

# Intrapersonal Communication

Constance Bainbridge (cbainbridge@g.ucla.edu), Gregory Bryant, & Rick Dale

Department of Communication / Center for Behavior, Evolution, and Culture

University of California, Los Angeles

## **Abstract**

From journaling to the overt yet private speech of young children, a wide range of behaviors conducted in isolation share many features in common with traditional, interpersonal communication. In this review, we synthesize across these various topics and argue that they could be usefully studied under the umbrella of “intrapersonal communication,” where both the sender and receiver of a message are contained within a single individual. We address different conceptions and criticisms of intrapersonal communication, the possible functions and developmental factors, individual differences and contextual influences, and various methods of study. We conclude with a theoretical matrix demonstrating one way such self-communicative behaviors may be categorized and understood.

*Keywords: Intrapersonal communication, consciousness, well-being, self-talk, inner speech, private speech, development of communication*

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Constance Bainbridge (cbainbridge@g.ucla.edu), Gregory Bryant, & Rick Dale

Department of Communication / Center for Behavior, Evolution, and Culture

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The study of communication has long been influenced by the sender-receiver model (Shannon, 1948). This all-too-familiar formulation frames a sender transmitting a message through a channel under noise. This sender has the intention of influencing a receiver of this message, to provoke some understanding or action. The receiver decodes the message, and communication continues. There have long been challenges to this paradigm in the many disciplines that have been influenced by the sender-receiver model, including which signals can be ascribed true meaning (e.g., Gernert, 2006; Rendall, Owren, & Ryan, 2009; Sperber & Wilson, 1996). Despite these challenges, Shannon's multi-party format, with distinct senders and receivers, seems still to be a defining criterion of the term "communication" across a wide variety of disciplines.

Debates about how to define communication can be framed using "edge cases" that go beyond conventional domains of study (e.g., Cushman & Whiting, 1972; Craig, 1999). An example edge case is whether we should include communication *with the self* as consistent with a definition of communication. Outside of social interactions, we often experience a process quite akin to communication. We engage in verbal thought, may speak aloud in isolation, write in journals, and so on. While many of us can relate to self-directed communicative behavior, the literature on the topic remains sparse and largely disjointed. Indeed, there is no unifying standard to encapsulate these behaviors (though see Vocate, 1994), and attempts at establishing a field of intrapersonal communication have been met with criticism (Cunningham, 1992; Hardy, 2006).

This debate about definition is a long-standing one, both to define “communication” as a general concept and as effectively underpinning a scholarly and scientific enterprise. Over 75 years ago, Platt asked *what do we mean, “communication”?*, seeking a general formulation for teaching and research in an emerging discipline. The result of this exercise was more abstract and more complex, because “communication” can connote a wide variety of senders, receivers, mediums and underlying features of each (Platt, 1955). Decades later, Andersen and Motley still debated over whether communication should be so broadly defined that it is almost impossible *not* to communicate across any kind of mutual perception (Andersen, 1991; Motley, 1991).

The question of intrapersonal communication can also be found in early debate. L. L. Barker and Wiseman (1966) proposed a model of intrapersonal communication, and in a subsequent debate with Cunningham (1992), they argued that intrapersonal processes should be part of our understanding of communication, whether we call it “communication” or something else (D. R. Barker & Barker, 1992). Many models in communication factor in intrapersonal cognitive processes as key ingredients to our participation in communication (even in media consumption, such as the intrapersonal components proposed by Cho et al., 2009). Further evidence for this comes from the growing landscape of computational modeling in communication science, in which models are explicitly formulated with underlying intrapersonal processes (e.g., Gong, Huskey, Eden, & Ulusoy, 2023).

The present review argues the case that L. L. Barker and Wiseman (1966) originally implied – that self-directed processes can be classed as a form of communication. This is a stronger thesis, but it has been adopted by many over the years as well, across many disciplines, from Communication Studies to Clinical Psychology (Ruesch & Bateson, 1951; see discussion in Macke, 2008). One reason to adopt this strong thesis is not to revisit these prior debates about the definition of communication itself. Instead, the inclusion of intrapersonal *communication* may be the best home for this concept. An overarching goal in this review is therefore to integrate a wide empirical literature across many disciplines pertaining to intrapersonal communication, and to formulate a set of observations that organize key findings.

In the next section, we offer a preliminary summary of this varied literature. We then share a series of empirical and theoretical observations that frame an understanding of intrapersonal communication. These will include the psychological and emotional functions of intrapersonal communication (Section 3), its emergence and psychological development (Section 4), factors that affect it (Section 5), and then a survey of research techniques and measurements to study it (Section 6). We end with theoretical possibilities for this domain.

## 1 Background: A Varied Literature

A testament to the persistence of the “intrapersonal communication” concept is the many terms associated with it, and the theoretical frameworks it has shaped across many disciplines. In some work, a signaler and receiver contained in one individual or entity is termed *autocommunication* (Broms & Gahmberg, 1983). Autocommunication may describe individuals or organizations, and is used as a way to update the ideal state of self or “produce the information necessary to maintain itself” (Christensen, 1997, p. 200). Autocommunication was proposed by Yuri Lotman as part of a theory of general semiotics (Kull, 2015), and may be considered ever present even in heterocommunication, or communication between separate individuals (i.e., the traditional model of communication as social).

Research in *intrapersonal communication* takes a similar approach, but while autocommunication tends to orient in culturally-tethered contexts such as marketing (Christensen, 1997) or the workplace (Morsing, 2006), intrapersonal communication focuses on individual communication and relies less on institutional influences. Intrapersonal communication may also encompass a wider range of behaviors, even potentially inclusive of dreaming and biofeedback training (Jandt & Beaver, 1973). One major component of intrapersonal communication is imagined interactions, where we are able to rehearse potential social communication interactions. In a study by (Honeycutt, 2019), participants shared an imagined interaction they’d had, and highlighted the use of intrapersonal communication in rehearsing highly relevant social relationships, such as romantic

relationships and conflict.

Treating these processes as “communicative” has invited direct criticism. In a review and critique, Cunningham (1992) posed a summary view of intrapersonal communication as a field of study, and raised several conceptual challenges to its inclusion within communication. First, Cunningham noted that in intrapersonal communication an individual is treated as a plurality. Cunningham suggested that intrapersonal communication lacks “a community of at least two persons,” as well as other features such as the sharing or transfer of meaningful or informative messages. Second, Cunningham also criticized the ways by which one is able to examine intrapersonal communication, and pushed back against the inclusion of inner processes, such as physiological influences. However, he suggested any externalization, such as language used to talk overtly to oneself, “[disqualifies] itself as an inner, self-contained exchange” (Cunningham, 1992, p. 608).

Cunningham’s critique is clear and incisive. Still, these two main parts of his criticism can be addressed. Consider, for example, the concern about individuals treated as a plurality. There are many studies in cognitive and neural science suggesting internal processes do have this quality. For example, binocular rivalry studies show that information can be available to some but not all systems in the brain (Lau, 2022). At a higher level, a degree of modularity may exist even across subsystems of a general social cognitive interface (Kurzban & Akipis, 2007). It would also be surprising that behaviors used to deliberate with the self do not have any function, such as potentially unifying information across domains.

Consider the second aforementioned criticism, that studying “internal” processes is somehow disqualifying. While certainly some modalities of self-communicative behaviors are inaccessible to current research methods, language does provide opportunities to understand how we perceive our own intrapersonal communication (cf. Lupyan, Uchiyama, Thompson, & Casasanto, 2023). In fact, understanding the aspects of intrapersonal communication that remain elusive will be informative to interpersonal communication itself. As we communicate with others, we are mostly aware of what we are communicating, we monitor how it may be interpreted, and how it represents us – we are not completely unaware to the influence of our own utterances (Giles, 2016).

Intrapersonal communication may in fact unify several concepts that are immensely meaningful to everyday experience. If true, it would therefore be valuable to develop an empirical and systematic study of it. Cunningham's important criticisms provide launching points for further developing this area of research.

Here, we synthesize many concepts under this framework, taking a deliberately multidisciplinary perspective on the topic. Indeed, the terms "autocommunication" and "intrapersonal communication" do not exhaust the many terms used to describe related ideas. Intrapersonal communication has varying descriptors across relevant literatures, such as inner speech, private speech, and self-talk. Different terms appear more common in certain domains, such as "private speech" used in studies of young children's intrapersonal communication (Alarcón-Rubio, Sánchez-Medina, & Prieto-García, 2014). However, in general terms, they can be subsumed under one notion: our personal thoughts can have the appearance of internalized communication. They may be overt, subdued, or covert vocalizations produced in isolation, written forms such as journaling and thought listing, and more. As such, intrapersonal communication will be defined here as communicative behaviors or processes where the sender and receiver are contained within an individual (cf. Ruesch & Bateson, 1951)

Regardless of these varied notions across disciplines, so many potential manifestations of intrapersonal communication suggest they could play an important role in our social cognition and communication. Our review in the next sections suggests that even a simple framework may help organize these findings and ideas. For example, an important dimension may be relative level of activity: Are we self-communicating as a volitional, active exercise, or engaging in a more passive perhaps even unconscious process? We revisit these dimensions in the conclusion. To begin this synthesis, in the next section, we first discuss the potential functions of intrapersonal communication.

## 2 Functions of Intrapersonal Communication

### 2.1 Information Search

What use would we have for intrapersonal communication? One possibility comes from the concept of internal foraging or search (Todd & Hills, 2020). We engage in mental foraging routinely, looking for concepts or ideas to formulate our thoughts and communications. If, for example, one is asked to list all the animals they can in a limited amount of time (Todd & Hills, 2020), individuals may internally search across various topics, from farm animals to a new category such as common household pets. Given similarities between external and internal foraging, self-awareness may have origins as a mechanism for distinguishing mental and external foraging (Hills & Butterfill, 2015). Hills and Butterfill proposed that it was adaptively advantageous to distinguish resource foraging thoughts from the real external environment, resulting in the evolution of self-awareness or “the capacity that allows adult humans to mentally represent to become aware of their protracted existence across subjective time” (quoted from Wheeler, Stuss, & Tulving, 1997 in Markowitsch, 2003, p. 181).

The possibilities introduced by intrapersonal communication would be limited only by the imagination of the self-communicator. Creating a kind of internalized fiction allows possibilities to be explored, and may benefit maintenance and development of mental processes much like exercise works the body or choosing a habitat works the external world (Tooby & Cosmides, 2001).

### 2.2 Imagined Interactions and Versions of the Self

Imagined interactions (IIs) may be particularly adaptive. For example, imagined interactions allow for the processing of norm violations (Berkos, Allen, Kearney, & Plax, 2001). In Berkos et al. (2001), students encountered one of three instances of teachers violating norms (i.e., being incompetent, offensive, or indolent) and were asked to report IIs with the target teacher as well the likelihood they would actually engage in said interaction. Students significantly use IIs relative to a theoretical mean, and use these IIs in the place of real-life interactions. As such, the imagination

can facilitate both exploration and avoidance of possible interactions.

IIs may also involve different versions of the self. The dialogical self, proposed by Hubert Hermans, involves internal dialogues or conversations, considering models (such as real life social partners, or fictional or distant others) to shape one's internal interlocutors. The dialogical self-perspective is necessarily social in nature, and generally extends to representations of society, culture, and history in seemingly infinite internal selves (Hermans, 2002, 2003). The interlocutors within the dialogical self may include specific roles, such as Faithful Friend, Ambivalent Parent, Proud Rival, and Calm Optimist (Puchalska-Wasył, 2015). Such techniques of separating out aspects of the self have proven valuable in the clinical realm, supporting the notion there may be distinct functions for intrapersonal communication, particularly self-talk (Schwartz, 2013). Self-talk also appears to feature a variety of interpersonal styles employed under different affective states (Lefebvre, Sadler, Hall, & Woody, 2022).

These connections to clinical psychology go back to Freud (Lapsley & Stey, 2011). The ego is considered to include unconscious monitoring and suppression of the self, which would logically extend to self-deception. Von Hippel and Trivers (2011) suggested that self-deception may facilitate social advancement by allowing for self-inflation. Similarly, Goffman (2004) posed the self as performative, where we engage in behaviors specifically to modulate others' perception of us like actors putting on masks. Intrusive thoughts provide an interesting example of dissonance within the self – while we may recognize these thoughts as generated from ourselves, we do not necessarily volitionally send these thoughts out, and often do not wish to identify with them. However, suppression is associated with increased intrusiveness, and leads to increased levels of distress (Marcks & Woods, 2005). Cognitive dissonance provides a similar example of tension within the self, where we make a change to our beliefs or behaviors to resolve the discomfort of such inner conflict (Festinger, 1957). The existence of self-deception, intrusive thoughts, and cognitive dissonance regulation strategies all imply the existence of a disjointed self and a need to balance different streams of information about the self.

## 2.3 Neural Functions

To understand the psychological functions of intrapersonal communication, we must also ask how it relates to neural activity. In neuroimaging, the default network of activity occurring when not performing a task may be associated with a default state of mind-wandering (Bar, Aminoff, Mason, & Fenske, 2007). This default mode network (DMN) may work in conjunction with a frontal-parietal network (FPN) to generate our streams-of-consciousness (Smallwood, Brown, Baird, & Schooler, 2012). As suggested by Smallwood et al. (2012), this pairing of the DMN with a control network like the FPN permits spontaneous trains of thought to occur. The DMN may also connect thoughts to different mental health conditions. Major depressive disorder, particularly the tendency towards rumination and brooding, is associated with patterns of higher rest-state connectivity (i.e., the DMN: Berman et al., 2011). Understanding the relationship between the DMN activations and different intrapersonal communication activities, content, and outcomes may further reveal functions for this internal process. As argued earlier by Stacks and Andersen, we can consider these internal brain dynamics as a kind of intrinsic intrapersonal process (Stacks & Andersen, 1989).

Verbal intrapersonal communication may link to other social and emotional neural systems. For example, labeling of emotional faces has been shown to reduce activation in the amygdala and other parts of the limbic system, suggesting diminished emotional reactivity (Lieberman et al., 2007). Different language-associated regions of the brain may also reflect the different roles of sender and receiver within one individual. As noted by Gibson and Foster (2007), the left frontal cortex tends to be associated with language production, while regions in the left temporal cortex tend to be associated with comprehension and monitoring of language and self-talk. Work on patients with schizophrenia who experience auditory verbal hallucinations is consistent with these brain activity patterns. Thoughts also do not necessarily rely on language as evidenced through neuroimaging of individuals with global aphasia who have limited verbal skills (Fedorenko & Varley, 2016).

## 2.4 Cross-Cultural Variation

When considering the functions of intrapersonal communication, it is also valuable to consider how it may appear similarly or differently across cultures. A study using Brinthaup's US-based Self-Talk Scale (Brinthaup & Dove, 2012) with a Chinese sample found reliability in self-talk being employed for self-criticism, self-reinforcement, self-management, and social assessment (Ren, Wang, & Jarrold, 2016). While functions and the characteristics of self-talk may share commonalities across cultures, the degree of these will likely vary as a function of cultural norms of expression. In a study comparing the IIs used by young adults in the US, Thailand, and Japan, a few differences were found. First, Americans were found to exhibit more self-dominance, or dominating of conversations, in IIs (McCann & Honeycutt, 2006). Valence, frequency, and variety of IIs was also found to vary across these three cultures. However, it is important to note that this sample represents fairly urban student populations in each country. Ultimately, much variation in imagined interactions, and likely other self-talk topics, should be expected across not only cultures but individuals, as the utility of self-talk will be adaptive to the needs of the individual in the contexts they occupy. Even in cases of psychosis-related acoustic hallucinations, cross-cultural differences have been found (Luhmann, Padmavati, Tharoor, & Osei, 2015), suggesting a wide range of intrapersonal communication behaviors and processes should be examined with a wider lens.

## 2.5 Summary

The functions of intrapersonal communication can be consciously engaged, such as searching our memory for information or ideas. It can also be subtle, such as the intrinsic dynamics of the brain while it is not pre-occupied with a task. Cultural variation suggests that self-talk may be a blend of deliberate self-regulation along with possibly unconscious influences of one's cultural context. The functions of intrapersonal communication may have both conscious and unconscious elements.

### **3 Development of Intrapersonal Communication**

If these functions characterize a core psychological contribution of intrapersonal communication, then we may see these sorts of functions emerge in systematic ways during the learning or development of various modes of intrapersonal communication.

#### **3.1 Early Development**

Upon birth, intrapersonal communication would not have verbal language as a medium for expression. However, as skills build early in life, different vehicles of intrapersonal communication may arise. A study with preverbal children aged 14, 16, and 18 months of age found self-regulatory private gestures employed during play activity, which may represent the precursors to private speech (Basilio & Rodríguez, 2017). Even newborn infants engage in imitation of body movements. Such a capacity may be reflective of an initial implicit consciousness that enables explicit consciousness-related behaviors later on (Lewis, 2003), such as intrapersonal communication or self-talk. Mechanisms like imitation or recognition of the self in mirrors show the capacity for parsing the self from others, and may further support the mental foraging versus external foraging perspective on evolutionary origins for self-talk.

Intrapersonal communication in children then typically transforms into private speech, which initially involves vocalizing verbally and overtly to oneself with no intention for an external audience to receive any messages. Infants as young as five-months-old may also be engaging in deliberate vocal play when alone. In a study by Shimada (2012), infants vocalized for longer durations when left alone by the parent(s), and used significantly more acoustic phrase repetition. Interestingly, in a condition where the infant vocalizations were amplified in real-time, infants prolonged their vocalizations further, altogether suggesting the goal was specifically vocal play rather than elicitation of parental attention (cf. Oller et al., 2013).

### 3.2 Debate on Developmental Trajectories

The nature of early self-talk such as private speech has provoked differing perspectives on the connections to social communication. A *Vygotskian* perspective on development suggests that self-talk starts in the social realm, moving to internal mental processes afterwards to enable self-regulation (Winsler, 2003). This may be reflected in the tendency for overt (external) private speech to boom starting from around 3 years of age before withdrawing internally around age 7 (Stanley, 2011). In the transition to internalized intrapersonal communication, partially internalized private speech occurs, with whispered or mouthed speech patterns. This partially internalized speech may have a self-regulatory as opposed to a social function (Alarcón-Rubio et al., 2014).

However, variation in the overtness of private speech may be dependent on context. A recent study using three separate tasks (involving delayed sequential memory, selective attention, and a Tower of London test) found differing degrees of overt speech based on the task (Doebel & Munakata, 2022). For example, age effects in this work (from 5- to 7-year-olds) were only found for frequency of self-directed speech on the selective attention task. A *Piagetian* perspective, in contrast to a Vygotskian one, argues that children rarely take a social perspective, instead making use of “egocentric” speech with social speech emerging as a product of developing logical thought (Stanley, 2011). As more studies explore the contexts and content of intrapersonal communication in children, it’s possible that either perspective, or both, may emerge as important explanations.

Interestingly, despite burgeoning use of private speech in the preschool years, it is unclear how or when *awareness* of internal thoughts or streams-of-consciousness develop in childhood. In a task evaluating willingness to attribute active mental states to others, or even themselves, younger children appear to perceive waiting periods as periods where there are no thoughts happening (Flavell, Green, & Flavell, 1993). In a task eliciting volitional streams-of-consciousness, kindergartners struggled with production compared to fifth graders (Kipp & Pope, 1997). However, pretend play, or pretense, appears during the second year of life, if not earlier, in the form of pretend gestures (Fein, 1981), showcasing that regardless of metacognitively generated self-reports, young children are able to generate fictionalized explorations independently in communication with the self. Ev-

idence suggests the ability to attribute mental states to others emerges by 3-4 years of age or even earlier (Surian, Caldi, & Sperber, 2007), and as such it may be more precise to consider intrapersonal communication early emerging yet variable as various cognitive capacities crystallize (Lewis, 2003).

### **3.3 Emergence of Emotional and Other Functions**

Both Vygotsky and Piaget considered self-regulation as a key mechanism relating to the self. While both considered self-regulation from an intellectual perspective, Piaget also highlighted the self-regulation of emotion (Fox & Riconscente, 2008). Research on the private speech of children used in a frustration task showed differences in self-talk usage in relation to emotional valence and regulation strategy (Day & Smith, 2013). For example, even when controlling for regulation strategies, negatively valenced task-relevant private speech, along with higher levels of social speech, predicted higher levels of sadness. Task-relevant self-talk appears to have both positive and negative potential on task performance, dependent on varying factors.

Greater frequency of overt task-relevant speech may be associated with lower inhibitory control and executive function issues (Thibodeaux, Bock, Hutchison, & Winsler, 2019). However, task-relevant private speech may be beneficial in cases where the task is neither too simple nor too difficult for the child (Fernyhough & Fradley, 2005). In another study considering the task-relevance of private speech, Mulvihill, Matthews, Dux, and Carroll (2021) found in both a DUPLO and a card sort task a high frequency of performance-related content, such as self-instruction, attention focusing, and observational statements. Task performance was particularly influenced negatively by task-irrelevant content. Forethought content, such as motivational language or future planning, was associated with improvements in task performance in some cases.

### **3.4 Family and Social Systems**

Given the social nature of language learning, it is unsurprising that the nature of children's self-talk will also be influenced by experiences with parents and other significant individuals in early life.

Overall, children who perceive the people in their lives as speaking to them positively use more positive self-talk and less negative self-talk, with the opposite pattern when they perceive others to use more negative talk to them, although sex differences may suggest differing social pressures based on gender norms (Burnett, 1994).

Similarities have also been found in child and parent narratives about traumatic events, even when sampled separately from each other (Alisic, Krishna, Robbins, & Mehl, 2016). These similarities include length/elaboration, rates of anxiety words, and rates of cognitive words. The makeup of a family may also influence self-talk: the frequency of self-talk, especially self-critical talk, was found to be higher for adults who grew up as only children compared to having siblings (Brinthaup & Dove, 2012). Interestingly, the researchers also report a higher frequency of self-talk in adults who had imaginary companions as children. This self-talk also included significantly more self-reinforcing and self-managing self-talk than those who did not have imaginary companions growing up, and suggests positive benefits to imagination that may play a functional role for intrapersonal communication.

### **3.5 Summary**

The development of intrapersonal communication reinforces the idea that one of its main functions is self-regulatory in nature. However, there remain a number of intriguing open questions about the developmental ordering and origins of the process, as the earliest speech can occur privately, but with potential systematic effects of the child's social environment.

## **4 Factors Influencing Intrapersonal Communication**

As described above, various functions of intrapersonal communication can be identified in the experiences and behaviors of young children. As a broad repertoire for engaging the self, it should also be flexible under various factors and conditions. This flexibility may derive, in part, from the activity levels mentioned earlier: Intrapersonal communication is undergirded by a range of both

conscious and unconscious processes. This is true in particular of numerous cognitive processes which we consider next.

#### **4.1 Cognitive Factors and Distancing**

Self-talk relies on language production and is thus likely to be constrained by priming that directs the flow of thoughts. This mental process can sometimes be very rapid and unconscious. For example, syntactic priming research demonstrates how the processing of one utterance's form influences the processing of subsequent utterances (Pickering & Branigan, 1999). The framing of thoughts in different times, spaces, and perspectives also has implications for the construction of self-talk. In a review by Trope and Liberman (2010), times, spaces, and perspectives that are considered more distal from the here and now and one's identity lead to more abstract mental construals.

These observations are central in construal-level theory. Increased abstraction appears to influence self-talk depending on context. One way psychological distance is achieved is through the use of first- versus second- or third-person pronouns, and this may impact performance on tasks. For example, when asked to give advice after imagining a specific scenario, individuals who were primed to give advice in the second-person (i.e., using "you" instead of "I") performed better on an anagram task (Dolcos & Albarracín, 2014). Distanced self-talk may also enable more rational thought, with a third-person perspective of the self leading to better gains in strategic games (Gainsburg & Kross, 2020).

There is evidence that this distancing factor relates to aspects of health-related feelings and outcomes (Kross et al., 2017; Furman, Kross, & Gearhardt, 2020; E. Oliver, Hudson, & Thomas, 2016; Orvell et al., 2021). For example, third-person self-talk may be a low-effort technique for emotion regulation, with reduced event-related potentials (ERPs) in a marker associated with self-referential emotional reactivity despite no enhancement in an ERP marker of cognitive control (Moser et al., 2017). Third-person self-talk appears to more strongly influence self-conceptualization than adopting the perspective of a close friend or thinking of the self in first-person, leading to more abstract language (Gainsburg & Kross, 2020).

Distanced self-talk can also occur beyond the personal pronoun anchoring. In work on decentering, de-identifying the self with certain aspects of an experience is used in some mental health interventions. Rather than construing oneself as “being sad,” for example, they may instead “have sadness,” minimizing the hold the feelings have on the individual (Bernstein, Hadash, & Fresco, 2019). Temporal framing of thoughts may trend towards the past being associated with depression and the future being associated with anxiety (Pomerantz & Rose, 2014). However, the effectiveness of temporal framing as a deliberate intervention may depend case-by-case based on individuals’ attachment styles, which may be proxies for baseline tendencies towards proximal or distal psychological distances (Wang, Lin, Huang, & Yeh, 2012). Circumstances may also matter, such as the life-altering effects of COVID-19, and may shift how temporal framing influences future thoughts (Bainbridge & Dale, 2023).

## **4.2 Contextual Variation**

Distancing is, of course, only one way self-talk can be employed to guide outcomes. As we’ve seen with research on private speech in children, task-related language can be beneficial, depending on varying details of the context. In the domain of sports psychology research, evidence suggests instructional self-talk may increase precision on tasks, while motivational self-talk may benefit strength and endurance (Hatzigeorgiadis, Theodorakis, & Zourbanos, 2004). Motivational self-talk of athletes using a stationary exercise bicycle was shown to reduce time to exhaustion as well as reducing ratings of perceived exertion when partway through this physically exerting activity, permitting greater endurance (Blanchfield, Hardy, De Morree, Staiano, & Marcora, 2014). This suggests self-talk is guided by context. Being in an autonomy-supportive environment (e.g., giving rationale, validating the participant’s perspective) lead to greater use of positive emotion words, fewer negative words, and fewer first-person references in a think-aloud task compared to being in a more controlled environment (E. J. Oliver, Markland, Hardy, & Petherick, 2008).

Our streams-of-consciousness may also be constrained by cognitive load. For example, when exposed to stimuli at a faster rate, or with greater short-term memory loads, task-irrelevant thinking

and visual imagery are lower, hinting at limitations to mental foraging when cognition is tied up elsewhere (Antrobus, Singer, Greenberg, et al., 1966). The common experience of mind-wandering may relate to intrapersonal communication, and it is also influenced by working-memory load (Soemer & Schiefele, 2020)

Intriguingly, the growing practice of mindfulness may relate to intrapersonal communication. Mindfulness does not necessitate language, and indeed often recommends avoidance of verbal mind-wandering by transferring focus elsewhere (Creswell, 2017). Mindfulness often applies attention to in-the-moment sensations and experiences (both internal and external), which can include the observation of verbal thoughts but aims to anchor against the streams-of-consciousness. The focus on physical sensations in mindfulness practices appears as one way to shift intrapersonal communication from uncontrolled verbal streams to interoceptive or exteroceptive (i.e., external) awareness. Interoceptive awareness, or the awareness and evaluation of the body's physiological workings and state, appears higher for those who are also high in dispositional mindfulness (Hanley, Mehling, & Garland, 2017). It may therefore be possible to adapt one's self-communicative mindfulness willfully. Deliberately observing physical sensations can help tune dispositional mindfulness, which in turn can improve benefits of using other modalities of intrapersonal communication, such as writing to the self (Quaglia, Braun, Freeman, McDaniel, & Brown, 2016).

### **4.3 Summary**

As suggested by the function and development of intrapersonal communication, cognitive features also reveal a variety of mechanisms that may support it. An unconscious process like linguistic priming may shift and guide intrapersonal thinking, while active and deliberate engagement may help people shape their own internal processes.

## 5 Methods to Study Intrapersonal Communication

Intrapersonal communication is a rich phenomenon, developing systematically, varying cross-culturally, and given to conscious and unconscious cognitive processes. In order to assess all these underlying factors, whether consciously active or more unconscious, various methodologies may be employed. In this section, we survey some of these in more detail.

### 5.1 Natural Language Processing

While language may not tap into the rawest form of intrapersonal communication occurring internally in the form of thoughts, it can provide immense value in revealing information about our minds. Natural language processing (NLP) methodology continues to develop as computational tools increase in power and application (Jackson et al., 2022). NLP allows for the quantification of language through varying methods, including sentiment analysis, topic modeling, and more.

Among the simplest but most widely applied NLP techniques, Linguistic Inquiry and Word Count (LIWC) is a frequency-based word categorization library (Tausczik & Pennebaker, 2010). For the past few decades, it has provided a method to study a wide range of linguistic functions, including negative and positive tone, temporal focus, and over a hundred other meaningful categories that have expanded with newer iterations. One study employing LIWC on recounts of trauma told as though unfolding in real-time found use of death-related words associated with more severe PTSD and depression, and poorer social adjustment after the traumatic event (Alvarez-Conrad, Zoellner, & Foa, 2001). While these associations do not speak to causality, they showcase how word categories used in narratives, and other forms of verbal intrapersonal communication, can reveal mental-state information about the signaler.

LIWC can also analyze dynamics in the form of narrative arcs, how text flows across cognitive tension, staging, and plot progression. These measures reveal trends in different linguistic contexts, with unique signatures found for TED talks, newspaper articles, Supreme Court opinions, and narrative media (Boyd, Blackburn, & Pennebaker, 2020). This signature of intrapersonal

communication remains largely untapped, and will likely vary depending on whether the method of communicating involves unaltered streams-of-consciousness versus more structured and edited journaling. On a much smaller scale, micro-features of real-time typing keystrokes may be meaningful as well. In a review of the literature on typing dynamics and emotion detection, slower typing and higher error rates appeared to indicate negative emotions and stress (Maalej & Kallel, 2020). Much of this work focuses on affective computing in the realm of human computer interaction (HCI), and with how much interpersonal communication now relies on digital formats, applications for computer-moderated intrapersonal communication may be just as fruitful.

## 5.2 Spoken Language

In cases where written or transcribed intrapersonal communication is available, NLP techniques can be immensely revealing. However, when intrapersonal communication is spoken, the additional signal provided by the voice itself can also provide valuable information, some of which may be unavailable or cumbersome to convey through typed language alone. Although often coded into data manually, partially internalized private speech is often whispered (Alarcón-Rubio et al., 2014), with whispers exhibiting both lower intensity and a lack of vocal fold vibration (Jovičić & Šarić, 2008). Some of this vocal information is likely the product of physiological influences that may shape vocal features by altering respiration or other production components (Scherer, 2003). Higher arousal emotions, such as anger, are likely to increase certain acoustic features, such as intensity and fundamental frequency mean, variability, and range. In a study where nurses and nursing school students evaluated mock patient voice recordings, when the content of speech exhibited valence that was dissonant to the voice's tone (e.g., positive content with negative tone), the negative valence more strongly influenced perception and emotional responses (Yogo, Tsutsui, Ando, Hashi, & Yamada, 2000).

This suggests that analyses of content alone, such as transcriptions of speech, may not accurately capture the emotional experience of spoken self-communicative instances. What specific features are necessary to infer emotion is unclear. However, one study found that pitch characteris-

tics alone led to fairly high reliability when evaluating emotive speech samples devoid of emotional semantic content (Fairbanks & Pronovost, 1939). Much of the work on vocal acoustics of emotions make use of actors, which may call into question ecological validity of true emotional expressions as more variation is introduced through cultural influences (Bryant, 2021). However, in the case of intrapersonal communication, there may be benefits to understanding what features can be deliberately employed to volitionally signal favorable emotional states to achieve positive outcomes of overt spoken self-talk.

It may be the case that task performance and emotional regulation will benefit from different modalities or intrapersonal communication techniques, given the added emotional information accessible via overt private speech. A study looking at published essays from major figures and persuasive spoken public addresses found that the oral modality involved more personal references, more first and second person pronouns, and other features of word patterns and lengths (Einhorn, 1978). If persuasion techniques are different across modalities, it may be the case that self-persuasion might operate differently orally versus written as well.

### **5.3 Think-Aloud Paradigm**

One existing method for studying thoughts presented vocally is the think-aloud paradigm. Often employed in the testing of computerized user interfaces, think-aloud involves speaking one's thought process aloud, typically as one performs a task such as navigating a website. Some scholars debate the validity of using think-aloud paradigms, typically due to concerns that it disrupts the main task of interest, such as website navigation and perception (Cooke & Cuddihy, 2005).

Despite these concerns, think-aloud as a standalone paradigm provides a valuable look at intrapersonal communication. An association between negative, past-oriented, self-focused language, and rumination tendencies in spoken language (Raffaelli et al., 2021) appears to match similar findings in typed paradigms, which link "I-talk," or self-focused language, to depression (Berry-Blunt, Holtzman, Donnellan, & Mehl, 2021). Some research also suggests overt versus covert self-talk may be equally beneficial for performance on tasks, although in a sample of patients with

rheumatoid arthritis, written disclosure showed more potential influence than spoken disclosure (Lumley et al., 2011).

Some related research has used experience sampling, in which a participant is prompted at regular intervals throughout a day to provide data (Van Raalte, Vincent, & Dickens, 2019). This could help to evaluate mind-wandering tendencies (Stawarczyk, Majerus, Maj, Van der Linden, & D'Argembeau, 2011). Different paradigms for eliciting self-talk may thus result in different styles of intrapersonal communication as well.

## **5.4 Survey-Based Research**

In efforts to understand the nature of intrapersonal communication, several questionnaire-based scales have been developed and tested. Some questionnaires look at the content of self-talk such as the Inner Speech Report, where one self-reports a list of as many topics of their self-talk as they can (Uttl, Morin, & Hamper, 2011). The Inner Speech Report parallels the thought-listing technique, which involves listing out all thoughts relating to some constraint, such as during a specific duration of time (e.g., “list all the thoughts you had while completing this past task”), and can include additional evaluations, such as reviewing one’s own thoughts and tagging them for valence or other attributes (Cacioppo, Von Hippel, & Ernst, 1997).

Other self-talk measures involve Likert scales in response to targeted questions that provide context such as the Self-Talk Inventory, which presents imagined scenarios and asks how likely they would use different kinds of self-talk phrases (Uttl et al., 2011; Calvete et al., 2005). Uttl and colleagues, for example, compared a collection of such self-report measures, finding internal consistency yet minimal evidence for validity across scales. Using such retroactive report style scales or paradigms are arguably indirect representations of more naturalistic and spontaneously occurring intrapersonal communication.

## 6 Preliminary Theoretical Framework and Conclusion

To better understand how different modes of intrapersonal communication might operate, an adapted model of communication could clarify how a sender and receiver exist within the self. Here, we propose a model that enables the self to be engaged as sender and receiver. As we have mentioned earlier in our review, the sending and receiving may be differentially “active,” in that the process may be one involving active awareness and effort. These roles constrain how intrapersonal communication influences behavior or reveal inner psychological or mental states. Similar approaches to traditional, interpersonal communication have been explored to understand sender-versus receiver-focused perspectives (Andersen, 1991). This includes exploring instances where the sender may be intentionally or unintentionally sending signals, or a receiver being receptive, incidentally receptive, or non-receptive. Is communication dependent on someone receiving that message, even if a sender has attempted to communicate? If so, then this suggests intrapersonal communication should also be considered communication. Examples of behaviors that represent different self-directed sender and receiver activations are presented in Table 1.

Active sender/active receiver represents the most involved model, where communication within the self is explicit and intentional. Imagined interactions may represent a fairly even distribution of focus as the sender and receiver, as the interaction plays out dynamically with consideration of potential interpretations a receiver of the signal may have, as well as how this then feeds back into the subsequent turn of the original sender. Overt intrapersonal communication, whether spoken or typed, also likely constitutes an active sender and active receiver model, as the act of making intrapersonal communication tangible forces the self to receive the message. While the self may still be influenced by the behaviors listed as active sender/inactive receiver, the role of receiver is inactive and lucid interpretation is not engaged. This category may be the least distinct, as the act of sending a message with awareness likely activates the receiving role more so than other inactive positionings. However, thoughts can often be generated without engaging reappraisal, leaving the role of receiver limited as it is not then taking a subsequent turn as sender in a hypothetical internal interaction. Indeed, one may become active as receiver after the fact, becoming retroactively aware

of a thought that had already been generated. While the matrix in Table 1 represents a simplified sender-receiver model, the feedback relationship between partners in traditional, dyadic communication interactions is likely to play out in intrapersonal communication as well. If we indeed are able to influence ourselves via intrapersonal communication, the model is interactive.

Hallucinations experienced by schizophrenia patients provide interesting case studies of an inactive sender/active receiver model. Auditory verbal hallucinations appear linked with less active brain regions associated with processing and monitoring language and likely self-talk (Gibson & Foster, 2007), which may conceptually reflect an inactive receiver. However, the sender role is not volitionally engaged. As such, hallucinations may instead be considered a problem of limited channel capacity. The channel capacity in a sender-receiver model limits how much signal (i.e., the message) and noise can in sum be passed through the channel per unit of time. Alternately, the sender encodes the message whilst the receiver decodes it, and semantic misinterpretations may occur when either end fails. Reduced activation in the receiving end may thus constitute a decoding error or faulty processing in the channel, where noise is falsely interpreted as signal. Emotional appraisal may also involve an inactive sender/active receiver, with reappraisal activating the sender role.

Dreams can be considered a special case of intrapersonal communication. Dreams are commonly experienced as a receiver of multi-modal information generated internally but beyond the control of the individual (i.e., inactive sender). This can be represented as the individual taking an active receiver role, particularly when dream recall has occurred, whilst the sender role is out of volitional reach. However, lucid dreaming permits the activation of the sender role, and in fact can lead to communication not only internally, but externally to others via volitional eye movements (La Berge, Nagel, Dement, & Zarcone Jr, 1981). One proposed evolutionary function of dreams is the simulation of responding to threats to rehearse and improve on possible responses (Revonsuo, 2000), although many other theories propose more specific emotion-regulation functions of dreams. Regardless of whether dreams function adaptively for threat-preparation or emotion regulation, both perspectives pose dreams as a signal generated internally to influence the self.

One criticism Cunningham (1992) raised of intrapersonal communication as a field of study was an extreme potential perspective that poses a private language for inner experiences inclusive of even pain. It seems fair to argue that intrapersonal communication could rapidly consume all human behavior and mechanisms down to the neuronal level (cf. Stacks & Andersen, 1989). While these may be argued to have communication-like patterns (such as the transmission of a signal from hypothetical neuron A to neuron B), we propose here that some mechanisms could instead match an “inactive sender, inactive receiver” model. This may be the least communication-like, in that a volitional and conscious message is not possible. However, through other intrapersonal communication behaviors, such as choosing to employ verbal thought, inactive roles could be made active. Mindful interoceptive awareness poses one example that appears to take a low-level mechanism like pain perception and adds a layer of added internal communication to it. By dividing out such a hierarchy of intrapersonal communication models, clarification of these mechanisms or behaviors in the self-regulation landscape, and their functional potentials, may be possible.

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		<b>Receiver</b>	
		<b>Active</b>	<b>Inactive</b>
<b>Sender</b>	<b>Active</b>	Imagined interactions, simulations, conscious sensory imagery (including visualization, auralization, interoception, etc.), overt self-talk (e.g., spoken, written), lucid dreaming	Spontaneous thoughts that are not appraised or attended to (but one could become aware of by activating the receiver role).
	<b>Inactive</b>	Dream recall, hallucinations, intrusive thoughts, emotional appraisal	Dreams not recalled, cognition, intangible thoughts such as implicit associations, biases, or unattended emotional responses

**Table 1:** *A matrix of self-communicative behaviors where the individual may take active or inactive sender and receiver roles. This matrix poses an analog to Fig. 1 proposed by Andersen (1991) explaining communication that is intentionally versus unintentionally transmitted or successfully versus unsuccessfully received. Like interpersonal communication, intrapersonal communication may vary in nuanced ways based on the effect it can have on the sender and/or receiver contained within the singular individual.*