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# Toward a Science of Silence: The Consequences of Leaving a Memory Unsaid

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## Abstract

Silence about the past permeates acts of remembering, with marked mnemonic consequences. Mnemonic silence—the absence of expressing a memory—is public in nature and is embedded within communicative acts, such as conversations. As such, silence has the potential to affect both speakers—the source of the silence—and listeners—those attending to the speaker. Although the topic of silence is widely discussed, it is rarely mentioned in the empirical literature on memory. Three factors are employed to classify silence into different types: whether a silence is accompanied by covert remembering, whether the silence is intentional or unintentional, and whether the silenced memory is related or unrelated to the memories emerging in a conversation. These factors appear to be critical when considering the mnemonic consequences. Moreover, the influence of silence on memory varies between speaker and listener. Although rarely mentioned, recent empirical research on memory clearly has a bearing on a topic of such general interest as silence.

## Keywords

collective memory, covertness, forgetting, intentionality, relatedness, retrieval-induced forgetting, silence

Silence often figures in how people or communities recount the past. It can serve as the means by which individuals or communities cope with trauma, exercise power, exclude others, and deny shameful acts (e.g., S. Butler, 1996; Cohen, 2001; Herman, 1997; Olick, 2007; Scott, 1990; Sturken, 1997; Terr, 2003; Wagner-Pacifi & Schwartz, 1991; Winter, 2006; E. Zerubavel, 2007; Zolberg, 1998). People may remain silent about their childhood abuse, while speaking at length about other aspects of their youth (for related work with children and trauma, see Af Hjelmsäter, Granhag, Strömwall, & Memon, 2008; Anderson, 2001; Saunders & MacLeod, 2002; S.-J. Williams, Wright, & Freeman, 2002; Wright & Loftus, 1998). And Turks may speak eloquently about the triumphs of the Ottoman Empire, while remaining silent about their treatment of Armenians (Akçam, 2006). As much as acts of remembering, silence can influence identity construction, attitude formation, decision making, and action, both individual and collective (e.g., Brockmeier & Carbaugh, 2001; Bruner, 1990; Cairns & Roe, 2003; Kaplan, 2005; McAdams, 1997; Pennebaker, Paez, & Rimé, 1997; Rosenberg, 1995; Sahdra & Ross, 2007; E. Zerubavel, 1999; Y. Zerubavel, 1995). Although *mnemonic silence* can be found in a wide variety of communicative media—paintings, movies, and songs, among others—we are chiefly interested in instances in which mnemonic silence is embedded in conversations (see also Hirst & Echterhoff, 2012). People are constantly talking to each other about

the past, and in doing so, they recount some details, while remaining silent about others (Ben-Ze'ev, Ginio, & Winter, 2010; Bruner, 2004; Ricoeur, 2004; Spence, 1983; Vinitzky-Seroussi, 2009; E. Zerubavel, 2007).

There is a widely shared belief that mnemonic silence leads to forgetting. Indeed, various philosophers and cultural theorists have often argued that, in many instances, people are ethically bound to give voice to the past, that is, not to be silent, for with this silence, what should be remembered will be forgotten (Assmann, 1995; Margalit, 2002). We explore here not only whether mnemonic silence promotes forgetting but also the circumstances in which the forgetting might occur. Moreover, we investigate the possibility that there are instances in which silence improves memory. Unlike much of the other work on silence, we base our investigation on the available empirical psychological research. That is, in this article, we examine the mnemonic consequences of silence from an experimental psychological perspective.

We should stress that, for us, *silence* is not just the “absence of sound,” the first definition in the *American Heritage Dictionary* (Kleinedler, 2001, p. 772); rather, to turn to another

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definition in that dictionary, we treat it as “the refusal or failure to speak out,” or, more specifically, “the refusal or failure to remember.” The definition of mnemonic silence, the one we adopt here, can apply to a wide range of content. Unrecalled memories can be autobiographical, community relevant, or simply factual, without necessarily bearing on construals of either self or community. Mnemonic silence can also “manifest” itself in a variety of different ways, to be articulated below. Our main concern here is to understand whether and how the mnemonic consequences of silence differ across possible variations of silence. There will be two major sections in this article: a section on the different types of silence followed by a section on the mnemonic consequences of these different types.

## Varieties of Mnemonic Silence

### Basic considerations

As we noted, we are interested in silence as it arises in a communicative exchange. Within this setting, a mnemonic silence occurs when a person fails or refuses to express in a conversation a memory that, under other circumstances, could and would be remembered and expressed. That is, the silenced memory could potentially be remembered and expressed if the appropriate retrieval cues, situational demands, or motives were present. Our emphasis on communication both limits and expands our range of concerns. It limits us by focusing our efforts on explicit memories. As we understand the distinction, an explicit memory is recognized by a rememberer as a memory, whereas an implicit memory is not (Schacter, 1987). As a result, only the former can be communicated to others as a recollective experience. It expands our considerations, in that it points us to the effect silence might have not just on the source of the silence—whom we will refer to as the *speaker*—but also on those attending to the speaker, the *listeners*. At times, the effects of silence on the speaker and listener are similar; at other times, different.

Our definition of silence allows for a number of variants. First, we follow the dictionary and distinguish between instances of silence in which people intentionally *refuse* to express or remember a memory with instances in which they unintentionally *fail* to express or remember. That is, we will be

concerned about the intentionality underlying the silence. As we have indicated, when discussing a failure to remember, we are not referring to instances in which the memory is erased or, to use Tulving and Pearlstone’s (1966) terminology, unavailable. Rather, we insist that a rememberer must have the potential to remember the material in another circumstance.

Second, in exploring the varieties of silence, we contrast those instances in which the failure or refusal to express a memory is accompanied by a recollective experience and those in which it is not. We adopt the following terminology when discussing this contrast. When a memory is expressed in a conversation, we will say that it is remembered *overtly*. When it is not expressed but is recollected, we say that it is remembered *covertly*. (See M. A. Smith & Roediger, 2011, for a similar distinction using similar terminology.) Mnemonic silence, then, occurs when there is no overt remembering. The silence may or may not be accompanied by covert remembering. We recognize that in order to distinguish between a silence with or without covert remembering, one would need to probe for an individual’s subjective judgment as to the presence or absence of a recollective experience. We are mainly concerned here with instances in which this judgment is not problematic—that is, when it is clear that a recollective experience is privately held but not publicly shared (Meade & Roediger, 2002; M. A. Smith & Roediger, 2011). Experimenters have collected such subjective judgments for several decades with reliable effects (e.g., Gardiner & Richardson-Klavehn, 2000), even producing evidence that private and public expressions of memory involve different brain mechanisms (Edelson, Sharot, Dolan, & Dudai, 2011).

If we focus on these two features—intentionality and covertness—then we have at least four types of silence to consider: (a) refusing to remember overtly while remembering covertly, (b) refusing to remember overtly and covertly, (c) failing to remember overtly while remembering covertly, and (d) failing to remember overtly and covertly (see Table 1).

### Crossing covertness with intentionality

Ultimately, we want to determine whether different types of silence have different mnemonic consequences, but before we do so, we need to better understand the nature of our four different types of silence. We discuss each of them below, pointing to

**Table 1.** Examples of Types of Silence

Intentionality	Recollective experience of the speaker	
	With covert remembering	Without covert remembering
Refusing to remember overtly (intentionally not remembering)	Deception by commission (lying) and deception by omission	Voluntary suppression
Failing to remember overtly (unintentionally not remembering)	Not having time in a conversation to convey a memory, even though you have it in mind	Being blocked in a conversation from retrieving an item (collaborative inhibition)

both real-world examples and experimental manifestations. In most instances, the relevant experiments were not originally framed in terms of silence, let alone the types of silence we discuss here. As a result, the language used to describe the experiments may not conform with the experimenters' original description.

**Refusing to remember overtly while remembering covertly.**

This type of silence often involves deception. With deception, one may have a memory clearly in mind but not share it with others. This silence can be expressed through either commission or omission. Lying is a good example of a silence by commission, with the liar intentionally saying one thing aloud—that he did not see Joe last night—while clearly remembering covertly something different (Bok, 1978, 1999). In silence by omission, instead of saying something misleading, people simply say nothing, or at least something completely unrelated to the memory covertly remembered.

Of course, this type of silence can arise without deception. People might, for instance, refuse to recall personal details because of pressures to conform (Asch, 1956), because of social taboos, or because of conversational maxims of quantity, quality, or relevance (Grice, 1975; Kashima, Klein, & Clark, 2007). Refusals to remember can also occur because speakers are tuning what they say to the perceived attitudes or expectations of their audience, articulating some aspects of their memory while leaving others unmentioned (Grice, 1975; Higgins & Rholes, 1978; Sperber & Wilson, 1986). In some but not all instances, such audience tuning takes place intentionally. Echterhoff and colleagues have realized this intentional tuning experimentally by paying participants to shape what they say to their audience's attitude (see Echterhoff, Higgins, & Levine, 2009, for other instances in which tuning may be intentional). Although these researchers do not explicitly probe for the recollective content of the speaker, it seems reasonable to assume that, when tuning for pay, the silenced memory may often be covertly remembered.

**Refusing to remember overtly and covertly.** Perhaps more interesting from a cognitive perspective are those instances in which people deliberately attempt to “not remember.” In such instances, we say that they are refusing to remember overtly or covertly. Although people often, and paradoxically, find themselves unable to stop remembering covertly or thinking about something they actively tell themselves not to remember or think about (Wegner, 1994, 1997), there are times when people can effectively prevent themselves from thinking a thought or even covertly remembering a memory (Anderson & Green, 2001; see also Anderson & Levy, 2009). In these instances, there is no recollective experience. Such effortful and successful suppression of a memory does not imply that people do not necessarily have the potential to remember overtly or covertly the suppressed memory if they wanted to. Rather, it simply implies that this potential is not realized, let alone communicated to others. We are uncertain how often people effortfully suppress a

recollection. There is no doubt, however, that in certain circumstances people undertake such an effort, especially when dealing with traumatic material (Freyd, 1996; Geraerts & McNally, 2008; Herman, 1997; Koutstaal & Schacter, 1997).

As to an experimental realization of effortful mnemonic suppression, consider Anderson and Green's (2001) think/no-think paradigm. They first asked participants to study word pairs, such as *ordeal*–*roach*, and then instructed them not to remember the response item *roach* when supplied with the cue *ordeal*. They argued that effective suppression in this “think/no-think” paradigm depends largely on executive control and working memory, a claim supported by functional MRI studies (for a review, see Anderson & Levy, 2009). Moreover, Anderson and his colleagues have shown that people use different strategies to exert executive control, for example, diverting their attention to something else or “blinking out” their mind. Some suppression strategies are more effective than others (Bergtöm, de Fockert, & Richardson-Klavehn, 2009; Levy & Anderson, 2008).

**Failing to remember overtly while remembering covertly.**

Failures of this kind often occur because circumstances make overt remembering impossible, regardless of what the rememberer has in mind. For example, a conversation's rapid turn taking might make it difficult for speaker–rememberers to express a memory they clearly have in mind, even if they wanted to. They simply cannot “get a word in edgewise.” Interestingly, the word “forget” is rarely used in such circumstances. Rather, people will claim that they remembered the event quite well but did not get the chance to convey their remembrance. Nevertheless, as far as listeners are concerned, the memories are simply not recollected, hence the nomenclature, “failure to remember overtly.”

**Failing to remember overtly and covertly.** A good example of this type of silence occurs when the direction of a conversation seemingly blocks one of the participants from remembering something that, in another circumstance, they would easily remember. Consider a conversation Mary might have with her mother about her date. Her mother directs the conversation to the surprisingly good profession the date has. As a consequence, Mary remains silent about the date's romantic ending. In such an instance, Mary may not covertly recollect the details about the end of the date and then censor herself. Nor might she intentionally try not to remember the details. Rather, the thrust of the conversation prevents the details from ever coming to mind. This silence, on Mary's part, could be because she wants to follow the rules of conversation, such as, keep to the topic at hand (Grice, 1975; Sperber & Wilson, 1986). Alternatively, Mary could be audience tuning, avoiding recollecting details that would upset her mother (Echterhoff et al., 2009). Her silence could also occur because of collaborative inhibition.

*Collaborative inhibition* has been identified as a robust consequence of collaborative remembering (see Rajaram & Pereira-Pasarin, 2010, for a review). Although a group conversing about

the past will overtly remember more collectively than any individual member might alone (a process called *collaborative facilitation*; see Meudell, Hitch, & Kirby, 1992), the emergent memory is less than the sum of the memories that individual participants might produce alone (Basden, Basden, Bryner, & Thomas, 1997; Weldon & Bellinger, 1997; see Harris, Paterson, & Kemp, 2008, for a review).

We identify collaborative inhibition as an example of failure rather than refusal to remember because the memory lapse is not a matter of choice but an unintended consequence of the social dynamics within the conversation (Weldon, Blair, & Huebsch, 2000). Because people often encoded an experience differently, conversational participants may begin their collective remembering with distinctly different representations. As a result, when they jointly try to recall the experience, one participant may take the lead and adopt a retrieval strategy that is effective for her but not for the other participants. In doing so, she would unintentionally be blocking other participants from pursuing what, for them, would be an effective retrieval strategy. This inefficiency leads to the observed inhibition (Basden et al., 1997). The blockage is not intentional on the speaker's part and is certainly not intentionally solicited by listeners. It is a structural consequence of the different representations conversational participants formed of the past and the pattern of social interactions within the conversation (Basden et al., 1997).

Repressed memories are another example of a failure to remember overtly and covertly. Although repression as a mechanism lacks strong experimental support, it is frequently mentioned in discussions of mnemonic silence (see Passerini, 2003). Repression is motivated forgetting. According to psychoanalytic theory, people repress a memory in order to avoid the anxiety the memory could produce (Freud, 1915). Given the central role of motives in any examination of repression, one might have expected us to include it in our discussion of silence as a refusal to remember. We do not treat it this way, because, for us and others, repression involves unconscious rather than conscious suppression (Holmes, 1990; Kihlstrom, 2002).<sup>1</sup>

### **Relatedness**

One additional distinction needs to be explored when considering silences within a conversational exchange: Silenced memories can either be related or unrelated to what is being remembered overtly in the conversation. Sometimes people are silent about a past event because they simply do not talk about it at all. They avoid it in conversation. At other times, people discuss the event but selectively remain silent about some details while expressing others. In the former case, the silence is said to be unrelated to whatever is being talked about; in the latter case, it is related. Many of the laboratory studies we review capture these phenomena experimentally. They realize silenced and overtly remembered memories in different ways, however: by providing additional practice to

some memories but not others (Anderson, Bjork, & Bjork, 1994; Cuc, Koppel, & Hirst, 2007), by testing some memories but not others (Chan, McDermott, & Roediger, 2006), and by asking participants to suppress some memories but not others (Anderson & Green, 2001; Wegner, 1994, 1997). Moreover, what is meant by relatedness is not always clear, as when, for instance, events from the same episode described in a story are said to be related, while those from different episodes are said to be unrelated (see Cuc et al., 2007; Stone, Barnier, Sutton, & Hirst, 2010). Although one could examine how the concept of relatedness is used across experiments, we feel that it is well enough specified at present to be heuristically useful.

### **Consequences of Mnemonic Silence on Subsequent Remembering**

Although one might conceive of other features on which to differentiate silences than the three just mentioned, we focus on the three features just discussed—covertly, intentionality, relatedness—because they have substantive consequences on memory. In what follows, we first discuss the mnemonic consequences of silence in the midst of unrelated overt remembering and then the mnemonic consequences of silence embedded within related overt remembering. We consider the consequences for both the speaker—the source of the silence—and the listener (see Table 2).

#### ***Mnemonic silence amidst overtly remembered, unrelated memories***

Mnemonic silence can have a detrimental effect on memory because it precludes the improvement accompanying rehearsal, reexposure, or retrieval. When something is remembered overtly in a conversation, both the speaker and the listener are reexposed to material (or sometimes exposed for the first time, in the case of the listener; for a review, see Greene, 1992). The benefit is probably greater for the speaker, the person remembering the material. As Karpicke and Roediger (2007) have noted, “[r]epeated retrieval is the key to enhancing later retention” (p. 159). But listeners also benefit (see Levine & Murphy, 1943), presumably because the speaker's overt remembering allows the listener to covertly rehearse the remembered material (see M. A. Smith & Roediger, 2011) or to use it as a reminder for as yet unretrieved memories (Hintzman, 2011). Blumen and Rajaram (2008) have recently documented the positive effects of retrieval and reexposure on subsequent memory in the context of collaborative remembering.

What happens to a memory if it is not rehearsed, retrieved, or reexposed? Since Ebbinghaus (1885/1964), psychologists have recognized that without rehearsal or reexposure, forgetting will occur at an exponential rate, with rapid forgetting in the short term and a slowing over the long term. A variety of mechanisms have been suggested to account for this forgetting, including decay, interference, context change, or some combination of these (Wixted, 2005). Although the rate may



**Table 2.** Different Types of Silence and Their Mnemonic Consequences

Intentionality	Recollective experience of speaker		
	With covert remembering	Without covert remembering	
Refusing to remember overtly (intentionally not remembering)	Unrelated		
	Speaker	Facilitates memory (ironic rebound effect)	Facilitates forgetting (think/no-think); greater forgetting than found with a failure to remember unrelated material
Listener	Forgetting due to lack of rehearsal or reexposure; less than if related		
Failing to remember overtly (unintentionally not remembering)	Speaker	Facilitates memory (Smith & Roediger, 2011)	Forgetting due to lack of rehearsal or reexposure; less than if related
	Listener	Forgetting due to lack of rehearsal or reexposure; less than if related	
Related			
Refusing to remember overtly (intentionally not remembering)	Speaker	No systematic research to date. According to the audience-tuning literature, could depend on the speakers' motives; may produce less forgetting than a failure to remember	
	Listener	Induces forgetting (socially shared retrieval-induced forgetting)	
Failing to remember overtly (unintentionally not remembering)	Speaker	Facilitates memory (retrieval-induced facilitation)	Induces forgetting (within-individual retrieval-induced forgetting)
	Listener	Induces forgetting (socially shared retrieval-induced forgetting)	

Note. Relatedness refers to the degree to which items are semantically related, for example, related: apple and orange (fruits) versus unrelated: apple (fruit) and broccoli (vegetable; Anderson, Bjork, & Bjork, 1994; Cuc, Koppel, & Hirst, 2007). However, what is meant by relatedness is not always clear, as when, for instance, events from the same episode described in a story are said to be related, while those from different episodes are said to be unrelated (see Cuc et al., 2007; Stone, Barnier, Sutton, & Hirst, 2010).

be affected by the relation between what is and is not remembered, forgetting will usually occur even when the silenced memories are unrelated to the remembered material. Bahrlick (1984) has documented that the rate of forgetting greatly diminishes after 6 years (see Rubin, 1982, for other exceptions to the standard forgetting curve). As a result, mnemonic silence might be a much less effective means for promoting forgetting if applied to events from the distant past (i.e., 6 or more years in the past) than to recently experienced events.

**Effects on speakers.** Do the mnemonic consequences of silence amid unrelated memories vary with covertness and intentionality for a speaker in a conversation? Covertness certainly matters. If a silenced memory is remembered covertly, then its retrieval encourages not forgetting but memory improvement (Roediger & Karpicke, 2006). Recent research

indicates that the mnemonic improvement associated with retrieval is as strong when the retrieval is covert as when it is overt (M. A. Smith & Roediger, 2011).

As for intentionality, two distinct paradigms lead to quite different conclusions.

**Ironic processes paradigm.** According to the research employing the ironic processing paradigm, when people actively and intentionally suppress a memory unrelated to “online” remembering (e.g., don’t think about a “white bear”), they will subsequently find themselves thinking about it more than they would if they had not intentionally suppressed the unrelated memory, in what is referred to as the rebound effect (Wegner, 1994, 1997; Wegner, Schneider, Carter, & White, 1987). According to Wegner and colleagues, two processes are involved in the suppression of a thought: (a) operating processes that promote the intended state (not thinking about a white bear) and (b)

monitoring processes that assess whether the unintended state is present (e.g., monitoring whether one is thinking about a white bear). The former requires substantially greater cognitive resources than the latter. Hence, when people are distracted or stressed, the operating process may fail, allowing for the content of the monitoring process to surface. Because of the susceptibility of the operating processes, successful thought suppression can be difficult. In Wegner and colleagues' account of the ironic rebound effect, people continue to monitor for the target item even after the effort to suppress the memory ends. Moreover, people have become sensitive to the target item because of the monitoring. As a result, the likelihood of the memory emerging after suppression increases.

The rebound effect suggests that intentional silences, can actually make speakers more likely to remember the suppressed material in the future rather than to forget it. Though this "ironic" effect of silence presumably extends to a range of contexts, extant research has thus far demonstrated it only when speakers in a conversation refuse to remember negative episodes from their lives (Dalgleish, Yiend, Schweizer, & Dunn, 2009) or from their romantic relationships (Wegner, Lane, & Dimitri, 1994) and when they refer to stereotypical information about an individual they are discussing (Macrae, Bodenhausen, Milne, & Jetten, 1994).

**Think/no-think paradigm.** Another experimental paradigm—the think/no-think paradigm discussed above—suggests that a refusal to remember does not lead to a rebound effect. Rather, it enhances forgetting. Interestingly, the think/no-think paradigm allows us to contrast the effect of refusing to remember with the effect of failing to remember. Anderson and Green (2001), for instance, contrasted suppression training, in which participants, in essence, refused to remember, with a condition in which participants proceeded directly to the final memory test. This latter procedure essentially ensured that participants would fail to remember during the interval that, in the suppression condition, they were refusing to remember. Anderson and Green found that forgetting was greater when people refused to remember (experienced suppression training) than when they failed to remember (received no suppression training). Moreover, they reported that the more extensive the training, the greater the forgetting. It is unclear how long this discrepancy between the rates of forgetting for silences of refusal and silences of failure lasts. There is some suggestion that it may be short-lived (Tomlinson, Huber, Rieth, & Davelaar, 2009).

**Implications of paradigm differences.** Why does intentional silence (without covert remembering) in the ironic processing studies enhance subsequent memory performance, whereas similar intentional silence in the think/no-think studies leads to forgetting?

In the Appendix, we discuss three differences between these experimental paradigms that lead us to believe that the consequences of such silence depend on the success of the suppression: Forgetting occurs if it is successful or perceived to be successful; a mnemonic rebound occurs if it is at least partially unsuccessful—that is, if the item is covertly retrieved.

The extant research further indicates that actual or perceived success at suppression is more likely to occur if it has to be sustained only for a short period of time, as it is in the think/no-think experiments. Lapses in suppression are more likely with sustained suppression, which is what is required in the ironic processing experiments. As to how often suppression is brief or sustained in the world outside the laboratory, we can only speculate. We suspect that people rarely must continuously suppress a memory for 5 min in most everyday circumstances. Conversely, people may suppress a memory briefly in a conversation and then suppress it again a few minutes later in the same conversation. This repeated and spaced suppression differs from the sustained suppression Wegner and his colleagues (Wegner, 1994, 1997; Wegner et al., 1987) studied and is closer to the repeated trials of suppression Anderson and Green (2001) studied.

**The effects on listeners.** As to listening to mnemonic silence amid unrelated overt remembering, generally speaking, any covert remembering on the part of the speaker should be irrelevant. The listener simply is not privy to the covert remembering the speaker might be undertaking. The intentions of the speaker should also not matter, in general. Memories of the listeners that are unexpressed by the speaker should simply fade, regardless of the intentionality or covertness of the silence, inasmuch as they are neither rehearsed nor reexpressed.

Of course, we need to consider not only the intentions of the speaker and the source of the silence but also the intentions of the listener. These intentions did not lead to the silence, but they may affect how the listener responds to the silence. For instance, the listener might suspect that a speaker is refusing to overtly remember or, for some reason, failing to overtly remember. Under these circumstances, the listener may make the effort to covertly remember what is not being said. Memory improvement should follow for the listener (M. A. Smith & Roediger, 2011). We suspect, however, in instances in which the silence occurs in the midst of unrelated, overt remembering, such suspicions on the part of the listener are unlikely to occur. Why would the listener suspect a silence if there is no connection between the silenced material and the discussed material? In most circumstances, then, the consequence of mnemonic silence in the midst of unrelated memories should be increased forgetting for the listener.

### **Mnemonic silence embedded in overtly remembered, related memories**

The research paradigms that have most carefully examined mnemonic silences of this kind explore the effects of selective retrieval on memory, specifically the possibility of subsequent retrieval-induced forgetting (RIF; Anderson et al., 1994). In the standard RIF paradigm, participants study and learn category-exemplar pairs (e.g., *fruit-apple*, *fruit-orange*, *vegetable-broccoli*, *vegetable-pea*). They then practice retrieving half of

the exemplars from half of the categories. The experimenter provides participants with the category name and the first letters of the studied exemplars (e.g., *fruit-ap\_\_*), and participants recall the exemplar. Thus, the participant is silent during the practice phase about some but not all of the fruit exemplars and all of the vegetable exemplars. A final recall test follows, with the participant attempting to recall the originally studied exemplars after being given the category labels (see Table 3). The experimental design creates three types of memories: Rp+, practiced (overtly remembered) memories (e.g., *fruit-apple*); Rp-, unpracticed (silenced) memories related to the practiced memories (e.g., *fruit-orange*); and Nrp, unpracticed (silenced) memories unrelated to any practiced memories (e.g., all the vegetables). The selective practice is said to induce forgetting when the related Rp- items are recalled less well than the unrelated Nrp items; it is said to facilitate memory when  $Rp- > Nrp$ .

Although there are a number of competing explanations as to why this type of forgetting might be observed in such experiments (K. M. Butler, Williams, Zacks, & Maki, 2001; Dodd, Castel, & Roberts, 2006; C. C. Williams & Zacks, 2001), the most widely accepted account involves inhibition (Anderson, 2003; Anderson & Spellman, 1995; see Schwabe & Wolf, 2010, for a related discussion of reconsolidation). The presentation of a retrieval cue activates related responses. Consequently, the rememberer must isolate from the array of activated responses the desired target and does so by inhibiting the non-target activated material. The unpracticed but related material thereby becomes harder to remember than the unpracticed, unrelated material. We classify the silence associated with the unpracticed items as a failure to remember because researchers have argued that the inhibition associated with retrieval-induced forgetting is automatic (Conway & Fthenaki, 2003; but see Román, Soriano, Gómez-Ariza, & Bajo, 2009).

The RIF paradigm allows us to both (a) examine the consequences of failing to remember a memory overtly and covertly and (b) determine whether the mnemonic consequence of this failure differs depending on whether the item is related (Rp-) or unrelated (Nrp) to what is overtly remembered. We should also note that the experiment produces a silence rather than an erasure of memory, in that participants should be able to remember at least some of the unpracticed items if asked to. That is, participants are failing to remember memories that

they have the potential to remember—a critical feature of our definition of silence.

**The effects on speakers.** Most experiments utilizing the RIF paradigm test a single participant in isolation. Although acts of remembering and being silent in this experiment are not in any way conversational in nature, one could nevertheless view the participant as a speaker—albeit one without a tangible audience. A substantial literature shows that the selective practice in this paradigm can induce forgetting for the unpracticed but related material, that is,  $Rp- < Nrp$  (Anderson et al., 1994; Barnier, Hung, & Conway, 2004; Ciranni & Shimamura, 1999; Garcia-Bajos, Migueles, & Anderson, 2008; Hicks & Starns, 2004; Saunders & MacLeod, 2002). RIF can be found not only for word pairs but also for stories (e.g., Saunders & MacLeod, 2002), scientific material (Carroll, Campbell-Ratcliffe, Murnane, & Perfect, 2007), and memories of witnesses to mock crimes (e.g., Shaw, Bjork, & Handal, 1995). However, there remains some confusion about whether it can be found for emotionally charged material. Some experiments suggest that the RIF effect can be found for positive and neutral material only (Moulds & Kandris, 2006); others, only for neutral material (Dehli & Brennen, 2009); still others for all types of emotional valence (Barnier et al., 2004; Brown, Kramer, Romano, & Hirst, 2011; Coman, Manier, & Hirst, 2009; Stone, Barnier, Sutton, & Hirst, 2011).

What justifies treating participants in these studies as a “speaker” is that selective remembering and selective silence need not be experimentally controlled to produce RIF. Most conversational acts of recounting involve selective remembering and selective silence, what Marsh (2007) refers to as *retelling* as opposed to *recalling* (see also Rajaram, & Pereira-Pasarin, 2010). When the mnemonic consequences of the selective remembering and selective silence in a free-flowing conversation are studied, RIF is still observed for speakers. This conversational RIF is found when participants recount both previously studied stories and autobiographical memories (Cuc et al., 2007; Stone et al., 2010, 2011).

Considered together, the extant experimental work suggests that people should be more likely to forget a silenced part of a story about a date if they talk about the date but leave out specific material, rather than avoid talking about the date altogether. More generally, the selective remembering typical of conversational remembering should lead to enhanced forgetting of the

**Table 3.** Design of Retrieval-Induced Forgetting Experiments

Study phase	Practice phase	Testing phase	Condition
Vegetable–broccoli		Recall words paired with “vegetable”	Nrp
Vegetable–pea			Nrp
Fruit–apple	Fruit–Ap__	Recall words paired with “fruit”	Rp+
Fruit–orange			Rp-

Note. A typical result showing retrieval-induced forgetting is that Rp+ items are remembered best, followed by Nrp items (silenced, unrelated), followed by Rp- items (silenced, related).



silenced memories, particularly if the silenced memories are related to memories surfacing in the conversation.

*Related silences may improve memory.* We need to emphasize that mnemonic silences embedded in overt, related memories need not induce forgetting. At times, it can improve memory. For instance, Chan et al. (2006) examined the role of selective testing (i.e., retrieval) of prose material reminiscent of an educational textbook. Their material included articles about toucans, the big bang theory, the history of Hong Kong, and the Shaolin Temple. After studying one or more of these articles, participants were asked questions about some of the articles and then only some of the material in an article. Thus, some untested material was related to tested items (Rp-), and some was unrelated (Nrp). As with RIF results, relatedness mattered. However, Chan et al. (2006) found that selective testing facilitated the recall of related yet untested material on final recall.

Chan and colleagues have begun to articulate some of the conditions under which mnemonic silence might be expected to lead to facilitation rather than forgetting (e.g., Chan, 2009, 2010; Chan et al., 2006). For instance, they asked some participants to undertake a broad retrieval search during the practice phase of the experiment, that is, to think of all facts related to the question, before answering. Alternatively, they asked others for a narrow search, that is, for participants to try to think of only the correct answer. Chan et al. (2006) also monitored response times. The broad search produced facilitation; when the narrow search yielded a quick response time, the final recall test showed evidence of RIF.

We suspect that the broad search produced facilitation effects because it encouraged participants to remember related material covertly and/or to identify the similarities across the to-be-remembered items (Anderson, Green, & McCulloch, 2000). The narrow search may have produced forgetting because it did not provide the time for covert remembering or the motivation to make the effort to search for similarities across the items. This would be especially the case if participants had only a short time to respond. That is, in Chan et al. (2006), mnemonic silence is not a failure to remember overtly and covertly but only a failure to remember overtly. The results of Chan et al. (2006), therefore, are consistent with what we observed with silences unrelated to overtly remembered memories: that forgetting is found if there is not concurrent covert remembering, and enhanced remembering is found if there is covert remembering.

How frequently might retrieval-induced facilitation follow a mnemonic silence? We are uncertain how often a broad search occurs in everyday social interactions. For instance, Hirst and Echterhoff (2008) have argued that the quick give-and-take of a conversation does not allow enough time for the broad search needed for retrieval-induced facilitation. Although there may be instances in which participants in a conversation undertake a broad search, it nevertheless seems reasonable that RIF may be a more common occurrence in

everyday life, especially in the course of everyday conversational interactions.

*Other boundary conditions on RIF.* These boundary conditions may not have to do with the presence or absence of covert remembering. As a result, they are more likely to eliminate or diminish the induced forgetting, without producing facilitation. For instance, RIF is diminished or eliminated when participants integrate the studied material, that is, they form “interconnections between competing memories” (Anderson & McCulloch, 1999, p. 609; see also Anderson, 2003). This result presumably arises because integration can diminish response competition (E. E. Smith, Adams, & Schorr, 1978; see also Myers, O’Brien, Balota, & Toyofuku, 1984). The diminishing effect of integration on RIF provides an account of why RIF is not observed for experts, who should be more likely to integrate material than should nonexperts (Carroll et al., 2007).

RIF will also vary with mood, in that, counterintuitively, a negative mood appears to protect a rememberer from the induced forgetting elicited by selective retrieval and mnemonic silence (K.-H. Bäuml & Kuhbandner, 2007; Kuhbandner, Bäuml, & Stiedl, 2009). Finally, some researchers suggest that the inhibition associated with RIF is temporally limited, with evidence of RIF disappearing after a day (MacLeod & Macrae, 2001; Saunders & MacLeod, 2002). However, other researchers have observed the impairment associated with RIF for up to a week (Storm, Bjork, Bjork, & Nestojko, 2006).

The extant results, then, clearly indicate that silence, as a failure to remember, can induce forgetting for the speaker to a greater degree when it is related to what is overtly remembered than when it is unrelated. However, in some instances, facilitation does occur. We are beginning to understand when these different consequences of silence emerge. The effort is important. For instance, the work on integration and RIF suggests that, following a conversation about a political crisis, people should be more likely to forget previously learned details when their grasp of the crisis is shallow and fragmentary than when it is deep and well integrated. This observation might explain why people seem to have difficulty remembering the details of many crises.

*Refusal versus failure to remember.* Would we expect induced forgetting to follow a refusal to remember related material, as much as it follows a failure to remember? At present, no systematic research has been done. Work on audience tuning suggests that when tuning is voluntary, it may not subsequently bias a speaker’s memory (see Echterhoff et al., 2009). For instance, no memory bias is found when participants are paid to tune. It is quite possible that when dealing with related material, a refusal to remember may lead to less forgetting than a failure to remember. This pattern is the opposite of what we observed for refusals and failures to remember unrelated material. However, it is difficult to draw any strong conclusions from the present work on audience tuning, as relevant studies do not experimentally manipulate intentionality.

**Effects on listeners.** The RIF effect is found not only for speakers in a conversation but also for listeners (Cuc et al., 2007). When discussing the induced forgetting associated with the speaker, Cuc et al. used the term *within-individual retrieval-induced forgetting* (WI-RIF); when discussing the induced forgetting associated with the listener, they used the term *socially shared retrieval-induced forgetting* (SS-RIF). Cuc et al. (2007) argued that SS-RIF should emerge when listeners concurrently, albeit covertly, retrieve the same memory with the speaker. Inasmuch as RIF does not depend on whether a memory is remembered overtly or covertly (Saunders, Fernandes, & Kosnes, 2009), the selective discussion and mnemonic silence attributed to the speaker should induce forgetting in both speaker and listener. Silenced material related to what the speaker said should be more likely to be forgotten by both speaker and listener than the silenced material unrelated to what the speaker spoke about. In constructing Table 2, we incorporated these findings for the listener without regard to the intentions of the speaker or the presence of a covert recollective experience on the speaker's part. As we previously argued, in many cases, the speaker's covert remembering and intentions are irrelevant to how the listener responds to a silence.

As with WI-RIF, SS-RIF can be found both when the silence occurs in a stem-completion task (as in Table 3) and when it is embedded in a free-flowing conversation (Cuc et al., 2007). Moreover, it is present for a wide variety of material, including not just paired associates and stories but also scientific material (Koppel, Wohl, Meksin, & Hirst, 2011), autobiographical memories (Stone et al., 2011), and for central elements as well as the details of a story (Stone et al., 2010). SS-RIF has also been found for positive, negative, and neutral emotionally valenced material (Stone et al., 2011). Brown et al. (2011) demonstrated both WI-RIF and SS-RIF for trauma-related material in individuals with combat-related posttraumatic stress disorder. Finally, the presence of RIF may increase the opportunity for a speaker (or other external sources) to implant a memory (Saunders & MacLeod, 2002).

**Semantically similar but different memories.** A speaker's silence may also induce forgetting in the listener for memories when the listener's memories are similar to but not the same as those of the speaker. Coman et al. (2009) studied this possibility by examining memories people held of their activities on September 11, 2001. These memories differed across individuals but shared semantic features: for example, both participants learned about the attack, but the location where they each learned it differed. Coman et al. found that the discussions two unrelated participants had about 9/11 decreased the accessibility of unmentioned memories in a subsequent recognition test, especially for those unmentioned memories related to the content of the conversation (i.e.,  $Rp^- < Nrp$ ). The memories of the speaker and listener were different, but they forgot the same type of memory. Consider a situation in which a speaker overtly remembers in a conversation where she was when she woke up on 9/11 but not where she was when she learned of the attack. Coman et al. indicate that she and her

listener should subsequently have more trouble remembering where they were when they learned of the attack than they would if the conversation had never taken place at all.

**Need for concurrent retrieval—overt or covert.** The presence of SS-RIF depends on the way a listener monitors what a speaker recollects. Monitoring instructions that demand that listeners assess the accuracy of the speaker's recollections forces listeners to concurrently retrieve, whereas monitoring instructions that ask listeners merely to attend to the fluidity of the recollection do not (Cuc et al., 2007). The "demand to assess accuracy" and, in turn, concurrently retrieve, maps nicely onto a core feature of the RIF effect, that is, the need for retrieval. The RIF effect occurs as a consequence of retrieval, not, for instance, extra study time (see Anderson, 2003; Anderson & Bell, 2001; Anderson, Bjork, & Bjork, 2000; K. Bäuml, 1996, 1997, 2002; Blaxton & Neely, 1983; Ciranni & Shimamura, 1999; Shivde & Anderson, 2001). As a result, SS-RIF depends on the monitoring instruction: Accuracy instructions produce SS-RIF; fluidity instructions do not.

In related findings, Koppel et al. (2011) found that nonexpert listeners demonstrate diminished RIF when listening to an expert compared with when listening to a nonexpert. They reasoned that listeners assume that the expert is recalling the material accurately and, hence, might not make the effort to concurrently retrieve in order to assess the expert's accuracy. Koppel et al. also found that when listeners mistrust a speaker, they manifested now increased RIF. Here, listeners may believe that they must monitor for accuracy, given the unreliability of the speaker.

The findings of SS-RIF suggest that if, for instance, going back to our earlier example about the Armenian genocide, the Turkish government wanted Turks to collectively forget the Armenian genocide, it would be better for them to discuss publicly the history of Armenians in Turkey, while remaining silent about the genocide, than to avoid discussing the Armenian issue altogether. In a similar way, students who have already studied for an exam may be induced to forget relevant material if they listen to a lecture selectively covering the same material. They may be less likely to forget the same information if they never listened to the lecture (Koppel et al., 2011).

## Toward a Science of Silence

What, then, are the mnemonic consequences of silence? The topic of silence is discussed in a wide number of fields, with scholars often offering armchair claims about its mnemonic consequences. Can the experimental literature on selective remembering provide some insight? We have argued here that mnemonic silence can be of different kinds, captured by features such as covertness, intentionality, and relatedness. Moreover, we have shown that the mnemonic consequences of silence depend on the type of silence. The widely held view that silence promotes forgetting is correct, generally, but as we have worked through relevant laboratory-based research, this claim, in some instances, lacks specificity in that the same level of

forgetting does not occur for all types of silence. Moreover, at times, silence leads to facilitation, not forgetting. As we considered the mnemonic consequences of the different types of silence we explored herein, three overarching observations are in order.

### **When does silence lead to forgetting?**

**Importance of covert remembering.** First, silence can lead to forgetting, but in a number of conditions, it may have no effect on memory, or it may facilitate remembering, at least for the speaker. A critical determinant of whether forgetting or facilitation occurs is whether covert remembering accompanies the silence. If the silenced memory is covertly remembered, it can reinforce the existing memory of the speaker and, in doing so, enhance her subsequent memory performance. Inasmuch as this covert remembering is private, in many circumstances, it should have no effect on the listener. It is possible, then, for mnemonic silence to facilitate the memory of the speaker, while promoting forgetting in the listener.

**Refusal versus failure to remember.** Second, silence accompanying a refusal to remember is generally more likely to promote forgetting by a speaker than is silence accompanying a failure to remember—that is, in addition to covertness, intentions matter. Intended silence may elicit greater forgetting than unintended silence (assuming that there is no covert remembering taking place), but these intentions on the speaker's part are once again private. In such instances, the intentions of the speaker should have no effect on the listener's memories. The silence should promote forgetting on the listener's part, but this level of forgetting should not vary as a function of the speaker's intentions. Of course, at times, a listener may guess the speaker's intentions or infer them from the conversational setting, but there is no guarantee.

Does intentional silence always yield forgetting? In some instances, intentional silence, or to use another term, suppression, leads to a rebound effect rather than forgetting. The outcome depends on the success of the suppression, the duration of the attempt at suppression, and the degree to which the speaker monitors the suppression. Generally, when suppression is successful, forgetting follows; when it is not, a rebound effect can be found. Such a conclusion suggests that when exploring the consequences of refusals to remember, researchers, as well as, for instance, therapists, should be sensitive to the success of the suppression.

**Related versus unrelated memories.** Third, as long as the silenced memory is not remembered covertly, silence embedded in acts of related overt remembering is more likely to promote forgetting than silence amid unrelated acts of overt remembering. The extant evidence for this claim is derived mainly from studies of unintended silence. As to instances in which covert remembering does occur, as it might when a speaker undertakes a broad search when attempting to

remember an item, facilitation rather than forgetting is observed. Thus, as we found when considering both covertness and intentionality, when it comes to relatedness, some conditions of silence promote forgetting, and others facilitate remembering. We are beginning to understand which conditions are likely to produce forgetting and which ones produce facilitation.

### **Effects on speaker versus listener**

In charting the effects of silence on memory, we have repeatedly observed that silence is public, that it occurs within a communicative setting, and that its effect on memory can vary for speaker and listener. It is not simply that listeners are not privy to the internal state of the speaker and, hence, cannot be affected by what speakers privately remember or what speakers' intentions are. The different effects of silence on speakers and listeners can be quite subtle. For instance, students may perceive their professor as an expert on all aspects of psychology, even though he is not. From the SS-RIF results we reported here, selective overt remembering of the speaker will induce forgetting in the speaker but not in the listener (Koppel et al., 2011). Alternatively, a professor may indeed be an expert but, because of miscues and/or hesitations made during a conversation, may be viewed by the students as a novice. Now, silence will not induce forgetting in the speaker, but it will induce forgetting in the listener. In both instances, there would be no mutual forgetting.

It is important to note that the consequences of mnemonic silence do not always differ for speaker and listener; often they are the same. For example, in many instances, mnemonic silence related to what the speaker remembers is more likely to induce forgetting in both speaker and listener. Again, to turn to our professor example, a neutral stance about the teacher's expertise will likely lead to similar RIF for both the professor and students. When similar effects for speaker and listener occur, they might be said to forget the silenced memories collectively (Stone et al., 2010).

Elsewhere, we have defined a collective memory as shared individual memories that bear on the identity of a community and have emphasized the importance of collective forgetting in the formation of a collective memory (Hirst & Manier, 2008; Stone et al., 2010). Recent research has also shown that the mnemonic consequences of silence is not confined to the interaction between a single speaker and a single listener but can propagate through a network of individuals, thereby underscoring their role in the formation of a collective memory not just for conversing pairs but for whole communities (Coman & Hirst, 2011). To the extent the formation of a collective memory can be viewed as a benefit to sociality, the forgetting that follows silence might be viewed not as a sin, to borrow Schacter's (2001) term, but a virtue (Hirst, 2010). When viewed from this perspective, it is not surprising that evolution has preserved this form of forgetting.

## Final thoughts

The work we have described to date constitutes only a beginning for a science of silence. Although the relevant research is not usually framed in terms of the mnemonic consequences of silence, it nevertheless can provide a basis for empirically grounded claims about the mnemonic consequences of silence. The extant research has allowed us to explore how silence affects individual memory and collective memory. And it has permitted us to understand when silence will induce forgetting, when it enhances memory, and when it has no effect. Even at this early stage of research, the emerging picture offers details not found in most discussions of silence in the humanities, social sciences, and psychoanalysis (e.g., Cohen, 2001; Herman, 1997; Patterson, 1992). Silence is not just about forgetting, and when it is, the manner by which it promotes or induces forgetting is complicated and nuanced. Our discussion here indicates that experimental psychology can offer new insights into the mnemonic consequences of silence. In doing so, it contributes in meaningful ways to a conversation that, to date, has excluded laboratory-based research.

## Appendix

There are at least three possible explanations for the different results found using the ironic processing and think/no-think paradigms. First, the two experimental paradigms focus on different postsuppression behaviors. In many of the studies of the rebound effect, researchers monitor how often a target comes to mind. The experimenters do not explicitly probe for the target. The think/no-think experiments usually involve an explicit memory test for the target. Intentional silence (without covert remembering), then, may encourage the suppressed memory to “pop into mind” in the future but may make it more difficult to bring the memory to mind when explicitly asked to do so. This explanation, however, would be inconsistent with Anderson and Green’s (2001) claim that the forgetting they found in their experiment arose because participants inhibited their memory of the suppressed material.

Second, participants in the ironic rebound experiments may be more sensitive to contextual information than participants in the think/no-think experiments. As a result, the testing environment may be more likely to cue a target item in the rebound experiments than in the think/no-think experiments. In the think/no-think experiments, the experimenter provides a strong retrieval cue in the final memory test (e.g., the target word’s paired associate), thereby substantially decreasing the need to rely on contextual cues (see S. M. Smith & Vela, 2001). In contrast, in the ironic processing experiments, contextual cues may be important. Individuals may suppress a thought by shifting their attention away from the target to other objects in the testing room. When an undesired thought intrudes, it can be associated with the attended objects. After the active suppression ends, the objects in the testing room can trigger the undesired thought. A change in testing rooms should, and does, diminish the ironic rebound effect (Macrae, Bodenhausen, Milne, & Jetten, 1994; Wegner, Schneider, Knutson, & McMahon, 1991).

Third, the ironic rebound effect depends on the suppression being unsuccessful or at least perceived to be unsuccessful, whereas the forgetting observed in the think/no-think study depends on successful inhibition. When participants pursue what is known to be a successful means of suppressing a memory—that is, thinking of something other than the memory—forgetting increases in think/no-think experiments, while the rebound effect is eliminated in ironic processing experiments (Levy & Anderson, 2008; Wegner, Schneider, Carter, & White, 1987). These findings might suggest that the rebound effect depends on the presence of covert remembering, which would not be present if the suppression succeeds. However, this explanation cannot account fully for the findings in that the rebound effect can be eliminated by simply telling participants that their suppression was successful (Martin & Tesser, 1989). The latter result is more consistent with Wegner et al.’s (1987) monitoring account than an account that assumes that the rebound effect occurs purely because of the presence of covert remembering.

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## Note

1. When Conway (2001; see also Anderson & Green, 2001) argued that the think/no-think paradigm is an experimental realization of repression, he made two unwarranted assumptions. First, as Kihlstrom (2002) and others have argued, Conway conflated the legitimate and important distinction between unconscious and conscious motives. Participants in the think/no-think experiments are acutely aware of trying not to remember. Second, Conway diminished the critical role of motives in Freudian theory. In the think/no-think paradigm, the experimenter tells participants to not remember. Participants do not “suppress” their memories to avoid anxiety. Given these two concerns, we would argue that the think/no-think paradigm is best thought of as probing refusals to remember, not failures to remember. It is not an experimental realization of repression.

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