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It's Surprisingly Nice to Hear You: Misunderstanding the Impact of Communication Media Can Lead to Suboptimal Choices of How to Connect With Others

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Positive social connections improve wellbeing. Technology increasingly affords a wide variety of media that people can use to connect with others, but not all media strengthen social connection equally. Optimizing wellbeing, therefore, requires choosing how to connect with others wisely. We predicted that people's preferences for communication media would be at least partly guided by the expected costs and benefits of the interaction—specifically, how awkward or uncomfortable the interaction would be and how connected they would feel to their partner—but that people's expectations would consistently undervalue the overall benefit of more intimate voice-based interactions. We tested this hypothesis by asking participants in a field experiment to reconnect with an old friend either over the phone or e-mail, and by asking laboratory participants to "chat" with a stranger over video, voice, or text-based media. Results indicated that interactions including voice (phone, video chat, and voice chat) created stronger social bonds and no increase in awkwardness, compared with interactions including text (e-mail, text chat), but miscalibrated expectations about awkwardness or connection could lead to suboptimal preferences for text-based media. Misunderstanding the consequences of using different communication media could create preferences for media that do not maximize either one's own or others' wellbeing.

Keywords: social connection, social cognition, communication

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Modern life affords many ways of connecting with others across different communication media, giving people choices about how best to connect with others. At any given time, people can connect over social media, video chat, text messaging, e-mail, or talk on the telephone, in addition to face-to-face conversation. Positive social connections are well-known to be essential for happiness and health (Baumeister & Leary, 1995; Diener & Seligman, 2002; Epley & Schroeder, 2014; Frey & Stutzer, 2002; Helliwell & Putnam, 2004; Holt-Lunstad, Smith, & Layton, 2010; House, Landis, & Umberson, 1988; Kahneman & Deaton, 2010; Myers, 2000), but not all media may foster social connection equally well. *How* people choose to connect with others may, therefore, affect wellbeing. Here we test how wisely people make choices about how to connect with others. We do so by examining how people's expectations about the outcomes of social interaction guide their choices of the media used to connect with others, and by then comparing those expectations against the actual experiences of interacting across different media. Our experiments test the extent to which people's expectations enable them to choose media that maximize their sense of connection to another person, and in so doing enhance their own (and others') wellbeing.

Experienced Interaction Outcomes Across Media

Communication media vary along many dimensions: they can involve live or asynchronous interactions (e.g., face-to-face interaction vs. Facebook posts), using relatively modern or ancient technology (e.g., e-mail vs. handwritten letters), conveying either many interpersonal cues or fewer cues (e.g., video chat vs. texting). Here we focus on one specific source of variance that existing psychological theory suggests is likely to be of systematic importance to the quality of social interactions: the presence versus absence of human voice.

We focus on this comparison because prior research has indicated that a person's voice reveals humanlike qualities of interpersonal warmth and intellectual competence (Schroeder & Epley, 2015, 2016; Schroeder, Kardas, & Epley, 2017). Other people seem more mindful—more thoughtful, intelligent, rational, and capable of emotional experience—when you literally hear what

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another person has to say compared with reading the same content in text. The first goal of this research is to meaningfully extend theorizing about the impact of communication media on social judgment to the experience of social interaction. Specifically, we predict that more intimate media containing voice will also increase the sense of connection to another person compared with media involving text alone. Because existing research suggests that the human voice is uniquely equipped for conveying humanlike mental capacities, we further predicted that additional individuating cues, namely visual cues, will not increase the sense of connection beyond the effects of voice alone. The human voice contains paralinguistic cues—like pauses and intonation (variance in pitch)—that reveal thinking and feeling as it is occurring in the mind of another person. Text-based media lacking these cues can make others seem relatively less competent and interpersonally warm.

In one experiment, for instance, professional recruiters rated job candidates as more competent, thoughtful, intelligent, and likable when recruiters heard a job candidate's "elevator pitch" than when they read the same pitch in a transcript or read a written pitch from the candidate (Schroeder & Epley, 2015). In another experiment, participants rated members of a political outgroup as more humanlike—more thoughtful, sophisticated, and emotionally warm—when they listened to an outgroup member explain his or her views compared with reading the outgroup member's explanation (Schroeder et al., 2017). If a person's voice reveals the presence of his or her mind more clearly than text alone, then we theorized that voice-based interaction could also lead to a greater sense of connection with another person than text-based interactions. This could occur, we reasoned, because the sense of connection to another person involves being connected to the mind of another person, a mind that is more fully revealed through a person's voice. A person's mind, after all, reflects his or her thoughts, feelings, beliefs, and attitudes, comprising the human being with whom one can connect. Consistent with this possibility, adolescent women in one experiment who were facing a stressful event either called their mother on the phone or chatted with her via text (Seltzer, Prososki, Ziegler, & Pollak, 2012). Those who called their mother—who heard her voice—were more calm and relaxed than those who typed with their mother. Although connecting with others consistently increases happiness and wellbeing, connecting with others over text-based social media does not appear to systematically increase happiness over time (Kross et al., 2013; Verduyn et al., 2015).

The human voice may therefore be an important cue for producing the wellbeing that comes from positive social connection. In one pilot test of this hypothesis, we asked 300 participants to fill out a questionnaire on the Friday before New Year's Eve (2017) and on the Monday afterward (see Experiment S1 in the online supplemental materials for details). At both points, participants reported how lonely they felt: How often they lacked companionship, how often they felt alone, and so on (measured by the 20-item UCLA Loneliness Scale; Russell, 1996). In the Monday survey, participants reported how much time they spent conversing with others on Saturday and Sunday in voice-based interactions (i.e., in person, on the phone, or voice/video chat) and in text-based interactions (i.e., e-mail, texting, or text-based social media). Results indicated that the more time participants spent in interactions involving voice, the less lonely participants felt after the weekend was over, $r = -0.18$, $p < .01$. The amount of time spent in interactions involving text, however, was not related to felt loneliness over the weekend, $r = .04$, $p = .57$. These correlation coefficients are significantly different from each other, $z = -2.83$, $p < .01$. These relationships between voice use, text use, and loneliness held when analyzing the results in regressions controlling for the loneliness participants reported in the earlier survey, respective ps = .01 and .42.

Because this experiment collapsed many different types of media into two categories of voice and text interactions, it cannot isolate the importance of a person's voice from other cues included in media that include a person's voice. It does, however, suggest that the media people choose for connecting with others could matter for how connected one feels to others, with more intimate voice-based media creating a stronger sense of connection than text-based media. Despite this potential positive social impact, text-based media are growing increasingly popular. For example, only 5% of adults in the United States reported using social media when the Pew Research Center began tracking usage in 2005. In 2019, 72% of Americans reported using social media (Pew Research Center, 2019). In a 2016 earnings conference call, Facebook CEO Mark Zuckerberg reported that his company's users spend an average of nearly an hour a day using its applications (Stewart, 2016). Do people fully understand how the media used for connecting with others influences how well they connect with others?

Expected Interaction Outcomes Across Media

Although voice-based conversation may yield a stronger sense of social connection, people's choices of how to connect with others are likely to be guided at least partly by their expectations of these outcomes. The second goal of this research is therefore to examine how people's expectations about social connection across communication media align with their experiences, and how these expectations about social connection affect the media people use for connecting with each other. We predict that systematic tendencies in human judgment are likely to produce systematically miscalibrated expectations about the outcomes of social interaction across different types of communication media, leading people to undervalue voice-based communication media. Even when connection is the primary goal, people may prefer to connect over media including text more strongly than would be optimal for the overall quality of their social interactions. This could happen for two reasons.

First, people may overlook the impact of different communication media on interaction outcomes when their attention is not explicitly drawn to it. In general, people tend to underestimate the impact of contextual factors on both their own and others' behavior, especially when their attention is not explicitly drawn to the context itself (Gilbert & Malone, 1995). The media through which people interact with others is a contextual feature that may capture less attention than the presumed content or intended purpose of the interaction itself, and hence may be neglected in people's expectations. Consistent with this possibility, participants in one experiment who communicated sincere and sarcastic messages to another person expected to communicate their intentions just as accurately when they were communicating with their voice versus in text alone, even though there was a large difference in recipients' actual ability to accurately infer the messages' intentions

(Kruger, Epley, Parker, & Ng, 2005). In the experiment described earlier involving job candidates giving elevator pitches (Schroeder & Epley, 2015), participants did not expect that communication medium would have a significant influence on how competent and intelligent they appeared to hypothetical employers, even though the job candidates were judged more favorably when their pitch was heard rather than read. In both of these cases, communicators seemed to be focused on the content of their communication rather than on the context in which it was communicated, thereby failing to recognize how communication media would affect the clarity of their message.

Second, all interactions in daily life come with a combination of potential costs and benefits. The costs could be rejection, negative evaluation, or conflict, any of which would create an awkward or uncomfortable conversation. The benefits are an enjoyable interaction, stronger social connections, and an increase in one's own wellbeing. In cases of uncertainty, risk aversion could lead to a heightened sense of threat that might lead people to overestimate the cost and underestimate the potential benefit of more intimate communication media compared with less intimate—and hence less risky—communication media (Rabin & Thaler, 2001). This risk aversion mechanism would arise primarily when the context of communication was brought explicitly to mind, while people were explicitly comparing one way of connecting against another.

Either overlooking the impact of communication media, or overweighting the potential negative outcomes of more intimate voice-based media, could create a stronger preference for text-based media than would be optimal for people's relationships. Preferences for using text-based media may come, at least in part, from miscalibrated expectations of the costs and benefits of more intimate voice-based media.

We conducted three experiments to test: (1) how different communication media affected the experience of social connection, (2) whether people's expectations about the consequences of media involving voice and text are systematically miscalibrated, and (3) if people's expectations guide their choice of how to connect with others in a way that may not be optimal for their own wellbeing. Experiments 1 and 2 compare expected outcomes of social interactions across communication media with actual experiences. Experiment 1 measures participants' expected outcomes within-participants, asking them to predict the outcome of reconnecting with an old friend both over text-based media *and* over voice-based media. Experiment 2, in contrast, measures the expected outcomes of different communication media between-participants, asking them to predict only the outcome of an upcoming interaction they are going to have either over text *or* using their voice. The within-participants design enables us to measure participants' expectations when the communication medium is explicitly drawn to participants' attention, whereas the between-participants design enables us to measure whether the communication medium spontaneously comes to mind to affect participants' expectations. Therefore, Experiment 1 measures how participants think communication media could affect their interaction and Experiment 2 measures whether participants spontaneously think about communication media when it is not explicitly drawn to their attention. These two experiments suggest that people overweight the negative consequences of voice-based interactions when explicitly comparing different media against each other but overlook the impact of different communication media almost entirely when their attention is not drawn to it explicitly (a hypothesis supported by a series of supplemental experiments). Finally, Experiment 3 measures how the expected effects of communication media affect participants' choices of how best to connect with another person. Across experiments, we predicted that participants would generally undervalue the overall positive outcomes of voice-based media (either by underestimating positive effects on connection or overestimating negative outcomes of awkwardness), thereby leading to a stronger preference for less intimate text-based media than would be optimal for participants' sense of social connection after social interactions.

Experiment 1: Reconnecting With an Old Friend

Reconnecting with old friends is likely to be of practical value by reestablishing dormant social network ties (Levin, Walter, & Murnighan, 2011), and also a pleasant experience by fostering one's sense of social connection (Baumeister & Leary, 1995). Modern technology has enabled many ways to reconnect with old friends. Experiment 1 examines how people's expectations about two communication media—telephone and e-mail—affect their preferences for how best to reconnect with an old friend, and also how these expectations compare with actual experiences. To do this, we asked participants in Experiment 1 to reconnect with an old friend they were once close to, had fallen out of touch with, and would like to reconnect with. After identifying this person, participants predicted how connected and awkward they would feel if they reconnected in two different ways: over the telephone (using their voice) and over e-mail (using only text). Participants also indicated which option they preferred (phone or e-mail). Instead of following this preference, we then randomly assigned each participant to either reconnect over the phone or e-mail.

We chose to compare a telephone interaction against an e-mail interaction because these two media are familiar ways for our participants to interact with others in their daily life, and because these two media isolate the use of voice versus text better than other media that more routinely include pictures, videos, or other audiovisual material (e.g., Facebook, Instagram). In addition, neither phone nor e-mail interactions are limited in their length either by design (e.g., Twitter) or by their typical use in practice (e.g., texting). It is important to note, however, that phone and e-mail also differ on dimensions other than just voice versus text, especially in terms of synchronous versus asynchronous interaction. We isolate the influence of voice in Experiment 2 by comparing synchronous video, voice, and text interactions.

We hypothesized that participants would feel more connected—but not more awkward—when they conversed over the phone than over e-mail, but that their expectations would fail to recognize this difference in outcomes, leading to a stronger preference for text-based media than would be warranted by participants' actual experiences.

Materials and Method

We did not exclude any data from any of the studies except where noted. We determined a minimum sample size in all experiments before collecting any data, and obtained informed consent from all participants. The Institutional Review Board approved all studies.

Participants. We recruited 200 University of Chicago students (96 female; $M_{age} = 20.29$, $SD = 2.81$) to participate in an experiment called "Reconnecting with Your Past" in exchange for $2. This field experiment involved a follow-up questionnaire after 1 week and a between-participants manipulation, so we targeted 200 participants thinking that a 50% response rate would still yield a sufficient sample size for our analyses (50 participants in each experimental condition). Of the 200 participants, 103 successfully completed the experiment (51.5%), 80 did not respond when contacted 1 week later, and 17 got back to us but indicated that they were unable to get in touch with the person they attempted to reach over the course of the week. Response rates did not differ by condition ($p = .4$). We include all 200 participants in our analysis of the within-participants prediction data collected during the first experimental session, but only the 103 participants (53 female; $M_{age} = 20.01$, $SD = 2.54$) in the follow-up between-participants analysis regarding actual felt connection. It is worth noting that participants' expectations about communicating over phone or e-mail did not differ between those who completed the follow-up and those who did not, all ts < 1.6 and ps $> .1$ (see online supplemental materials for details).

Procedure. Participants were told that people occasionally fall out of touch with others they were once fairly close to, and were then asked to think of someone they were once close to but had not interacted with in a least "a couple of years" whose contact information they could obtain (phone and e-mail address). We presented this instruction in bold-faced text to emphasize that we would actually be asking them to reach out to this person later on in the experiment. Participants provided the initials of the person that came to mind, an open-ended description of the nature of their relationship, how long it had been since they last interacted, and reported the current status of their relationship on a scale from 1 (*feels like we're miles apart*) to 9 (*feels like we're really close*).

We then asked participants to imagine reconnecting with this person from their past. First, we asked participants to indicate whether they would prefer to contact this person by phone or e-mail. Second, we asked participants to predict several outcomes of the interaction if they reconnected by e-mail and also if they reconnected by phone (in a counterbalanced order): how much they thought they would enjoy their interaction, how strong of a bond they thought they would form with this person, how well they thought they would get to know what the person was like today, the extent to which they felt like they would really reconnected, and how awkward it would be to reconnect with this person. Participants made all predictions on 9-point scales.

Participants learned that they would be randomly assigned to actually reconnect with their old friend either over e-mail or phone, and then drew a slip from a container that had 200 pieces of paper in it (half labeled "Phone" and half "E-mail"). Participants were told to reconnect at some point over the following week using their assigned mode of communication. To help increase the likelihood of following through on this assignment, participants completed a commitment form indicating the method they would use to contact the person, how they would obtain the individual's contact information, the date and time in the upcoming week that they would attempt to reach out, and where they would be at that time. Participants also provided their own e-mail address so we could send them a reminder and contact them with a follow-up questionnaire about their interaction 7 days after the initial lab session.

The follow-up questionnaire asked participants to indicate the initials of the person they had contacted, the method of communication used to reach out to them, the amount of time they spent interacting with this person (in minutes), and the broad nature of what was discussed. Participants then rated their actual feelings on the same 1–9 scales used in the first phase of the experiment, and how much effort they expended to obtain the contact information of the person they communicated with on a scale from 1 (*not much*) to 9 (*a whole lot*).

Results

Expectations. Sixty-seven percent of participants indicated that they would prefer to interact over e-mail than over the phone, $\chi^2(1, N = 200) = 23.12$, $p < .0001$, $\varphi = 0.34$. Participants expected that they would feel like they had formed a stronger bond with their old friend over the phone ($M = 5.72$, $SD = 1.82$) than over e-mail ($M = 4.44$, $SD = 1.72$), *paired* $t(199) = 8.59$, $p < .0001$, $d = 0.61$, and to feel they had "really connected" more strongly over the phone ($M = 6.08$, $SD = 1.85$) than over e-mail ($M = 4.34$, $SD = 1.69$), *paired* $t(199) = 11.32$, $p < .0001$, $d = 0.80$. However, participants also expected that they would feel more awkward over the phone ($M = 6.66$, $SD = 2.20$) than over e-mail ($M = 4.89$, $SD = 2.48$), *paired* $t(199) = 7.31$, $p < .0001$, $d = 0.52$. Consistent with our hypothesis, a regression predicting participants' choice of communication media from differences in expected awkwardness between the two communication media was significant, $\beta = -0.41$, $SE = 0.07$, $z = -6.07$, $p < .001$. Logistic regressions that predicted choice from differences in expected connection and strength of bond were also significant, respective βs $= 0.69$ and 0.55, SEs $= 0.11$ and 0.10, zs $= 6.16$ and 5.41, both ps $< .001$. A multiple regression predicting choice from all three items in the same model revealed the largest effect size for expected awkwardness ($\beta = -0.34$, $SE = 0.07$, $z = -4.61$, $p < .0001$), a significant effect for expected connectedness ($\beta = 0.54$, $SE = 0.14$, $z = 3.81$, $p = .0001$), and a weaker effect for expected strength of bond ($\beta = 0.11$, $SE = 0.13$, $z = 0.81$, $p = .42$).

As mentioned earlier, 52% of participants completed the follow-up questionnaire concerning their actual experiences. The expectations from this subset alone are consistent with the results described above. Among participants who successfully completed the experiment, 72% indicated that they would rather interact over e-mail than over the phone, $\chi^2(1, N = 103) = 19.66$, $p < .0001$, $\varphi = 0.44$. These participants also expected to feel a stronger bond over the phone ($M = 5.80$, $SD = 1.84$) than over e-mail ($M = 4.61$, $SD = 1.76$), *paired* $t(102) = 5.37$, $p < .001$, $d = 0.53$, and predicted that they would feel like they reconnected to a greater extent over the phone ($M = 6.18$, $SD = 1.76$) than over e-mail ($M = 4.52$, $SD = 1.61$), *paired* $t(102) = 8.05$, $p < .001$, $d = 0.79$. These participants also predicted that their interaction would feel more awkward over the phone ($M = 6.71$, $SD = 2.18$) than over e-mail ($M = 4.58$, $SD = 2.47$), *paired* $t(102) = 6.24$, $p < .001$, $d = 0.61$. A regression predicting participants' choice of communication media from differences in expected awkwardness was significant, $\beta = -0.44$, $SE = 0.10$, $z = -4.39$, $p < .001$. Logistic regressions that predicted choice from differences in expected connection and strength of bond were also significant, respective βs $= 0.79$ and 0.49, SEs $= 0.18$ and 0.14, zs $= 4.35$ and 3.61, both ps $< .001$. A multiple regression predicting choice revealed the

largest effect size for expected awkwardness ($\beta = -0.38$, $SE = 0.12$, $z = -3.31$, $p < .001$), a significant effect for connection ($\beta = 0.69$, $SE = 0.25$, $z = 2.78$, $p < .01$), and a weaker effect for strength of bond ($\beta = -0.02$, $SE = 0.19$, $z = -0.09$, $p = .93$).

These results indicate that participants' expectations about the outcome of the interaction are correlated with their preferences for reconnecting over text-based versus voice-based media. Although participants expected to form stronger bonds, and feel more connected after the conversation, if they talked with an old friend than if they typed to an old friend, they also expected to feel more awkward if they talked to their friend. Anticipating a relatively awkward interaction may have led participants to prefer text-based media for reconnecting with an old friend rather than using their voice.

Experience. Fifty-two percent of participants actually reconnected with an old friend, as requested, either using voice-based media (phone) or text-based media (e-mail). Consistent with participants' expectations reported above, Figure 1 shows that participants reported feeling a significantly stronger bond when assigned to reconnect over the phone ($M = 5.27$, $SD = 1.54$) than over e-mail ($M = 4.62$, $SD = 1.76$), $t(101) = 1.99$, $p < .05$, $d = 0.40$, and also reported a marginally significant stronger feeling that they really connected over the phone ($M = 4.96$, $SD = 1.79$) than over e-mail ($M = 4.24$, $SD = 2.07$), $t(101) = 1.88$, $p = .06$, $d = 0.37$. However, participants did not feel significantly more awkward when they connected over the phone ($M = 5.60$, $SD = 2.17$) than over e-mail ($M = 5.45$, $SD = 2.13$), $t < 0.4$, $p > .7$. Participants in the phone and e-mail conditions also did not differ significantly in the reported amount of time spent in the interaction ($M_{\text{phone}} = 17.23$ min, $SD_{\text{phone}} = 9.16$; $M_{\text{e-mail}} = 17.85$ min, $SD_{\text{e-mail}} = 11.20$), $t < 0.4$, $p > .7$, or in the reported difficulty of obtaining their old friends' phone numbers ($M = 2.73$, $SD = 2.01$) versus e-mail addresses ($M = 2.49$, $SD = 1.78$), $t < 0.7$, $p > .5$.

Because participants were randomly assigned to reconnect with their friend either over the phone or e-mail, some participants happened to be assigned to the media condition that they reported preferring while others were not. Participants assigned to their preferred versus nonpreferred media did not differ in the strength of the bond they felt with their conversation partner (Ms = 4.80 vs. 5.06, respectively, SDs = 1.84 vs. 1.48), $t(101) = -.78$, $p = .44$, $d = .15$. They also did not differ in the extent to which they felt like they really reconnected with their conversation partner (Ms = 4.61 vs. 4.53, respectively, SDs = 2.08 vs. 1.85), $t(101) = 0.19$, $p = .85$, $d = 0.04$. Participants assigned to their preferred communication media did, however, feel significantly less awkward than participants assigned to their nonpreferred media (Ms = 5.07 vs. 6.06, respectively, SDs = 2.25 vs. 1.89), $t(101) = -2.40$, $p = .02$, $d = 0.47$. Participants assigned to preferred versus nonpreferred media also did not differ significantly in the reported time spent in the interaction or the difficulty obtaining contact information, ts(99 and 101) = 0.22 and 0.07, respectively, ps = .82 and .94, ds = .05 and .02. Response rates also did not differ between these two groups, with 50% of those assigned to their preferred media completing the follow up procedure (56/112) and 47% of those assigned to their nonpreferred media doing so (41/88), $p > .6$. Controlling for whether participants were randomly assigned to their preferred media or not does not meaningfully alter the results of participants' experiences: people who connected over the phone reported feeling a marginally stronger bond ($b = 0.67$ ($SE = 0.37$), $p = .07$), and a significantly stronger sense of connection ($b = 0.93$ ($SE = 0.43$), $p = .03$), without feeling more awkward ($b = -0.35$ ($SE = 0.46$), $p = .46$), than those who connected over e-mail.

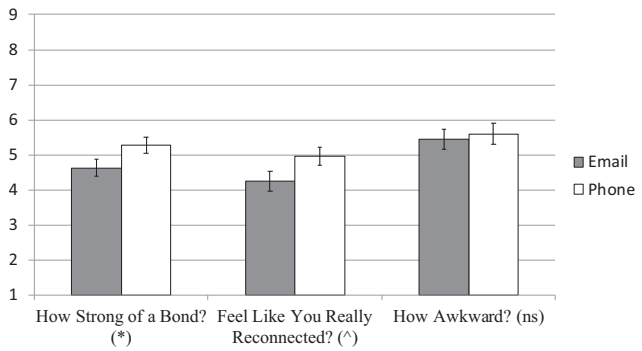

Figure 1. Results of Experiment 1 for strength of bond, connection, and awkwardness after actual interactions. Participants reported feeling like they reconnected more when calling their old friend (light bars) than when communicating with him or her over e-mail (dark bars). They did not report differences in felt awkwardness across conditions. * $p < .05$. ^ $p < .10$.

Decisions about how to connect with others are based in part on expectations of the costs and benefits of the interaction. These results suggest that miscalibrated expectations about the potential costs—in this case, awkwardness—of more intimate voice-based communication media could affect how people choose to connect with others. Participants expected that connecting with others over more intimate voice-based media would yield a stronger sense of social connection, but they also expected it to be more awkward than connecting through text-based media. This anticipated cost of awkwardness may have loomed larger than the anticipated benefits of connection when they were directly compared against each other, as two thirds of participants preferred to choose a medium that they believed was less effective (and indeed was less effective) for creating a sense of social connection.

Although these results suggest that the presence versus absence of human speech could be producing the effects we observed, a naturalistic field experiment cannot isolate the mediating mechanism of voice alone because the phone versus e-mail comparison may contain important confounds that contribute to the result we observed. This field experiment also yielded imperfect response rates, raising the possibility that those who completed the experiment are different in some way from those who did not, even though we found no evidence of any differences in their expectations of the social interaction. Therefore, we designed Experiment 2 to provide a more carefully controlled test of our hypothesis. This experiment ensures perfect response rates, constrains the topics of discussion to reduce any possible confounds in the content discussed across media conditions, and also experimentally controls the media through which participants interacted. Specifically, all participants engaged in live, synchronous interaction with another person either over text chat, voice chat, or video chat to more carefully isolate the potential importance of speech. Finally, Experiment 2 measured participants' expectations only about an upcoming interaction they were about to have, thereby measuring expectations about how communication media would influence their experience between-participants. Experiment 2 as-

sesses the extent to which people spontaneously expect that communication media will affect interaction outcomes when it is not brought explicitly to mind. Prior research (e.g., Kruger et al., 2005) suggests that people may overlook the importance of communication media for affecting the outcomes of interactions when they are not explicitly considering it.

Experiment 2: Becoming Friends, Faster and Slower

Participants interacted with a stranger in a modified "fast friends" procedure (see below; Aron, Melinat, Aron, Vallone, & Bator, 1997) either over text chat, voice chat, or video chat. Including a video condition allowed us to further increase the contribution of this experiment by assessing whether providing additional individuating cues—namely visual cues—would further increase expectations or actual experiences of connection or awkwardness compared with voice alone. Prior research has indicated that a person's voice contains humanizing cues that convey the presence of a thinking and feeling mind in another person compared with text alone, but that additional individuating visual cues do not affect evaluations above and beyond voice alone (Schroeder & Epley, 2015; Schroeder et al., 2017). This was true even in cases when the semantic content was held constant across different communication media. These results, and accompanying psychological theory about how voice conveys the presence of humanlike mind, led us to predict that voice-based media would create just as strong a sense of social connection as audiovisual media. Therefore, we predicted no significant difference in experiences of connection or awkwardness between voice and audiovisual media, indicating that voice uniquely provides a sense of social connection. It is again worth mentioning that although we believe existing work suggests this hypothesis, previous research involved measures of mind perception and not measures of social connection. We believe a key contribution of this article is moving from inferences about someone else's mind to comparing people's expectations about the outcomes of social interactions across media to their choices of how to interact with another person, and to their actual experiences of connection.

Before engaging in the interaction, participants predicted how connected they would feel to their partner (how much they would get to know, would like, and how strong a bond they would feel with their partner) and also how awkward they expected the interaction to be. Participants then actually conversed with each other. We again hypothesized that participants would feel more connected (but no more awkward) over voice-based media compared with text-based media, but that participants would again underestimate the positive outcomes of voice (compared with text) interaction.

Materials and Method

Participants. We recruited 302 participants (139 women; M_{age} = 28.31, SD = 12.67) to laboratories on the University of Chicago campus and in Downtown Chicago, IL to participate in an experiment called "Getting to Know People." This sample was drawn from a student population as well as a more representative community pool. Note that these two samples did not meaningfully differ in their responses to any of our measures (see online supplemental materials). We therefore combined them into a single experimental sample.

Each participant was paired with another participant with whom they had never interacted before. We targeted a minimum sample size of 300 so that we could have 50 pairs of participants in each of three experimental conditions. One additional pair completed the experiment because they signed up in advance for a time when another unscheduled pair was completing the experiment concurrently in a different physical location. This resulted in a total of 151 pairs for our analyses.

Procedure. We randomly assigned pairs to one of three groups: text, audio, and audiovisual. They were told that this was a study of interpersonal connection and their task was to get close to their partner. To get close, they were instructed to interact via a "sharing game," a modified version of the fast friends procedure (Aron et al., 1997). This paradigm involves two participants engaging in self-disclosure by asking each other intimate questions and having both parties reveal their answers. Participants were shown five questions they would be asking and answering in advance. These questions were (1) What would constitute the "perfect" day for you?; (2) Is there something you've dreamed of doing for a long time? Why haven't you done it?; (3) What is one of your favorite memories? (4) What is one of the more embarrassing moments in your life?; and (5) Can you describe a time you cried in front of another person? They were told that they would discuss their answers to these questions for about 10 min. Depending on their condition assignment, participants were notified that they would be communicating with their partner either through text in a chat window on a computer screen in front of them (text condition), through voice chat (audio condition), or through video chat (audiovisual condition). All interactions used Microsoft's Skype software, which provides all three communication media. One participant in each dyad was told that they would type or read the first question, provide their own answer, and then read or listen to their partner's response to that same question. This would continue until participants had gone through all five questions, with participants alternating who went first. They were told that the experimenter would leave the room for their interaction, but if their conversation lasted for longer than 15 min, they would be encouraged to conclude their conversation so they could move on to the next portion of the experiment.

Before interacting, participants predicted their reactions to the conversation on the following 9-point scales: How well do you think you will get to know your conversation partner, their true beliefs, their attitudes, their preferences, their interests—their minds? (1 = *not well*, 9 = *very well*); How similar do you think you will feel to your conversation partner? (1 = *not at all similar*, 9 = *very similar*); How much do you think you will enjoy your conversation? (1 = *not at all*, 9 = *very much*); How much do you think you will like your conversation partner? (1 = *not at all*, 9 = *very much*); How strong of a bond do you think you will form with your conversation partner? (1 = *weak, like a stranger*, 9 = *strong, like a new friend*); and How awkward do you think it will be to discuss these five questions with your partner? (1 = *not at all awkward*, 9 = *very awkward*).

Participants then completed the modified fast friends task, in either the text, audio, or audiovisual condition. After they had finished the interaction, they were asked to report how they actually felt on the same measures described above.

Results

In contrast to Experiment 1, in which participants predicted their experience in both the voice-based and text-based media conditions, Table 1 shows that participants in Experiment 2 predicted no significant differences across communication media in either connection or awkwardness (all ps $> .1$). In other words, participants showed no evidence of expecting that the medium through which they were about to connect with another person would affect their experience of connection or awkwardness. Compared against participants' expectations in Experiment 1, this result suggests that people's expectations may incorporate the anticipated impact of communication media only when they are explicitly compared against each other, but communication media may otherwise be a situational feature that participants otherwise overlook (consistent with prior research; Kruger et al., 2005).

Although participants did not expect different outcomes across communication media, their actual experiences differed in the same way we observed in Experiment 1. Specifically, participants again felt more connected to their partner when they communicated over voice-based media than when they used text alone (see Table 2). Adding additional cues beyond voice in the video condition did not increase participants' sense of connection or awkwardness compared with the audio condition alone, suggesting that simply adding more interpersonal cues (namely, visual cues) does not increase the sense of connection to another person. Instead, this result provides an important theoretical contribution by suggesting that the human voice is uniquely equipped to create a sense of connection with another person. Also consistent with Experiment 1, we observed no difference in experienced awkwardness between communication media conditions, $F < 1$, $p > .4$ (p value for all pairwise comparisons $>.2$).

Because we collected predicted ratings and actual responses from participants for only the experimental condition to which they were assigned, we can directly compare participants' expectations against their actual experiences. As predicted, participants underestimated how connected they would feel to their partner significantly more when interacting over voice than when interacting over text. Averaging across our five connection measures to form a composite (α for predictions >0.8; α for experiences >0.9), participants significantly *under*estimated how connected they would feel across conditions ($M_{predicted} = 5.27$, $SD_{predicted} = 1.05$; $M_{actual} = 6.15$, $SD_{actual} = 1.36$), *paired* $t(150) = 10.43$, $p < .0001$, $d = 0.85$, but this main effect was qualified by a significant interaction. Specifically, the difference between predicted and actual ratings was significantly greater in the audio ($M_{diff} = 1.02$, $SD_{diff} = 0.87$) and audiovisual conditions ($M_{diff} = 1.05$, $SD_{diff} = 1.02$) than in the text condition ($M_{diff} = 0.58$, $SD_{diff} = 1.16$), both ps $< .05$. The magnitude of misprediction did not differ between the audio and audiovisual conditions, $p > .8$. Connecting over voice-based media created a surprisingly strong bond with another person. Participants significantly overestimated how awkward their interaction would be to a similar degree in all three media conditions ($M_{predicted} = 5.08$, $SD_{predicted} = 1.62$; $M_{actual} = 3.37$, $SD_{actual} = 1.68$), *paired* $t(150) = -12.36$, $p < .001$, $d = 1.01$. Experiencing the "fast friends" procedure with a stranger was significantly less awkward than participants expected it to be, regardless of the media through which people interacted.

Experiments 1 and 2 suggest that communication media containing human voice, whether it contains additional visual cues or not, fosters a stronger sense of social connection than media lacking voice (i.e., text), without increasing the awkwardness of the interaction—even when reconnecting with an old friend (Experiment 1) or discussing relatively intimate questions with a stranger (Experiment 2). In both experiments, the more intimate media involving human voice was objectively superior for social engagement than text alone. However, both experiments suggest that people's expectations may be miscalibrated in a way that could lead them to undervalue the positive consequences of voice-based communication media.

Although participants in both Experiments 1 and 2 undervalued the positive outcomes of voice-based interactions, the exact nature of their expectations varied in what we believe are predictable ways. Participants in Experiment 1 expected differences across communication media whereas participants in Experiment 2 did not. We believe this difference emerged because participants in Experiment 1 directly compared the communication media against each other in a within-participants design whereas participants in Experiment 2 considered only one communication mode. The direct comparisons from Experiment 1, therefore, measure how people think communication media will influence their social interactions, while the indirect comparisons in Experiment 2 likely measure whether people overlook the importance of communication media altogether when their attention is not drawn to its impact.

To better understand how expectations might vary depending on whether communication media are compared directly or not, we

Table 1
Average Predictions for All Measures Before Actual Interactions in Experiment 2 in the Text, Voice, and Video Chat Conditions

Condition	Text	Voice	Video
N (pairs)	50	50	51
Got to know	4.94 ($SD = 1.29$)$_a$	5.32 ($SD = 1.54$)$_a$	4.89 ($SD = 1.34$)$_a$
Similar to partner	4.66 ($SD = 1.50$)$_a$	5.03 ($SD = 1.33$)$_a$	4.74 ($SD = 1.21$)$_a$
Enjoy conversation	5.79 ($SD = 1.30$)$_a$	5.86 ($SD = 1.25$)$_a$	5.79 ($SD = 1.20$)$_a$
Like partner	6.20 ($SD = 1.12$)$_a$	6.21 ($SD = 1.18$)$_a$	6.09 ($SD = 1.13$)$_a$
Strength of bond	4.52 ($SD = 1.28$)$_a$	4.59 ($SD = 1.52$)$_a$	4.43 ($SD = 1.25$)$_a$
Awkwardness	5.17 ($SD = 1.81$)$_a$	5.06 ($SD = 1.37$)$_a$	5.02 ($SD = 1.66$)$_a$

Note. Subscripts of the same letter across rows indicate that means are not significantly different from others in that row. Participants did not expect any differences across conditions in anticipation of their interaction.

Table 2
Average Actual Ratings for All Measures in Experiment 2 After Interactions Had Taken Place

Condition	Text	Voice	Video
N (pairs)	50	50	51
Got to know	5.38 ($SD = 1.63$)$_a$	6.04 ($SD = 1.62$)$_b$	5.90 ($SD = 1.47$)$_{a,b}$
Similar to partner	5.27 ($SD = 1.94$)$_a$	6.00 ($SD = 1.58$)$_b$	5.49 ($SD = 1.55$)$_{a,b}$
Enjoy conversation	6.50 ($SD = 1.50$)$_a$	7.22 ($SD = 1.33$)$_b$	7.05 ($SD = 1.32$)$_b$
Like partner	6.69 ($SD = 1.47$)$_a$	7.35 ($SD = 1.27$)$_b$	7.12 ($SD = 1.18$)$_{a,b}$
Strength of bond	5.15 ($SD = 1.62$)$_a$	5.67 ($SD = 1.75$)$_a$	5.46 ($SD = 1.42$)$_a$
Awkwardness	3.62 ($SD = 1.83$)$_a$	3.19 ($SD = 1.53$)$_a$	3.31 ($SD = 1.66$)$_a$

Note. Comparisons across rows are significantly different in the cases (at the $p < .05$ significance threshold) where a subscript does not include the same letter. Across items, participants in the voice conditions felt more connected, but no more awkward, on average, than participants in the text condition.

briefly report three additional experiments testing our hypotheses in the main text and describe them in more detail in the online supplemental materials. Experiment S2 in the online supplemental materials is a conceptual replication of Experiment 2 ($N = 492$) in which participants were randomly assigned to report their expectations for only one communication media condition (i.e., between-participants, for *either* text chat, voice chat, or audiovisual chat), to report their expectations for all media conditions (i.e., within-participants), or to engage in an actual interaction in one of the three communication media conditions. This large-scale experiment—that involved some participants making predictions and others having actual conversation experiences—asked participants about social connection but did not ask about awkwardness. Results indicated no difference in expectations across communication media when they were not compared directly against each other (i.e., between-participants), as we observed in Experiment 2 (see Table S3 in the online supplemental materials), but that participants did expect to feel more connected to their partner in voice-based media when predictions were made within-participants, as we observed in Experiment 1 (see Table S4 in the online supplemental materials). Once again, we replicated the effects on actual connection from Experiment 2, with participants feeling more connected to their partner over voice-based media than over text (video and audiovisual conditions did not differ; see Table S5 in the online supplemental materials).

In an additional follow-up experiment (Experiment S3 in the online supplemental materials), 52 laboratory participants imagined partaking in Experiment 2 in both the text *and* voice chat conditions (within-participants). In this experiment with participants evaluating both media conditions, we replicated the effects of Experiment 1 with participants expecting to feel significantly more connected and significantly more awkward in the voice-chat condition than in the text-chat condition.

In a third follow-up (Experiment S4 in the online supplemental materials), participants recruited online imagined participating in a study like Experiment 2 and were then randomly assigned to report how they expected they would feel in both the voice and text conditions (i.e., within-participants), or in only one of the two conditions (i.e., between-participants). We again observed significant differences in expectations of connection and awkwardness only in the within-participants version that involved an evaluation of both the voice and text conditions (see Figure S1 in the online supplemental materials).

These results suggest that people's expectations about the consequences of communication media may be miscalibrated either because they overlook its impact entirely when they are not explicitly led to think about it, or because they overestimate the negative outcomes that will come from more intimate voice-based media when they think about it more explicitly. Whether overlooked or misestimated, the consequence remains the same: people's expectations underestimate the positive outcomes of talking with another person in conversation, compared with typing with another person.

Experiment 3: Expectations Guide Choices

Regardless of which mechanism leads people to undervalue the positive consequences of communication media involving voice, we believe that miscalibrated expectations matter because they can guide people's choices for how to interact with others. Misunderstanding how the media through which we interact affects the outcomes of our interactions could lead people to choose an objectively inferior method for connecting with another person, such as choosing to send someone an e-mail, as a majority preferred to do in Experiment 1, instead of picking up the phone and having a more positive experience.

Of course, there are many different reasons why people might choose one communication medium over another. Experiment 3 provides a critical test of our hypotheses by examining how expectations about social connection and awkwardness, in particular, could guide people's choices of how to connect with others. If choices are based on mistaken expectations about how communication media affect the outcomes of social interaction, then miscalibrated expectations could lead people to choose media for connecting with others that are more psychologically distant than would be optimal for their own—and their conversation partner's—wellbeing.

We tested this hypothesis in Experiment 3 by asking participants to imagine reconnecting with old friends, as in Experiment 1, but to think of five different people from their past with whom they could reconnect. For each person, participants indicated how connected they expected they would feel to the given individual, and also how awkward they expected it would be to reconnect with them, both when interacting over e-mail (text-based media) and over the telephone (voice-based media). After reporting their expectations, participants indicated the strength of their preference for communicating over one communication media compared with the other. Based on the results of Experiment 1, we hypothesized that both expected awkwardness and expected connection would guide people's choices. Also based on the results of Experiment 1,

and the general tendency for negative outcomes to be weighed more heavily in choices compared with positive outcomes (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Kahneman & Tversky, 1979; Rozin & Royzman, 2001), we further hypothesized that people's choices would be better predicted by expected awkwardness than by expected connection.

Materials and Method

Participants. We recruited 101 participants from the United States (35 women; $M_{age} = 32.27$, $SD = 8.21$) through Amazon's Mechanical Turk platform to complete this study in exchange for $1.00.

Procedure. Participants were recruited for an experiment on social interaction. Similar to Experiment 1, participants were asked to think about reconnecting with old friends from their past that they had fallen out of touch with. Participants were then asked to think of five specific people they were once close to but who they hadn't interacted with in at least a couple of years. To help participants think broadly, we asked them to think of people from a variety of contexts in their life:

> These should be people that you'd say you've really fallen out of touch with, for whom you might wonder what they're up to these days, with whom you could catch up, and so on. Each individual person from your past can be from different domains of your life if you want. They could be people you knew at a previous job, from school, on a team you were on; really anyone you'd like that fits this description and with whom you could reconnect.

Participants were instructed that these should be people whose contact information (e-mail address and phone number) could be acquired. They were also told that we were interested in the communication media they would prefer, depending on the context.

For each target, participants indicated the person's initials, reported how they knew him or her, and briefly described why they might reconnect. Participants then considered what it would be like to actually reconnect with this person. They were asked to take a moment to imagine how the interaction would go if they were reaching out to the person over text-based media (e-mail) and voice-based media (telephone). For each target, participants rated how connected and how awkward they expected to feel, both over e-mail and over the phone on 9-point Likert scales. The specific questions they responded to were: "If you got in touch with this person [over email/over the phone], how connected do you think you'd feel to him or her—how strong of a bond do you think you would form with him or her?" (1 = *not at all connected*, 9 = *very connected*) and "How awkward do you think it would be to get in touch with this person [via email/via the phone]?" (1 = *not at all awkward*, 9 = *very awkward*). Finally, they indicated their preferred communication media on a 7-point scale with the following anchors: "Strongly Prefer Email," "Somewhat Prefer Email," "Slightly Prefer Email," "No Preference," "Slightly Prefer Phone," "Somewhat Prefer Phone," and "Strongly Prefer Phone."

Results

Because participants provided ratings for both communication media, we calculated a difference score for both expected connection and expected awkwardness over the phone versus over e-mail and used this to predict the difference in preferences for connecting via the phone versus e-mail across the five targets participants considered. Because predictions across the five targets were nested within participants, we constructed a linear mixed model with participant as a random effect, and the difference in predictions of connection and predictions of awkwardness as fixed effects. This allowed us to assess how variance in expected connection and expected awkwardness by communication media was related to variance in preference for connecting via phone versus e-mail across participants.

As predicted, participants' expectations of connection and awkwardness significantly predicted their preferences for how to connect with others. The more participants expected to feel connected via phone relative to e-mail, the more they preferred to talk via phone than to type via e-mail, $b = .22$, $SE = .04$, $t(501.6) = 5.89$, $p < .0001$. In contrast, the more awkward participants expected to feel via phone relative to e-mail, the more they preferred to type via e-mail rather than talk via phone, $b = -.45$, $SE = .04$, $t(500.9) = -12.41$, $p < .0001$. Comparing the absolute magnitude of these relationships against each other indicated that the effect of expected awkwardness on preferences was significantly larger than the effect of expected connection on preferences, $b = -.22$, $SE = .06$, $t(501.1) = -3.54$, $p < .001$. Choices for how to connect with others may, therefore, be based on miscalibrated expectations about awkwardness and connection. Either exaggerating the potential awkwardness that could come from more intimate voice-based media (as observed in Experiment 1), or overlooking the increased sense of connection that could come from voice-based media (as observed in Experiment 2), could lead to a mistaken preference for text-based media in everyday life.

General Discussion

Modern technology provides communication tools that enable social interaction regardless of physical distance, thereby giving people distinctly new choices in modern life about exactly how to connect with another person. People's choices tend to be guided at least in part by assessments of expected value (Becker, 1993). Decisions about how to interact with others should, therefore, be guided partly by the expected outcomes of an interaction. The experiments we report suggest that people's expectations about the impact of communication media on social interaction may be imperfectly related to its actual impact, in a way that could encourage people to choose less intimate—and potentially less effective—media for communicating with others.

In a correlational study described in the introduction, respondents reported feeling less lonely over the course of a New Year's weekend as they spent more time in voice-based communication, which included face-to-face meetings as well as voice-based interactions. Experiments 1 and 2 highlighted the importance of voice more specifically, and manipulated communication media experimentally. In both experiments, participants reported feeling more connected to their conversation partner—either an old friend or a stranger—when they talked using voice-based media than when they typed using text-based media. Participants' expectations in Experiment 1 anticipated this effect on the strength of their social connections when they compared the two media against each other directly, but they also expected that voice-based inter-

action would be more awkward than text-based interaction. As a result, most participants preferred to reconnect over text. This preference appeared to be at least somewhat mistaken as actual interactions using one's voice created a stronger sense of social connection but proved no more awkward than interactions using text. Participants in Experiment 2 considered interacting only over one communication media, and their expectations did not vary across media conditions but their experiences did. These participants underestimated how connected they would feel to their partner more over voice-based media than over text-based media. Both experiments suggest that people may undervalue the benefits of connecting through more intimate, voice-based, media.

We believe these miscalibrated expectations matter because they may serve as an important guide for how people choose to interact with others, potentially creating a misplaced preference for less intimate text-based media. Experiment 3 provided direct support for this possibility. Specifically, both anticipated feelings of connection and awkwardness were correlated with participants' preferences for how best to interact with others. The more participants expected to feel connected to others, the more they preferred connecting over voice-based media, while the more awkward participants expected an interaction to be, the more they preferred engaging with the person through text-based media. Engaging in conversation can involve perceived costs and perceived benefits. Costs like feeling awkward may loom large before an interaction, guiding decisions about how to communicate. Experiments 1 and 2, however, indicate that voice-based interactions leave people feeling more connected to their conversation partner, while being no more awkward than text-based interactions. Some scholars have argued that the increase in online interaction through social media platforms in the 21st century has partly contributed to increases in loneliness and self-focus (Cacioppo & Patrick, 2008; Turkle, 2012). Our results suggest that the demand for less intimate social media platforms may come not only from the ease of connecting over these text-based platforms, but also because people undervalue the positive outcomes of more intimate voice-based media.

New Questions

We believe these experiments raise several important questions for future research. First, our experiments indicate that *how* one person connects with another influences how strongly connected they will feel, but they do not do not identify exactly why voice-based media create stronger social connection than text-based media. Previous research has demonstrated that paralinguistic cues present in speech, such as pitch variance (i.e., intonation), convey the presence of a more humanlike mind that is capable of both thinking and feeling (Schroeder & Epley, 2015; Schroeder et al., 2017). To the extent that one's sense of connection to another person comes from feeling connected to his or her mind—to another person's thoughts, beliefs, attitudes, emotions, or experiences—we would expect that a person's voice would yield a stronger sense of connection. Experiment 2 suggests that the presence versus absence of voice may have unique effects on connection, as adding additional individuating visual cues did not increase connection above and beyond voice alone. However, communication media may vary along many potential dimensions, including the amount of semantic content conveyed, the length of an interaction, the ease of generating content, and the content discussed. Experiment 2 addresses some of these confounds by controlling both the length of conversation as well as the questions participants discussed, but more research is clearly needed to identify the precise role that voice plays in creating a sense of social connection.

It may be particularly interesting to further investigate the potential importance of the synchronous nature of communication with regards to the connections one feels with others. It is possible that synchronous interaction could lead to stronger feelings of connection. Of course, Experiment 2 controls for this to some extent by asking participants to engage in a live text chat, more closely matching the synchronous element of the voice and audiovisual conditions. Even when all interactions were relatively synchronous, participants felt more connected when talking than typing. However, it could be the case that live voice-based interaction (such as voice chat or video chat) still enables more responsiveness than text chat, and hence contributes more to the sense of feeling connected to another person. People can likely interject more easily in the flow of a conversation when using their voice than when using text. By responding to what others are saying in real time, people may feel more "in sync" over synchronous voice chat, and hence more connected, than over synchronous text chat. Note, though, that Experiment 2 also included an audiovisual condition. One might expect being able to see someone and, therefore, having additional visual cues—such as responding with, say, a head nod or a smile—would also increase feelings of synchrony, and hence connection. It did not, as feelings of connection were just as strong when participants communicated over voice chat as they were when participants communicated over video chat. Nevertheless, understanding how perceived responsiveness may also play a role in the impact of communication media on social connection is well worth exploring.

Although Experiment 2 compared synchronous voice chat and synchronous text chat, we did not study asynchronous voice interactions in any of these experiments. Although voice-based interaction is typically synchronous, one could in theory exchange back-and-forth audio messages with another person, such as exchanging voice mails with another person. We tried to examine common methods for connecting with others in our work. Prior research documenting the impact of voice on mind perception used asynchronous voice and text messages, leading us to expect that an asynchronous exchange of voicemails, for instance, would also lead to stronger feelings of connection than identical exchanges of text messages.

In addition, our research focused on communication media that enable social connection at any amount of physical distance via video, phone, or e-mail, but arguably the most intimate social interaction involves close physical contact, including physical touch. The mere touch of a hand on one's forearm can convey distinct emotions, including love, fear, and gratitude (Hertenstein, Keltner, App, Bulleit, & Jaskolka, 2006). Handshaking can improve negotiation outcomes by conveying prosocial intentions (Schroeder, Risen, Gino, & Norton, 2019), while NBA teams that touch more often early in the season have been found to perform better at the end of the season (Kraus, Huang, & Keltner, 2010). And close social contact in the form of a hug may even improve immune system functioning enough to protect a person from catching the common cold (Cohen, Janicki-Deverts, Turner, & Doyle, 2015). Although our research cannot compare the relative

impact of voice against physical contact in creating a sense of connection, our experiments do suggest that people are likely to overestimate how awkward more intimate social connection may feel, and hence avoid appropriate physical contact more often than might be ideal for the strength of their relationships.

Moreover, our research identifies how miscalibrated expectations measured at a single time point could lead to suboptimal choices of how to connect with another person, but the impact of these expectations could vary with psychological distance from an event (Trope & Liberman, 2010). Decisions to engage with others can often represent approach/avoidance conflicts, including both a desire to reach out and connect with another person but also fears of rejection, awkwardness, or even physical or emotional harm. The potential negative outcomes of an interaction may loom larger the closer a person is to actually experiencing it (Gilovich, Kerr, & Medvec, 1993; Kahneman & Tversky, 1979; Miller & Murray, 1952; Van Boven, Loewenstein, & Dunning, 2005). In Experiment 3, the perceived awkwardness of an interaction—an avoidance-oriented cue—was a significantly more powerful predictor of people's choices of how to interact with another person than was the perceived sense of connection that would follow from an interaction. The strength of this cue may become even stronger as one gets closer to an actual social interaction, but may be considerably weaker for more distant social interactions. We suspect readers may resonate with the authors' experiences of planning to reach out and call or visit an old friend sometime in the next month or two only to "chicken out" and avoid the interaction altogether when the time actually comes to reach out, or to send an e-mail at the last minute rather than picking up the phone as one might have initially preferred. It is at least possible that people misunderstand the impact of communication media most at the very time they are making a choice of how interact with another person, because of the magnified intensity of avoidance-oriented motives and fears.

Finally, we have identified how miscalibrated expectations may lead to suboptimal choices of how to interact with others, but we have not identified how best to calibrate people's expectations to help them make wiser choices in their daily lives. Our data suggest that learning from actual experience could serve to calibrate people's judgment by providing more accurate feedback. However, miscalibrated expectations are likely to serve as a barrier to this learning mechanism because they are likely to be at least somewhat self-fulfilling, with miscalibrated expectations guiding people's choices in a way that inhibits accurate learning (see also Fazio, Eiser, & Shook, 2004). If a person expects it will be awkward to reach out and talk to another person, then he or she is likely to choose less intimate communication media and will, therefore, fail to learn that those expectations could have been wrong. This predicts that people who have more experience with more intimate communication media involving voice will also have more calibrated expectations about their consequences. It also suggests that providing people with more unbiased experience is a key to increasing the accuracy of their expectations. Indeed, in one experiment, people who routinely avoid talking to strangers underestimated how positive talking to a stranger would actually be, while those who routinely talk to strangers did not underestimate how positive the experience would be (Epley & Schroeder, 2014; see also Zelenski et al., 2013). Understanding exactly how people update their expectations after interacting with others is a critical topic for future research.

Broader Implications

While empirical questions remain, we think our experiments and the broader literature of which they are a part have implications now for policymakers trying to improve public health, for technology developers trying to create new social media, and for individuals trying to strengthen their social ties.

For policymakers and other social scientists, our data suggest that changes in the technology that people use to interact with each other could affect how connected people actually feel to each other and, therefore, impact mental and physical health outcomes. Survey research suggests that reported loneliness has increased over the last two decades, at least in the United States (Cigna, 2018), just as technology is providing ever-increasing opportunities for text-based interactions. Experiencing a global pandemic in early 2020 that has kept people from interacting with each other in person for months on end, in contrast, seems to have meaningfully shifted technology use, with the frequency of voice and video calls skyrocketing compared with prepandemic levels (Comcast, 2020; Kang, 2020; Kastrenakes, 2020). Unable to connect with loved ones in person, people were forced to connect at a distance. Given how important a sense of social connection is for both a person's wellbeing and physical health, variance in how people are using technology to connect with others could explain meaningful variance in public health outcomes. Educating the public in how to better use technology to maintain their mental and physical health, and providing such technology affordably to disadvantaged communities, should be a public service priority.

For technology developers, our data highlight the importance of catering not only to technology's ease, which could drive demand at the time of a consumer purchase, but also to its actual effectiveness, which could be related to a consumer's long-term satisfaction. Technology is neither good nor bad; it is simply a tool that can be utilized more or less wisely by its users. Scientific research can be a useful guide to technology developers for making products more beneficial to users' experiences. Technology aimed at connecting human beings together should make it easy not just to type to each other, but perhaps more important, to talk to each other, nudging people into ways of connecting that users could ultimately find to be more satisfying. Our evidence suggests that miscalibrated expectations could be driving somewhat misplaced consumer demand for less intimate ways of connecting with others, including the dramatic rise in social media platforms that are primarily text-based, such as Twitter and Facebook.

Finally, for individuals trying to maintain a strong sense of social connection to others, our data provide yet another reminder of the importance of using technology wisely. Although e-mail and other text-based media can be excellent for scheduling meetings and sending spreadsheets, connecting with others is better done using one's voice. Ironically, the barrier to using communication media wisely may not stem from any limits in modern technology, but rather from age-old limits in human psychology. Fears about awkward interactions could push people toward less intimate communication media, like text, but those fears seem to be miscalibrated. Understanding this can help people make wiser choices about how to interact with others to maximize both their own and others' wellbeing.

References

Aron, A., Melinat, E., Aron, E. N., Vallone, R. D., & Bator, R. J. (1997). The experimental generation of interpersonal closeness: A procedure and some preliminary findings. *Personality and Social Psychology Bulletin, 23,* 363–377. http://dx.doi.org/10.1177/0146167297234003

Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology, 5,* 323–370. http://dx.doi.org/10.1037/1089-2680.5.4.323

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117,* 497–529. http://dx.doi.org/10.1037/0033-2909.117.3.497

Becker, G. S. (1993). Nobel lecture: The economic way of looking at behavior. *Journal of Political Economy, 101,* 385–409. http://dx.doi.org/10.1086/261880

Cacioppo, J. T., & Patrick, W. (2008). *Loneliness: Human nature and the need for social connection*. New York, NY: Norton.

Cigna. (2018). *Cigna U.S. loneliness index: Survey of 20,000 Americans examining behaviors driving loneliness in the United States*. Retrieved from https://www.ipsos.com/sites/default/files/ct/news/documents/2018-05/us-loneliness-index-report-pr-2018-05-01.pdf

Cohen, S., Janicki-Deverts, D., Turner, R. B., & Doyle, W. J. (2015). Does hugging provide stress-buffering social support? A study of susceptibility to upper respiratory infection and illness. *Psychological Science, 26,* 135–147. http://dx.doi.org/10.1177/0956797614559284

Comcast. (2020, May 30). *COVID-19 network update*. Retrieved from https://corporate.comcast.com/covid-19/network

Diener, E., & Seligman, M. E. P. (2002). Very happy people. *Psychological Science, 13,* 81–84. http://dx.doi.org/10.1111/1467-9280.00415

Epley, N., & Schroeder, J. (2014). Mistakenly seeking solitude. *Journal of Experimental Psychology: General, 143,* 1980–1999. http://dx.doi.org/10.1037/a0037323

Fazio, R. H., Eiser, J. R., & Shook, N. J. (2004). Attitude formation through exploration: Valence asymmetries. *Journal of Personality and Social Psychology, 87,* 293–311. http://dx.doi.org/10.1037/0022-3514.87.3.293

Frey, B. S., & Stutzer, A. (2002). What can economists learn from happiness research? *Journal of Economic Literature, 40,* 402–435. http://dx.doi.org/10.1257/jel.40.2.402

Gilbert, D. T., & Malone, P. S. (1995). The correspondence bias. *Psychological Bulletin, 117,* 21–38. http://dx.doi.org/10.1037/0033-2909.117.1.21

Gilovich, T., Kerr, M., & Medvec, V. H. (1993). Effect of temporal perspective on subjective confidence. *Journal of Personality and Social Psychology, 64,* 552–560. http://dx.doi.org/10.1037/0022-3514.64.4.552

Helliwell, J. F., & Putnam, R. D. (2004). The social context of well-being. *Philosophical Transactions of the Royal Society of London, Series B: Biological Sciences, 359,* 1435–1446. http://dx.doi.org/10.1098/rstb.2004.1522

Hertenstein, M. J., Keltner, D., App, B., Bulleit, B. A., & Jaskolka, A. R. (2006). Touch communicates distinct emotions. *Emotion, 6,* 528–533. http://dx.doi.org/10.1037/1528-3542.6.3.528

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: A meta-analytic review. *PLoS Medicine, 7,* e1000316. http://dx.doi.org/10.1371/journal.pmed.1000316

House, J. S., Landis, K. R., & Umberson, D. (1988). Social relationships and health. *Science, 241,* 540–545. http://dx.doi.org/10.1126/science.3399889

Kahneman, D., & Deaton, A. (2010). High income improves evaluation of life but not emotional well-being. *Proceedings of the National Academy of Sciences of the United States of America, 107,* 16489–16493. http://dx.doi.org/10.1073/pnas.1011492107

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47,* 263–291. http://dx.doi.org/10.2307/1914185

Kang, C. (2020, April 9). The humble phone call has made a comeback. *The New York Times*. Retrieved from https://www.nytimes.com/2020/04/09/technology/phone-calls-voice-virus.html

Kastrenakes, J. (2020, March 30). Comcast says voice and video calls have skyrocketed 212 percent during widespread self-isolation. *The Verge*. Retrieved from https://www.theverge.com/2020/3/30/21200040/comcast-video-chats-voip-traffic-spikes-coronavirus-work-from-home

Kraus, M. W., Huang, C., & Keltner, D. (2010). Tactile communication, cooperation, and performance: An ethological study of the NBA. *Emotion, 10,* 745–749. http://dx.doi.org/10.1037/a0019382

Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., . . . Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. *PLoS ONE, 8,* e69841. http://dx.doi.org/10.1371/journal.pone.0069841

Kruger, J., Epley, N., Parker, J., & Ng, Z. W. (2005). Egocentrism over e-mail: Can we communicate as well as we think? *Journal of Personality and Social Psychology, 89,* 925–936. http://dx.doi.org/10.1037/0022-3514.89.6.925

Kumar, A., & Epley, N. (2020). *It's surprisingly nice to hear you: Misunderstanding the impact of communication media can lead to suboptimal choices of how to connect with others*. Retrieved from osf.io/szt4n

Levin, D. Z., Walter, J., & Murnighan, J. K. (2011). Dormant ties: The value of reconnecting. *Organization Science, 22,* 923–939. http://dx.doi.org/10.1287/orsc.1100.0576

Miller, N. E., & Murray, E. J. (1952). Displacement and conflict; learnable drive as a basis for the steeper gradient of avoidance than of approach. *Journal of Experimental Psychology, 43,* 227–231. http://dx.doi.org/10.1037/h0053532

Myers, D. G. (2000). The funds, friends, and faith of happy people. *American Psychologist, 55,* 56–67. http://dx.doi.org/10.1037/0003-066X.55.1.56

Pew Research Center. (2019). *Social media fact sheet*. Retrieved from http://www.pewinternet.org/fact-sheet/social-media/

Rabin, M., & Thaler, R. H. (2001). Anomalies: Risk aversion. *The Journal of Economic Perspectives, 15,* 219–232. http://dx.doi.org/10.1257/jep.15.1.219

Rozin, P., & Royzman, E. B. (2001). Negativity bias, negativity dominance, and contagion. *Personality and Social Psychology Review, 5,* 296–320. http://dx.doi.org/10.1207/S15327957PSPR0504_2

Russell, D. W. (1996). UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment, 66,* 20–40. http://dx.doi.org/10.1207/s15327752jpa6601_2

Schroeder, J., & Epley, N. (2015). The sound of intellect: Speech reveals a thoughtful mind, increasing a job candidate's appeal. *Psychological Science, 26,* 877–891. http://dx.doi.org/10.1177/0956797615572906

Schroeder, J., & Epley, N. (2016). Mistaking minds and machines: How speech affects dehumanization and anthropomorphism. *Journal of Experimental Psychology: General, 145,* 1427–1437. http://dx.doi.org/10.1037/xge0000214

Schroeder, J., Kardas, M., & Epley, N. (2017). The humanizing voice: Speech reveals, and text conceals, a more thoughtful mind in the midst of disagreement. *Psychological Science, 28,* 1745–1762. http://dx.doi.org/10.1177/0956797617713798

Schroeder, J., Risen, J. L., Gino, F., & Norton, M. I. (2019). Handshaking promotes deal-making by signaling cooperative intent. *Journal of Personality and Social Psychology, 116,* 743–768. http://dx.doi.org/10.1037/pspi0000157

Seltzer, L. J., Prososki, A. R., Ziegler, T. E., & Pollak, S. D. (2012). Instant messages vs. speech: Hormones and why we still need to hear each other. *Evolution and Human Behavior, 33,* 42–45. http://dx.doi.org/10.1016/j.evolhumbehav.2011.05.004

Stewart, J. B. (2016, May 5). Facebook has 50 minutes of your time each day. It wants more. *The New York Times*. Retrieved from https://www.nytimes.com/2016/05/06/business/facebook-bends-the-rules-of-audience-engagement-to-its-advantage.html

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review, 117,* 440–463. http://dx.doi.org/10.1037/a0018963

Turkle, S. (2012). *Alone together: Why we expect more from technology and less from each other*. New York, NY: Basic Books.

Van Boven, L., Loewenstein, G., & Dunning, D. (2005). The illusion of courage in social predictions: Underestimating the impact of fear of embarrassment on other people. *Organizational Behavior and Human Decision Processes, 96,* 130–141. http://dx.doi.org/10.1016/j.obhdp.2004.12.001

Verduyn, P., Lee, D. S., Park, J., Shablack, H., Orvell, A., Bayer, J., . . . Kross, E. (2015). Passive Facebook usage undermines affective well-being: Experimental and longitudinal evidence. *Journal of Experimental Psychology: General, 144,* 480–488. http://dx.doi.org/10.1037/xge0000057

Zelenski, J. M., Whelan, D. C., Nealis, L. J., Besner, C. M., Santoro, M. S., & Wynn, J. E. (2013). Personality and affective forecasting: Trait introverts underpredict the hedonic benefits of acting extraverted. *Journal of Personality and Social Psychology, 104,* 1092–1108. http://dx.doi.org/10.1037/a0032281

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