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# The Thought Gap After Conversation: Underestimating the Frequency of Others' Thoughts About Us

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After conversations, people continue to think about their conversation partners. They remember their stories, revisit their advice, and replay their criticisms. But do people realize that their conversation partners are doing the same? In eight studies, we explored the possibility that people would systematically underestimate how much their conversation partners think about them following interactions. We found evidence for this *thought gap* in a variety of contexts, including field conversations in a dining hall (Study 1), “getting acquainted” conversations in the lab (Study 2), intimate conversations among friends (Study 3), and arguments between romantic partners (Study 4). Several additional studies investigated a possible explanation for the thought gap: the asymmetric availability of one’s own thoughts compared with others’ thoughts. Accordingly, the thought gap increased when conversations became more salient (Study 4) and as people’s thoughts had more time to accumulate after a conversation (Study 6); conversely, the thought gap decreased when people were prompted to reflect on their conversation partners’ thoughts (Study 5). Consistent with our proposed mechanism, we also found that the thought gap was moderated by trait rumination, or the extent to which people’s thoughts come easily and repetitively to mind (Study 7). In a final study, we explored the consequences of the thought gap by comparing the effects of thought frequency to thought valence on the likelihood of reconciliation after an argument (Study 8). Collectively, these studies demonstrate that people remain on their conversation partners’ minds more than they know.

**Keywords:** availability, conversation, metaperception, person perception, thought frequency

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What a wee little part of a person's life are his acts and his words! His real life is led in his head and is known to none but himself.


— Mark Twain, *The Biography of Mark Twain*

People spend upward of 50% of their waking hours engaged in some form of communication—with conversation being by the far the most common form (Klemmer & Snyder, 1972; Mehl &

Pennebaker, 2003; Rankin, 1928; Samovar et al., 1969). This leaves the rest of the day to remember, replay, and relive what was said. The result is that people’s conversations affect them not only while they are taking place, but also long after the last word is spoken.

Thinking about past conversations, however, presents unique psychological challenges, one of which involves knowing whether you have impacted your conversation partners to the same degree that they have impacted you. In other words, people know very well whether they are still laughing at a colleague’s joke, mulling over a friend’s advice, or thinking about a spouse after an argument. But how do people come to understand how much their conversation partners are still thinking about them—and are their beliefs accurate?

To answer these questions, we had people report on the frequency of their thoughts about their conversation partners, and we also had people estimate the frequency of their conversation partners’ thoughts about them. Because people have privileged access to their own thoughts but only limited access to others’ thoughts, we explored the possibility that people would systematically underestimate the extent to which they remained on their conversation partner’s mind after a conversation. Conversations linger in everyone’s minds, but we suspected that people would mistakenly believe

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Data are posted to a public archive: <https://researchbox.org/285>; <https://osf.io/rny4b/>.

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this is especially true of themselves compared with their conversation partners. Here, we present eight studies that establish the existence of such a *thought gap*, identify its causes, and explore its consequences.

### Perceiving Others' Thoughts: During and After Conversation

People have privileged access to their own subjective experience, which means that they will always know their own thoughts more directly and with greater certainty than they can know the thoughts of others (Alston, 1971; Cottingham, 1996; Heil, 1988; Pronin, 2008; Pronin et al., 2002; Ross & Sicoly, 1979). Engaging in the act of conversation, however, might be the closest people come to truly knowing the thoughts of another person.

During conversation, others' thoughts are more accessible for the obvious reason that they share their thoughts directly using language. In addition, many thoughts that people do not share explicitly can nonetheless be inferred. For example, it is unlikely that a new acquaintance would say to you, "I really like you, and I think our relationship is increasing in closeness." But during conversation, you may be able to infer how much a new conversation partner likes you by how much they self-disclose (Collins & Miller, 1994), whether they trust you enough to gossip (Dunbar, 1998), or by the steady flow of nonverbal information, such as the pitch and prosody of their voice (Gregory & Webster, 1996). Although conversation is far from a perfect conduit into other's thoughts—after all, people edit their thoughts out of politeness, self-protection, or to ingratiate (Beck & Clark, 2010; Brown & Levinson, 1987; Jones, 1964)—for the most part, conversation is a cooperative act in which people come together and reveal themselves, and, as a result, conversation provides a rare and intimate glimpse into the thoughts of another person. That is, until the conversation is over.

After conversations, people are put in a remarkably difficult position with respect to knowing others' thoughts, as they no longer have access to the real-time feedback that social interaction provides. This is a significant psychological transition, as people go from being intimately connected with another person's thoughts to being alone with their own thoughts. One consequence is that a gulf widens between the certainty that people feel about their own thoughts (e.g., "I really enjoyed that conversation, and I'm thinking a lot about what she said."), and the certainty that people feel about their conversation partner's thoughts (e.g., "I wonder if she liked me—or if she's even thinking about me at all?"). In response to this uncertainty, people's judgments about others' thoughts assume a characteristic shape, which existing research has explored.

### Content of Thoughts

There are two broad categories of questions one might ask about knowing others' thoughts after a conversation: first, what is the *content* of one's conversation partner's thoughts? And second, what is the *frequency* of one's conversation partner's thoughts? Existing research has mainly focused on the former.

After interactions, the content of people's thoughts often consists of what their conversation partners might think about *them*—does my conversation partner think that I am trustworthy or

duplicious, easygoing or neurotic, hardworking or lazy? These so-called "metaperceptions" pose a fundamental challenge for perceivers because they must be formed under conditions of substantial uncertainty. However, despite this uncertainty, people do manage to see themselves through others' eyes, with research showing that people have significant insight into both their reputation generally (e.g., "When I meet people, they tend to think I'm extraverted.") as well as more modest insight into how they are uniquely perceived by specific individuals (e.g., "I know Jim thinks I'm extraverted, but I think Jack sees me as more on the introverted side"; Carlson & Furr, 2009; Carlson & Kenny, 2012; Carlson et al., 2011; Kenny & DePaulo, 1993; Levesque, 1997). What psychological processes allow people to arrive at these metaperceptual judgments?

### Egocentric Projection

Ironically, people's greatest tools for peering into the minds of others might simply be the assumption that others' minds are similar to their own. Indeed, *self-perception* of one's own traits (e.g., "I know I can be a bit neurotic.") often allows people to infer what others might think (e.g., "My new colleague probably thinks I'm neurotic too"; Kaplan et al., 2009; Kenny, 1994; Kenny & DePaulo, 1993; Shrauger & Schoeneman, 1979). In addition to self-perception, research has also shown that *assumed reciprocity* of thoughts can also function as a useful heuristic—if I like you, you probably like me—especially in contexts when people are trying to infer interpersonal attraction or liking (Kenny, 1994, 2019). How do these strategies work when trying to estimate the frequency, rather than the content, of others' thoughts?

### Frequency of Thoughts

Although there is less research devoted to the topic, it seems plausible that the same psychological processes that are responsible for how people perceive (and misperceive) the *content* of others' thoughts might also help explain how people perceive (and misperceive) the *frequency* of others' thoughts.

As previously discussed, success in perceiving the content of others' thoughts is greatest when people have a stable view of where they fall on some dimension or trait: If someone knows they are extraverted, they can assume that this will shine through in most social situations and thus be recognized by a new conversation partner. But does this same logic apply when people are trying to estimate the frequency of others' thoughts about them? It is not clear that people even have an existing self-view when it comes to how much others think about them after conversation. Moreover, any such view is likely constructed from very limited information. After all, when your friends think about you in your absence, what percentage of the time do they actually tell you?

As we just saw, the second major strategy that people use to infer the content of others' thoughts about them is *assumed reciprocity*. Regarding frequency of thoughts, it seems likely that people would avail themselves of this strategy (e.g., "I'm thinking a lot about her after our conversation, so she is probably thinking a lot about me."). But we argue that people are liable to stop short of assuming full reciprocity, where others' thoughts are at parity with their own, due to the sheer lack of evidence.

In sum, when trying to estimate the *frequency* of others' thoughts about them, people will likely adopt the same strategies as when they are trying to estimate the *content* of others' thoughts. In the case of frequency, however, these basic strategies appear to be even less useful, laying the groundwork for a systematic bias in how much people believe that their conversation partners are thinking about them—a “thought gap.”

### Availability of Thoughts

One promising strategy for estimating how much a conversation partner has been thinking about you is to assume (egocentrically) that however much you have been thinking about your conversation partner, they have been thinking about you the same amount. Our thesis, however, is that people deviate from this strategy in the direction of underestimating others' thoughts about them. We propose that this occurs, at least in part, owing to the asymmetric availability of one's own thoughts compared with others' thoughts in the aftermath of conversation.

One way in which one's own thoughts are more “available” after conversation is in the sense that is originally suggested by the availability heuristic—the idea that people often estimate the frequency of events or the likelihood of their occurrence by the “ease with which instances or associations come to mind” (Tversky & Kahneman, 1973; p. 208). For example, when people are asked whether there are more words in the English language that begin with ‘r’ or contain ‘r’ as the third letter, words beginning with ‘r’ come to mind quite easily (e.g., “ring,” “rang,” “rung”), whereas words with ‘r’ as the third letter come to mind with more difficulty (e.g., “far” . . . “harder” . . . “struggle”). Because first-letter ‘r’ words come to mind more easily than third-letter ‘r’ words, people mistakenly assume that words that begin with ‘r’ are more frequent. If metacognitive ease of recall can bias people's beliefs about the frequency of words, it may also bias people's beliefs about the frequency of others' thoughts, thus producing the thought gap (e.g., “It's easy to remember the times I thought about her. But I'm having a hard time imagining instances of her thinking about me. . .”).

Although the original formulation of the availability heuristic, as well as related research, emphasize the subjective, phenomenal experience of ease of recall (e.g., Kelley & Lindsay, 1993; Koriat, 1993), there is also work in social cognition that describes how availability can bias judgment more directly (Schwarz et al., 1991; Schwarz & Vaughn, 2002). To continue the example from above, perhaps people overestimate the frequency of first-letter ‘r’ words because they can simply generate more words beginning with ‘r’ and fewer words that have ‘r’ as the third letter. Words that begin with ‘r’ are thus *overrepresented* in people's recalled sample, and so people infer that they are more frequent. Note that this explanation does not require differential ease of recall, which is at the core of the availability heuristic, but simply flows from one's naturally greater access to one's own thoughts (e.g., Ross & Sicoly, 1979). This same logic could also produce the thought gap directly (e.g., “I can think of three thoughts I've had about her, but only one thought she had about me. I extrapolate from this sample that I have probably thought about her more than she has thought about me.”).

We do not seek to make specific claims about which of these availability processes—either metacognitive ease of recall or

extrapolating from a direct information asymmetry—is the one that produces the more available thoughts that in turn produce the thought gap. Rather, we believe that both of these processes are likely operative. Moreover, what is most important here is the *asymmetric* availability of thoughts: that one's own thoughts are more available compared with others' thoughts. Exactly *how* one's own thoughts are more available is an interesting question, but one that is peripheral to the present research.

In sum, we propose that the thought gap is supported by the broad principles of availability that have been a mainstay of research in decision-making and social cognition. Here, we apply these principles in a novel and consequential domain: estimating thought frequency.

### Innovations and Contributions to Existing Literature

The current work, which explores the idea that people mistakenly believe that they think more about their conversation partners than their conversation partners think about them, contributes to several literatures.

The most obvious contribution is to the small and growing literature that has already begun to explore how people estimate (and misestimate) thought frequency. For example, consider the “spotlight effect”—the finding that when asked to put on an embarrassing t-shirt and walk into a room full of people, participants overestimate how much others notice their shirt (Gilovich et al., 2000, 2002). This work is often interpreted as showing that people tend to think others' attention is on them even when it is not. But recent work has provided evidence for the reverse finding: If you simply ask people eating lunch in a cafeteria how much others are noticing them, they actually *underestimate* how much others' attention is on them—mistakenly thinking they are relatively invisible (Boothby et al., 2017). The seeming conflict of both being in the spotlight and being invisible is exactly what egocentrism would predict: whatever people are focused on, they think others are too. If someone is embarrassed (e.g., by wearing a ridiculous t-shirt), they will think others are noticing the source of their embarrassment too. Left to their own devices, however, with little evidence that others are watching (e.g., quietly eating lunch alone; Goffman, 1963; Zuckerman et al., 1983), people instead feel relatively invisible, like they are the ones peering out at the world, not realizing that they, too, are the object of others' attention (Wicklund & Duval, 1971). Together, this pair of studies raises interesting questions about how people form judgments about the frequency of others' thoughts about them—and in what contexts are people's judgements of thought frequency biased, and why?

In short, several papers have started to explore how people estimate the *frequency* of others' thoughts. But exactly how this occurs (a) after conversation, (b) in different conversational contexts, (c) across different relationship types, and (d) over time remains unknown. Moreover, evidence for the (e) asymmetric availability of thoughts as a primary mechanism is lacking. Finally, research has not explored (f) the consequences of misestimating the frequency of others' thoughts, or (g) how thought frequency and thought valence might have independent as well as additive effects on important outcomes.

Beyond these contributions, the present research seeks to connect itself to two broader literatures. First, to the metaperception literature, which has mostly focused on how people estimate the

content of others' thoughts, rather than their frequency (Kenny, 2019). Our work also contributes to research on metaperceptual biases specifically. For example, recent work has shown that after meeting someone new, people systematically underestimate how much their conversation partners liked them (Boothby et al., 2018; Mastroianni et al., 2021; see also, Li et al., 2020; Wolf et al., 2021). Our work suggests that people not only underestimate the positive content of their conversation partners' thoughts but also the frequency.

Second, our work builds on existing research examining how remarkably pessimistic people can be before, during, and after conversation—a pessimism that appears to extend well beyond metaperception, characterizing people's beliefs about how much they will enjoy talking with a stranger, their self-perceived ability as conversationalists, and their predictions about what it will be like to have an open and honest conversation about a difficult topic (Epley & Schroeder, 2014; Levine & Cohen, 2018; Sandstrom & Boothby, 2021; Sandstrom & Dunn, 2014). Such pessimism is a puzzle given people's optimistic beliefs in many other domains (e.g., Chambers, & Windschitl, 2004; Weinstein, 1980; cf. Moore, 2007; Moore & Small, 2007).

Finally, in light of the preceding, there remain many open questions and opportunities for theory development, which we take the first step in addressing with the present work. For example, are the same psychological processes that are responsible for people's judgments about the *content* of others' thoughts also responsible for people's judgments about the *frequency* of others' thoughts? How accurate are "metaperceptions" about the frequency of others' thoughts? How is thought frequency related to thought valence, and how do they both act as inputs into people's social judgments? Finally, alongside these theoretical and empirical contributions, we think the thought gap has applied implications for relationship development, the quality of people's social interactions, and conflict management—future directions that we see our work as building toward.

## Summary of the Argument

The act of conversation provides people with a rare and intimate glimpse into others' thoughts. This means the end of a conversation is a significant psychological transition, after which people no longer have access to the real time feedback that social interaction provides. As a result, people are left with the basic asymmetry of knowing exactly how much they are thinking about their conversation partner but having little information about how much their conversation partner is thinking about them. The present work examines this precarious psychological position, which should sound familiar to anyone who has been involved in a conversation: after an argument with a spouse, or giving advice to a friend, or exchanging feedback with a coworker, people remember their spouse's words, revisit their friend's advice, and replay their coworker's feedback; but at the same time, people often wonder whether their conversation partners are doing the same: "Did he even hear my side of the argument?"; "Did my advice fall on deaf ears?"; "Was my feedback taken to heart?" This raises the possibility that people will underestimate how much their conversation partner is thinking about them in the aftermath of a conversation. We explored this "thought gap" in eight studies, across various conversational contexts, while examining whether the pattern of results is consistent with the asymmetric availability of thoughts as a proximate psychological cause.

## Analysis Plan

### Question

Following conversations, can people accurately estimate how much their conversation partners have been thinking about them?

### Hypothesis

People will underestimate how much their conversation partners think about them, owing in part to the abundant availability of one's own thoughts and the limited availability of their conversation partner's thoughts.

### Operationalization

Across our studies, our primary operationalization of the thought gap consisted of (a) people's reports about how much they have been thinking about their conversation partner, since the conversation and (b) people's estimates of how much their conversation partner has been thinking about them. In some studies, rather than just asking people about the frequency of their thoughts about their conversation partner, we also asked people how much they were affected by the conversation, how much they replayed parts of the conversation in their head afterward, or to estimate the number of thoughts they had about the conversation itself. These measures were intended to provide convergent evidence of the thought gap.

### Open Practices

For each study, sample sizes were determined *ex ante*, and we report all conditions, manipulations, and exclusions (Simmons et al., 2011). The online supplemental materials contain a full list of our measures. All studies were preregistered at AsPredicted, except for Study 1, which was the first we ran. Preregistration links, as well methods, data, and code, are all available at ResearchBox at the following link: <https://researchbox.org/285>; <https://osf.io/rny4b/>.

## Study 1: Field Survey

The goal of Study 1 was to observe the thought gap in the field. To do so, we administered a survey to students in dining halls across campus. First, we asked people to remember the last conversation they had. Then we asked people how much they had thought about their conversation partner since the conversation ended as well as how much they believed their conversation partner had thought about them.

## Method

### Participants

One hundred sixteen college students (40.52% male, 59.48% female; age:  $M = 20.64$ ,  $SD = 1.15$  years) agreed to participate.

### Procedure

To prevent people from reporting on a current conversation, trained research assistants approached students who were observed entering the dining hall alone. After verbally consenting, participants completed a brief survey. First, they were

prompted to think of a conversation they had that met the following five requirements:

- It should be a conversation that lasted at least 20 minutes
- It should be a conversation with only one other person
- The conversation should have occurred in person
- One's conversation partner should be either a friend or significant other (not a stranger or family member)
- The conversation should have happened at least one hour ago

Participants were then asked to name their conversation partner and briefly describe what the conversation was about, writing as much as they wanted. Participants then answered the following six questions using 7-point Likert scales, whose endpoints were labeled *not so much* and *very much*: (a) "How much was your conversation partner on your mind after you talked?"; (b) "How much did your conversation affect you?"; (c) "How much did you replay parts of the conversation in your head afterward?"; (d) "How much did you think you were on your conversation partner's mind after you talked?"; (e) "How much do you think you affected your conversation partner?"; and (f) "How much do you think your conversation partner replayed parts of the conversation in their head afterward?"

Finally, participants answered a number of exploratory and demographic measures fully described in the online supplemental materials (Questions 1.1–1.7).

## Results

We used paired *t* tests to compare *actual thoughts*, or how much people thought about the conversation (measures a–c), to *perceived thoughts*, or how much people believed their conversation partner thought about the conversation (measures d–f). If actual thoughts are greater than perceived thoughts, this would provide evidence of the thought gap.

Measures of actual thoughts ( $\alpha = .77$ ) and perceived thoughts ( $\alpha = .88$ ) were highly correlated, and so we collapsed the respective dependent variables to create an actual thought index and a

perceived thought index. As shown in Figure 1, there was a significant difference between the actual ( $M_{actual} = 3.75$ ,  $SD = 1.37$ ) and the perceived thought index ( $M_{perceived} = 3.34$ ,  $SD = 1.48$ ),  $t(115) = 4.14$ ,  $p < .001$ , mean difference = .41, 95% CI [.22, .61], Cohen's  $d = .38$ . In other words, after conversations, people believed they thought about their partner more than their partner thought about them. That is, they exhibited the thought gap after conversation.

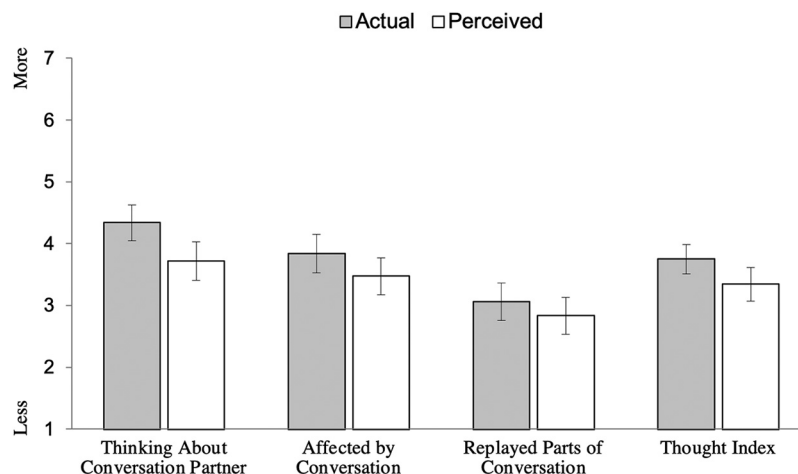
In addition, as shown in Figure 1, we separately analyzed the underlying measures that comprised the actual and perceived thought indices. Participants reported that their conversation partner was on their mind ( $M_{actual} = 4.34$ ,  $SD = 1.64$ ) significantly more than they believed they were on their conversation partner's mind ( $M_{perceived} = 3.72$ ,  $SD = 1.73$ ),  $t(115) = 5.49$ ,  $p < .001$ . Participants also reported being affected by their conversation partner ( $M_{actual} = 3.84$ ,  $SD = 1.63$ ) to a greater extent than they believed they affected their conversation partner ( $M_{perceived} = 3.47$ ,  $SD = 1.61$ ),  $t(115) = 2.81$ ,  $p < .01$ . Lastly, participants reported that they replayed parts of the conversation ( $M_{actual} = 3.06$ ,  $SD = 1.69$ ) more than they thought their conversation partner replayed the conversation ( $M_{perceived} = 2.83$ ,  $SD = 1.59$ ), although this difference was not significant,  $t(115) = 1.58$ ,  $p = .116$ .

Overall, these results provide initial evidence that, after a conversation, people believe that they thought more about their conversation partner than their conversation partner thought about them.

## Studies 2 and 3: The Laboratory

Study 1 provided initial evidence for the thought gap. However, Study 1 was limited in that it only included data from one side of the conversation. In other words, a possible interpretation of Study 1 is that there was no thought gap at all. Instead, there was a recall bias, such that participants recalled a conversation in which they actually *did* think more about their conversation partner than their conversation partner thought about them. If this were true, the thought gap would not be a mistake but rather an accurate reflection of reality. This possibility seems unlikely, as the design of

**Figure 1**  
Results of Study 1



Note. Mean ratings of actual and perceived thoughts after a conversation. Error bars show 95% confidence intervals.

Study 1 took steps to avoid it: rather than have participants select just any conversation from memory, we asked people about their most recent conversation; we also asked participants to recall a conversation with a peer rather than a family member (e.g., a mother plausibly thinks about her son more than her son thinks about her). But strictly speaking, Study 1 cannot rule out the possibility of a recall bias. Therefore, the goal of Study 2 (and Study 3) was to address this limitation by utilizing a more tightly controlled and fully dyadic design. In addition to enabling us to obtain data from both parties involved in the interaction, this study also allowed us to control the timing of the conversation, the content of the conversation, and the relationship between conversation partners.

Accordingly, we recruited dyads and facilitated a conversation by providing participants with a list of questions designed to promote disclosure. After the conversation was over, participants left the laboratory. After some time had passed, we recontacted participants and asked them how much they had thought about their conversation partner, and how much they believed their conversation partner had thought about them. We executed two variants of this study with the same basic design: Study 2 consisted of a conversation between strangers, and we measured the thought gap two hours after the conversation had ended; and Study 3 consisted of a conversation between friends, and we measured the thought gap the following day.

## Study 2: Conversations Between Strangers

### Method

#### Participants

One hundred college students (28.87% male, 69.07% female, one participant preferred not to report their gender, and one participant reported their gender as “other”; age:  $M = 20.03$ ,  $SD = 1.59$  years) reported to the laboratory in exchange for \$15 or course credit. People were recruited to come to the lab two at a time.

#### Procedure

Upon arrival, two participants who had never met before were escorted to a private room by an experimenter. Participants were told that they would have a 45-min conversation with each other. To standardize the conversation, participants were provided a deck of 17 flashcards containing questions designed to promote self-disclosure (Aron et al., 1997; see online supplemental materials). Participants were instructed to take turns asking each other the questions and to get through as many as possible in the time allotted, but they also were told that they should feel free to ask follow-up questions and let the conversation flow as naturally as possible.

After 45 min had passed, the experimenter escorted each participant to a private room, where they provided their contact information and were informed that in two hours, they would receive a quick follow-up survey by text message and e-mail. Participants were then dismissed.

Two hours later, participants received a follow-up survey by text and e-mail. In the e-mail and text body, participants were provided with a link to the survey. In the survey, participants were

asked two primary questions of interest on 7-point Likert scales, endpoints labeled *not so much* and *very much*: (a) “Earlier today, you had a conversation. How much was your conversation partner on your mind after you talked?” and (b) “How much do you think you were on your conversation partner’s mind after you talked?”

Participants were also asked, “If you found out that you were on your conversation partner’s mind as much as they were on your mind, how would you feel?.” Participants answered by choosing from among three options: *unpleasantly surprised*, *not at all surprised*, or *pleasantly surprised*. Participants were also asked whether they talked to their conversation partner after leaving the lab and whether they had ever met their conversation partner before. Finally, participants answered a number of exploratory and demographic measures that are described in full in the online supplemental materials (Questions 2.1–2.4; .1–.3).

### Results

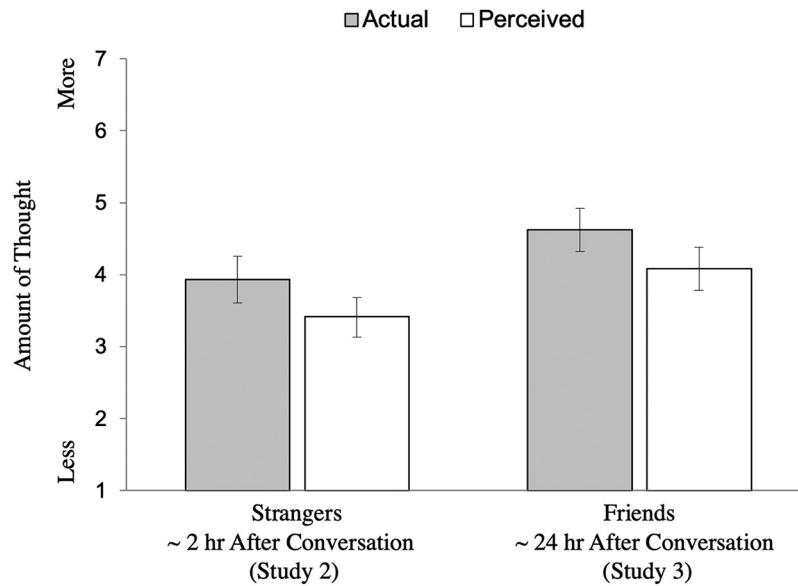
Following our preregistration plan, data from six participants were excluded because those participants (or their partners) either did not complete the follow-up survey or they reported being in contact with each other after leaving the laboratory. This left us with data from 94 participants (28.72% male, 69.15% female, age:  $M = 20.03$ ,  $SD = 1.59$  years). These exclusions do not meaningfully change any result.

In considering the dyadic structure of our data, one basic question is whether our dyads are “distinguishable” or “indistinguishable” (Kenny et al., 2006). One possible distinguishing variable is gender. Since our dataset is comprised of same-sex *and* mixed-sex pairs, distinguishability only applies to the subset of our sample whose conversations were mixed-sex. For those 22 mixed-sex dyads, we empirically tested for distinguishability using DINGY (Kenny, 2015). Our analysis revealed that males and females were indistinguishable on the thought gap means,  $\chi^2(1) = 1.95$ ,  $p = .16$ , and variances,  $\chi^2(1) = .01$ ,  $p = .91$ . We thus treated our dyads as indistinguishable.

To test for the thought gap, our analysis compared *actual thoughts* (e.g., “How much was your conversation partner on your mind after you talked?”) to *perceived thoughts* (e.g., “How much do you think you were on your conversation partner’s mind after you talked?”). Because these data were nested within dyad, we fit a mixed linear model to the data, with rating type (actual or perceived) as the independent variable and thoughts as the dependent variable. Our model included our independent variable as a fixed effect, as well as an intercept for each participant and an intercept for each dyad as random effects. The number of observations per participant did not permit the use of random slopes.

This analysis revealed that participants thought about their conversation partner ( $M_{actual} = 3.93$ ,  $SD = 1.60$ ) significantly more than they believed their conversation partner thought about them ( $M_{perceived} = 3.41$ ,  $SD = 1.34$ ),  $b = .51$ , 95% CI [.28, .74],  $t(93) = 4.37$ ,  $p < .001$ . In sum, as shown in the left panel of Figure 2, two hours after participants had a 45-minute conversation with an unfamiliar person they mistakenly believed that they had thought about their conversation partner significantly more than their conversation partner had thought about them. These results provide strong evidence of the thought gap in a controlled laboratory setting with data from *both* conversation partners.

**Figure 2**  
Results of Study 2



*Note.* Mean ratings of actual and perceived thoughts 2 hr after a conversation between strangers and 24 hr after a conversation between friends. Error bars show 95% confidence intervals.

To understand the potential affective consequences of the thought gap, we also analyzed participants' answers to the following question: "If you found out that you were on your conversation partner's mind as much as they were on your mind, how would you feel?" Nearly half of the participants (41.49%) said they would be pleasantly surprised by this information, while only one participant (1.1%) reported that he or she would feel unpleasantly surprised. These findings suggest that if only people realized how much their conversation partners actually thought about them after they talked, it might benefit their relationships and their well-being.

### Study 3: Conversations Among Friends

#### Method

##### Participants

One hundred two people (30.39% female, 67.65% male, one participant preferred not to report their gender; age:  $M = 20.56$ ,  $SD = 4.97$  years, data missing from one participant) reported to the laboratory in exchange for \$15. While participants in Study 2 were strangers, participants in Study 3 were friends, who we recruited by asking individuals to bring a friend with them to the study.

##### Procedure

The procedure was almost identical to Study 2 (i.e., participants had a 45 min conversation in the laboratory guided by discussion questions), with one notable exception: participants were sent a follow-up survey the next day (rather than 2 hrs later).

Participants received a follow-up survey by text or e-mail at noon the day after their conversation in the laboratory had taken

place with the same primary measures as in Study 2, except the conversation was described as "Yesterday" rather than "Earlier today." Participants also answered either "yes" or "no" to the following questions: "Are you with your conversation partner right now?" and "Have you talked to your conversation partner since you left the lab?" Finally, participants answered a number of exploratory and demographic measures that are described in the online supplemental materials (Questions 3.1–3.5; .1–.3).

#### Results

Data were excluded from one dyad because one member failed to respond to the survey.<sup>1</sup> The analysis revealed that participants thought about their conversation partner ( $M_{actual} = 4.62$ ,  $SD = 1.54$ ) significantly more than they thought their conversation partner thought about them,  $M_{perceived} = 4.08$ ,  $SD = 1.49$ ,  $b = .54$ , 95% CI [.31, .76],  $t(99) = 4.73$ ,  $p < .001$ . As shown in the right panel of Figure 2, approximately 24 hrs after friends engaged in a conversation, they mistakenly believed that they had thought more about their friend than their friend had thought about them. This result provides further support for the thought gap, demonstrating that it also occurs among friends, in a controlled laboratory setting, and endures well after a conversation has ended.

Similar to Study 2, nearly half of participants (43.00%) said they would be pleasantly surprised to learn that their friend had thought about them as much as they had thought about their friend

<sup>1</sup>This exclusion criterion was inadvertently omitted from our preregistration. Nevertheless, for this study, it is important to include only dyads for which we have data from both conversation partners, providing the strictest test of our hypothesis. This exclusion does not meaningfully change any result.



in the time since their conversation, while only one participant (1%) said that they would be unpleasantly surprised to learn this information.

Overall, these results corroborate the results of Study 2, further suggesting that the thought gap may blind people to the basic truth that our friends think about us just as much as we think about them after conversations.

### Additional Analyses: Studies 2 and 3

#### A Note on “Accuracy”

When people try to estimate how much their conversation partners are thinking about them, there are at least two ways to conceptualize accuracy. First, one could ask if people tend to over- or underestimate how much their conversation partners think about them. In other words, is the mean level of how much people *believe* their partners think about them different from the mean level of how much their partners *actually* think about them? This has been referred to as *mean-level bias* (Fletcher & Kerr, 2010). On the other hand, one could set aside the question of whether people over- or underestimate how much others think about them and ask whether people’s estimates are *correlated* with the truth. In other words, do people generally come away from interactions with insight into which of their conversation partners were thinking about them more or less? This has been referred to as *tracking accuracy*. Importantly, these two types of accuracy can be orthogonal. For example, people may be biased to think their partners do not think about them as much as they actually do after a conversation, but people’s beliefs about how much their conversation partner thinks about them may still be highly correlated with the truth.

Although both types of accuracy are important, the thought gap is an example of a mean-level bias, and so that has been our primary focus. Nevertheless, the truth and bias model (West & Kenny, 2011) can complement our primary analyses by simultaneously estimating tracking accuracy and mean-level bias. A benefit of this analysis is its ability to shed light on the underlying psychological processes that might be operative as people try to estimate how much others are thinking about them.

#### Truth and Bias Model

A truth and bias model reveals the extent to which a judgment of some value is related to the true value and to some biasing force. In our case, the judgment in question is how much participants *believed* their conversation partners thought about them (i.e., people’s metaperceptions). The “truth” is how much participants were *actually* being thought about by their conversation partners. Finally, in a typical truth and bias model, how much participants report thinking about their partners would be referred to as the “biasing” force, but to avoid confusion between this form of bias and the mean-level bias that is the thought gap, we refer to this as *projection*. It is important to consider projection because when people try to estimate how much their conversation partners are thinking about them, they may do so, in part, by projecting their own beliefs onto others (e.g., “I’m thinking a lot about her, so she must be thinking a lot about me.”).

Following West and Kenny (2011), we first centered our variables (i.e., metaperception, truth, and projection) on the mean of truth. We then entered these variables into a regression with

participants’ metaperceptions as the outcome, and truth and projection as predictors. We implement the same model for Studies 2 and 3.

In a truth and bias analysis, the intercept represents the mean-level bias, which was significant, both in Study 2 ( $-.51$ , 95% CI  $[-.70, -.32]$ ,  $t(91) = -5.27$ ,  $p < .001$ ) and in Study 3 ( $-.54$ , 95% CI  $[-.75, -.33]$ ,  $t(97) = -5.17$ ,  $p < .001$ ). Note that the magnitude of the intercept is equivalent to the size of the thought gap reported in Studies 2 and 3. This model also revealed that the coefficient for truth was *not* significant for Studies 2 and 3,  $ps > .30$ . Overall then, people *do not* appear to display signs of tracking accuracy, which again is the correlation between people’s estimates of others’ thoughts and the true number of thoughts others have. Owing to the way the truth and bias model is specified, this lack of tracking accuracy needs to be interpreted against the effect of projection, which was significant; Study 2:  $b = .59$ , 95% CI  $[.47, .71]$ ,  $t(91) = 9.78$ ,  $p < .001$ ; Study 3:  $b = .66$ , 95% CI  $[.51, .81]$ ,  $t(97) = 8.87$ ,  $p < .001$ , suggesting that people rely heavily on how much *they* are thinking about others to estimate how much others are thinking about them.

In sum, people do not seem to have unique insight into how much their conversation partners are thinking about them—their estimates of their partners’ thoughts are not correlated with reality (tracking accuracy). Instead, people appear to use the frequency of their own thoughts about their conversation partners as a heuristic to estimate their conversation partners’ thoughts about them (projection). Meanwhile, people stopped short of believing that others think about them the same amount that they think about others—perhaps because of a lack of evidence of others’ thoughts. The result is a significant thought gap (i.e., mean level bias) such that participants underestimated how much their partners thought about them following conversations. These analyses provide an initial indication that the thought gap may be caused, at least in large part, by the lack of availability of others’ thoughts compared with the ample availability of one’s own thoughts. We test several predictions of this asymmetric availability account in Studies 4–7.

### Interim Discussion: Predictions of Our Differential Availability Account

The results of Studies 1–3 provide ample evidence of the thought gap. But why does it exist? We propose that the thought gap is caused by the asymmetric availability of one’s own thoughts compared with others’ thoughts. Because people have privileged access to their own thoughts and limited access to others’ thoughts, they possess overwhelming evidence that they have been thinking about their conversation partners, but little evidence that their conversation partners are doing the same. If this availability account is true, we would expect to find support for the following predictions, which we test in Studies 4–7:

*H1 (Study 4): Salient conversations will increase the size of the thought gap.* To test this, we measured the thought gap after an argument. We predicted that the thought gap would be greatest for ongoing arguments, which tend to be highly salient and available in one’s mind, and smallest for resolved arguments, which tend to be less salient and less available.

*H2 (Study 5): Increased availability of others' thoughts will decrease the thought gap.* To test this, we had people recall an argument and then prompted them to reflect on their conversation partner's thoughts after the argument ended. We predicted that making their partner's thoughts more salient would reduce the magnitude of the thought gap.

*H3 (Study 6): The thought gap will increase as time passes after conversations.* Immediately after a conversation, people have not had time to think much about their conversation partner—thoughts take time to accumulate in one's mind, as one begins reflecting on the conversation. We therefore sought to test whether the size of the thought gap would grow in proportion to the time that has elapsed since the end of a conversation.

*H4 (Study 7): The thought gap will be moderated by how readily available one's own thoughts are at a trait level.* By measuring people's tendency to ruminate, we explored whether the thought gap is largest for people with more plentiful thoughts and smallest for people with fewer thoughts.

Studies 4–7 test these predictions with the aim of providing evidence that privileged and asymmetric access to one's own thoughts is a primary mechanism responsible for the thought gap. Study 8 examines possible consequences of underestimating the frequency of others' thoughts and compares the effect of thought frequency to that of thought valence.

#### Study 4: Resolved Versus Ongoing Arguments

The aim of Study 4 was to test one prediction of our asymmetric availability account: Salient conversations ought to increase the magnitude of the thought gap. To test this prediction, we explored the thought gap after an argument with a close other. Arguments are tense, emotional, and relatively infrequent, which tends to make them salient. Therefore, thoughts about such conversations should be highly available. That said, some arguments are more salient than others—namely those that are ongoing compared with those that have been resolved. If the thought gap is indeed caused by privileged and asymmetric access to one's own thoughts, then the thought gap ought to be greater for ongoing arguments and smaller for those that have already been resolved.

#### Method

##### Participants

Three hundred one people (50.17% male, 49.50% female, one participant reported their gender as "other"; age:  $M = 39.10$ ,  $SD = 12.99$  years) were recruited through Amazon Mechanical Turk and participated in exchange for \$1.00.

##### Procedure

Participants were asked to recall a recent argument. First, participants named the last friend or significant other they had an argument or disagreement with. Next, participants answered the following six questions using 7-point Likert scales, with the endpoints *not very much* and *very much*: (a) "How much was your argument with [partner's name] on your mind after it happened?"; (b) "How much did your argument with [partner's name] affect

you?"; (c) "How much did you replay certain parts of the argument with [partner's name] in your head after it happened?"; (d) "How much do you think the argument was on [partner's name]'s mind after it happened?"; (e) "How much do you think your argument with [partner's name] affected them?"; and (f) "How much do you think [partner's name] replayed certain parts of the argument in his or her head after it happened?" Participants also indicated either "yes" or "no" as to whether the argument was resolved or ongoing. Participants then reported how serious the argument was using a 7-point Likert scale whose endpoints were labeled *very serious* and *not very serious*, and how well they knew their partner using a 7-point Likert scale whose endpoints were labeled *not at all* and *extremely well*. Finally, participants answered a number of exploratory and demographic measures that are described in the online supplemental materials (Questions 4.1–4.8; .1–.3).

#### Results

We used paired  $t$  tests to compare *actual thoughts*, or how much people thought about their argument with their partner (measures a–c), to *perceived thoughts*, or how much people believed their partner thought about their argument (measures d–f). Measures of actual thoughts were highly correlated ( $\alpha = .92$ ) and measures of perceived thoughts were also highly correlated ( $\alpha = .93$ ), so we combined the respective dependent variables to create an *actual thought* index and a *perceived thought* index, which allowed a test of the thought gap.

Our primary analysis revealed that participants thought about the argument ( $M_{actual} = 5.00$ ,  $SD = 1.54$ ) significantly more than they believed their partner did ( $M_{perceived} = 4.34$ ,  $SD = 1.65$ ),  $t(300) = 6.82$ ,  $p < .001$ , mean difference = .65, 95% CI [.47, .85], Cohen's  $d = .39$ . There was no interaction between the thought gap and how well participants reported knowing their partners,  $b = .01$ , 95% CI [–.18, .20],  $t(300) = .13$ ,  $p = .90$ . In short, people believed they were thinking about a recent argument quite a bit, but that their conversation partner was not thinking about it as much.

##### Argument Seriousness

Our preregistration plan called for an analysis of how the thought gap varies according to the seriousness of the argument, with the prediction that more serious arguments would produce highly salient and thus highly accessible thoughts, thereby increasing the magnitude of the thought gap. This prediction was confirmed by a significant thought gap  $\times$  argument seriousness interaction,  $b = .24$ , 95% CI [.13, .35],  $t(299) = 4.24$ ,  $p < .001$ . More serious arguments produced a significantly larger thought gap.

##### Resolved Versus Ongoing Arguments

Another, relatively more concrete, measure of an argument's salience is whether the argument is resolved or ongoing. To explore whether the thought gap was more pronounced for ongoing arguments compared with those that had been resolved, we fit a mixed linear model to the data with thoughts as the dependent variable, and rating type (actual or perceived) and argument type (ongoing or resolved) as independent variables. Our

model included our independent variables as fixed effects, as well as a random intercept for participant. We conducted a series of postestimation contrasts to fully explore the relationship between argument type and the thought gap. The analysis revealed that the thought gap was significant both for resolved arguments (mean difference between actual and perceived = .48, 95% CI [.28, .70],  $t(299) = 4.59$ ,  $p < .001$ ) and for ongoing arguments (mean difference between actual and perceived = 1.30, 95% CI [.88, 1.70],  $t(299) = 6.27$ ,  $p < .001$ ). Moreover, the Rating Type  $\times$  Argument Type interaction was significant,  $b = .81$ , 95% CI [.35, 1.26],  $t(299) = 3.47$ ,  $p < .001$ , indicating that there was a significantly larger thought gap for ongoing arguments than for arguments that were resolved (see Figure 3).

The previous analyses confirmed our primary prediction: as the salience of a conversation increases, so too does the thought gap. One further point to consider is that the thought gap is composed of two judgments, and so an increase in the thought gap could reflect an increase in people's *own* thoughts, or alternatively a decrease in people's estimates of *others'* thoughts. Which is it? Our mechanism makes a specific prediction: The thought gap should be larger for unresolved arguments due to an *increase in people own thoughts*. This pattern is clearly visible in Figure 3. Participants' own thoughts about arguments were significantly greater when the argument was ongoing ( $M_{ongoing} = 5.59$ , 95% CI [5.20, 5.99]) compared with then when it was resolved ( $M_{resolves} = 4.84$ , 95% CI [4.64, 5.04]), mean difference =  $-.75$ , 95% CI [-1.19,  $-.31$ ],  $t(492) = -3.34$ ,  $p < .001$ ; but whether or not their argument was resolved had no bearing on participants' beliefs about their partners' thoughts, mean difference =  $-.06$ , 95% CI [-.39, .50],  $t(492) = .25$ ,  $p = .80$ . That is, the thought gap was

larger for ongoing arguments than for resolved arguments, and this was due to people's *own* thoughts being more frequent and available to them, which is exactly the pattern of data we would expect based on our proposed mechanism.

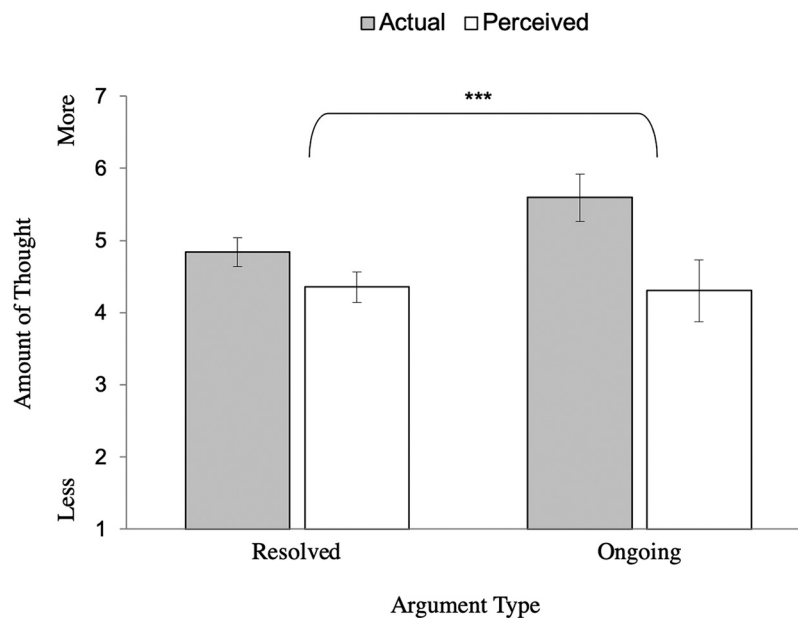
In the time following an argument, participants believed that they thought about the argument more than their conversation partner had. This mistaken belief was exacerbated when the argument was more serious, and when it was unresolved. Not only did Study 4 replicate the thought gap in a new conversational context (i.e., arguments), but it also provided initial evidence that the asymmetric availability of one's own thoughts compared with others' thoughts is a psychological process responsible for our effect.

### Study 5: Evidence of Others' Thoughts

As suggested by the results of Study 4, the thought gap is caused, at least in part, by the ready availability of one's own thoughts. The flip side of the privileged availability of one's own thoughts is the pronounced lack of evidence people have for their conversation partner's thoughts. Thus, one prediction of our account is that the availability of others' thoughts should affect the size of the thought gap.

To test this prediction, we used the same setup as the previous study in which people reported on a recent argument. In one condition, we simply sought to replicate the main result of Study 4: the existence of the thought gap after arguments. In a second condition, we prompted people to take a moment to reflect on the opportunities that their counterpart might have had to think about the argument after it happened. Our prediction was that prompting people to consider their counterpart's thoughts would increase the

**Figure 3**  
Results of Study 4



*Note.* Mean ratings of actual and perceived thoughts after resolved arguments and ongoing arguments. Error bars show 95% confidence intervals.

\*\*\*  $p < .001$ .

availability of others' thoughts, thus decreasing the magnitude of the thought gap.

## Method

### Participants

Potential participants were recruited through Prolific Academic. They first completed a three-item screener to assess their English proficiency and whether they resided in the United States. This screener required them to know that children who are 4 or 5 years old attend kindergarten, that an American ZIP code is a sequence of five numbers, and that eating turkey is not associated with Halloween. In total, 497 participants (47.9% male, 51.5% female, one "other," two "prefer not to say"; age:  $M = 33.29$ ,  $SD = 11.34$  years) completed our survey in exchange for \$1.25.

### Procedure

Participants followed the same basic procedure as the previous study, in which they named the last friend or close other with whom they had an argument. Participants were then randomly assigned to a "unprompted reflection" condition or a "prompted reflection" condition.

In the unprompted reflection condition, participants simply answered the key dependent measures that comprise the thought gap: (a) "How much was your argument with [partner's name] on your mind after it happened?" and (b) "How much do you think the argument was on [partner's name]'s mind after it happened?" (scale endpoints: 1 = *not very much* and 7 = *very much*).

In the prompted reflection condition, prior to answering the main dependent measures, participants were instructed to take a moment and consider the opportunities that their counterpart may have had to think about the argument since it ended: "Thinking back to the argument between you and [partner's name]. . . In the time since your argument occurred, are there times when [partner's name] might have thought about what happened between you? Write down one or two examples of when [partner's name] might have been thinking about your argument and what his or her thoughts might have been." Participants answered by writing as much as they wanted.

Finally, participants answered several questions about the nature of the argument and demographic measures described in the online supplemental materials (Questions 5.1–5.3; .1–.3).

## Results

Following our preregistration, 38 participants failed to pass an attention check embedded in the survey and were excluded, leaving data from 459 participants (47.7% male, 51.6% female, 1 "other," 2 "prefer not to say"; age:  $M = 33.52$ ,  $SD = 11.44$  years) for analysis. To explore whether reflecting on others' thoughts decreased the thought gap, we fit a mixed linear model to the data with thoughts as the dependent variable, and rating type (actual or perceived) and reflection type (unprompted or prompted) as independent variables. Our model included our independent variables as fixed effects, as well as a random intercept for participant.

Overall, our analysis revealed a significant effect of rating type,  $b = -.38$ , 95% CI  $[-.55, -.24]$ ,  $t(459) = -4.95$ ,  $p < .001$ . Once again, people believed that they thought more about a recent

argument than their conversation partner did. But did prompting people to reflect on their partner's thoughts decrease the size of the thought gap?

As shown in Figure 4, follow-up analysis revealed a significant effect of rating type in the unprompted condition, meaning that the thought gap was present (mean difference between actual and perceived =  $-.55$ , 95% CI  $[-.77, -.34]$ ,  $t(461) = -5.07$ ,  $p < .001$ ). By contrast, the thought gap was only marginally significant when participants were prompted to reflect on their counterpart's thoughts (mean difference between actual and perceived =  $-.21$ , 95% CI  $[-.44, .01]$ ,  $t(461) = -1.88$ ,  $p = .06$ ). Critically, the interaction between the thought gap and reflection type was significant,  $b = .34$ , 95% CI  $[.03, .65]$ ,  $t(459) = 2.16$ ,  $p = .03$ , indicating that reflecting on others' thoughts did indeed reduce the size of the thought gap.

In sum, we prompted people to consider opportunities that their conversation partner might have had to think about their recent argument. This appears to have increased the salience of others' thoughts, thus decreasing the magnitude of the thought gap. These results provide additional support for our differential availability account.

## Study 6: The Thought Gap Over Time

Study 6 explores yet another prediction of our mechanism: The magnitude of the thought gap should increase over time. As more time passes following conversations, people's own thoughts have time to accumulate, whereas access to others' thoughts remains limited. Therefore, the thought gap should increase in proportion to the time that has elapsed since the end of the conversation. To test this prediction, we asked people to recall a recent conversation and report exactly how long ago the conversation had occurred. We then asked people how much they have thought about their conversation partner since the conversation ended, and to estimate how much their conversation partner has thought about them.

Although the overall design of Study 6 was similar to previous studies, one notable difference was that instead of asking people to report their frequency of their thoughts using a Likert scale, we asked people to *quantify* their thoughts—that is, to estimate the actual number of times they thought about their conversation partner and the number of times they believed that their conversation partner had thought about them. This change was meant to provide a different, hopefully convergent, and compelling measure of the thought gap.

## Method

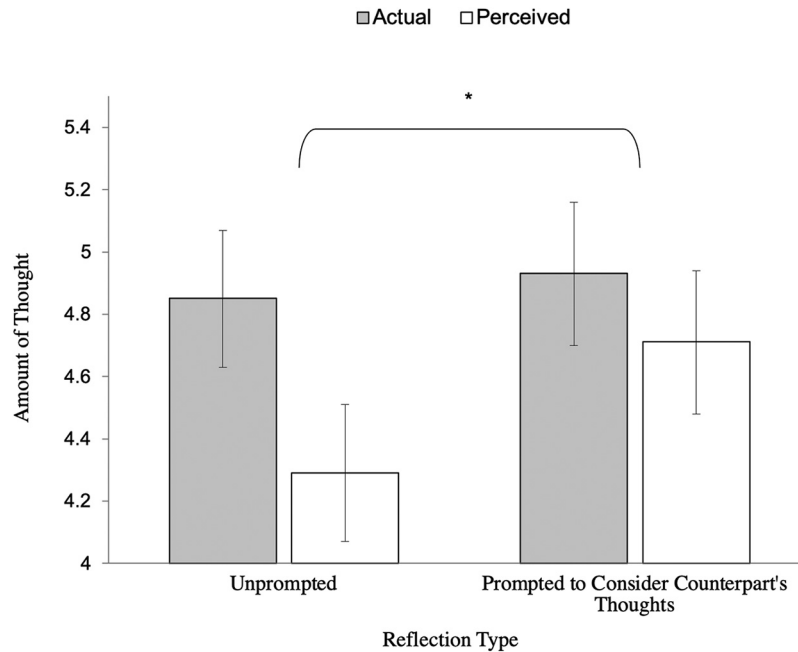
### Participants

Five hundred two people (55.38% male, 44.02% female, one participant preferred not to report their gender, and two participants reported their gender as "other," age:  $M = 36.61$ ,  $SD = 11.33$  years) were recruited through Amazon Mechanical Turk and participated in exchange for \$1.00.

### Procedure

Participants were asked to name the last person they had a conversation with who was *not* a stranger. Participants then responded to the question, "How long ago was your conversation with [partner's name]?" by selecting from among the following options: "the conversation is still going on," "just finished," "within the

**Figure 4**  
Results of Study 5



*Note.* The magnitude of the thought gap by reflection type. Error bars show 95% confidence intervals.

\*  $p < .05$ .

past 15 minutes,” “within the past hour,” “1–2 hr ago,” “2–3 hr ago,” “4–5 hr ago,” “6–8 hr ago,” “8–12 hr ago,” or “12+ hours ago.” Participants then reported how well they knew their partner using a 7-point Likert scale whose endpoints were labeled *not at all* and *extremely well*.

Then participants answered the following questions: “Since your conversation with [partner’s name], how many times have you thought about them?” and “Since your conversation with [partner’s name], how many times have they thought about you?” by typing a whole number. Finally, participants answered a number of exploratory and demographic questions described in the online supplemental materials (Questions 6.1–6.3; .1–.3).

## Results

We excluded data from seven participants who provided answers that were unreasonably large (e.g., 1,000 thoughts), which left 495 participants in the final data set (55.35% male, 44.04% female, age:  $M = 36.71$ ,  $SD = 11.36$  years).<sup>2</sup> Because the data consist of thought counts, and because of overdispersion of the data, we used a negative binomial regression. For interpretability, we report the estimated means of actual and perceived thoughts on the original response scale.

### The Thought Gap

As in previous studies, we compared our measure of *actual thoughts* (e.g., “Since your conversation with [partner’s name], how many times have you thought about them?”) to our measure of *perceived thoughts* (e.g., “Since your conversation with [partner’s name], how many times have they thought about you?”).

Our analysis revealed that, after a conversation, people reported having a significantly greater number of thoughts about their conversation partner ( $M_{actual} = 3.44$ ) than the number of thoughts they believed their conversation partner had about them ( $M_{perceived} = 2.73$ ),  $b = .23$ , 95% CI [.11, .35],  $z = 3.72$ ,  $p < .001$ . We therefore replicated the thought gap once again, here with a dependent measure that asked people to estimate the actual raw number of thoughts they and their conversation partners had.

For the curious reader, the distribution of our count variable—number of thoughts—is as follows. Frequencies for *actual thoughts*: 0 thoughts = 9.09%, 1 thought = 22.63%, 2 thoughts = 22.83%, 3 thoughts = 15.35%, 4+ thoughts = 30.10%. Frequencies for *perceived thoughts*: 0 thoughts = 14.75%, 1 thought = 28.08%, 2 thoughts = 23.64%, 3 thoughts = 9.49%, 4+ thoughts = 24.04%. In other words, most of our sample reported having and perceiving that their conversation partner had between 0 and 3 thoughts, and the resulting pattern is exactly what one would expect given the thought gap: Whereas only 32% of our sample actually had 0–1 thoughts about their conversation partner, 43% of our sample believed that their partners had 0–1 thoughts about them; conversely, the pattern is reversed for 2+ thoughts, with 68% of participants reporting having 2–3 thoughts about their partners, but only 57% of our sample believing that their partners had 2+ thoughts about them.

<sup>2</sup>The pattern of results is similar if we set a threshold at 3 times the interquartile range, excluding data from participants who provided an answer greater than that. The pattern of results is also similar if we set the threshold at 1.5 times the interquartile range, removing participants who provided an answer greater than that.

### Effects of Availability

We predicted that as more time passes following conversations, people's own thoughts have time to accumulate, whereas access to others' thoughts remains limited. Therefore, the thought gap should increase in proportion to the time that has elapsed since the end of the conversation. To investigate this hypothesis, we first simplified participants' answers to the question about how long ago their conversation occurred by binning them into three time categories: 0–1 hr ago, 1–12 hr ago, and 12+ hours ago. We then fit a negative binomial regression to the data with rating type (actual or perceived) as an independent variable, and number of thoughts as the dependent variable. We also included time (treated as a factor) as an additional independent variable. Convergence issues did not permit the inclusion of random effects for participant. Postestimation contrasts were used to derive significance tests for the thought gap at each time point. As predicted, the thought gap increased over time. Specifically, the thought gap was present at all time points, but as more time elapsed since the end of the conversation, the gap between actual and perceived thoughts increased: 0–1 hr mean difference = .44, ratio of actual to perceived = 1.22, 95% CI [1.01, 1.46],  $z = 2.05$ ,  $p = .04$ ; 1–12 hr mean difference = .75, ratio of actual to perceived = 1.23, 95% CI [1.04, 1.45],  $z = 2.43$ ,  $p = .02$ ; 12+ hour mean difference = 2.40, ratio of actual to perceived = 1.71, 95% CI [1.13, 2.58],  $z = 2.52$ ,  $p = .01$ . In sum, as shown in Figure 5, people mistakenly believed they had more thoughts about their conversation partner than their conversation partner had about them, and this thought gap steadily increased over time. These findings further support the

thought gap as well as provide additional evidence that the asymmetric availability of thoughts is a psychological process responsible for the effect.

### Study 7: The Thought Gap and Trait Rumination

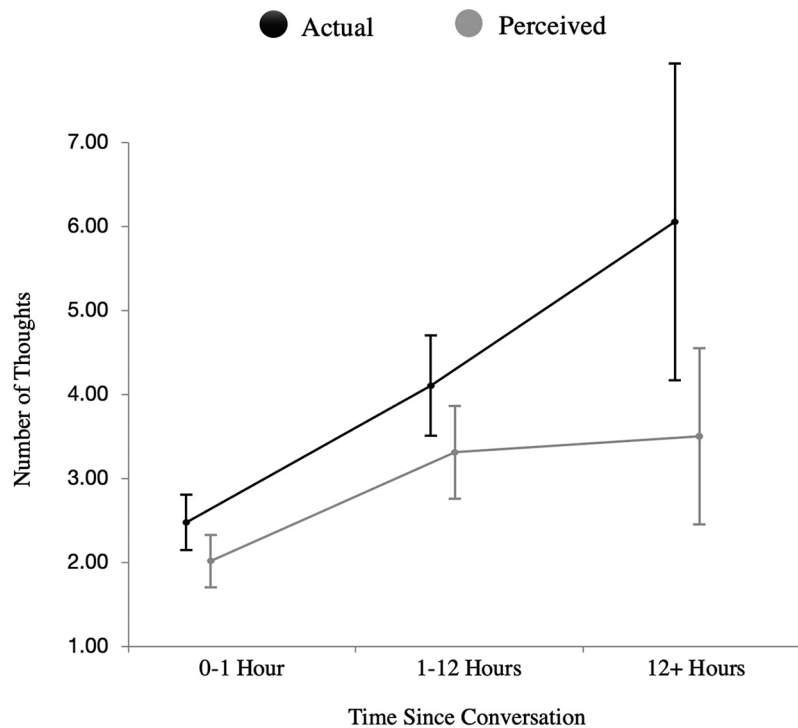
Study 7 was designed to test a final prediction of our asymmetric availability account: People who tend to experience more thoughts running through their minds *in general* should display a larger thought gap than those who experience fewer thoughts. As a proxy for the extent to which people's thoughts are readily available, we measured trait rumination. Rumination is the tendency to think about things repetitively, recurrently, and intrusively (Brinker & Dozois, 2009). Therefore, high ruminators should have a greater number of readily available thoughts compared with low ruminators, and consequently high ruminators should exhibit a larger thought gap. To test this prediction, we used the same procedure as in Study 4, surveying people about a recent argument they had, and asking how much they had thought about the argument since and how much they believed their conversation partner thought about it.

### Method

#### Participants

Three hundred fifty-two people (53.69% male, 46.31% female, age:  $M = 38.05$ ,  $SD = 13.25$  years) were recruited

**Figure 5**  
Results of Study 6



*Note.* The magnitude of the thought gap over time. Error bars show 95% confidence intervals.

through Amazon Mechanical Turk and participated in exchange for \$1.00.

### Procedure

Participants named the last friend or significant other with whom they had an argument or disagreement. Then participants answered the following two questions using 7-point Likert scales with the endpoints labeled *not very much* and *very much*: (a) “How much was your argument with [partner’s name] on your mind after it happened?” and (b) “How much do you think the argument was on [partner’s name]’s mind after it happened?” Participants also answered several questions about the nature of the argument (see the online supplemental materials).

Participants then completed the Ruminative Thought Style Questionnaire (RTSQ; Brinker & Dozois, 2009), indicating how well each of the RTSQ statements (e.g., “I find that my mind often goes over things again and again,” “I cannot stop thinking about some things,” etc.) applied to them using 7-point Likert scales with endpoints *not at all descriptive of me* and *describes me very well* (see the online supplemental materials). We inserted an attention check partway through the 20-item questionnaire, asking participants to select the fourth choice option as the answer to the question. Finally, participants answered a number of exploratory and demographic measures that are described in the online supplemental materials (Questions 7.1–7.6; .1–.3).

### Results

As preregistered, we excluded data from participants who failed our attention check embedded in the RTSQ. Forty-one participants failed the attention check and were excluded, resulting in data from 311 participants (52.73% male, 47.27% female; age:  $M = 38.81$ ,  $SD = 13.40$  years).

#### The Thought Gap

We compared our measure of *actual thoughts* (e.g., “How much was your argument with [partner’s name] on your mind after it happened?”) to our measure of *perceived thoughts* (e.g., “How much do you think the argument was on [partner’s name]’s mind after it happened?”) using a paired  $t$  test. Participants reported that the argument was on their mind ( $M_{actual} = 5.11$ ,  $SD = 1.65$ ) significantly more than they thought it was on their partner’s mind ( $M_{perceived} = 4.51$ ,  $SD = 1.83$ ), mean difference = .60,  $t(310) = 6.06$ ,  $p < .001$ , 95% CI [.41, .80], Cohen’s  $d = .32$ . Replicating the basic result of Studies 4–6, after an argument, people believed that they thought about the argument more than their conversation partner did.

#### Effects of Rumination

To test a prediction of our availability mechanism, we also examined the relationship between the thought gap and people’s tendency to ruminate. To do so, we fit a mixed linear model to the data with thought type (actual or perceived) as an independent variable and thoughts as the dependent variable, with participants’ RTSQ rumination score as an additional independent variable. The independent variables were included as fixed effects, and an intercept for each participant was included as a random effect. The analysis revealed a significant rumination  $\times$  rating type interaction:

$b = .27$ ,  $t(309) = 3.35$ ,  $p < .001$ , 95% CI [.11, .43]—participants who ruminated more exhibited a larger thought gap.

To further explore the effects of rumination on the thought gap, we grouped participants into three ruminator types: low ruminators (1st tertile), average ruminators (2nd tertile), and high ruminators (3rd tertile). We then fit the same model as described above, but instead of including rumination as a continuous variable, we included ruminator type as a factor. Postestimation contrasts were used to explore the relationship between the thought gap and rumination type. Our analyses revealed that participants who were low ruminators displayed a small, marginally significant thought gap (mean difference between actual and perceived = .30,  $t(310) = 1.79$ ,  $p = .08$ , 95% CI [–.03, .64]); average ruminators displayed a moderately sized and significant thought gap (mean difference between actual and perceived = .61,  $t(311) = 3.55$ ,  $p < .001$ , 95% CI [.27, .94]); and high ruminators displayed a large and significant thought gap (mean difference between actual and perceived = .93,  $t(308) = 5.44$ ,  $p < .001$ , 95% CI [.59, 1.26]). As depicted in Figure 6, trait rumination moderated the thought gap: high ruminators exhibited a thought gap that was much larger than that of average ruminators, who in turn exhibited a larger thought gap than that of low ruminators.<sup>3</sup>

In sum, people believed they thought more about their conversation partner than their conversation partners thought about them. Moreover, the thought gap increased for people whose thoughts were more readily available at a trait level. These findings provide further support for the thought gap and confirm the fourth and final prediction of our asymmetric availability account.

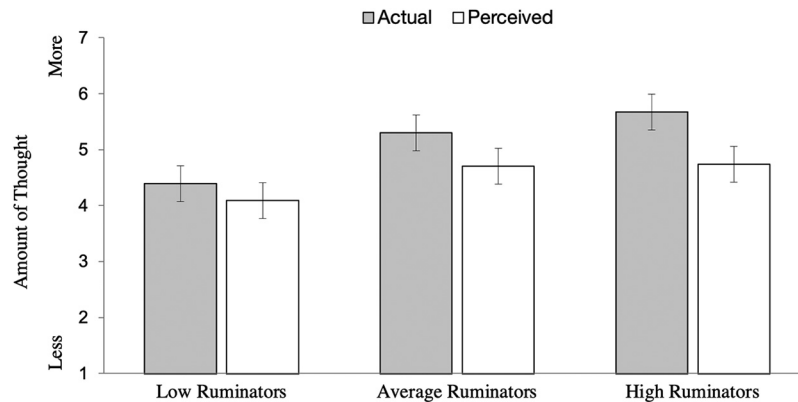
### Study 8: Thought Frequency and Thought Valence

The thought gap describes a bias in which people underestimate the frequency of their conversation partners’ thoughts about them. But does it matter if people underestimate the frequency of others’ thoughts? Exploratory analyses from Studies 2–3 suggest that, at the very least, it may improve people’s well-being to know how often others think about them after conversation. The current study aims to further explore the possible consequences of the thought gap.

To do so, we think it is helpful to consider the relationship between thought frequency and another important aspect of thoughts: valence. Thought valence is obviously important, in the sense that if you learned that your conversation partner was having positive or negative thoughts about you, this would *clearly* affect your beliefs, attitudes, and behavior. But what about the frequency of your partners’ thoughts? Does frequency matter? If so, how?

<sup>3</sup> It is worth noting that, technically, when high ruminators believe that they think more about their conversation partners than their conversation partners think about them, it might not be a mistake. After all, on average, high ruminators are talking to others who are not as high in rumination. On the other hand, this makes the thought gap pattern for low ruminators even more surprising, as low ruminators are, on average, talking to people who ruminate more than they do. And note that average ruminators nevertheless display a significant thought gap. Overall, however, it was not the aim of this study to test the claim that different types of ruminators are necessarily making a mistake. Rather, we were interested in whether we could observe a pattern of results across rumination type consistent with our asymmetric availability account, which we did.

**Figure 6**  
Results of Study 7



Note. Moderation of the thought gap by trait rumination. Error bars show 95% confidence intervals.

To answer these questions, we constructed scenarios involving an argument between oneself and a counterpart. We varied the frequency and valence of one's counterpart's thoughts after an argument and asked people to predict the likelihood that their counterpart would want to reconcile their differences. Our hypotheses were as follows: (a) Thought frequency would magnify the relationship between positive thoughts and perceived likelihood of reconciliation; and (b) Thought frequency itself would positively affect the likelihood of reconciliation, even when valence is neutral.

In testing these hypotheses, our goal was to provide clear experimental evidence of the interactive and dissociable effects of thought frequency and thought valence on an important outcome—the perceived likelihood that one's conversation partner will reconcile after an argument.

## Method

### Participants

Participants were recruited through Prolific Academic. They first completed a three-item screener to assess their English proficiency and whether they resided in the United States. In total, 305 participants (48.5% male, 50.5% female, one "other"; age:  $M = 32.71$ ,  $SD = 11.52$  years; demographic information missing from two participants) completed our survey for \$1.25.

### Procedure

Participants were told to imagine that they had an argument with a significant other or a friend. Participants were then randomly assigned to a thought valence condition in which they either thought about how they would feel if their conversation partner had positive thoughts about them and their argument after it ended (*positive thoughts condition*) or neutral thoughts about them and their argument after it ended (*neutral thoughts condition*). Participants in the positive thoughts condition responded to two scenarios, one in which their counterpart thought about them and their argument many times (*high thought frequency condition*; 8.1), and one in which their counterpart thought about them and their

argument once (*low thought frequency condition*; 8.2). Participants in the neutral thoughts condition also responded to two scenarios in which their counterpart thought about them and their argument many times (8.3) or once (8.4). Participants then reported their beliefs about the likelihood that their counterpart would want to reconcile their differences if they talked again (i.e., "If you talked with this person again about your argument, how likely do you think it would be that they would want to reconcile their differences with you?" Scale endpoints: 1 = *Not very likely* and 2 = *Very likely*). Finally, participants answered a number of demographic measures. The demographics and the exact wording of the scenarios described above are also detailed in the online supplemental materials (Questions .1–.3; 8.1–8.4).

## Results

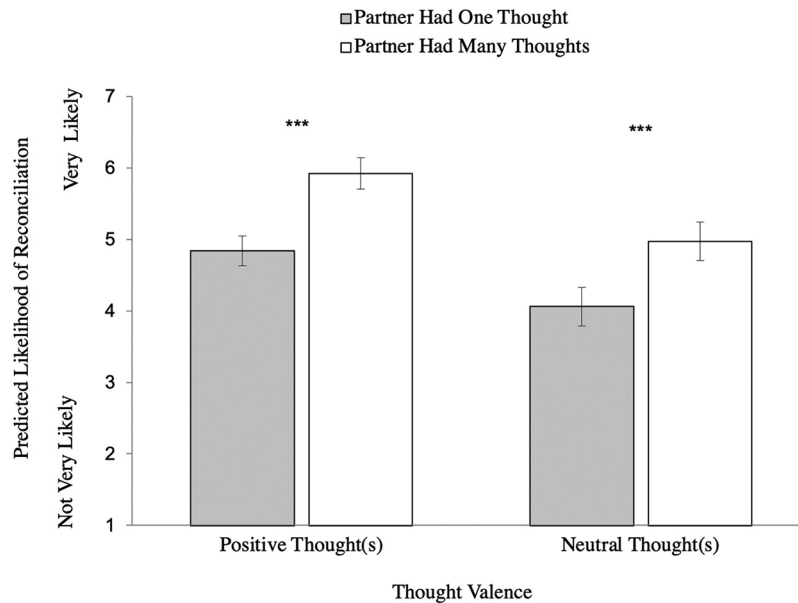
Following our preregistration, 18 participants failed to pass an attention check embedded in the survey and their data were excluded from all analyses. Data from the remaining 287 participants (49.1% male, 49.8% female, one "other"; age:  $M = 33.12$ ,  $SD = 11.52$  years; demographic information missing from two participants) were included in all analyses. To analyze the data, we fit a mixed linear model, including fixed effects for thought frequency (low or high) and thought valence (positive or neutral), as well as a random intercept for participant. Postestimation contrasts were used to extract key comparisons.

### Positive Thoughts

Our analysis revealed a significant overall effect of valence ( $b = .78$ , 95% CI [.45, 1.12],  $t(554) = 4.58$ ,  $p < .001$ ). In other words, people who responded to scenarios in which their counterpart had positive thoughts after an argument believed that their counterpart would be significantly more likely to want to reconcile. Further analysis of the positive thoughts condition also revealed a significant effect of thought frequency on reconciliation (mean difference between high and low frequency = 1.08, 95% CI [.77, 1.39],  $t(285) = 6.88$ ,  $p < .001$ ). Critically, as shown in Figure 7, the frequency of thoughts people believed their counterpart had after an



**Figure 7**  
Results of Study 8



*Note.* The effects of thought valence and thought frequency on the perceived likelihood of reconciling after an argument. Error bars show 95% confidence intervals.

\*\*\*  $p < .001$ .

argument magnified the relationship between positive thoughts and increased likelihood of reconciliation.

### Neutral Thoughts

What about the effect of thought frequency *when valence is neutral*? Analyzing data from the neutral thoughts condition again revealed a significant effect of thought frequency on the likelihood of reconciliation (mean difference between high and low frequency = .91, 95% CI [.61, 1.22],  $t(285) = 5.88$ ,  $p < .001$ ). In other words, as shown in Figure 7, even when people imagined that their counterpart had neutral thoughts after an argument, imagining that their counterpart had more thoughts nevertheless increased people's belief that their counterpart would be willing to reconcile.

Finally, the Valence  $\times$  Frequency interaction was not significant ( $b = .17$ , 95% CI [-.26, .60],  $t(285) = .76$ ,  $p = .45$ ), suggesting that frequency has a similar effect regardless of valence.

In sum, thought frequency appears to magnify the relationship between positive thoughts and perceived likelihood of reconciliation, and thought frequency can itself positively affect the likelihood of reconciliation, even when valence is neutral. To further highlight the implications of these results, consider Study 4, which demonstrated the existence of the thought gap after an argument just like the one described in this study. If people are underestimating how often their partners are having positive or neutral thoughts after an argument, people are also likely underestimating their partner's willingness to reconcile their differences.

## General Discussion

Following conversations, participants in our studies mistakenly believed that they thought more about their conversation partner than

their conversation partner thought about them. We found evidence for this *thought gap* in the field (Study 1), in a controlled laboratory setting (Studies 2 and 3), and in several online studies (Studies 4–6, 8).

Furthermore, the thought gap existed across a variety of relationship types, including strangers meeting for the first time, friends, and significant others (Studies 1–8). The thought gap also persisted across a variety of social contexts, including “getting-to-know-you” conversations (Study 2), arguments (Studies 4–7), and deep and meaningful discussions (Study 3). We also observed the same pattern of results for both positive interactions, such as conversations among friends (Studies 1 and 3), and for negative interactions, such as disagreements (Studies 4, 7, and 8). These results strongly support the existence of a thought gap across a variety of relationships and social contexts.

Our primary explanation for the thought gap is people's asymmetric access to their own thoughts compared with others' thoughts, and we tested four predictions of this account: (a) conversations that produce especially salient and thus accessible thoughts should produce a larger thought gap; (b) increasing the availability of others' thoughts should reduce the size of the thought gap; (c) the thought gap should increase over time as one's thoughts have time to accumulate in one's mind; and finally, (d) the thought gap should be moderated by rumination, or the extent to which people's thoughts are readily available at a trait level. Results from Studies 4–7 confirmed each of these predictions, providing consistent evidence for one of the main psychological processes responsible for the thought gap.

Finally, we began to explore some possible consequences of the thought gap. People reported that they would be pleasantly surprised to learn how much their conversation partners were truly thinking about them (Studies 2 and 3), and the results of Study 8 suggest that

thought frequency can magnify the effects of thought valence and also have independent effects on important outcomes, such as perceived willingness to reconcile after an argument.

### Additional Consideration of Mechanism

Although it is clear that the thought gap is caused, at least in part, by the ample availability of one's own thoughts and people's limited access to others' thoughts, additional psychological processes may also play a role. For example, perhaps people are underestimating how much their conversation partners think about them after conversations because it is somehow socially desirable to say so. Many studies have demonstrated that people sometimes misreport their true attitudes, beliefs, and behavior to present a favorable self-image (e.g., Fisher, 1993). This leads people to misreport things such as their illegal drug use (Sloan et al., 2004) or their consumption of unhealthy foods (Klesges et al., 2004). In the same way that people exaggerate the amount of money they give to charity (Connelly & Brown, 1994), might people also exaggerate the number of thoughts they have about their conversation partners to appear kind? Social desirability could also contribute to the thought gap from the other direction: Perhaps participants purposely lowballed their estimates of how much their conversation partners thought about them to appear humble.

However, a social desirability account cannot explain the pattern of results we observed. For example, social desirability cannot easily explain why there was a larger thought gap for arguments that were ongoing versus resolved (Study 4). Furthermore, and most convincingly, it cannot explain why the magnitude of the thought gap increased as more and more time had elapsed since the end of the conversation (Study 6). Overall, the results of these studies suggest that it is unlikely that the thought gap is the result of participants simply substituting socially desirable responses in lieu of their true beliefs.

Nevertheless, perhaps a more nuanced social desirability processes is operative, whereby people are motivated to recruit evidence that supports the thought gap, which might ultimately bias cognition toward some larger functional goal, such as reputation management. After all, people often do not just engage in a superficial process of *misreporting* their true beliefs to appear a certain way, rather they actually *hold* these socially desirable beliefs (Hoelzl & Rustichini, 2005; Svenson, 1981; Williams & Gilovich, 2008), as evidenced by the well-catalogued psychological processes that support this sort of motivated reasoning, such as biased interpretation of ambiguous stimuli, selective recruitment of evidence, and asymmetric updating (Dawson et al., 2002; Dunning et al., 1989; Epley & Gilovich, 2016; Gilovich, 1991; Kunda, 1990; Sharot et al., 2012).

In short, based on the observed pattern of data, we believe it is unlikely that people are simply misrepresenting their beliefs for the sake of humility, but we do not deny that exhibiting a thought gap might ultimately be an advantageous social strategy that minimizes reputational costs (Kurzban, 2012; von Hippel & Trivers, 2011)—although this claim is obviously in need of empirical support.

In sum, although a number of processes may contribute to the thought gap, the results of our studies provide clear and consistent evidence in favor of the asymmetric availability of thoughts as a central mechanism. As we argued in the Introduction, people have

strategies to gain access to their conversation partners' thoughts, such as egocentrically projecting one's own self-views or assuming reciprocity of thoughts such that however much I am thinking about you, I assume you are thinking about me a similar amount. But it appears that even with these strategies at their disposal, people are unable to overcome the lack of availability of others' thoughts, and thus systemically underestimate how much their partners think about them in the aftermath of conversations.

### Conceptual Scope of the Thought Gap

Because the thought gap is a mistake that involves (a) estimating the frequency of others' thoughts *about oneself*, and because the thought gap occurs (b) *after conversation*, there are naturally two questions one might ask about its conceptual scope. First, in addition to underestimating others' thoughts about oneself, do people underestimate others' thoughts about other topics? Second, is the thought gap a phenomenon that only arises after a conversation, or does it occur in other contexts, perhaps even without a social interaction to incite it?

In theory, one could ask whether people over- or underestimate the frequency of others' thoughts about any topic—do people underestimate how much others think about broccoli, the Broncos, or Borneo? And if people's thoughts about such topics were highly salient, a "thought gap" might emerge. In addition, it seems plausible that our mechanism—*asymmetric availability*—would actually cause people to believe that others have *more* thoughts than they do in some circumstances (e.g., if they happen to bring up a rare topic multiple times during a conversation). Overall, our mechanism does not preclude the misestimation of people's thoughts about other topics, or even a possible reversal of the thought gap under the right circumstances.

Additionally, our proposed mechanism does not support the narrow conclusion that the thought gap ought to emerge exclusively following conversations. In fact, we might expect other salient events to produce a thought gap. The thought gap might even emerge as people anticipate their conversations, such as leading up to an interview or meeting someone new.

In sum, we make no claim that underestimating others' thoughts is limited to people trying to estimate others' thoughts *about them* or limited to occurring after conversations. But we feel there are strong practical and theoretical reasons to start here, including the fact that people spend a considerable amount of time thinking about their colleagues, friends, and spouses after conversation. Overall, it is our hope that this work isolates an important and consequential case of underestimating others' thoughts and inspires more research on thought frequency generally.

### Limitations of the Current Research

One limitation of the current studies is that they are not all dyadic. For example, in Studies 1 and 4–7, people *recall* a conversation or argument they had. As a result, we only have access to data from one member of a dyadic interaction. This raises the possibility that, when prompted, people selectively reported on a conversation or argument that they had thought about to an unusually great degree. This would exaggerate the size of the thought gap, as well as call into question whether the thought gap is a bias or simply an accurate reflection of reality—because it is possible that

people recalled exactly those conversations in which they really did think more about their conversation partner than their partner thought about them. Of course, this is why we ran two dyadic laboratory studies (Studies 2 and 3), which revealed the same pattern of results. Moreover, we took several steps to avoid the possibility of a recall bias (e.g., participants were prompted to report on the last conversation or argument they had, rather than the most salient one in memory). Nonetheless, we acknowledge the limitations of nondyadic studies for investigations of the thought gap.

### Implications of the Thought Gap

A conversation with a friend can be a delight, but it would be considerably less delightful if you thought you were the only one who spent the rest of the afternoon thinking about all the moments of connection you shared—while your conversation partner simply went on with their day. The results of Studies 2 and 3 are consistent with this possibility, as the majority of our participants reported that they would be “pleasantly surprised” to learn that their conversation partners were thinking about them just as much as they were. One implication is that the thought gap may contribute to feelings of loneliness and social isolation, which are increasingly recognized as important contributors to people’s mental and physical health (Diener & Seligman, 2002; Hawkey & Cacioppo, 2010; Helliwell & Putnam, 2004; Holt-Lunstad et al., 2017; Myers, 2000; Sun et al., 2020). This is especially true on account of the fact that the thought gap continues to increase as time passes, in the hours and days that follow an interaction (Study 6)—quite the lonely position to be in.

The thought gap may also have implications for one’s future conversations. For example, imagine you have an argument with your spouse or a friend; afterward, the heat of the moment having dissipated, you find yourself thinking about them and their point of view, and how maybe they weren’t actually so wrong after all. If you believe *they* are likewise thinking about *you* and your point of view, you might approach the next conversation primed for reconciliation (e.g., Studies 4 and 8). If, on the other hand, you believe you are the only one bearing the burden of conciliatory thoughts, you might dig in your heels or approach the next interaction less charitably. This is just one example of how the thought gap may perpetuate a self-reinforcing cycle of negativity in certain conversational contexts, such as arguments or periods of interpersonal conflict.

Taken together, alerting people to the existence of the thought gap ought to help people appreciate that they remain a fixture in others’ thoughts, much more than they realize, which appears to be a mostly pleasant and reassuring fact. Alternatively, it is easy to see how, left unchecked, the thought gap may contribute to feelings of uncertainty, loneliness, and lack of social support, which in turn could negatively affect people’s existing relationships as well as the development of new ones—consequences we hope future research will explore.

### Conclusion

During conversation, people forgo all the possible things they could be thinking about to devote their thoughts to another person. This ability to make another person the sole focus of one’s thoughts is one of the many reasons why conversation is such a

successful device for the formation and maintenance of social relationships. After conversations are over, however, people are put in the difficult psychological position of no longer having access to others’ thoughts, while still knowing exactly how much they are thinking about others. This appears to cause people to systematically underestimate the extent to which they remain on their conversation partners’ minds after conversations.

The thought gap ultimately obscures a basic truth: After interactions with friends, romantic partners, colleagues, and new acquaintances, when you call to mind your conversation partner, on average, they do the same about you. Just as our conversation partners echo in our minds, we echo in theirs. But because other people’s thoughts remain hidden from us, the impact we have on our conversation partners remains greater than we know.

### Context

For several years, we have been studying how people form beliefs about what their conversation partners think about them and whether those beliefs are accurate. In previous research, we found that after meeting a new conversation partner, people systematically underestimated how much their partner liked them and enjoyed their company (Boothby et al., 2018; Mastroianni et al., 2021; see also, Li et al., 2020; Wolf et al., 2021). This “liking gap” is a metaperceptual error regarding the *content* of others’ thoughts about them. In the current work, we explore people’s beliefs about the *frequency* of others’ thoughts and find that people underestimate how much their conversation partners think about them after conversations. This “thought gap,” together with the liking gap, suggests that people can be surprisingly pessimistic about the impact they have on their conversation partners—regarding both the content and frequency of others’ thoughts. Overall, we hope that our work will highlight the importance of studying thought frequency, raise interesting questions about how judgments of thought frequency relate to processes implicated in the broader metaperception literature, and, ultimately, contribute to a growing body of literature on the social cognition of conversation.

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