



## The Many Faces of Forgetting: Toward a Constructive View of Forgetting in Everyday Life



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Forgetting is often considered a fundamental cognitive failure, reflecting the undesirable and potentially embarrassing inability to retrieve a sought-after experience or fact. For this reason, forgetfulness has been argued to form the basis of many problems associated with our memory system. We highlight instead how forgetfulness serves many purposes within our everyday experience, giving rise to some of our best characteristics. Drawing from cognitive, neuroscientific, and applied research, we contextualize our findings in terms of their contributions along three important (if not entirely independent) roles supported by forgetting, namely (a) the maintenance of a positive and coherent self-image (“Guardian”), (b) the facilitation of efficient cognitive function (“Librarian”), and (c) the development of a creative and flexible worldview (“Inventor”). Together, these roles depict an expanded understanding of how forgetting provides memory with many of its cardinal virtues.

### General Audience Summary

Our inability to remember the name of an acquaintance or an important date is both embarrassing and frustrating. For that reason, forgetting is often viewed as a sign of impending cognitive decline or even as a character flaw. These fears have even driven some toward the promise of memory-enhancing pharmaceuticals and digital technologies designed to preserve memories indefinitely. Long the stuff of science fiction, these promises are closer than ever to realization. In this article we instead argue that a life without forgetting risks sacrificing some of our most adaptive and virtuous qualities. We offer a fresh reminder of these virtues, drawing from recent cognitive, neuroscientific, and applied findings. In so doing, we identify three important (if not entirely independent) roles supported by forgetting, namely maintenance of a positive and coherent self-image (“Guardian”), facilitation of efficient cognitive function (“Librarian”), and development of a creative and flexible worldview (“Inventor”). Together, these roles depict an expanded understanding of how forgetting provides memory with many of its cardinal virtues.

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To be forgotten is, to many, a fate worse than death. To forget is, to many more, a shameful sin. Indeed, if one were to ask a friend or colleague to describe the most significant

failings of the human mind, it is likely that forgetfulness would rank near the top of their list. To combat these concerns, an increasing number have attempted to preserve their memories

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through a combination of supplements, exercises, and digital record-keeping. Yet, whereas the promise of archiving and sharing the past with greater detail and reach than ever before is alluring, the quest to remember (and be remembered) has illustrated poignant reasons to fear such an infallible memory. One might consider the case of a youthful indiscretion finding its way to a potential employer who is conducting a preliminary Internet search—or when a mistaken decision leads to painful, debilitating rumination.

The social networks that increasingly bind us together have come to rely on algorithms that automatically determine whether otherwise forgettable incidents are granted eternal life on public feeds and in the cloud that stores our collective memories. In this way, forgetting is being erased from society—at our own peril. Yet, humankind need not submit to fate. Individuals have the facility to exert a certain level of control over their memories. In reviewing the potential to forget below, we aim to challenge the predominant view that forgetting is a cognitive failure. Instead, we argue that the “best” memory is often a selective one. We argue that, much like one’s own reputation, forgetting should not be defined by its occasional sins but also appropriately reflect its more virtuous aspects. In short, whereas the inability to remember something can be distressing, the inability to forget something has the same destructive potential. In making the case for the virtues of forgetting, our purpose is not to introduce new theory, but rather to organize what we know about forgetting into an overarching functional framework, not unlike those developed to characterize other aspects of memory.

We are certainly not the first to note that forgetting plays an important role in everyday life. To be sure, scientists and philosophers alike have long argued that forgetting is just as important as remembering (e.g., James, 1890/1950; Ribot, 1882). For example, in Cicero’s (1840/2009) *De Oratore*, when Themistocles is offered the secret to perfect recall, he replies that it would instead “. . .oblige him much more if [the speaker] could instruct him how to forget. . .what he chose.” Others have provided a literary portrait of what a “perfect” memory might look like, accentuating the tragic suffering of those who are relatively unable to relinquish distracting, outdated, or otherwise upsetting memories (e.g., Borges, 1962). These literary depictions are themselves supported by real-world cases that bear a striking resemblance (e.g., Luria, 1968; Price & Davis, 2008), showing how an inability to forget imposes many functional impairments on our cognitive and emotional well-being. This has led some scientists to suggest that forgetting may reflect an adaptive mechanism (Bjork, LaBerge, & Legrand, 1968), if not a major “cost” of an otherwise adaptive system (Schacter, 1999, 2001).

Despite such acknowledgements, few taxonomies exist systematizing how forgetting actively contributes to our well-being (cf. Nørby, 2015). We approach this challenge in the form of seven cardinal virtues delineating the core benefits of forgetting, which are summarized in Table 1. To this end, we have personified these virtues within the framework of three characters whose titles are intended to illustrate how forgetting gives rise to real-world, applied benefits. These include the “Guardian” (who maintains a coherent, positive self-image and permits us to disengage from harmful thoughts or behaviors),

“Librarian” (who facilitates efficient, orderly cognition), and “Inventor” (who drives a creative and flexible worldview). Given that their functions are not wholly independent, we imagine these figures working together in the aim of supporting a healthy, positive existence.

To ground our perspective, we first present an overview of notable attempts to model real-world forgetting in controlled experiments. Throughout, we highlight what is known about the virtues of forgetting and what can be learned through the various memory-related disciplines interested in this topic. Nevertheless, the initial mechanistic overview may be skipped by readers wishing to dive into each of these roles, their attendant virtues, and more applied examples. We hope this work contributes to a constructive view of forgetting in the laboratory and in everyday life.

### The Mechanisms of Forgetting: An Overview

Information loss begins at the moment of experience, with attention favoring certain details over others. Attended information may then benefit from elaborative encoding that contributes to retention (Craik & Lockhart, 1972), whereas unattended information may fail to make a lasting impression in memory or even to be perceived consciously (Simons & Chabris, 1999; although, for effects of unconsciously processed events, see e.g., Greenwald, 1992; Marcel, 1983a, 1983b). This risk is especially prominent when attention is divided amongst multiple tasks, as might occur when one is trying to read an article while chatting with a colleague; the content of the article becomes relatively less attended and is therefore more likely to be lost. Importantly, although frustrating, this type of information loss may not be due to forgetting *per se*, but rather a lack of adequate encoding.

Even after encoding has begun, subsequent shifts in attention allow for continued mnemonic flexibility, should the presented material be recharacterized as outdated, mistaken, or otherwise irrelevant. For example, after clicking on an attention-grabbing headline to discover that the titular claims were not supported by the underlying article, the story may be safely forgotten through the redirection of attentional resources and the abandonment of further processing. Forgetting of this variety has been modeled in the laboratory using the item-method directed forgetting paradigm. In this task, participants are provided with a series of items each followed by an instruction to remember or forget the preceding item (MacLeod, 1998). Participants tend to have worse memory for those items they had been told to forget compared to items they had been told to remember. The general consensus is that much of this difference derives from a differential encoding strategy disfavoring the to-be-forgotten information (Basden, Basden, & Gargano, 1993; MacLeod, 1999), possibly aided by an active control process (Fawcett, Lawrence, & Taylor, 2016; Fawcett & Taylor, 2008; Zacks, Radvansky, & Hasher, 1996). Effectively, individuals tend not to remember information they fail to process adequately—and processing can be withdrawn intentionally even after encoding has begun.

Once something has been encoded, there are still many ways in which memories can be forgotten. Classic theories of

**Table 1**  
*The Seven Cardinal Virtues of Forgetting Organized According to Their Dominant Role*

Virtue	Description	Dominant role
1. <i>Serenity</i>	Forgetting allows us to avoid certain emotional consequences of past events—either by making them relatively inaccessible or dulling their emotional properties. Forgetting also facilitates forgiveness, helping us to move past negative actions of others and motivate ourselves despite recent adversity.	Guardian
2. <i>Stability</i>	Forgetting allows us to find stability in our understanding of the world by removing details inconsistent with our self- and world-views. Forgetting also helps us navigate situations in which preservation depends on shading past experience.	Guardian
3. <i>Clarity</i>	Forgetting helps us rid ourselves of mundane experiences, the details of which are unlikely to be important later. This form of forgetting is perhaps the most basic of all, even the “default,” helping to reduce distracting clutter and maintain mental clarity.	Librarian
4. <i>Revision</i>	Forgetting allows us to update experiences and memories with new information to maximize relevance and minimize competition. This can be accomplished via loss of detail—with gaps filled in by general knowledge—or more direct replacement via mechanisms such as reconsolidation.	Librarian
5. <i>Abstraction</i>	Forgetting provides a mental digestion process through which specific details are lost, allowing broad commonalities across similar experiences to emerge and form a more general knowledge base.	Librarian
6. <i>Inspiration</i>	Forgetting helps us cast off preconceptions and past fixations, allowing us to identify creative solutions to new problems.	Inventor
7. <i>Rediscovery</i>	Forgetting motivates us to reconnect with activities and people from our past. Seen through the gauze of nostalgia, complicated associations can be rekindled and given a new chance to flourish.	Inventor

forgetting ascribe forgetting to decay (J. Brown, 1958), interference (McGeoch, 1932; Müller & Pilzecker, 1900; Thorndike, 1914), ineffective memory cues (A.S. Brown, 1991; Shiffrin, 1970; Spear, 1971), or inhibition (Anderson, 2007; for an opposing view, see MacLeod, Dodd, Sheard, Wilson, & Bibi, 2003).

Decay presupposes that memory traces deteriorate over time—perhaps due to neuronal death or loss of connections within the brain, complicating re-activation of the desired pattern (for a review, see Ricker, Vergauwe, & Cowan, 2016). Although decay arguably occurs at some level, it has not received a great deal of attention in cognitive psychology, outside of neurobiological studies in non-human animals (Hardt, Nader, & Nadel, 2013).

An interference perspective instead suggests that experiences compete with one another, allowing past learning episodes to disrupt encoding of new information, and vice versa. For example, swimming in a sea of holiday memories from time spent on a particular beach over many years may swamp the memory of last summer’s trip to a new location. But, if the new locale becomes a regular holiday destination going forward, memory for prior vacations may be the ones to suffer from accumulating interference. Data supportive of these experiences have been observed using a variety of models (for a review, see Wixted, 2004), as well as real-world scenarios wherein the encoding of intervening information has been disentangled from the passage of time (Baddeley & Hitch, 1977). Indeed, the role of interference in forgetting is largely undisputed and likely substantial (for different considerations of interference’s role in forgetting, see Anderson, 2003; Wixted, 2004).

Recalling the location of last summer’s holiday becomes trivial in the presence of a reminder that points straight back to the original event. A geotagged digital photograph provides one such example, but effective retrieval cues are not always readily

available. Philosophical (e.g., Nietzsche, 1881/1911, p. 131) and psychological (Tulving, 1974) accounts of forgetting resulting from mismatched cues at encoding and retrieval predate smartphones. Classic demonstrations occur following shifts in the internal or external context between study and test (Baddeley, 1989; Bower, 1983). For example, scuba divers studying words underwater perform best when tested underwater (thereby equating study and test context) as opposed to on land (or vice versa; Godden & Baddeley, 1975). Although studying underwater may represent a fairly niche practice, this principle also predicts less fluent recall of the details of a case study when answering questions at a far-flung conference venue, which lacks the familiar contextual cues of one’s home institution. A fish out of water may have trouble getting its bearings, even in mnemonic terms.

Just as a new setting can make one feel out of their depth and grasping for effective memory cues, an abrupt change in internal context (e.g., physiological state, mood) can also affect the accessibility of memories encoded under different conditions (see Smith & Vela, 2001, for a review). In addition to revealing the mnemonic costs and benefits stemming from instructions to forget previously encoded information sets, the list-method directed forgetting paradigm (Bjork et al., 1968) has informed how shifts in the contents of conscious awareness (e.g., Estes, 1955; Howard & Kahana, 2002; Mensink & Raaijmakers, 1988; see Manning, Norman, & Kahana, 2014, for a review) can set the stage for forgetting. In this particular laboratory task, participants study two lists of items, with some participants instructed to forget the first list prior to studying a second list. Relative to a comparison group that was prompted to continue to remember the first list rather than forget it, participants in the forget condition generally show worse memory for the first list, a finding historically attributed to retrieval inhibition of the studied material (Bjork, 1989; Geiselman, Bjork, & Fishman, 1983).

Sahakyan and Kelley (2002) proposed a different explanation for the directed-forgetting effect, supported by their findings that a similar forgetting cost is revealed by asking participants to engage in diversionary thoughts (like imagining invisibility or a far-away vacation; Delaney, Sahakyan, Kelley, & Zimmerman, 2010) in place of an explicit instruction to forget the first list. Breaking the flow of study, either by introducing a sudden instruction to forget or by mentally teleporting oneself to a very different time and place through the power of imagination, is considered to alter the otherwise steady drift of mental context over time. In turn, participants would be expected to find themselves much farther afield from first-list encoding when they are asked to recall that list on the final test, making it harder to recall that information, much like the scuba divers struggling to recall underwater what they had studied on dry land.

Manning et al. (2016) used fMRI to track the drift of mental context over time and reported that, compared to remember instructions, a prompt to forget is associated with a more substantial departure from the original encoding context, to a degree that predicted forgetting of the first list. Together, these findings suggest that a simple change of mental scenery may allow individuals the opportunity to move past certain elements of a period they would prefer to forget (e.g., a difficult episode at work), all without leaving the comfort of their home: A staycation with the right mindset can help both save money and lose the extra baggage. Fortunately, if circumstances change, mental time travelers are not necessarily stranded upstream without a paddle. Sahakyan and Kelley (2002) went on to demonstrate that mentally reinstating one's original encoding context by thinking back to that time significantly reduces the effect of directed forgetting. Context may drift naturally, but its ebb and flow can be influenced by intention. Arguably, the role of context in directed forgetting is not necessarily at odds with an inhibition account of the phenomenon (Anderson, 2005) and may itself diminish with time (see Hupbach, 2018, for evidence that differential consolidation may be largely responsible for long-term effects of directed forgetting).

But one need not travel to far off lands to induce forgetting: Selective retrieval of one memory can impair the retrieval of related memories from the same semantic neighborhood or episode. For example, retrieving the name of a neighbor's child may make it harder to remember the name of the child's twin sibling: When related memories threaten to interfere with the retrieval of a target memory, control processes may be summoned to temporarily reduce the accessibility of those competitors. As a result, retrieval of the target is made easier at the cost of rendering competitors harder to recall for some extended period of time. This retrieval-induced forgetting (RIF) effect has been studied extensively in the context of the retrieval-practice paradigm (Anderson, Bjork, & Bjork, 1994; Anderson & Spellman, 1995), wherein participants learn a series of categorized lists (e.g., FRUIT–Apple, FRUIT–Orange, etc.) followed by practice retrieving repeatedly a portion of those exemplars (FRUIT–A\_\_\_\_\_). According to Anderson and colleagues, unpracticed items from those categories (Orange) are co-activated during retrieval, eliciting the aforementioned control processes to resolve interference and, in turn, making them

harder to recall during a later test relative to members from unpracticed categories (DRINKS–Scotch).

Whereas RIF demonstrates how retrieving one experience incidentally diminishes our ability to remember competing experiences, other findings demonstrate how it is possible to disrupt memories in a more motivated way, by suppressing retrieval when confronted with a powerful reminder. These findings have emerged from work employing the Think/No-Think (TNT) paradigm (Anderson & Green, 2001), wherein participants learn reminder–target pairs to criterion (e.g., LAWN–Beef), after which they receive a subset of the reminders and practice repeatedly either retrieving the associated target (Think trials) or suppressing the target's retrieval (No-Think trials). Attempts to suppress the retrieval is associated with the elicitation of cognitive control mechanisms affecting memory in the moment and beyond (for discussion of strategic differences, see Benoit & Anderson, 2012; Bergström, De Fockert, & Richardson-Klavehn, 2009; Hertel & Calcaterra, 2005). As a result, target memories that participants had sufficient practice suppressing tend to exhibit a lingering impairment when later tested and compared to baseline items that were equally well learned but not cued for subsequent practice (Anderson & Green, 2001; Anderson et al., 2004). Like RIF, this suppression-induced forgetting (SIF) effect exhibits properties consistent with the consequences of inhibitory control (Levy & Anderson, 2002).

The laboratory models discussed in this section have contributed greatly to mechanistic accounts of real-world forgetting, especially as variants prioritizing greater ecological validity have emerged over the years (many of which are discussed further below). But, as much as the work stemming from these approaches has revealed the costs of forgetting, we now turn to what they can reveal about the virtues of forgetting.

### The Guardian: The Protective Role of Forgetting

When someone thinks back to their first long-term relationship, they may feel a hint of nostalgia or even a certain bittersweet longing for that period of their lives. But, presuming the relationship ended years ago, they are likely to feel little else. This is in stark contrast to their feelings soon after the breakup. The disparity between these responses exemplifies an important role played by forgetting in everyday life: It often guards us from our past and helps us to build a stable, positive representation of our present and future. This role is protective, like an oyster creating a pearl to guard itself from the sharp edges of any sand hidden beneath its shell; in a similar manner, we tend to smooth the sharp edges of our personal experience by pruning or dulling any negative or unflattering elements (analogy borrowed from Sawyer, 2008). The curation of our experiences in the aim of achieving positivity and internal consistency gives rise to the related virtues of serenity and stability.

### Finding Serenity

One functional role of forgetting is to maintain a serene mind, by reducing the intrusiveness of unwanted experiences while also diminishing the impact of any experiences that do intrude

into our thoughts. Of course, not everyone is equally capable of keeping unwanted experiences from mind—as demonstrated by the prevalence of worry and rumination in the general population. However, this particular virtue is perhaps best exemplified by the struggles faced by certain individuals diagnosed with highly superior autobiographical memory (HSAM; [Parker, Cahill, & McGaugh, 2006](#)). The most famous case of this condition is that of Jill Price who was also the first to receive the diagnosis. Although she is able to recall distant personal events as though they happened only yesterday and in far greater detail and clarity than the average person, she leads a modest life and views her condition as a curse rather than a blessing ([Price & Davis, 2008](#)). This is largely because she is unable to let go of past negative experiences. Whereas the average person suffers in the aftermath of a psychological trauma, the emotional toll diminishes with time; this is not true of Jill, for whom traumas remain as intrusive and emotionally burdensome as the day they occurred.

With this example in mind, it should be clear that our ability to forget plays a crucial role in the regulation of our emotional state (see [Engen & Anderson, 2018](#); [Nørby, 2015, 2018](#), for reviews of this perspective). For example, the retrieval of positive experiences is an important endogenous means of improving current mood ([Josephson, Singer, & Salovey, 1996](#)). However, such a strategy presumes ready access to positive experiences undeterred by negative intrusive thoughts. This is not a problem for most people most of the time. In fact, we tend to become increasingly biased toward the retrieval of positive experiences as we age, producing a positivity bias in memory ([Mather & Carstensen, 2005](#)). In addition to brightening our mood, retrieval of positive experiences also provides a deeper benefit: It inoculates us against negative emotions by helping us to forget competing negative experiences. This claim has drawn support from studies showing that the magnitude of RIF observed for emotional material predicts an individual's positivity bias ([Marsh, Edginton, Conway, & Loveday, 2018](#)). This means that people differ in their bias toward positive information, and that these differences may be driven by their ability to use retrieval as a means of encouraging forgetting of negative experiences. Context may also be important here. By making the current internal and external state less similar to past negative events, we make the associated experiences more difficult to retrieve due to lack of contextual support.

Of course, should we be reminded of a negative experience, we still require a means of pushing and keeping the memory out of mind. Disrupting retrieval is one way of achieving this goal and should not only reduce the probability of an unwanted event coming to mind again, but also make it less detailed and easier to manage should it re-emerge ([Noreen & MacLeod, 2013](#); [Stephens, Braid, & Hertel, 2013](#); for similar findings in other paradigms, [Fawcett et al., 2016](#); [Fawcett, Taylor, & Nadel, 2013a, 2013b](#)). Forgetting the details of an unwanted event may seem at times undesirable (e.g., forgetting details of a criminal assault), but it also spares us from re-experiencing the event in full force. For example, it is much easier to move on after an embarrassing episode once distance has dulled the memory's content and emotional context.

Individual differences play an important role in the control of unwanted memories, as demonstrated by broad variation across individuals in the ability to push unwanted memories from mind (see [Levy & Anderson, 2008](#), for a review). Those bad at controlling their memories in the laboratory are also more likely to suffer from disorders characterized by uncontrollable thoughts or memories in their everyday lives ([Stramaccia, Rischer, Fawcett, & Benoit, 2019](#)). In particular, poor memory control in laboratory tasks has been linked to both rumination ([Fawcett et al., 2015](#); [Hertel & Gerstle, 2003](#); [Hertel, Maydon, Ogilvie, & Mor, 2018](#)) and worry ([Benoit, Davies, & Anderson, 2016](#)), as well as the diagnosis of specific conditions such as post-traumatic stress disorder (PTSD; [Catarino, Küpper, Werner-Seidler, Dalgleish, & Anderson, 2015](#)). Together, these findings highlight the idea that our ability to forget when advantageous is a major determinant of mental health.

For that reason, it is perhaps surprising that many clinicians eschew forgetting—and memory control in particular—as a beneficial process during treatment. In fact, the very idea that pushing aversive thoughts or experiences from mind might help us process a trauma is at odds with conventional wisdom that trying to control memories worsens perseveration ([Magee, Harden, & Teachman, 2012](#); [Najmi & Wegner, 2009](#)). The latter perspective is supported by the common clinical observation that instructing patients to avoid thinking about something only leads to their focusing on it all the more. However, tension between these perspectives may be explained by selection bias: Individuals with the greatest impairments in control processes are likely overrepresented in clinical populations ([Stramaccia et al., 2019](#)). Thus, instructing such individuals to push unwanted memories from mind without additional support may be setting them up for failure, because their inability to do so has led them to seek treatment in the first place (see [Hertel, 2015](#)). This interpretation allows us to maintain forgetting as a process that may shield the broader population from negative experiences (see [Hulbert & Anderson, 2018](#)), with the caveat that not everyone is equally adept at forgetting in this manner. Those unable to do so may benefit instead from alternate interventions aimed at making the unwanted experiences easier to manage or reframing them in a less negative light. Indeed, such interventions may prove beneficial in tandem with everyday forgetting processes.

Although our focus has been on finding serenity within the individual, forgetting also helps process conflict between individuals. It may be especially difficult to forgive someone for a transgression with the memory of that transgression clear in mind. The abilities to forgive and to forget are, therefore, interconnected. Preliminary evidence supporting this claim comes from research showing that memory control is possible only for those transgressions that have been forgiven ([Noreen, Bierman, & MacLeod, 2014](#)) and that the forgiveness itself must be made on an emotional—rather than purely rational—level to be effective ([Lichtenfeld, Buechner, Maier, & Fernández-Capo, 2015](#)). However, once this decision has been made, it is linked to fewer intrusive thoughts pertaining to the transgression ([Rhoades et al., 2007](#)) and a positively biased representation of the transgressor ([Lichtenfeld et al., 2015](#)). Whereas it remains unclear whether it is necessary—or even desirable—to forget the transgression

entirely, forgiveness requires a reframing of the individual and situation facilitated by the selective recall of details pertaining to either (Lichtenfeld et al., 2015; Sell, 2016). In this manner, forgetting and forgiveness are apt to form a reciprocal relationship whereby forgetting dulls a certain amount of pain caused by the transgression, making emotional forgiveness more palatable. Forgiveness, in turn, makes a reframing of the memory possible, further minimizing the emotional burden. A corresponding process might likewise open a window to relieving regret and guilt, through forgiveness of oneself.

### Facilitating a Stable Self-Concept

How we view ourselves is predicated largely on our experiences; that is to say that we are who we remember ourselves to be and who we envision ourselves becoming. But the picture is often incomplete and rarely accurate. For example, it is common for polite adults to minimize their rude behavior from childhood. These inaccuracies reflect subtle revisions to our life story, pulling us toward a prototypical self. This is achieved using a combination of deconstructive and reconstructive processes enacted to bolster a coherent self-representation relatively impervious to behavioral deviations that might otherwise challenge our self-concept.

Forgetting is an important component of this process, advantaging information congruent with one's identity while disadvantaging competing information. Beyond the finding that the former is better processed (Lieberman, Jarcho, & Satpute, 2004; Swann & Read, 1981), such material is also more likely brought to mind (Conway, 2005). Reconstructive retrieval processes may then modify anything we do recall to better fit with our self-image. For instance, if we view ourselves to be particularly intelligent, we become less likely to recognize instances where we behaved in an unintelligent manner earlier in our lives and are also more likely to focus on and encode similar examples of that trait moving forward.

These particular biases in the encoding and motivated retrieval of experiences are supplemented by further biases favoring the retrieval of positive details or events over negative ones. As discussed in the preceding section, retrieval is guided by a positivity bias that emerges across the lifespan (Mather & Carstensen, 2005), and the unsolicited retrieval of undesirable memories—such as past indiscretions—is often avoided or interrupted (Storm & Jobe, 2012). As a result, information challenging one's self-narrative should become increasingly inaccessible with time (Marsh et al., 2018; Storm & Jobe, 2012). For example, someone having experienced an embarrassment during an otherwise pleasant evening, like falling off-stage while singing karaoke with their friends, may choose to retrieve and share only the positive aspects of that evening as a means of preserving their self-image. Over the years, the record of their clumsiness might fade to the point that they have trouble remembering the accident, even when confronted with photographic proof. Forgetting in this case allows us to maintain a positive self-image despite occasional evidence to the contrary (Conway, 2005) and might be viewed as analogous to a biased

attentional process permitting the dominant self to emerge against a backdrop of potential self-perspectives.

Forgetting also helps us redefine who we are as individuals in accordance with current circumstances. Our self-concept at any given moment is defined according to multiple interrelated beliefs, organizing our understanding of the world around us and our role in it (Conway, 2005; Rathbone, Moulin, & Conway, 2008). Because this sense of identity is built on the foundation of our experiences, changing the relative accessibility of those experiences should alter our beliefs, and therefore self-perception (McAdams et al., 2006). Forgetting is therefore a necessary component of the self-reinvention emblematic of the human experience throughout our lives because it allows us to emphasize certain memories while excluding others. This is perhaps most obvious in the case of someone making a “fresh start” by changing jobs or relocating. In either case, those around us base their initial impressions, in part, on the narrative we provide. Rather than grappling with our former selves, forgetting facilitates our personal growth by easing our transition from one self-representation to the next, allowing us to become fully the individual we choose to be—even if that individual is bereft of certain elements from our past.

However, these editorial processes are not under our control alone; our self-narrative—and therefore identity—are also influenced by those around us. Actively listening to someone else selectively retrieve shared information reinforces those details in the minds of speakers and listeners alike, while also weakening competing, unspoken details with each retelling (Hirst & Echterhoff, 2012; Stone, Barnier, Sutton, & Hirst, 2013). Experiences considered taboo or otherwise not suitable for discussion are similarly disadvantaged through restraint, minimizing their risk of emerging in conversation or perhaps through the development of joint strategies to ensure avoidance of associated reminders or interruption of retrieval (for more on this perspective, see Stone, Coman, Brown, Koppel, & Hirst, 2012). Each of these effects is strengthened by greater identification with one's conversational partner (Coman & Hirst, 2015). Not all social groupings abide by the same conversational boundaries, of course. Polite company might diplomatically eschew mention of potentially sensitive topics that intimates might otherwise use to needle each other. Yet, who would know better than a friend what conversational lines never to cross? A tumble off the karaoke stage, to return to an earlier example, could be the stuff of legendary ribbing or shared silence, depending on a combination of rapport, sensitivities, and motivations. In turn, conversations have the power to build legends, just as they can bury them.

In short, we share a common editorial process, revising not only our own self-narrative, but its interrelation with the narratives of the surrounding community. People negotiate those experiences and even details they wish to include in conversation while also tacitly confirming those best excluded. Here, forgetting facilitates a common narrative suitable to promote a sense of group membership (Coman & Hirst, 2015). It can also serve the broader function of allowing an entire cultural group or nation to redefine itself in the face of historical transgressions or cultural traumas via mechanisms analogous to processes within the

individual (for related arguments, see [Aydin, 2017](#); [Esbenshade, 1995](#); [Muzaini, 2015](#)).

### **The Librarian: Managing Interference and Improving Efficiency**

What would the Library of Congress be without a method for curating, organizing, and efficiently sifting through the holdings? It would be more akin to a dumping ground than a functional database. Capacity, especially in the digital age, is near limitless, but an infinite supply of information is not necessarily informative. Much as a newspaper might aim to contain all the news that is fit to print (and not more), forgetting processes serve to reduce mental clutter and facilitate access to the most relevant information. We attribute this function to the role of the Librarian, who is responsible for (among other things) organizing and curating materials in their collection, selecting which records to keep and integrating new acquisitions as they arrive. Similarly, forgetting ensures our minds are as orderly and up-to-date as possible, giving rise to the virtues of clarity, abstraction, and revision, which we detail below.

### **Maintaining Clarity of Mind**

Schacter and colleagues have argued convincingly that the main function of our memory system is to navigate the present, rather than the past, and to guide our current and future decisions ([Schacter, Benoit, de Brigard, & Szpunar, 2015](#)). According to this functional view, individuals may be better off forgetting the majority of our everyday experiences, most of which are of little diagnostic or predictive value. A bowl of nutrient-packed Grape-Nuts may be an important part of one's morning routine, but remembering the specifics of each box purchased would represent a wasteful expenditure of the energy it provides. Unless something out of the ordinary materializes, these details are unlikely to be needed (or even available) for later recall. The mnemonic invisibility of information with which people come in regular contact is stunning, if completely understandable—and helpful, even. For example, people around the world are notoriously bad at recreating the visual features of their local currency and are equally bad at recreating logos from popular brands, despite viewing both regularly ([Castel, Nazarian, & Blake, 2015](#)).

In the neurobiological literature, synaptic downscaling during sleep ([Tononi & Cirelli, 2006](#)), the growth of new neurons in memory-relevant brain areas, and the associated overwriting and remodeling of existing synaptic connections ([Epp, Silva Mera, Köhler, Josselyn, & Frankland, 2016](#); [Frankland & Bontempi, 2005](#)), are all considered important factors contributing to the gradual decay of memories over time ([Hardt et al., 2013](#)). Some researchers have gone so far as to claim that forgetting is the “default mode” of the brain, assuming it to be adaptive because the majority of our experiences have little informative value for our future decisions ([Davis & Zhong, 2017](#); [Richards & Frankland, 2017](#)). In the cognitive literature, other factors, including interference from new learning and shifts in our internal or external context, have assumed prominence as the main drivers of forgetting. However, both decay and interference

accounts make one fundamental prediction: Recent memories tend to be more accessible and, thus, more likely to be remembered, whereas remote memories are less accessible and thus more likely to have been forgotten. Such forgetting ensures that, in principle, the most recent and up-to-date (i.e., often most relevant) entries in our memory are also the most accessible. For example, if asked for local restaurant recommendations, the meals consumed recently are more relevant than the ones from a year ago. Here, forgetting preserves clarity by acting as a gradual filter, rendering old information less likely to interfere with our current mental processes.

Context is another important factor determining the information accessible in a given moment ([Tulving & Thomson, 1973](#)). Clearly, people are able to recall even very remote (e.g., from childhood) memories from time to time. Such remembering is often triggered by strong contextual cues ([Tulving, 1974](#); [Polyn, Norman, & Kahana, 2009](#)). For example, meeting an old friend from school or visiting one's hometown may conjure many memories that—were it not for the powerful environmental cues—would have been difficult to bring to mind. Yet, the relative inaccessibility of those experiences is frequently adaptive because it prevents contextually inappropriate information from coming to mind and interfering with other ongoing processes. In the above example, having moved away from the town in question means that many of the “forgotten” events likely pertain to an earlier chapter in life, people with whom we no longer associate, and situations we are unlikely to re-encounter. Unless those experiences are cued by something related to one's new life, they are probably not useful. Context can thus be considered a gate-keeper, helping us to preserve clarity by favoring only those memories relevant in a given environment.

### **Updating and Revising Our Experiences**

Although outdated or contextually inappropriate memories are not necessarily problematic from the perspective of storage capacity ([Azevedo et al., 2009](#)), they become problematic when they overlap with memories that come to be the target of retrieval and are, therefore, likely to be co-activated by context or available retrieval cues ([E.L. Bjork & Bjork, 1988](#)), introducing the threat of proactive interference (e.g., [Underwood, 1957](#)). One may, for instance, breathe a sigh of relief in the comfort of a strong memory of having turned off the stove before leaving the house. Such a memory would be cold comfort, were we unable to disambiguate and discount previous instances of turning off the stove from the state of the kitchen this morning. Since we navigate dynamic environments in which the rules are frequently changing, our memory system is often challenged with minimizing the disruptive impact of outdated or currently inappropriate information when searching for memories. Forgetting no-longer-relevant information in such environments can thus be argued to increase cognitive flexibility.

Much evidence points to the pivotal role of active retrieval in supporting the updating of memories and attenuating the impact of outdated or unwanted information. The first line of evidence comes from studies of reconsolidation, which demonstrate that reminders can render old memories malleable and susceptible

to change. Although reconsolidation was initially discovered in rodents (Dudai, 2012; Sara, 2000), it is now also studied in humans using a memory updating paradigm. During an initial session, participants first learn a list of items. They then return a few days later to learn a second list of items. The critical manipulation is whether the second list is preceded by a reminder of the first list. When preceded by such a reminder (compared with no reminder), items from the newly learned list are more likely to intrude when subjects are instructed to remember the original list (Hupbach, Gomez, Hardt, & Nadel, 2007). This basic finding is consistent with a reconsolidation mechanism, but also with a context-change account where reactivating the original learning context during novel learning increases source confusion (Sederberg, Gershman, Polyn, & Norman, 2011). However, more recent studies found that, in addition to the source confusion, participants also show increased forgetting for the original list despite the reminder they received. This finding is less consistent with a context-change explanation (Chan & LaPaglia, 2013). Together, these results suggest that the updating of outdated memories with new information critically depends on reminders that arguably destabilize the old, once-consolidated memories and facilitate their updating (for a review, see Scully, Napper, & Hupbach, 2017).

Researchers have begun to explore the therapeutic potential of reconsolidation manipulations for extinguishing traumatic memories in patients with PTSD or for reducing drug cravings in addiction disorders. These studies have shown promising early successes (Kessler et al., 2019; Phelps & Hofmann, 2019), along with some practical limitations (Brewin, 2018; Phelps & Hofmann, 2019; Wood et al., 2015). For example, the number of memory intrusions from a traumatic movie was reduced when participants later received a reminder of the movie, followed by an interfering task (Kessler et al., 2019). Overall, there is increasing evidence that memories can be rendered labile by reminders or active retrieval, and, when in this labile state, new learning can revise the memory so that other details or features come to mind more readily. The effectiveness of reconsolidation-based approaches in real life, for example in clinics, requires further study.

Another line of evidence suggesting a powerful role for active retrieval in memory updating comes from studies of RIF (Anderson, 2003). Much as checking the stove over and over to make sure it is turned off dampens memory for checked behaviors (Linkovski, Kalanthroff, Henik, & Anholt, 2013; for costs and benefits of individual differences in inhibitory control relevant to clinical populations, see Schilling, Storm, & Anderson, 2014), retrieving one ingredient from memory threatens to impair the ability to remember the rest of the elements of a new soup recipe, spoiling dinner plans. As with reconsolidation, this form of forgetting can be highly selective in that it depends on the level of interference (i.e., overlap) between memories: No forgetting is induced for memories that are not co-activated by the reminder. Very strong overlap, on the other hand, signals that the old information is still valid and can lead to integration and co-strengthening, rather than forgetting, of the old memory (Chan, McDermott, & Roediger, 2006; Goodmon & Anderson, 2011). RIF thus provides a highly selective means of attenuating

only those memories that elicit inference. This selectivity is an important feature of RIF, which could become relevant in clinical settings where often the goal is to disrupt one particular set of unwanted or traumatic memories while leaving other memories untouched.

Researchers continue to debate the extent to which RIF is sustained (or sustainable) over extended periods of time (Abel & Bäuml, 2014; Murayama, Miyatsu, Buchli, & Storm, 2014; Ortega, Gómez-Ariza, Morales, & Bajo, 2015). Intuitively, it seems that an adaptive memory system would not entirely expunge a formerly relevant memory every time it recalls a related bit of information, since that “lost” memory might become relevant again in a different context (MacLeod & Hulbert, 2011). Supporting this idea, it has been shown that competing memories do become temporarily impaired via retrieval, but they are easily relearned when the competitors become relevant again at a later point in time, and forgetting can even be reversed into enhancement (Storm, Bjork, & Bjork, 2008). Neurocomputational work offers a mechanistic explanation for this reversal, suggesting that suppression of a competing memory, followed by its relearning, helps to differentiate the overlapping memories such that the target and competing memories are now in a state where they are both easily retrieved without eliciting interference (Hulbert & Norman, 2015). Such differentiation might, for example, occur as we gain expertise in distinguishing between fine wines, colleagues with similar names/appearances, or different possible diagnoses for a client. Over time, the combination of retrieval and restudy should help disambiguate the representation of these once confusable memories, facilitating future retrieval success.

Together, the literature reviewed in this section demonstrates that our memory system has developed an impressive repertoire for handling the excessive amount and high overlap of information that finds its way into long-term memory, and that active retrieval is central to this organizational role. Reminders and overt recall offer opportunities to update the target memory with new, possibly more relevant information. At the same time, the retrieval-induced, temporary loss of competing memories facilitates our current attempts to access target memories and protects inaccessible, competing memories from being retrieved and accidentally updated in the wrong context.

### Streamlining Memories to Form Abstractions

So far, when considering the benefits of forgetting, we have largely focused on dynamics that take place between memories that share a common associative link, with forgetting of currently irrelevant information helping to efficiently access and update target memories. We will now turn to the target memories themselves and ask whether complete and precise remembering is always desirable, or whether forgetting finer-grained detail could also have an adaptive benefit. True, those who do not remember their past may be condemned to repeat their mistakes, but the history most relevant to directing future behavior is that which is generalizable, not that which is specific to only one time and place. A notable disagreement with a loved one may serve as a prominent memory instance of that which we would not like to



repeat. As such, cues signaling that a similar situation is potentially afoot may be pertinent. Nevertheless, the particulars that set off the previous disagreement (such as the laundry) may be far less relevant to appropriately correcting one's course than the underlying trends abstracted from many shared instances (e.g., achieving a fair balance between household responsibilities).

Abstracting from the precise information in memory possibly requires some degree of forgetting (Richards & Frankland, 2017; Schooler & Hertwig, 2005). Notably, people with an overly precise memory, like the individual described in *The Mind of a Mnemonist* (Luria, 1968), often fail in tasks that require abstraction. Similarly, the field of artificial intelligence has struggled to devise systems that do not merely store an exact record, but instead adaptively forget and generalize to novel environments (Freedman & Adams, 2011). Tasks that require gist extraction, such as category learning, appear to benefit from conditions that increase the forgetting of specifics (Kornell & Bjork, 2008; Vlach and Kalish, 2014). Evidence suggests that to use our memories to predict the future, it is more adaptive to store a generalizable, gist-like mnemonic trace that represents the essential constellation of events, rather than just a memory for the specific details. This should be especially true under naturalistic circumstances in which environments constantly change. Forgetting of details supports the creation of such generalized memories that can be flexibly applied to novel situations, preventing mnemonic overfitting and behavioral inflexibility in a changing environment (Richards & Frankland, 2017; Schooler & Hertwig, 2005).

In fact, it appears that our memory system has a natural tendency for the gist of an experience to become dominant and for peripheral details to be forgotten (Brainerd & Reyna, 2002). It is widely assumed that systems consolidation entails a transformation of the stored information driving stabilization of the central elements of a memory and a simultaneous loss of detail (Nadel & Moscovitch, 1997; Winocur & Moscovitch, 2011). Evidence for such transformation has been shown for real-life autobiographical memories (see Conway, 2009), as well as for verbal narratives and film clips (Bahrick, 1984; Sekeres et al., 2016; Thorndyke, 1977). Sleep seems to play a special role in extracting the gist of a newly acquired memory by supporting its integration with pre-existing knowledge over time (Dudai, Karni, & Born, 2015; Frankland & Bontempi, 2005).

Moreover, active retrieval plays a major role in shaping what is remembered and forgotten about an event over time, similar to the updating and interference resolution discussed above. Repeatedly recalling new memories at varying intervals after their encoding is one of the best ways to protect them against forgetting (Karpicke & Roediger, 2008). This long-term benefit of retrieval, known as the “testing effect,” has been documented in numerous lab-based studies, as well as in real-life contexts in which participants learn new vocabulary or textbook materials (Rowland, 2014). Many theories of the testing effect predict that active retrieval supports the generalization of episodic memories by encouraging the forgetting of more fine-grained details. The core assumption shared by these accounts is that retrieval is a highly associative and imprecise process, with activation spreading to semantically or contextually related memories

in addition to the target (Anderson, 1983; Antony, Ferreira, Norman, & Wimber, 2017; Pyc & Rawson, 2012). This view is supported by empirical studies of repeated testing (Carpenter, 2011; Jonker, Dimsdale-Zucker, Ritchey, Clarke, & Ranganath, 2018; Pyc & Rawson, 2012). Such spreading activation can, in some instances, be strong enough to produce false memories (Lee, Samide, Richter, & Kuhl, 2018), but it also helps to extract the central gist of recent events and to link and integrate them with related long-term memories (Antony et al., 2017). In sum, we speculate that every time we mentally recapitulate a recent experience, our memories become more narrative or gist-like, losing some detail.

However, a generalized memory is, of course, not always the most desirable one. While, in the majority of cases it is sufficient (and even adaptive) to retain the central gist of an experience, there are certainly situations in which remembering detail is crucial (as would be the case for newspaper reporters or witnesses to a crime). Although people might have a strong tendency to naturally recall and retain the central narrative of an experience (Linde-Domingo, Treder, Kerrén, & Wimber, 2019; Rumelhart & Ortony, 1977; Thorndyke, 1977), perceptual, contextual, and other peripheral details can, in principle, be protected from forgetting if actively recalled shortly after learning or when appropriate reminders are provided during a time window in which this information is still available (Sekeres et al., 2016).

### **The Inventor: Encouraging Exploration and Creativity**

The preceding has emphasized how the ability to forget grants individuals the flexibility to shift away from strong, outdated memories in favor of more relevant, recently acquired ones. But the solution individuals seek is not always the product of a zero-sum game between existing associations. Sometimes it is necessary to leave behind what one already has to discover something new. This often requires thinking outside the box of warehoused memories at one's disposal (e.g., Storm, 2011; Storm & Angello, 2010; for additional perspective, see Ditta & Storm, 2018). Forgetting fosters innovation by allowing the mind's eye to more freely examine problems (and potential solutions) with new perspective. Such an escape from the past could mean preserving energy that would otherwise be wasted on reinventing the wheel. Or the freedom could foster a new lease on a relationship without the encumbrances of routines gone flat. In other words, forgetting grants a mulligan—an opportunity to start fresh without the barriers imposed by previous decision outcomes or pressures to remain internally consistent. When the known becomes unknown once again, the drive to exploit the known dissolves into a willingness to explore the various possibilities. In this section, we detail the final two virtues from Table 1, those most associated with the Inventor role: inspiration and, finally, rediscovery.

### **Inspiring Creativity**

Selective forgetting has been shown to facilitate relearning and the differentiation of existing memory representations (e.g., Hulbert & Norman, 2015; Storm et al., 2008). Looked at differently, could forgetting also create space for entirely new

representations to take form? To recognize a shoe as a piece of footwear is easy. But, in stepping away from the shoe's most common function and forgetting that particular use temporarily, more creative, original uses may emerge: For instance, a shoe could be used as a hammer, a flowerpot, or a pin cushion. The old can become new again when one's perspective is not so constrained by the past.

Getting stuck on what one has come to know about items has been referred to as mental fixation (Smith, 1995), a problem common to mnemonic, problem-solving, and creative endeavors. If a person had trouble generating alternative uses for a shoe, for example, they were likely experiencing a symptom of functional fixedness. Luckily, the solution may simply require temporarily walking away from the problem to allow creative solutions time to incubate. As time passes and circumstances change, one's mental context can drift away from the obvious. New perspective can be achieved by breaking circular thinking, by letting go of the past, or by forgetting misleading memories (Smith & Blankenship, 1989, 1991; Vul & Pashler, 2007).

Formalized by the forgetting-fixation hypothesis (Smith & Blankenship, 1989), such forgetting might not only explain certain benefits of incubation, it could also predict individual differences in creative capacity. Two operationalizations are necessary to test this prediction. For the first, Storm and Angello (2010) adopted the retrieval-practice paradigm described above to measure forgetting. Then, as a measure of creative problem-solving, they used the remote associates test (RAT; Mednick, 1962). The RAT asks participants to produce a common associate for three cues, such as *LOUNGE*, *HOOR*, and *NAPKIN*. If one finds this example challenging, they could do with some time away, as suggested above—or, perhaps, a stiff drink instead. In fact, *COCKTAIL* is the target response, a solution that sometimes arrives with the subjective experience of sudden insight (see Rothmaler, Nigbur, & Ivanova, 2017, for a related paradigm). The task becomes harder if fixated on a misleading associate, as participants were primed to do in Storm and Angello's (2010) study. Nevertheless, those participants displaying greater RIF also exhibited significantly less fixation.

The observed correlation between these measures may reflect individual differences in a generalized ability to inhibit dominant, inappropriate responses in the context of both tasks. That this association apparently disappears when RAT performance is measured after long retention intervals suggests that the forgetting processes associated with selective retrieval practice may be less necessary after fixation resolves itself through other means, like the accumulation of incidental interference. Koppel and Storm (2014) found this to be true especially for individuals with lower RIF; those exhibiting relatively greater RIF performed equally well on the RAT with or without a long incubation period.

It also should be possible to detect the aftereffects of inhibiting particular responses. Indeed, this has been demonstrated in a number of ways. Storm, Angello, and Bjork (2011), for one, demonstrated that memory for strong, misleading responses was significantly reduced after attempting to solve RAT problems. Moreover, they went on to show that more problem-solving-induced forgetting predicted greater success on an independent

RAT. If misleading responses can be forgotten incidentally through problem-solving, might explicit instructions to suppress unwanted memories also render them less accessible as target responses on a purportedly independent task? Using the Think/No-Think paradigm described above, Angello, Storm, and Smith (2015) reported that attempts to suppress primed solutions drawn from a subsequent word-fragment completion test helped participants overcome fixations and generate creative solutions. This effect emerged only after participants had been explicitly encouraged to think back to the negative primes during the fragment completion task. No such effect was observed when the relationship to the fragment completion task was indirect. Even without establishing a direct linkage in the minds of participants, however, Wang, Luppi, Fawcett, and Anderson (2019) demonstrated that repeatedly cueing participants to suppress learned associates reduces the likelihood that participants would go on to regenerate those responses on an independent RAT. Clearly, creativity and forgetting come in many forms and interact in complicated ways. Our picture of these connections remains somewhat fragmentary. While we must not forget foundational findings, new and creative ways of modeling real-world aspects of these two capacities in the laboratory are needed to fill in the gaps between our emerging understanding of forgetting and potential applications.

As added inspiration, consider an excursion to an art museum where you discover a beautiful statue. As your eyes trace the carving, the tour guide might offer up some historical context. Unfortunately, evidence suggests a tension between the externally directed perceptual focus and internally directed mnemonic focus. Neuroimaging evidence indicates that activity within a region of the brain associated with the encoding and retrieval of event-related associative information (the hippocampus) tends to be driven below baseline during fine-grained visual discrimination (e.g., Law et al., 2005). Brain maps can paint a pretty picture, but what might such apparent deactivations mean in terms of one's ability to absorb and retain what the tour guide worked so hard to teach? Deactivations of this region, also observed around periods of time when people are explicitly motivated to suppress retrieval of unwanted memories, turn out to be associated with an amnesic side effect impairing associative memory for surrounding events (Hulbert, Henson, & Anderson, 2016; Hulbert, Hirschstein, Brontë, & Broughton, 2018; see also, Fawcett & Taylor, 2012; Ludowig et al., 2010). While the exposed materials may retain a certain level of familiarity, the contextual links provided by the guide may be lost under the amnesic shadow. Put in more general terms, the careful inspection of the perceptual world (as well as explicitly motivated forgetting), could be said to carve out a virtual lesion in the hippocampal memory system. True, this temporary condition may consign certain associative information to oblivion. But there is an upshot. Getting lost in visual appreciation could simultaneously permit the next great burst of creativity by temporarily freeing the mind from preconceptions and distracting memory associations. We can only hope that our examination of these phenomena has inspired readers to sketch out new experiments testing the theoretical linkages between creativity and forgetting with enhanced ecological validity.

For now, though, we step out of the museum to note that creativity requires more than the ability to forget well-worn conventions in favor of new approaches. The RAT, for example, requires both the generation of many possible responses to each of the provided cues, as well as the ability to select a single correct solution befitting all of them—even if that means over-coming stronger (yet unsuitable) options. Like many before us (e.g., [Bristol & Viskontas, 2016](#); [Chrysikou, 2019](#); [Kleinmintz, Ivancovsky, & Shamay-Tsoory, 2019](#)), we similarly grant that the generative (divergent) thinking process often is facilitated by allowing activation to spread from memory cues to their many associates. As such, memory control cannot be considered sufficient for all creative endeavors. The true key to creativity may instead be found in one's ability to dynamically orchestrate how and when forgetting processes are unleashed.

Notably, the ability to flexibly call upon forgetting processes better enables individuals to sift through the products of brainstorming and converge on a suitably creative solution. Work supporting this notion stems from the alternative uses task ([Guilford, 1967](#)). This task asks participants to generate as many possible uses as they can for a named object (e.g., a shoe). The total number of proposed uses can be considered a measure of generative fluency. But it is also possible to independently rate the distinctiveness of the uses generated—a creative quality presumably facilitated by the ability to overcome (or inhibit) more common/otherwise primed uses. [Storm and Patel \(2014\)](#) conducted a series of experiments that, together, helped substantiate the interplay between forgetting and distinctiveness. Their results, which parallel the aforementioned problem-solving-induced forgetting effect, revealed that memory for previously studied uses is impaired after being asked to generate new uses for objects. More interesting still, they found that the magnitude of the so-called thinking-induced forgetting effect correlated specifically with the number of distinctive uses generated (i.e., not with the number of uses that were considered to be non-creative). Thus, we encounter additional tradeoffs associated with memory control. While clearly not a fix-all (cf. [Chrysikou, 2019](#)), the facility to selectively hammer down less useful or uncreative responses should be seen as a handy addition to one's cognitive toolkit (or shoebox, as the case may be).

In their essay on the role of memory in imagining the future, [Dudai and Carruthers \(2005\)](#) note that, "Considering memory solely as a brain imprint of the past might limit the creativity of research programmes and bias the interpretation of their outcome" (p. 576). To this warning, we add that failing to forget the past could also limit countless other forms of creative expression.

### Rediscovering Creative Possibility

Just when one might feel that there is no more to be seen, no new creative discoveries to be had, an individual occasionally is lucky enough to encounter something from their past that leads them to discover it all over again. Time may continue to march forward, but rediscovery has the power to keep people feeling young in a world full of possibility. We further argue that, by forgetting a previous decision, one is freed to chart a new path

should they later confront a similar choice. And it is on this path that we encounter rediscovery, the final virtue.

We are not the first to discover the value of forgetting in optimizing reward states within a world that is subject to change. [Richards and Frankland \(2017\)](#) review this case in everything from flies to neural network models (we also discussed related evidence when considering the virtue of abstraction most associated with the role of Librarian). Environmental contingencies occasionally reverse, and perseveration under these circumstances can be disadvantageous or even dangerous. In rapidly changing environments, faster forgetting rates are preferred (e.g., [Fusi, Asaad, Miller, & Wang, 2007](#)). But quickly reacting to an A-not-B error and flipping the decision switch to "B" remains limiting in terms of one's willingness to explore the possibilities hiding behind a newly realized option—call it "door C." Sometimes the unknown holds similarly unknown rewards, and forgetting just might offer the key to opening that door.

Though people tend to strongly exhibit loss aversion and place greater value on things owned for longer periods of time (including those that have since been lost; [Strahilevitz & Loewenstein, 1998](#)), not everyone seems to fully appreciate the potential value of rediscovery. The time-capsule paradigm has revealed that people generally underestimate the pleasure, interest, and curiosity associated with rediscovering ordinary, forgotten experiences—experiences that often take on much more import over time ([Zhang, Kim, Brooks, Gino, & Norton, 2014](#)). Zhang and colleagues reported that people consequently exhibit a general unwillingness both to document the present and to revisit what had been documented. Traditions and social obligations arguably provide the exact type of nudge needed to rediscover forgotten associations and customs at holiday gatherings, funerals, and other types of reunions. Mixed together with the forgetting that had occurred between such reunions, these ingredients provide space for individuals to renew their bonds with fresh eyes and open hearts, despite certain differences that may have arisen in the interim.

Indeed, encountering a reminder of a forgotten memory after long periods of dormancy has the power to bring with it a flood of influential emotions, the potency of which would have been difficult to sustain had the memory been accessible and revisited in its veridical form continuously. Time also benefits the perception of these experiences by smoothing out some of their rough edges through gistification and motivated forgetting (consider the virtues of serenity, stability, revision, and abstraction). In so doing, the memories become more pleasant to recall and re-experience, more easily digested in one's life narrative, and as motivational advice for subsequent generations (cf. [Mather & Carstensen, 2005](#)). Indeed, psychological (and mnemonic) distance helps impart nostalgic experiences with their characteristic gist-based, idealized rendering of past events that can do far more than merely boost self-esteem ([Sedikides et al., 2015](#)).

Arguing, as we do, that forgetting the particulars of a time period gone by is a core feature of most nostalgic experiences, leads to an enhanced appreciation of the creative possibilities afforded by forgetting and, in turn, nostalgia. Nostalgia serves as a powerful motivational force, reformulating connections between the past, present, and future. [Sedikides and Wildschut](#)

(2016) review the growing evidence that nostalgia is associated with increased openness to exploring novel experiences, heightened feelings of social connectedness, and added inspiration to pursue goals. Individuals who are especially apt to experience nostalgic reverie tend also to exhibit more of these very qualities, just as do those for whom nostalgia was induced experimentally using the event reflection task or other memory prompts (like distantly familiar music or scents).

Warm and fuzzy feelings (kindled, we argue, by warmer and fuzzier memories owing to forgetting) have been known to overcome people's avoidance tendencies and lead them toward greater pro-sociality, in the form of charitable giving and other helping behaviors (e.g., [Stephan et al., 2014](#); [Zhou, Wildschut, Sedikides, Shi, & Feng, 2012](#)). In yet another sign that the partially forgotten past can enhance creativity, the nostalgic state seems to facilitate creativity by way of greater openness (e.g., [van Tilburg, Sedikides, & Wildschut, 2015](#); [Ye, Ngan, & Hui, 2013](#)). Thus, we end up right back where we started this section, perhaps with a slightly rosier view of forgetting and more willingness to embrace the possibilities it creates.

### Putting Forgetting into Perspective in a Modern World

How do we reconcile the many faces of forgetting? Without a doubt, forgetting something at the wrong time can be frustrating; however, we have argued above that remembering something at the wrong time can be just as disruptive. And forgetting something at the right time can be very helpful, but often goes unnoticed. This is probably one reason that forgetting is underappreciated—when retrieval fails, it is noticeable, like staring blankly into space, but when forgetting fails we are often unaware anything has gone wrong. Forgetting almost seems like negative space against the foreground of memory. [Schacter \(1999, 2001\)](#) mounts a convincing argument that many of memory's fallibilities can be understood as the "cost" of a generally adaptive system. If the need to accurately predict the future and navigate the present has fundamentally shaped our ability to draw upon the past, then much of the transience, distortions, and biases associated with memory can be viewed as a part of a larger plan for the world's inhabitants to survive and thrive (see also [Ditta & Storm, 2018](#)). [Schacter \(2001\)](#) concludes his book on the subject with a powerful reminder that "memory's vices are also its virtues, elements of a bridge across time which allow us to link the mind with the world" (p. 206). We hope that lending these virtues personable names, realized through new examples and experimental data, will add to the small but growing chorus singing the praises of forgetting.

Reminding ourselves that the virtues of forgetting must not themselves be forgotten is especially prudent if we are to retain our order and stability—along with our creativity and humanity—in an increasingly data-logged world. Forgetting, in our minds, represents more than a cost to be written off. It represents an active investment, as we double down on important knowledge and embrace growth opportunities. Such an investment is not without its risks, of course. And while those risks may yield certain costs, the forgetting processes giving rise to those costs might best be considered features, rather than bugs.

Our brains dedicate far too much to ensuring we forget precisely what needs to be forgotten in a given moment for it to be incidental or epiphenomenal. Yet, amidst growing recognition that forgetting serves a unique and important service to memory, we as a society are concurrently embracing technological trends that challenge this process in fundamental ways. We now possess the means to transmit and archive moments from our lives in a manner inconceivable in decades past. With these new technologies, making private what has become public is increasingly difficult.

Much of that accomplished by forgetting with respect to emotion regulation might be undone by modern technology. A sufficiently strong retrieval cue, such as an automatically generated anniversary photomontage on one's social media timeline, risks reinstating hard feelings surrounding a relationship gone sour. And although those feelings are perhaps muted relative to the original event ([Gagnepain, Hulbert, & Anderson, 2017](#); [Legrand et al., 2018](#)), they may still be enough to send one into a depressed mood. Society's ability to editorialize the past is also compromised ([Jones, 2016](#); [Mayer-Schönberger, 2009](#)). Prior to the advent of the Internet, a geographic relocation might have been effective in negating the past, with only personal experiences or physical records challenging one's new self-narrative. This has changed with the emergence of ubiquitous digital storage and social media. Whereas we could once forget an embarrassing incident, we now risk an irrefutable and persistent external reminder. High profile cases of cyber-bullying have shown the powerful impact that such reminders can have on our social standing ([Ciucci & Baroncelli, 2014](#)) and mental health ([Vaillancourt, Faris, & Mishna, 2016](#)). These effects occur, in part, due to the perversion of the typical course of memory and our dominion over it. Importantly, these external engrams of our unwanted experiences are becoming increasingly accessible—with indiscretions from our youth being retrieved and used as evidence against individuals when crossing borders (e.g., [Statt, 2016](#)), applying for jobs (e.g., [Bielski, 2014](#); [V.R. Brown & Vaughn, 2011](#); [Rosen, 2010](#)), or even making new friends (for discussion, see [Jones, 2016](#)). Whereas the ability to modify our past to adapt our identity toward our environment was once in our own hands, the existence of a permanent record now anchors individuals to reality in a manner unprecedented in human history. For that reason, it could be that the modification of people's life stories may become ever more driven by the individuals (and algorithms) that surround them.<sup>1</sup>

### Conclusion

Rather than one of the mind's greatest failings, we argue that forgetting is actually one of its greatest features. We suggest that

<sup>1</sup> There is some hope that these challenges may be corrected by government-mandated forgetting processes akin to the motivated forgetting mechanisms described earlier. Many countries, including with the European Union, have begun enacting laws supporting the "right to be forgotten," or the right to dissociate oneself (e.g., via removal from search engines or webpages, unlinking of information) from past events (for discussion, see [Jones, 2016](#)). This shift (while limited in extent) reflects a growing awareness on the international stage of the importance played by forgetting.

the best memory system is not one that remembers everything all of the time, but rather one that balances access to information with the needs of our internal and external environments. Sometimes, this is best served by fidelity and breadth; at other times, we benefit most through careful management of limited-capacity resources. Forgetting is, in most instances, an act of good, smoothing out our rough edges, washing away the detritus of the mind, and floating the possibility of redemption. Its workings are no longer quite as mysterious, thanks to the work of those who have helped reveal the good in the word “forgetting” and the good forgetting can do in the world (e.g., Bjork, 1989; Davis & Zhong, 2017; Engen & Anderson, 2018; Richards & Frankland, 2017; Schacter, 1999, 2001; Schlesinger, 1970; Nørby, 2015). Through our attempt to put a more human face on the many beneficial roles forgetting plays in life, we hope to have given voice to an array of new findings and perspectives that do the same.

### Author Contribution

Both authors contributed equally to each part of the present manuscript.

### Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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