversation, online senders compensate for the inability to express nuanced opinions by adopting explicit positions on issues that matter to them.
3. Compared with FtF conversation, online responders have difficulty conveying disapproval in subtle ways and therefore rely more on explicit disapprovals.

4. The explicit language use signals polarization and conflict which fosters the emergence of flaming norms that encourage conflictual behavior in online users.

Study Overview

In order to open up the comparative study of CMC and FtF group communication processes, gain insight into the development of online polarization and conflict, and provisionally test our hypotheses, we decided to research everyday conversations about potentially controversial topics. To manipulate the hypothesized main source of the difference between online and offline interactions (i.e., the lack of subtle dynamic social cues online), we let participants communicate via chat, video-chat and face-to-face. The video-chat condition was introduced to control for the potential influence of anonymity and as an explorative condition in which some characteristics of both the face-to-face and chat interaction are present. As we wanted to create a natural situation, we first ran a pilot study on a group of students to select fitting topics, and in the main study let (another group of) unacquainted Dutch student in sets of three consecutively use all three media to share and discuss their opinions on the selected topics. After each communication medium condition, participants filled out the same short questionnaire about their interactional experiences. Additionally, an explorative content coding of the transcripts of all conversations was conducted. This mixed methods approach gives us a subjective (self-perception) as well as a more objective (behavioral) assessment of differences between the communication media.

The results of this study will provide us with insight into the efficacy of our new procedures and methodology. Moreover, the findings can promote our understanding of the mechanisms behind online hostility and polarization, which will steer future inquiry in a constructive direction and in the end provide well-founded suggestions for effective interventions to improve online interaction climates.

Method

Pilot Study

As stimulus material we aimed to select statements that had a high potential for instigating animated conversation and disagreement among the student participants. To this end, a pilot study was conducted, which started with the preselection of statements from the repository of the website http://www.nporadio1.nl/standpunt. This website is connected to the Dutch radio show "Standpunt.nl" that presents listeners every day with a topical controversial statement and asks them to indicate via phone or website whether they agree or disagree with it ("standpunt" roughly translates to "opinion"). As input material for the pilot study, we selected 70 statements that elicited a lot of online dissent and we deemed relevant to students. Subsequently, we presented these statements in an online questionnaire format to a sample of 21 students who rated each statement regarding the degree to which they (dis)agreed with it and the degree to which they were convinced that they would be able to speak about it with other students for 5 minutes. As stimulus material for the main study, we selected the nine statements on which the pilot sample was most divided and which had, according to them, the highest potential for instigating a conversation of at least 5 minutes (see Table A[1]1).

Research Design

This study can be classified as a semi-controlled experiment with a multilevel within-subject repeated measures design. The study comprised three experimental conditions representing different communication media: face-to-face (FtF), chat, and video-chat. Each group of three participants participated in all three conditions. In each condition, participants were consecutively presented with three controversial statements (each one sentence long). The nine statements selected from the pilot study were divided in three sets of three so that each set of

[1] "A" refers to Appendix.

three was of equivalent character (i.e., first: policy concerning typical Dutch issues, second: policy related to terrorist threats, third: international policy, mostly related to climate; see Table A1).

The allocation of participant groups to combinations of conditions and statement sets was based on Graeco-Latin squares. To represent all possible combinations of all possible orders of conditions and statement sets, four 3 x 3 Graeco-Latin squares were constructed. This resulted in 36 cells of unique combinations of conditions and statement set orders. Each group was allocated to one of these unique cells. This design means that we cannot infer anything about order effects, but also ensures that order effects can be ruled out as explanation for the findings.

Power and Sample Size

A power analysis with the software package G*power (version 3.1.9.2; Faul, Erdfelder, Buchner, & Lang, 2009) suggested that in order to achieve a power of .8 with an effect size of .25, a minimum of 30 groups of three would be required (assuming for the sake of simplicity that group members are perfectly dependent on each other, with group-level intraclass correlations (ICC's) of 1). However, to be able to rule out order effects of the conditions and statement sets (see above), we calculated the need to recruit 36 groups, which comes down to 108 participants. This results in a power of .91 (at p = .05 and effect size of .25) at the group-level (i.e. if group-level ICC's were 1) and .999 at the level of the individual (i.e. if group-level ICC's were 0).

Sampling Procedures

Participants were recruited from the first year psychology student participant pool of the University of Groningen and by means of active recruitment at various open spaces in faculties of the University of Groningen and Hanzehogeschool Groningen. The first student population received partial course credit, while the latter received an 11 euros compensation

for participation. Participants were selected from student populations of different levels and fields of study (e.g., psychology, business administration, technology). This was done to maximize the chances for disagreement between participants in the same group and to minimize the chances they knew each other beforehand. We selected only native Dutch speakers because the group conversations (and questionnaire) were in Dutch. During recruitment, prospective participants were provided with full information about the experimental procedures, we only kept our hypotheses secret until after the experiment.

Participant Characteristics

Participants were 108 native Dutch students (M_{age}=20.69, *SD*= 2.55; 58.3% female). Group composition was such that of the 36 groups, 2 were all-male, 6 all-female, 11 two-male-one-female, and 17 two-female-one-male. All participants indicated that they did not know their group members before the start of the experiment. A majority of 59.3% placed themselves on the left side of the political orientation scale, 20.3% allocated themselves to the right side, and the remaining 20.4% placed themselves in the middle.

To ensure a good quality discussion we aimed at recruiting a diverse sample. In the sample a great diversity of study directions are represented, which can be conveniently grouped together as follows: social sciences (48), language and culture studies (23), economics and business administration studies (13), ICT-related studies (8), law (5), politics (5), medical or biological sciences (4). Two (recently graduated) non-students participated. As to the educational level, the sample consisted of 1 senior (mbo) student, 20 higher vocational (hbo) students, and 85 University students.

Procedure and Apparatus

Data were collected in the spring of 2017. Participants were invited into the lab in groups of three and were individually seated in cubicles behind a computer, where the

experimental leader provided each of them separately with a short introduction to Google Hangouts' chat and video-chat functions. Before the experiment started, most participants had never used Google Hangouts (77.8%); a few were a bit experienced (15.7%) or experienced (5.6%) with this software. In the chat condition, participants were instructed to open the Google Hangouts chat screen. In the video-chat condition, participants were instructed to open the screen with the Google Hangouts video-chat and activate their webcam by clicking on the camera icon. The sound was deactivated to prevent participants from verbal talking instead of chatting with each other alongside the real-time video connection. The experimental leader explicitly told participants that emoji could be used so as to keep chatting as naturally as possible. The discussion statements were presented to participants on their computer screens one at a time. Underneath each statement, one of the three participants in a group read that he or she was designated the role of sender, while the others read that they were appointed the role of responder. This task allocation was done in a way that ensured that each participant was sender once per condition. The participants were represented in the chats by pre-set nicknames: "H.H. Maan", "P.P. Roos", and "M.M. Vis". In the FtF condition, participants were instructed to seat themselves in a circle in an adjacent room and engage in natural verbal conversation (see Figure A1 for the experimental setup). Here the three statements and task divisions were printed on strips of paper and handed over in the form of three numbered envelopes for each individual participant.

In all conditions, the sender was instructed to open the conversation by stating his or her opinion about the provided statement to the other participants. The other two participants (the responders) were asked to wait for someone else to start the conversation and react to this. After approximately 5 minutes, the experimental leader intervened by knocking on doors and asking the participants to proceed to the following statement. After each round of three discussions via one communication medium, participants filled out the same short questionnaire about their

last three conversational experiences. To enable content coding, the text of all chat and video-chat interactions was stored on a computer and all FtF conversations were audio-recorded. At the end of the entire experiment, participants were asked to provide some demographic details. Afterwards all participants read a debriefing statement on their computer screen and were given the chance to ask the experimental leader any remaining questions.

Dependent Measures

Questionnaire. After each set of three discussions, participants filled out a questionnaire in Qualtrics (see Table A2 for the entire questionnaire), measuring six constructs to tap into their perception of the discussion climate and relationships. All items were rating scales ranging from 1 (*Totally disagree*) to 5 (*Totally agree*). Participants were asked to rate the items measuring the first three constructs (shared cognition, belongingness, and identification) as pertaining to each block of three conversations in general. The items measuring the fourth construct (social norms) were described as relating to the feelings experienced during each conversation block. For the remaining items that measured the last two variables (flow and polarization), participants were instructed to mentally go back to and rate each individual conversation in each block of three.

Shared cognition: To measure perceived understanding, we asked participants to rate two items that we adapted from Koudenburg et al. (2013): “I feel that my group members and I understood each other/ were on the same wavelength”.

Belongingness: Four items were used to measure perceived belongingness, e.g., “I felt like an outsider during the conversations”, adapted from the Dutch translation of the belongingness scale from the Need Threat Scale (Van Beest & Williams, 2006) that was provided to us by the first author.

Identification: To assess degree of identification, we included a single-item measure of social identification adopted from Postmes, Haslam, and Jans (2013): “I identify with the other participants”.

Social norms: We designed seven items to measure perceived social norms, because no suitable scale could be found in the literature. These items assessed to what extent participants felt certain behaviors were accepted and considered appropriate in their group (e.g., “In this group, people expect critical statements.”).

Flow: Perceived conversational flow was measured with three items adapted from Koudenburg, et al. (2017): “The conversation about this topic was coordinated and smooth/ difficult/ pleasant”.

Polarization: As we could not retrieve a fitting scale from literature, we constructed two items to measure the degree of perceived polarization. Participants indicated to what extent they perceived their group was in harmony or divided (e.g., “In the conversation group members were divided about this topic”).

Content coding. In addition to analyzing questionnaire scores, and in an effort to uncover part of the mechanisms behind these results, we performed an explorative content coding of the conversation transcripts. By analyzing the conversations of a couple of groups in depth, a provisional coding scheme was devised. This scheme was further shaped in the process of iteratively coding all conversations. This means that the coding was entirely informed by the data and not by theoretical considerations. Due to time constraints we only analyzed the start of each conversation, ranging from the first reaction to the provided statement (either giving an opinion or initiating a joint search for definitions) until the opinion expression of a second person. This is also convenient as one could reasonably assume that the first remarks in a conversation set the (normative) tone for all that follows. In fact, our second and third hypotheses consider the explicitness of the first statement and the immediate

reaction this elicits. Below we provide a short description of the coded variables. A somewhat more elaborate description will follow in the results section as we consider the coding experience a result in itself.

Opening with repeating statement: We counted the instances in which a participant (usually the sender) reiterated (part of) the provided statement as a way to open the conversation without showing their own opinion on the matter.

Opening with announcing sender role: We counted the instances in which the sender opened the conversation by stating that they were commissioned to do so.

Forcefulness/ tentativeness of sender and forcefulness/ tentativeness of responder: We rated the forcefulness versus tentativeness of the first two opinion statements in reaction to the provided statement on a five point scale: 1 (*Very forceful*), 2 (*Somewhat forceful*), 3 (*Quite tentative*), 4 (*Very tentative*), and 5 (*Extremely tentative*). Only participants explicitly mentioning that they had no opinion received a score of 5. Generally, the more and the stronger the qualifiers used ("as far as I know", "maybe", "on the one hand"), the more tentative a statement was considered.

Violations of local coherence: In line with Öhlschlegel and Piontkowski (1997), we counted as violations of local coherence all utterances that did not logically link up to and seemed to ignore the comment directly preceding it.

Violations of neutral coherence: Again inspired by Öhlschlegel and Piontkowski (1997), we counted as violations of neutral coherence all utterances that criticized a previous opinion statement. This thus can be considered an assessment of the overt expressions of disagreement between group members. As our data seemed to require it, we decided to make this a scaled item: 0 (*No disagreement)*, 1 (*Subtle disagreement*), 2 (*Quite explicit disagreement*), and 3 (*Explicit disagreement*).

Asking for explanation: We counted the instances in which one of the responders asked the sender to explain the reasons behind his or her opinion.

Asking for clarification: We counted the number of times one of the responders asked the sender to explain what he or she meant with (part of) an earlier opinion statement.

Small expressions of encouragement: We counted the instances in which during or immediately following an opinion statement by the sender, the responders gave short expressions of encouragement or additional arguments supporting the sender, without clearly showing their own opinion.

Rhetorical questions: We counted the number of times one of the group members asked a question to make a point rather than to elicit an answer. We only counted rhetorical questions related to opinions, not those referring to definition searches.

Having fun: We counted as having fun those instances in which a participant made a well-meant joke, laughed, or posted a smiling emoji (☺).

Searching for definition by sender and searching for definition by responder: Whenever the definition of (elements in) the provided statement was a topic of discussion among at least two participants, we scored definition search as present. This definition search could be initiated either by the sender or by one of the responders.

Results

Questionnaire Responses

We analyzed the data in multilevel models with the lme4 package (version 1.1-9; Bates, Maechler, Bolker, & Walker, 2015). Communication medium (level 1, repeated measures) was nested within individuals (level 2) nested in groups (level 3). Intraclass correlation coefficients confirmed that scores were non-independent (see Table A3). In the multilevel models, communication medium (condition) was included as a fixed effect predictor. The individual and group intercepts were included as random effects.

Preliminary analysis. We performed a multivariate outlier analysis by calculating Mahalanobis distances for all three scores (repeated measures) on all dependent variables at the individual participant level. Three clear outliers were detected by visually inspecting the resulting Mahalanobish distance plot. Re-running the main analysis without these outlying observations did not result in any changes in conclusions. We therefore report the results with all cases included.

The reliability of the scales derived from the literature was good. Averaging across measurement blocks, Cronbach's alpha was .78 for shared cognition, .68 for belongingness, and .78 for flow (for identification no internal reliability could be calculated as this was a single-item measure). As can be seen in Table A4, correlations between dependent variables were moderate to strong, but the amount of shared variance between them (maximum $.56^2$ = 31%) suggests that it is useful to distinguish between these constructs.

As mentioned previously, we devised new scales to measure perceived social norms and polarization. The social norm items did not scale well together however (Cronbach's α = .56). The item intercorrelations were small to moderate (see Table A5). An explorative factor analysis on the seven items suggested two factors that explained little variance (16% and 14% respectively), with factor loadings that were not high (ranging from .27 to .66). As to the

polarization measure (see Table A6), the intercorrelation between the two items was in the expected direction, but only moderate in strength ($r(106) = -.40$). The two items could also be seen as tapping into slightly different feelings: a (dis)harmonious climate and (un)dividedness in opinions. Accordingly, we performed the analysis on each norm and polarization item separately.

Main analysis. In order to test the differences between communication media conditions, we compared the multilevel model of each dependent variable with condition as a fixed effect predictor with the associated null model that only included the intercepts. As can be seen in the first column of Table 1, there was a significant improvement in model fit for the four scales taken from literature (i.e., shared cognition, belongingness, identification, and flow), as well as for the two polarization items, revealing between-medium differences. The 95% confidence intervals in this table show that the FtF condition differed significantly from the video-chat and chat conditions. The only exception to this pattern is that the difference between the video-chat and FtF condition on identification was not significant at $p < .05$. Further, the differences between the chat and video-chat conditions were not significant. This is in line with predictions and suggests that the current differences between FtF and CMC cannot be explained by anonymity alone.

For the most part, as compared to FtF, participants perceived less shared cognition ($M_{\text{Chat}} = 3.71$ and $M_{\text{Video-chat}} = 3.90$ versus $M_{\text{FtF}} = 4.27$, $SE = .08$), less flow ($M_{\text{Chat}} = 3.67$ vand $M_{\text{Video-chat}} = 3.71$ versus $M_{\text{FtF}} = 3.90$, $SE = .05$), less harmony ($M_{\text{Chat}} = 3.85$ and $M_{\text{Video-chat}} = 3.94$ versus $M_{\text{FtF}} = 4.15$, $SE = .05$), and more dividedness ($M_{\text{Chat}} = 2.78$ and $M_{\text{Video-chat}} = 2.75$ versus $M_{\text{FtF}} = 2.52$, $SE = .09$) in CMC. Also, social relationships tended to be perceived as less close online: reduced feelings of belongingness ($M_{\text{Chat}} = 3.90$ and $M_{\text{Video-chat}} = 3.99$ versus $M_{\text{FtF}} = 4.24$, $SE = .06$) and identification ($M_{\text{Chat}} = 3.21$ and $M_{\text{Video-chat}} = 3.39$ versus $M_{\text{FtF}} = 3.56$, $SE = .08$). These results are all in line with Hypothesis 1.

Concerning the seven social norm items, the analysis showed significant differences only for agreeing ("In this group, people consider it important to agree with each other.") and disagreeing ("In this group, it is not a problem when someone has a deviant opinion."). Interestingly, the effects on these two items pointed in opposite directions: in the chat condition (as compared to both the FtF and video-chat conditions) respondents reported that it was least normative to disagree (M_{Chat} = 3.85 versus $M_{\text{Video-chat}}$ = 4.09 and M_{FtF} = 4.06, *SE* = .07) but also least normative to agree (M_{Chat} = 2.52 versus $M_{\text{Video-chat}}$ = 2.73 and M_{FtF} = 2.76, *SE* = .09). We can only speculate as to what may have caused this result. Perhaps the complex formulation of the disagreeing item (with a double negation) is to blame, but we cannot draw firm conclusions without further information. However, for all but one (outspoken: M_{Chat} = 3.31 versus $M_{\text{Video-chat}}$ = 3.23 and M_{FtF} = 3.37, *SE* = .10) of the remaining norm items the non-significant effects pointed in expected directions (see Hypothesis 4). Specifically, participants appeared inclined to perceive the online group as attaching more importance to the freedom of speech than to the preservation of harmony (M_{Chat} = 3.61 and $M_{\text{Video-chat}}$ = 3.60 versus M_{FtF} = 3.46, *SE* = .09) and as considering nuanced expression less mandatory (M_{Chat} = 2.71 and $M_{\text{Video-chat}}$ = 2.65 versus M_{FtF} = 2.78, *SE* = .10), while being more accepting of extreme statements (M_{Chat} = 3.42 and $M_{\text{Video-chat}}$ = 3.39 versus M_{FtF} = 3.33, *SE* = .09) and expecting more critical expressions (M_{Chat} = 3.47 and $M_{\text{Video-chat}}$ = 3.39 versus M_{FtF} = 3.39, *SE* = .09).

In sum, the questionnaire data provide substantial support for Hypothesis 1: as compared to the FtF conversations, participants perceived significantly less flow, less understanding, more polarization, and less relational closeness in the CMC. However, no convincing support was found for Hypothesis 4, something that might be due to a failure to operationalize the social norm concept well enough.

Table 1.

Chi-square test results, means, and 95% confidence intervals of the questionnaire variables per condition.

		FtF		Video-chat		Chat	
	$\chi^2(2)$	*M*	95% CI	*M*	95% CI	*M*	95% CI
Shared cognition	44.41***	4.27	[4.12, 4.42]	3.90	[3.75, 4.05]	3.71	[3.56, 3.86]
Belongingness	33.16***	4.24	[4.12, 4.36]	3.99	[3.87, 4.11]	3.90	[3.78, 4.02]
Identification	14.16***	3.56	[3.40, 3.72]	3.39	[3.23, 3.55]	3.21	[3.05, 3.37]
Flow	18.22***	3.90	[3.80, 4.00]	3.71	[3.61, 3.81]	3.67	[3.57, 3.77]
Polarization Harmony	31.68***	4.15	[4.06, 4.25]	3.94	[3.84, 4.04]	3.85	[3.75, 3.95]
Polarization Divided	8.73*	2.52	[2.35, 2.68]	2.75	[2.58, 2.92]	2.78	[2.61, 2.95]
Norm Freedom of speech	4.73 ^{ns}	3.46	[3.27, 3.65]	3.60	[3.41, 3.79]	3.61	[3.42, 3.80]
Norm Outspoken	4.49 ^{ns}	3.37	[3.16, 3.58]	3.23	[3.02, 3.44]	3.31	[3.10, 3.51]
Norm Nuanced	2.40 ^{ns}	2.78	[2.57, 2.98]	2.65	[2.44, 2.85]	2.71	[2.51, 2.92]
Norm Extreme	1.24 ^{ns}	3.33	[3.16, 3.51]	3.39	[3.21, 3.56]	3.42	[3.24, 3.59]
Norm Critical	1.41 ^{ns}	3.39	[3.22, 3.56]	3.39	[3.22, 3.56]	3.47	[3.30, 3.64]
Norm Disagreeing	9.19*	4.06	[3.93, 4.20]	4.09	[3.96, 4.22]	3.85	[3.72, 3.98]
Norm Agreeing	9.12*	2.76	[2.58, 2.94]	2.73	[2.55, 2.91]	2.52	[2.34, 2.70]

Note. ^{ns} = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

Exploration of demographic covariates. As the final step in the analysis of questionnaire responses, we explored the influence of various potential covariates that we measured (i.e., demographic characteristics). Including gender, age, acquaintance or gender composition of the group, did not result in a significant improvement in fit for any of the dependent variable models. This suggests that these demographic characteristics did not influence the results.

However, after incorporating political orientation as predictor the model fit improved significantly for flow ($\chi^2(1) = 4.68$, $p = .031$), the two polarization items ($\chi^2(1) = 4.77$, $p = .029$ for harmony and $\chi^2(1) = 5.47$, $p = .019$ for divided), and the norm item agreeing ($\chi^2(1) = 6.19$, $p = .013$). Regression coefficients (unstandardized) indicated that being more right wing related to perceiving less flow ($B = -.06$, $SE = .03$), less harmony ($B = -.06$, $SE = .03$) and

more dividedness (*B* = .09, *SE* = .04), and to attaching less importance to agreement (*B* = -.13, *SE* = .05) in the group conversations. This makes sense as participants from the right side of the political spectrum were in the minority in the sample.

Moreover, adding the variable experience with Google Hangouts resulted in a significant improvement in model fit for identification ($\chi^2(1) = 5.57$, $p = .018$) and the norm item agreeing ($\chi^2(1) = 8.47$, $p = .004$). Regression coefficients indicated that being less familiar with Google Hangouts related to reduced identification (*B* = -.24, *SE* = .10) and a decrease in the perception that agreement is seen as important in the group (*B* = -.35, *SE* = .12). As the overwhelming majority of participants scored a 3 (i.e., no experience) on this measure, there was little variance which may explain these ambiguous findings as due to chance.

Further, inclusion of educational level (ignoring the two non-students) led to a significant improvement in model fit for belongingness ($\chi^2(1) = 3.92$, $p = .048$) and identification ($\chi^2(1) = 6.01$, $p = .014$). Regression coefficients indicated that having a higher level of education related to perceiving weaker social relations: reduced feelings of belongingness (*B* = -.20, *SE* = .10) and identification with the other participants (*B* = -.33, *SE* = .13).

Finally, addition of the variable time (i.e., the number of conversations held in a block) significantly improved the model fit for identification ($\chi^2(1) = 10.64$, $p = .001$) and the norm item outspoken ($\chi^2(1) = 9.98$, $p = .002$). The relations were such that the more conversations the group members held, the more they felt they could speak their mind (*B* = .10, *SE* = .03) and the more they identified with each other (*B* = .15, *SE* = .05). The former makes intuitive sense as the more people get used to one another, the less constrained they will probably feel in their expression. The latter finding is consistent with other research showing that group

interaction tends to lead to increased levels of identification (Jans, Leach, Garcia, & Postmes, 2015).

Discussion Content

Lessons and insights from the coding process. One of the central purposes of the present research was to investigate the possibility of conducting this kind of research. Accordingly, the coding process itself was largely explorative and geared towards discovering what would be the best way to code data from three very different media. A lot was learned from this process of developing a method for content coding.

The coding turned out to be an effortful process of comparing very different data resulting from the different communication media. One initial thought was to code for exact occurrences of particular instances as much as possible (e.g., to count the number of misunderstandings). However, we found that this was quite difficult, if not impossible. For example, is an offline “hmmm” (a vocalization with an inflection suggesting understanding or agreement) equivalent to an explicit online endorsement such as “yes”? Specifically, small expressions of encouragement occurred very frequently FtF, mostly taking the form of “hmmm”, filling in for or providing additional arguments to conversational partners. However, it turned out to be virtually impossible to find a CMC equivalent to code. Nevertheless, this is a very interesting entrance for further research as it might be an important factor in inducing a sense of mutual understanding and agreement, but also of respect and encouragement, helping to subtly regulate interactions with preservation of social relationships. In fact, previous research already found that these conversational fillers, by enabling short latencies between turns, signal a greater understanding between communicators and contribute to the establishment of common ground (Beňuš, Gravano, & Hirschberg, 2011). Also violations of local coherence turned out to be too difficult to code using the same requirements in FtF and CMC. However, due to the semi-synchronous nature of the medium,

out of sync statements were found more often online than offline, inducing flow disruptions which might contribute to a sense of misunderstanding and/or disrespect (Koudenburg et al., 2013). Moreover, some of the codes we had thought might be relevant turned out to represent rare occurrences, which resulted in very few counts (i.e., asking for explanation and asking for clarification). Lastly, whereas repeating the provided statement, mentioning one's sender role, and asking rhetorical questions were found more FtF than in CMC, these results are difficult to interpret because of a lacking theoretical basis. However, these could be seen as opinion postponing or apologizing strategies used by participants to show their goodwill.

The key challenge underlying these coding concerns was that coercing very different interaction formats (CMC versus FtF) into a categorization scheme which attempts to treat offline and online utterances in the same way, risks severely distorting the data, even to the point that it gives an artificial and inaccurate representation of the experience of participants. FtF there was much more text, because it takes far less time to orally articulate than to type messages and people can talk at the same time FtF but not in CMC. Furthermore, FtF interactions often began before the real discussion about the provided statement started. All this made the strict counting of occurrences like comparing apples with oranges. Therefore most of the coded variables (as described above) were not deemed eligible for reliable and meaningful statistical analysis.

The more subjective interpretative coding, which in some sense considers how the conversation "feels", appeared to be much more fitting to the task of comparing across communication media. However, it remained difficult to interpret some of the offline messages due to missing nonverbal cues, an inherent shortcoming of analyzing audio recordings. That is, the nature of the FtF conversations is changed enormously before coding, whereas the chats preserve all the cues the participants perceived during conversation. Online users have to adapt to the (text-only) constraints to expression and be more explicit and clear

in their language (which might result in impressions of extremity). Offline this is not the case, but by reducing all conversations to transcripts for coding, the FtF conversations are distorted quite a lot whereas the CMC interactions stay intact. Nevertheless, as an outside observer, the coder sometimes had a hard time interpreting chat messages whereas the conversational partners seemed to have perfectly understood each other. This suggests that the experience of an online conversation can be quite different for an outside observer as compared to the communicators.

Notwithstanding these concerns, we discovered that we were able to meaningfully code some content (discussed below) and we did gain an overall impression of the interactions about which we are confident. As to this last point, generally speaking, the FtF discussions took the form of a vaguely formulated first opinion expression followed by a multitude of diverse reactions culminating in another opinion statement, whereas the online conversations often took the form of a short sender opinion followed immediately by a short responder opinion. To use a metaphor, the CMC format is a bit like a pile of pancakes, whereas the FtF format is more like a cappuccino. Where in CMC opinions are stacked on top of each other without much integration or coherence, in FtF conversation the different opinions are mixed together with foam floating on top.

Testing differences between conditions. The five coded variables that we were confident would be meaningful for making inter-medium comparisons and that were sufficiently frequent to subject to statistical analysis will be described in turn below (see Table A7 for the intercorrelations). As we did with the questionnaire items above, we analyzed these coded variables using multilevel modeling. After coding all individual interactions, the mean scores of the conversations within the same condition and group were calculated. This resulted in a two-level model with communication medium (level 1, repeated measures) nested within groups (level 2).

Forcefulness/ tentativeness of sender and forcefulness/ tentativeness of responder were rating scale measures ranging from 1 (*Very forceful*) to 5 (*No opinion*). Only opinions concerning the provided topics were coded for forcefulness/ tentativeness. However, sometimes opinions were implicitly conveyed in statements that objectively did not appear to be opinion statements as such, for example in definitions that people gave of certain concepts, in the seemingly objective information they provided, or in speculations they made about the opinion of the general public. This happened most often in the FtF condition and was coded as a more tentative opinion expression.

In general, group members agreed on most issues and it was clear that they did not want to engage in major conflict and keep the mutual relation good. Quite striking was the online and offline ubiquitousness of the word “lastig”, Dutch for “difficult”, and offline sighing with which participants seemed to signal their discomfort and/or struggle with the provided statement and their opinion about it. Nevertheless, a clear difference in forcefulness/ tentativeness was found between conditions (see Table 2). The sender statements were most forceful in the chat and most tentative in the FtF condition ($M_{\text{Chat}} = 2.19$, $M_{\text{Video-chat}} = 2.29$, $M_{\text{FtF}} = 2.77$, $SE = .12$). The responder opinions were most forcefully stated in the video-chat and most tentatively communicated in the FtF condition ($M_{\text{Chat}} = 2.06$, $M_{\text{Video-chat}} = 1.94$, $M_{\text{FtF}} = 2.68$, $SE = .11$). This provides suggestive evidence for Hypothesis 2 and 3 (i.e., more explicit expression in CMC). Only the differences between the chat and video-chat conditions were not significant.

A subtle but notable difference between the FtF and CMC second opinion statements was that online respondents often made remarks which opened with “I agree, but…”, followed by a nuancing statement which tended to explicitly reiterate what was already (implicitly) mentioned by the sender. This means that CMC responders often expressed the exact same opinion as the sender but in a form that suggested a conflict of opinions. An

agreement dressed up as a disagreement so to say. This could be seen as a sign of compliance with a CMC norm of disagreement (in line with Hypothesis 4) or as an instance of the increased misunderstanding that was perceived by participants online.

Violations of neutral coherence were measured by rating statements on a scale ranging from 0 (*No violation*) to 3 (*Explicit*). In all conditions we did not observe much disagreement, because participants often agreed about the general opinion but disagreed in the specifics (e.g., *how* to check for terrorists at borders), which they mostly started to explore outside our restricted coding area. While conditions did not significantly differ, the trend was as expected: the CMC media scored higher than the FtF condition on this measure of perceived disagreement (M_{Chat} = .73, $M_{\text{Video-chat}}$ = .90, M_{FtF} = .58, SE = .10). This can be seen as supporting evidence for Hypothesis 3 (i.e., more explicit disapprovals online). Although we did not code for this, participants seemed more easily persuaded by the opinion of others in FtF conversations than in CMC. In some FtF conversations participants changed their opinion considerably but in a natural way that made it barely noticeable. It even seemed as if participants were more motivated than online to come to a common agreement offline.

Having fun was a count measure of sincere laughing, "☺", "haha", and clear jokes. A large difference was found in the amount of fun at the start of the conversations online versus offline. The FtF condition scored highest and the chat condition scored lowest on this measure, with again the only non-significant difference between video-chat and chat (M_{Chat} = .17, $M_{\text{Video-chat}}$ = .19, M_{FtF} = .60, SE = .07). The difference would have been even larger when the many instances of having fun before the conversation officially started were also taken into account. Quite a lot of laughing, giggling and making joking occurred during the very first opinion sharing, something that might show uneasiness but also goodwill.

As the variables searching for definition by sender and searching for definition by responder both had too few counts to be considered reliable measurements, we collapsed them

into one dichotomous variable measuring whether a definition search was present (*1*) or not (*0*). Results show that definitions were significantly more often searched for FtF than in CMC, with the only non-significant difference existing between chat and video-chat (M_{Chat} = .09, $M_{\text{Video-chat}}$ = .06, M_{FtF} = .27, *SE* = .03). Joint definition searching can be interpreted as the establishment of a common ground (e.g., Clark, 1996; Clark & Marshall, 1981; Kashima, Klein, & Clark, 2007). Research has found that a common understanding is very beneficial for social relationships too (Finkenauer & Righetti, 2011). We further noticed a tendency for participants to search for definitions together *before* giving any opinion FtF, whereas they often started searching definitions *after* stating an opinion in CMC. A telling example is the first responder reaction in chat 3 of group 35: "Agree! Even though I do not know enough about this". In sum, it seems that, contrary to offline, online opinions are often given before or completely without establishing common ground by agreeing on definitions.

Table 2.

Chi-square test results, means, and 95% confidence intervals of the (group-level) coded variables per condition.

		FtF		Video-chat		Chat	
	$\chi^2(2)$	*M*	95% CI	*M*	95% CI	*M*	95% CI
Force Sender	13.44**	2.77	[2.53, 3.01]	2.29	[2.05, 2.53]	2.19	[1.94, 2.43]
Force Responder	26.63***	2.68	[2.46, 2.89]	1.94	[1.72, 2.15]	2.06	[1.85, 2.28]
Violation Neutral	4.82^{ns}	.58	[.38, .79]	.90	[.69, 1.11]	.73	[.52, .94]
Having fun	33.03***	.60	[.46, .74]	.19	[.04, .33]	.17	[.02, .31]
Definition search	25.52***	.27	[.21, .33]	.06	[.01, .12]	.09	[.03, .15]

Note. ^{ns} = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

Quantitative-Qualitative Combined

Quantitative-qualitative relationships. Most correlations between coded variables and self-report scales were weak (see Table 3). However, there were some exceptions. First, the code violations of neutral coherence was negatively correlated with the questionnaire variables shared cognition, flow, harmony, belongingness, and identification, while it related positively to dividedness. These relationships suggest that having (more explicit) disagreements coincided with perceiving less understanding, less flow, more polarization, and less relational closeness. Further, fun positively correlated with shared cognition, flow, harmony, and belongingness. These findings suggest that having more fun related to perceiving more understanding, flow, harmony, and belongingness. Lastly, forcefulness of sender and responder correlated positively with shared cognition. This suggests that increased tentativeness tended to co-occur with an increased perceived understanding.

Table 3.

Correlations between coded variables (columns) and questionnaire variables (rows).

	Force Sender	Force Responder	Violation neutral	Having fun	Definition search
Shared cognition	.13*	.11*	-.30***	.26***	$.11^{ns}$
Belongingness	$.06^{ns}$	$.02^{ns}$	-.14*	.11*	$.06^{ns}$
Identification	$.07^{ns}$	$.09^{ns}$	-.12*	$.10^{ns}$	$.01^{ns}$
Flow	$.03^{ns}$	$-.03^{ns}$	-.21***	.18**	$.03^{ns}$
Polarization Harmony	$.08^{ns}$	$.04^{ns}$	-.24***	.19***	$.08^{ns}$
Polarization Divided	$-.05^{ns}$	$.03^{ns}$	.42***	$-.08^{ns}$	$-.08^{ns}$

Note. ^{ns} = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

Qualitative mediation of quantitative results. Having obtained the quantitative and qualitative results as reported above, we could explore the role of discussion content in explaining the between-condition differences on the self-report measures. As this analysis was

explorative in character without any clear hypotheses, we entered in one step all five coded variables as fixed effect predictors in the multivariate models of the questionnaire variables for which a meaningful effect of condition was obtained, and subsequently compared these with the corresponding models with only condition as predictor.

As can be seen in Tables A8 - A13, the model fits improved significantly for shared cognition, flow, harmony, and dividedness. This was especially caused by violations of neutral coherence (disagreement), which explained a lot of variance. The (unstandardized) regression coefficients suggested, not surprisingly, that disagreement related negatively to perceived conversational flow (B = -.15, SE = .04), understanding (B = -.30, SE = .06), harmony (anti-polarization; B = -.15, SE = .04), and positively to feelings of dividedness (pro-polarization; B = .51, SE = .07). However, there was no clear evidence for mediation by disagreement: the effect of disagreement on these scale responses was not dependent on condition. In other words, the between-condition differences in disagreement did not appear to explain the between-condition differences in conversational climate. For the questionnaire variables signifying social relationships (belongingness and identification), discussion content was not strongly related to questionnaire responses.

In sum, discussion content did appear to have some effect (in the form of disagreement) on perceived flow, understanding, and polarization, but not on solidarity. However, there was no proof for any mediation effects, which means that the effects of condition on questionnaire results could not be explained by the coded discussion content.

Discussion

The present study is the first in a new line of research that aims to compare CMC and FtF communication modes, with special attention for how social regulation is achieved in the micro-dynamics of offline and online conversations. To that end, the present study's central aim was to develop and test a new methodology and procedure.

Major Findings

First and foremost, we can conclude that, in this specific experimental task, we found substantial differences in the form of online and offline group interactions, in the subjective experience of participants (self-perception) as well as in the more objective (behavioral) assessment by an outside observer. Online, as compared to offline, communicators tend to perceive less flow, less mutual understanding, more polarization, and less solidarity. The perception of the outside observer was in line with this: offline conversations were much more smooth and integrated than online interactions. FtF, participants seemed to invest more in keeping the discussion climate and relationships pleasant by having fun, reaching common ground before stating an opinion, expressing themselves in a tentative manner, and being somewhat less disagreeing. Together these difference factors seem to provide more fertile grounds for flaming and conflict online than offline.

Across the board, the differences between chat and video-chat were not significant, whereas those between video-chat and FtF were (except for identification). This means that the video-chat was more similar to the chat that to the FtF condition. This pattern is consistent with the expectation that discussion form (and not anonymity alone) may play a key role in the difference between online and offline media.

Besides testing hypothesized effects, we answered various methodological questions in this explorative study. In the design phase, we made decisions concerning the manner in

which to manipulate online versus offline communication and how to measure the self-perception and behavior of participants so that we could meaningfully compare across media. As most of the hypothesized effects were found, we can conclude that the decisions made and methodology used is workable. Only the newly devised social norm measure requires some work as the items did not scale well together and did not show any significant differences between the communication media. Further, the coding of discussion content by counting of occurrences turned out to be rather difficult. A more interpretative approach appeared better suited to the coding of this content.

Implications for Literature

Hypotheses. Aside from finding a workable method for comparing FtF with CMC media, we attempted to (provisionally) test four hypotheses we derived from literature. As outlined in the introduction section, research on everyday FtF conversations found that when the smooth and coordinated progression (i.e., the flow) of conversations is (even briefly) disrupted, this alarms people that there is a social problem and threatens their sense of solidarity, mutual understanding, and harmony (Koudenburg et al., 2011; 2013). We hypothesized that, due to their a- or semi-synchronous nature, the coordination of smooth turn-taking behavior is considerably more difficult online, making CMC more prone to flow disruptions and attendant perceptions of reduced understanding and solidarity than FtF (Hypothesis 1). This is exactly what we found: participants perceived relatively less flow as well as less understanding, harmony, and solidarity in our semi-synchronous CMC conditions.

During explorative content coding, we learned a lot about possible mechanisms behind these findings (see Table A14 for an overview). While no proof for any mediation effects was found, various codes and questionnaire variables did co-occur in a logical manner. Specifically, we observed less searching for common ground as well less perceived understanding in participants online. Further, we observed less instances of having fun online,

which might have contributed to the decreased sense of flow, understanding, harmony, and solidarity reported by participants. Conversely, the slightly increased violations of neutral coherence (disagreements) in CMC coincided with an increased sense of polarization and reduced flow, understanding, and solidarity. The relative tentativeness observed in FtF opinion expressions co-occurred with the experience of more understanding, flow, solidarity, and harmony by participants. Compared to forceful statements which are arguably more restrictive, tentative opinion expressions might leave more room for other people to identify, relate, and integrate their own viewpoints. The virtual absence of small expressions of encouragement (e.g., “hmmm”, “yes”), that were so ubiquitous FtF, might very well contribute to the relatively low scores for CMC on perceived flow, understanding, solidarity, and relatively higher polarization score. Conversely, violations of local coherence (out of sync comments) tended to occur more online, where participants perceived less flow, understanding, solidarity, and more polarization.

Based on literature we further hypothesized that, if they want to secure their inclusion in a newly formed online group, users will have to rely entirely on the sole cue to normative behavior present in that context: the language used by their new group members. As these group members are less able to express themselves in a subtle way online, their language use will be more explicit than offline (Hypotheses 2 and 3). That is, whereas offline communicators will find subtle social cues that tentatively and respectfully tell them how they ought to behave to remain socially accepted, online users will only find the explicit language used by their group members. We found suggestive evidence for this reasoning in the coding of discussion content. The code forcefulness/ tentativeness can be seen as a proxy for explicit/ subtle expression. In line with expectations, we observed much more forcefulness online and much more tentativeness offline in both sender and responder expressions. We also found a tendency towards more and more explicit expressions of disagreement in CMC (violations of

neutral coherence code). Relatedly, participants mostly posed their clearly-worded opinions at the very start of the conversation in the chat (like piling up pancakes), while in the FtF conversations this was preceded by a “cloud” of diffuse expressions, postponing behavior, and searching for common ground (like preparing a foaming cappuccino).

We further reasoned that the explicit online language could easily be translated into a flaming norm that condones hostile and aggressive behavior, motivating group members searching for inclusion to behave accordingly and thereby perpetuate online explicitness and conflict (Hypothesis 4). In the current study, we were not able to test this expectation because the social norm items did not scale well together and did not show any significant effects for condition. However, the coder noticed that participants communicating online often dressed their agreement as disagreement, which might be a symptom of compliance with a norm of disagreement. FtF the reverse was observed: after hearing an opposing opinion of one of their group members, participants often smoothly deflected their argumentation towards agreement.

CMC literature. In the current CMC literature the focus is on content: *what* is being said verbally and nonverbally, to the neglect of form: *how* things are being said. Our research builds on the research tradition into the consequences of conversational form and extends it into the online context, attesting to the strong influence of the micro-dynamics of online interactions on more macro-level outcomes (i.e., social relationships).

In fact, our results are in conflict with one of the leading hypotheses in the CMC literature: the idea that the anonymity provided by CMC leads people to lacquer social concerns and behave in a normatively disinhibited manner (e.g., O’Sullivan & Flanagin, 2003; Suler, 2004). The fact that the addition of a video-connection between chatting participants, while obviously removing the factor of anonymity, did not remove the observed differences between online and offline conversations, argues against this idea. This is consistent with the suggestion that discussion content and form (and not anonymity) play a

key role. Thus, although we cannot entirely rule out the influence of anonymity and attendant disinhibition, it seems safe to conclude that this is not the sole or leading factor in explaining the online-offline difference.

Another influential theory in CMC literature is media richness theory (Daft & Lengel, 1986). The media richness literature focuses largely on the ambiguity of message *content* that is brought about by the reduction of communication cues (e.g., nonverbal signals) in online media. However, we found strong suggestions that conversational form plays a central role in explaining message differences, rather than ambiguity of content. We argue that the increase in perceived misunderstanding online is a direct consequence of the sense of disrupted flow which is (partially) caused by the reduced availability of subtle social cues. If anything, we found evidence that statements in CMC are less ambiguous (more explicit) and that FtF, there is a lot more talking around issues and a lot more scope for introducing ambiguity as a result. In some sense, the present findings show the exact opposite from media richness theory: the greater ambiguity in FtF conversations creates the kind of context in which disagreements on content can be reconciled with the maintenance of good interpersonal relations.

Alternative Explanations

There are two prominent alternative difference factors that might be (partially) underlying the observed differences between FtF and CMC. The first important difference factor is that chatting progresses much slower than verbal talking. This was clearly observed in the current study as participants were much earlier finished discussing a topic FtF than online, making it less likely to reach an agreement within 5 minutes. Concerning solidarity, previous research found that when given enough time and when the quantity of online communication is high enough, people can form relationships as intimate as in FtF situations (Walther & Burgoon, 1992; Walther, 1993). Communicators appear to adapt to the restrictions posed by CMC by modifying their language to compensate with words for the

lack of nonverbal cues (e.g., more direct language use; Tidwell and Walther, 2002). As mentioned above, we found support for this in the forcefulness of opinion statements. Also, during debrief, participants mentioned that they edited their online comments quite a lot before sending, suggesting that participants were pretty mindful concerning the exact wording of their online expressions. However, we found that not only do online users say less and use different words, their conversations are also flowing in another way. That is, besides *what* (content), *how* people communicate (form) also shapes their social relationships.

This is related to the second difference factor as the focus on words was reflected in participants' method of question answering. Specifically, in the process of filling out the questionnaire after the CMC conditions, participants could and reportedly did look back at the chats, whereas this was not possible in the FtF condition, making the latter more dependent on participants' memory and the former more reflective of the relatively strong focus of participants on the (sparse) language used in the chat.

Limitations and Weaknesses

The present study had some issues with the measurement of social norms, content coding and qualitative-quantitative mediation analysis. First, the fact that we did not observe any effects for our newly developed social norm items might be due to the relatively short time span occupied by each condition (15 minutes). That is, it might be impossible to find a noticeable change in norm perception after such a short period of time. Indeed, research has found that the longer a group interacts, the stronger members' commitment to normative behavior becomes (Cvetkovich & Baumgardner, 1973; Smith & Postmes, 2009; Thomas & McGarty, 2009), only to reduce again when approaching the end of the conversation in favor of an increased individuation (Postmes et al., 1998).

Further, the content coding as executed in this study was exploratory and provisional. While we were able to reliably code some content and find some meaningful differences

between conditions, many codes were deemed unfit for analysis and we failed to find any effects in the mediation analysis. However, only a very small part of the data (the first few sentences of each conversation) was coded and coding was done by only one coder (the first author). This might very well explain why we were as yet unable to accurately and reliably capture what really happened in the conversations and therefore unable to uncover the underlying processes behind the subjective experiences reported by participants.

During the explorative content coding, we learned that comparing online with online communication is like comparing pancakes with cappuccinos. By subjecting these very different interaction formats to the same categorization requirements, we might end up with an inaccurate representation of the experience of participants. Already in the process of preparing the data for coding, the difference between spoken words and written text can unevenly distort the data. Specifically , transcripts of chat sessions are an exact replication of what happened in the conversation between online communicators, whereas transcriptions or, as in the current case, audio-recordings of offline conversations strip these from all visual and/or auditory cues present and thereby ignore myriad of communication signals that could have been perceived by the interactional partners. Relatedly, in an online situation one is forced to become consciously aware of various signals that one emits and receives unconsciously in FtF interactions. That is, communicators adapt themselves to the restrictions posed by text-only messaging (e.g., Lewis & Fabos, 2005).

Finally, the external validity of this research is limited as we studied unacquainted Dutch students who were instructed to talk about certain predefined topics and assume an allocated role (sender or responder) within a small group setting in laboratory context. To counter this potential problem, we simulated as natural a group conversation as possible, by selection of statements via a pilot study and letting participants freely discuss these (except for having to start or respond and being allowed to talk for 5 minutes). Further, the

hypothesized processes are context-independent as they are expected to occur in every chatting-situation: real-life as well as in an artificial laboratory context. One would even expect to find stronger effects in real-life as participants in this study presumably were motivated to restrain from engaging in any conflict because they knew that a monitoring experimental leader was present and that they would meet their conversational partners again in real-life after the experiment.

Future Directions

This study was a pilot forming the forefront of a line of research that we will roll out in the coming four years. In the discussion above, already various suggestions for further research shone through. Below, we will shortly discuss the five we consider most pressing.

First, to enable the measurement of social norms in future explorations, we might extend interaction time and/or make the norm items more concrete and relevant for shorter interactions (e.g., less extreme and clearer formulation).

Second, it seems natural to expect a norm carry-over effect: norms established in one condition carry over to the next and thus affect conversations across media. By subjecting one group to each possible different order of conditions and statements, we are currently able to rule out that order effects can explain any results reported in this paper. However, in further studies it might be very interesting to see whether this normative carry-over happens and when this effect is strongest. In fact, we found some suggestive evidence for this in the form of rather high individual-level ICC's (repeated measures) for the norm items (except for disagreeing; see Table A3).

Third, future research should scrutinize the path the observed effects take. We expect that flow disruptions will cause a decreased sense of understanding, harmony and solidarity, which is followed by the development of flaming norms that foster conflict.

Fourth, by extending the content coding from the first few sentences to the full conversations in future studies, we might more accurately and reliably capture what happens in conversations and thereby gain more insight into the conversational dynamics that underpin participants' subjective responses. Also, the further development of a coding scheme that does justice to the very different communication media is needed. Most likely this scheme will focus on interpretative coding at the expense of the exact counting of instances, as we found the former more fitting to the data. Relatedly, it might be wise to code for more general impressions, especially explicitness/ subtleness, discussion climate, and social relationships.

Fifth, a lot might be learned from letting actors play out chat transcripts and code these as well as the video recordings of offline interactions. This can be seen as the mirror image of analyzing FtF interactions based on transcriptions: we enrich the online interactions with the cues we deprive the offline interactions off. This will allow us to take a closer look at the exact differences between the media. Also, by showing these acted out chats to an audience we can assess how bystanders interpret and infer social norms when chat discussions are spoken out FtF. We conjecture that voicing the more explicit chat messages out loud will be perceived as conflictual behavior (flaming).

In fact, we already ran a pilot by having three actors (seated in a circle) act out a few of the collected chat transcripts while video-taping them. We experimented with instructing the actors to perform the scripts as void of any emotion as possible or to freely interpret the texts. Especially the latter method led to some very alienating and confusing interactions, for actors as well as observers. Actors experienced it as very unnatural as their utterances often seemed entirely disconnected from the preceding statement. The actors were also surprised by the strong emotions they discovered in some pieces of text upon speaking it out. This was most common for anger: the actors mentioned they felt they easily came across as pretty angry. After viewing one of the resulting videos in a general showing, observers noticed the

difficulty they had in following the conversation as it was not logically structured, with a lot of interference by out of sync comments. Moreover, one member of the public mentioned that seeing the chats acted out felt like observing a long-married couple that is not concerned about potential relationship damage anymore. In other words, if you talk the way you write, observers get the impression that speakers have a total disregard for their future relationships and each other's well-being. This is entirely in line with our expectation that observers will perceive conflictual behavior when seeing explicit chat conversations acted out.

The experiences of observers as well as actors are in accordance with the flow literature which holds that the use of subtle social cues in FtF conversations enables people to show their disapproval and normatively regulate an interaction *without* damaging social relationships. That is, the impression of disregard for relationship status in the acted out online interactions presumably is the result of the absence of subtle social cues in the presence of flow disruptions. This can be related to research findings concerning the importance of conversational accommodation behavior for inducing perceptions of flow, understanding, and feelings of social unity (Giles, Coupland, & Coupland, 1991; Giles, Mulac, Bradac, & Johnson, 1987). Obviously verbal and nonverbal accommodation is very difficult without being able to hear or see one’s interactional partners. The relative lack of mutual accommodation might be easily perceived by others as a lack of concern over social relationships. This might also partially explain the reduced sense of solidarity experienced by participants in their CMC interactions. It is quite ironic that online communicators seem to be *more* concerned with how they express themselves (a lot of editing), maybe trying to comply with a norm of explicit expression in order to secure their social inclusion, but tend to come across as *less* concerned with social relationships, something that might elicit hostile reactions in others.

Conclusion

We learned much more from this study than we dared to hope. Most importantly, we can conclude that it *is* possible to compare pancakes with cappuccinos. Besides having found a workable method for future work in this area, the first tests of most hypotheses was successful, and we found many interesting entrances for future exploration.

To conclude, what is *the* difference factor that fosters flaming and online conflict? We think that there is not one single factor but that there are multiple. The present study attests against the idea of anonymity leading to online disinhibition and shifts the focus away from conversational content to its form. Even when clearly not anonymous, online communicators appear to perceive their interactions as less coordinated and smooth, with less mutual understanding and solidarity, and more polarization. This combination of factors seems to provide a rather fertile ground for online conflict. Further, to the outside observer, online communicators generally seem less concerned with relationship preservation. These results emphasize the key role that subtle micro-dynamics in interpersonal interaction play in maintaining harmonious social relationships.

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Appendix

Table A1.

The stimulus material in original Dutch and translated in English: three sets of controversial statements and attendant role allocation instructions.

	Original statement	English translation
Statement set 1[a]	De koning beledigen moet kunnen.	Insulting the king should be possible.
	Een boerkaverbod in Nederland is niet nodig.	A burka ban in the Netherlands is not necessary.
	Volledig draaien op duurzame energie in 2050 is een illusie.	Running entirely on renewable energy in 2050 is an illusion.
Statement set 2[a]	Zelf vuurwerk afsteken is een traditie die moet blijven.	The self-lighting of fireworks is a tradition that must remain.
	De buitengrenzen van Europa moeten dicht voor vluchtelingen.	The external borders of Europe should be closed for refugees.
	Megastallen moeten verboden worden.	Factory farms should be prohibited.
Statement set 3[a]	De overheid moet kindervaccinatie verplicht stellen.	The government has to make childhood vaccination compulsory.
	Privacy is ondergeschikt aan veiligheid in deze tijden van terreur.	Privacy is subordinate to security in this age of terror.
	Het raadgevend referendum moet zo snel mogelijk worden afgeschaft.	The advisory referendum must be abolished as soon as possible.
Instruction to sender[b]	Open het gesprek door als eerste op deze stelling te reageren.	Open the conversation by responding to this statement first.
Instruction to responders[b]	Wacht tot een van je groepsleden het gesprek opent.	Wait for one of your group members to open the conversation.

Note. [a]The numbering of statement sets in this table is arbitrary (introduced to promote presentational clarity).

[b]Depending on the role that was allocated to a specific participant in a particular conversation, either the instruction to sender or the instruction to responders was printed underneath the provided statement.

Table A2.

Questionnaire content in original Dutch and translated in English with all measurement items (sources mentioned in parentheses) and the attendant instructions in order of presentation.

Instruction/ Measure (source)	Original instructions/ Items	English translation of instructions/ Items
Instruction 1	Hieronder volgen enkele vragen over de gesprekken die jij en je groepsleden zojuist gevoerd hebben. Geef voor elk van de onderstaande stellingen aan in hoeverre je het ermee eens of oneens bent (1=Volledig mee oneens, 5 =Volledig mee eens).	Below are some questions about the conversations you and your group members just held. Please indicate to what extent you agree or disagree with each of the following statements (1=Completely disagree, 5=Completely agree).
Shared Cognition (adapted from Koudenburg, Postmes, & Gordijn, 2013)	Ik heb het gevoel dat mijn groepsleden en ik elkaar begrepen.	I have the feeling that my group members and I understood each other.
	Ik heb het gevoel dat mijn groepsleden en ik op dezelfde golflengte zaten.	I have the feeling that my group members and I were on the same wavelength.
Belongingness (adapted from Van Beest & Williams, 2006)	Ik had tijdens de gesprekken het gevoel dat ik er bij hoorde.	I had the feeling that I belonged to the group during the conversations.
	Ik voelde mij niet geaccepteerd door de andere groepsleden. (R)	I did not feel accepted by the other group members. (R)
	Er was veel interactie tussen mij en de andere groepsleden.	There was a lot of interaction between me and the other group members.
	Ik voelde mij een buitenstaander tijdens de gesprekken. (R)	I felt like an outsider during the conversations. (R)
Identification (adopted from Postmes, Haslam, & Jans, 2013)	Ik identificeer mij met de andere deelnemers.	I identify myself with the other participants.
Instruction 2	De volgende stellingen gaan over het gevoel dat je kreeg over de groep tijdens het bespreken van de drie onderwerpen. Geef voor elke stelling aan in hoeverre je het ermee eens of oneens bent (1=Volledig mee oneens, 5 =Volledig mee eens).	The following statements are about the way you felt about the group during the conversations about the three topics. Please indicate to what extend you agree or disagree with each of the following statements (1=Completely disagree, 5=Completely agree).
Social norms (newly devised)	In deze groep is de vrijheid van meningsuiting belangrijker dan het	In this group, the freedom of speech is more important than

	bewaren van de harmonie.	the preservation of harmony.
	In deze groep wordt het normaal gevonden als je het achterste van je tong laat zien.	In this group, it is considered normal to reveal one's true thoughts.
	In deze groep moet je je genuanceerd uitdrukken.	In this group, you have to express yourself in a nuanced manner.
	In deze groep is het OK om extreme uitlatingen te doen.	In this group, it is OK to make extreme statements.
	In deze groep verwacht men kritische uitspraken.	In this group, people expect critical statements.
	In deze groep is het geen probleem als iemand een afwijkende mening heeft.	In this group, it is not a problem when someone has a deviant opinion.
	In deze groep vindt men het belangrijk om het met elkaar eens te zijn.	In this group, people consider it important to agree with each other.
Instruction 3	Nu volgen enkele vragen over de verschillende onderwerpen die je besproken hebt. Ga in gedachten terug naar het gesprek over: [ONDERWERP][a]. Geef aan in hoeverre je het met de onderstaande stellingen eens of oneens bent (1=Volledig mee oneens, 5 =Volledig mee eens).	Now some questions will be asked about the different topics you talked about. Think back about the conversation on: [TOPIC][a]. Please indicate to what extent you agree or disagree with each of the following statements (1=Completely disagree, 5=Completely agree).
Polarization (newly devised)	In het gesprek waren de groepsleden verdeeld over dit onderwerp.	In the conversation, group members were divided about this topic.
	Het gesprek over dit onderwerp verliep harmonieus.	The conversation about this topic was harmonious.
Flow (adapted from Koudenburg, Postmes, & Gordijn, 2013)	Het gesprek over dit onderwerp kostte de groep veel moeite. (R)	The conversation about this topic took the group a lot of effort. (R)
	Het gesprek over dit onderwerp verliep gecoördineerd en soepel.	The conversation about this topic was coordinated and smooth.
	Het gesprek over dit onderwerp was aangenaam.	The conversation about this topic was pleasant.
Instruction 4	Tot slot willen we nog wat gegevens van je weten.	To conclude, we want to know a few more things about you.

Demographics	Wat is je leeftijd?	What is your age?
	Wat is je geslacht? Man ❍ Vrouw ❍	What is your gender? Male ❍ Female ❍
	Wat is je moedertaal?	What is your mother tongue?
	In politieke zaken praten mensen vaak over “links” en “rechts”. Hoe zou je jouw opvattingen op deze schaal plaatsen? Sterk links ❍ ❍ ❍ Midden ❍ ❍ ❍ Sterk rechts	In politics people often talk about “left” and “right”. How would you place your own views on this scale? *Strongly left* ❍ ❍ ❍ *Middle* ❍ ❍ ❍ *Strongly right*
	Ben je student? Ja ❍ Nee ❍	Are you a student? Yes ❍ No ❍
	Wat studeer je?[b]	What do you study?[b]
	Wat is je studieniveau?[b] MBO ❍ HBO ❍ Universiteit ❍	What is your study level?[b] Senior ❍ Higher vocational ❍ University ❍
	Had je voor deze studie ervaring met het gebruik van Google Hangouts? Ja ❍ Een beetje ❍ Nee ❍	Did you have any experience with the use of Google Hangouts before this study? Yes ❍ A bit ❍ No ❍
	Hoe goed kende je de andere deelnemers voorafgaand aan het onderzoek (ga uit van de persoon die je het best kent)? Helemaal niet ❍ Nauwelijks ❍ Redelijk goed ❍ Heel goed ❍	How well did you know the other participants before this study (indicate for the person you know best)? Not at all ❍ Barely ❍ Reasonably well ❍ Very well ❍

Note. [a]Here the three statements that were discussed in the last conversation block (condition) were repeated each in turn.

[b]These questions were not presented if participants answered “No” to the question “Are you a student?”.

Figure A1. The experimental setup. In the back: one of the three individual cubicles in which participants chatted, video-chatted, and filled out the questionnaires. In front: the setup in which the face-to-face conversations were held.

Table A3.

The group- and individual-level intraclass correlation coefficients of all questionnaire variables.

	ICC Level 3 (Group)	ICC Level 2 (Individual)
Shared cognition	.16	.16
Belongingness	.07	.39
Identification	.02	.29
Flow	.05	.31
Polarization Harmony	.05	.28
Polarization Divided	.15	.15
Norm Freedom of speech	.22	.52
Norm Outspoken	.30	.67

Norm Nuanced	.15	.57
Norm Extreme	.10	.54
Norm Critical	.02	.54
Norm Disagreeing	.00	.15
Norm Agreeing	.04	.49

Table A4.

Overall means, standard deviations, and intercorrelations of the variables derived from literature (individual-level).

	M (SD)	Shared cognition	Belongingness	Identification
Shared Cognition	3.96 (.71)			
Belongingness	4.05 (.60)	.47***		
Identification	3.39 (.83)	.54***	.35***	
Flow	3.76 (.51)	.56***	.53***	.37***

Note. ^{ns} = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

Table A5.

Overall means, standard deviations, and intercorrelations of the social norms items (individual-level).

	M (SD)	Freedom of speech	Outspoken	Nuanced	Extreme	Critical	Disagreeing
Freedom of speech	3.56 (.81)						
Outspoken	3.30 (.84)	.44 ***					
Nuanced	2.71 (.93)	-.02^{ns}	-.04^{ns}				
Extreme	3.38 (.83)	.30***	.36***	-.26***			
Critical	3.42 (.87)	.22***	.18***	.06^{ns}	.04^{ns}		
Disagreeing	4.00 (.70)	.03^{ns}	.04^{ns}	-.15**	.16**	.08^{ns}	
Agreeing	2.67 (.91)	-.16**	-.14*	.25***	-.29***	.02^{ns}	-.14*

Note. ^{ns} = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

Table A6.

Overall means, standard deviations and intercorrelations of the polarization items (individual-level).

	M (SD)	Harmony
Harmony	3.98 (.50)	
Divided	2.68 (.78)	-.40***

Note. ^{ns} = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

Table A7.

Overall means, standard deviations, and intercorrelations between the coded variables (group-level).

	M (SD)	Force Sender	Force Responder	Violation Neutral	Having fun
Force Sender	2.41 (.76)				
Force Responder	2.23 (.71)	.54***			
Violation Neutral	.74 (.63)	-.21***	-.14*		
Having fun	.32 (.47)	.25***	.17**	-.09^{ns}	
Definition search	.14 (.20)	.39***	.33***	-.26***	.37***

Note. Based on the group-averages of the coded variables per condition (i.e., 3 observations per group).

^{ns} = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

Table A8.

Chi-square test result and unstandardized regression coefficients with standard errors and t-values for the shared cognition model with only condition as predictor (left) and the model with the coded variables added (right).

Model Shared cognition	Mediated Model Shared cognition
$\chi^2(5)$= 26.79***	

	B (SE)	*t-value*	*B (SE)*	*t-value*
Intercept[a]	4.27 (.08)	55.82***	4.51 (.21)	21.58***
Video-chat	-.37 (.08)	-4.51***	-.29 (.11)	-2.73**
Chat	-.56 (.08)	-6.82***	-.51 (.10)	-5.08***
Force Sender			-.02 (.06)	-.35[ns]
Force Responder			-.01 (.07)	-.09[ns]
Violation Neutral			-.30 (.06)	-4.79***
Having fun			.22 (.10)	2.18*
Definition search			-.43 (.22)	-1.93[ns]

Note. [ns] = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

[a]The intercept represents the FtF condition.

Table A9.

Chi-square test result and unstandardized regression coefficients with standard errors and t-values for the belongingness model with only condition as predictor (left) and the model with the coded variables added (right).

	Model Belongingness		Mediated Model Belongingness	
		$\chi^2(5)=3.18^{ns}$		
	B (SE)	*t-value*	*B (SE)*	*t-value*
Intercept[a]	4.24 (.06)	70.70***	4.50 (.16)	27.31***
Video-chat	-.25 (.06)	-4.23***	-.31 (.08)	-3.84***
Chat	-.34 (.06)	-5.75***	-.40 (.08)	-5.16***
Force Sender			-.01 (.05)	-.16[ns]
Force Responder			-.07 (.05)	-1.29[ns]
Violation Neutral			-.04 (.05)	-.92[ns]
Having fun			-.02 (.08)	-.24[ns]
Definition search			-.06 (.17)	-.36[ns]

Note. ^{ns} = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

[a]The intercept represents the FtF condition.

Table A10.

Chi-square test result and unstandardized regression coefficients with standard errors and t-values for the identification model with only condition as predictor (left) and the model with the coded variables added (right).

	Model Identification		Mediated Model Identification	
	$\chi^2(5)=7.47^{ns}$			
	B (SE)	*t-value*	*B (SE)*	*t-value*
Intercept[a]	3.56 (.08)	44.22***	3.53 (.24)	14.69***
Video-chat	-.18 (.09)	-1.90^{ns}	-.10 (.12)	$-.86^{ns}$
Chat	-.35 (.09)	-3.81***	-.31 (.12)	-2.68**
Force Sender			-.06 (.07)	$-.86^{ns}$
Force Responder			.12 (.08)	1.51^{ns}
Violation Neutral			-.13 (.07)	-1.83^{ns}
Having fun			.10 (.11)	$.89^{ns}$
Definition search			-.34 (.26)	-1.33^{ns}

Note. ^{ns} = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

[a]The intercept represents the FtF condition.

Table A11.

Chi-square test result and unstandardized regression coefficients with standard errors and t-values for the flow model with only condition as predictor (left) and the model with the coded variables added (right).

	Model Flow	Mediated Model Flow
	$\chi^2(5)=19.36$**	

	B (SE)	*t-value*	*B (SE)*	*t-value*
Intercept[a]	3.90 (.05)	77.46***	4.27 (.14)	30.34***
Video-chat	-.19 (.06)	-3.38***	-.23 (.07)	-3.20**
Chat	-.22 (.06)	-4.05***	-.27 (.07)	-3.93***
Force Sender			-.01 (.04)	-.28[ns]
Force Responder			-.09 (.05)	-1.90[ns]
Violation Neutral			-.15 (.04)	-3.45***
Having fun			.11 (.07)	1.62[ns]
Definition search			-.32 (.15)	-2.07*

Note. [ns] = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

[a]The intercept represents the FtF condition.

Table A12.

Chi-square test result and unstandardized regression coefficients with standard errors and t-values for the polarization harmony model with only condition as predictor (left) and the model with the coded variables added (right).

	Model Polarization Harmony		Mediated Model Polarization Harmony	
		$\chi^2(5)=15.87$**		
	B (SE)	*t-value*	*B (SE)*	*t-value*
Intercept[a]	4.15 (.05)	85.01***	4.36 (.14)	31.67***
Video-chat	-.21 (.05)	-3.98***	-.19 (.07)	-2.68**
Chat	-.30 (.05)	-5.66***	-.29 (.07)	-4.35***
Force Sender			-.01 (.04)	-.28[ns]
Force Responder			-.04 (.04)	-.88[ns]
Violation Neutral			-.15 (.04)	-3.61***
Having fun			.11 (.07)	1.71[ns]
Definition search			-.17 (.15)	-1.12[ns]

Note. ^{ns} = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

[a]The intercept represents the FtF condition.

Table A13.

Chi-square test result and unstandardized regression coefficients with standard errors and t-values for the polarization divided model with only condition as predictor (left) and the model with the coded variables added (right).

	Model Polarization Divided		Mediated Model Polarization Divided	
		$\chi^2(5)=53.55$***		
	B (SE)	*t-value*	*B (SE)*	*t-value*
Intercept[a]	2.52 (.09)	29.46***	1.79 (.22)	7.99***
Video-chat	.23 (.10)	2.38*	.21 (.12)	1.79^{ns}
Chat	.27 (.10)	2.73**	.31 (.11)	2.75**
Force Sender			.00 (.07)	.07^{ns}
Force Responder			.14 (.07)	1.85^{ns}
Violation Neutral			.51 (.07)	7.49***
Having fun			.03 (.11)	.27^{ns}
Definition search			.11 (.25)	.47^{ns}

Note. ^{ns} = P > 0.05, * = P ≤ 0.05, ** = P ≤ 0.01, *** = P ≤ 0.001.

[a]The intercept represents the FtF condition.

Table A14.

Overview of the differences observed between FtF and CMC during the coding process, debriefing, and pilot of acting out chats.

CMC as compared to FtF
More forceful opinion expressions.
Less having fun together.

Less searching for shared definitions (little securing of common ground).
Tendency towards more and stronger disagreements.
Virtually no small expressions of encouragement.
Tendency towards more out of sync comments.
A pancake-style stacking of opinion statements without much integration or coherence.
More short and clear opinion statements.
Tendency towards starting the conversation with an opinion expression.
Tendency to state opinion *before* establishing common definitions.
Agreements disguised as disagreements (repeat the arguments of others as if these are new).
Slower progression (typing takes more time than speaking).
Possible to look back at the chat conversations while filling in the questionnaire.
Participants edited their messages quite a lot before sending.
Perceived by participants as more arduous.
An outside observer can have a hard time interpreting chat messages that conversational partners seem to understand perfectly.
Adding visual and auditory cues works confusing for outside observers and gives them the impression of a disregard for social relationship preservation.