

Putting the “Me” in “Mentalizing”: Multiple Constructs Describing *Self* Versus *Other* During Mentalizing and Implications for Social Anxiety Disorder



Erin L. Maresh and Jessica R. Andrews-Hanna

Introduction

In daily life, the experience of reflecting on our own thoughts and feelings may subjectively feel quite distinct from the experience of inferring the thoughts and feelings of other people. Yet, it is becoming increasingly appreciated that the processes underlying how we understand the mental states of both ourselves and others—processes collectively called “mentalizing”—show considerable overlap and interconnectedness (Gerace, Day, Casey, & Mohr, 2017; Oosterwijk, Snoek, Rotteveel, Barrett, & Steven Scholte, 2017; Saxe, 2015). For example, reflecting on our own thoughts, feelings, and memories may provide a template for understanding the mental states of others (Bradford, Jentzsch, & Gomez, 2015; Dimaggio, Lysaker, Carcione, Nicolò, & Semerari, 2008; Gordon, 1986; van der Meer, Costafreda, Aleman, & David, 2010). Inversely, attempting to understand others’ mental states can clarify our own inner experience and self-concept (Cooley, 1909; Fonagy, Gergely, Jurist, & Target, 2002; Mead, 1934). Consequently, far from distinct constructs, self- and other-mentalizing are interdependent processes with broad implications for psychopathology, where both excessive and limited self-focus can be associated with impairments in understanding others (Cotter et al., 2018; Dimaggio et al., 2008; Kaplan et al., 2018; Plana, Lavoie, Battaglia, & Achim, 2014). To date, however, self-focused thought has been explored largely independently from mentalizing about others, and hence, little is known about how self-focus benefits or impairs mentalizing.

E. L. Maresh (✉)

Department of Psychology, University of Arizona, Tucson, AZ, USA
e-mail: erinmaresh@arizona.edu

J. R. Andrews-Hanna (✉)

Department of Psychology, Cognitive Science Program, University of Arizona,
Tucson, AZ, USA
e-mail: jandrewshanna@arizona.edu

The aim of this chapter is to begin refining our understanding of the relationship between the *self* and *other*. Specifically, we will examine different ways of understanding the role of the self in mentalizing and consider its relevance to social anxiety disorder (SAD). To this end, we will establish three distinct but overlapping constructs describing different ways of construing *self* versus *other* in mentalizing. For each construct, we will integrate behavioral and neural evidence from diverse fields, highlighting a critical role for the brain's default mode network (DMN) in supporting these constructs (Andrews-Hanna, Smallwood, & Spreng, 2014; Mars et al., 2012; Northoff et al., 2006; Spreng & Andrews-Hanna, 2015), and will discuss how heightened focus on the *self* within each construct contributes to SAD. SAD, a disorder characterized by excessive fear of being evaluated by others, is hypothesized to be maintained by negative self-focused thought related to social situations (Alden, Auyeung, & Plasencia, 2014; Heimberg, Brozovich, & Rapee, 2010), making it especially suited to examining how self-focus interferes with mentalizing about others. Finally, we will consider real-world examples of these constructs and broader clinical implications. Our hope is that by shedding light on the interdependence of self- and other-processing in mentalizing, we will inform our understanding of both functional and dysfunctional mentalizing, uncover potential transdiagnostic targets for therapeutic intervention, and highlight exciting areas for future research.

Constructs to Distinguish the Self and Other

Even the simplest social exchange engages a complex interplay between processing the self and processing others. We can flexibly switch between considering our own mental states and those of our interaction partners; we can infer the emotions and perspectives of others without confusing them with our own; and we can dynamically evoke mental images of ourselves and of others in past and potential future scenarios to inform our social behavior. Thus, far from a singular construct, distinguishing between the self and other during mentalizing likely involves multiple underlying constructs. In the sections that follow, we describe three of these constructs, with an emphasis on the role of the *self* in each: (1) when the self is the *target* of mental state inferences, (2) when the self is the *source* of knowledge used to make mental state inferences, and (3) when an image of the self is mentally constructed due to the *visual perspective* adopted during mental imagery. Of note, throughout this chapter, we use the term “mentalizing” to indicate making mental state inferences not only about *cognitive* states, such as thoughts, beliefs, and intentions, but also about *affective* states, given the interdependence of neural processes underlying cognitive and affective mentalizing (Lamm & Majdandžić, 2015; Sebastian et al., 2012).

Self as Target: Understanding One’s Own Mental State

Mentalizing is often construed as the ability to infer the mental states of other people (Frith & Frith, 2006; Mitchell, 2006). Yet, equally important to its definition is the ability to infer one’s *own* mental states, a process that has been referred to by many names, including “self-referential thought,” “self-reflection,” “private self-consciousness,” and—harkening back to William James—“introspection” (Fenigstein, Scheier, & Buss, 1975; James, 1890; van der Meer et al., 2010). Here, we will call this process “self-focused mentalizing” to underscore its role in mentalizing while differentiating it from *other*-focused mentalizing. Thus, perhaps the most overt construct for distinguishing “self” and “other” in mentalizing is simply identifying the *target* of mental state inference—whether the *perceiver* (the individual making a mental state attribution) is trying to understand their own mental state (self-focused mentalizing) or that of another person (other-focused mentalizing).

Although identifying *self* or *other* as the target of mentalizing appears straightforward at first glance, several methodological issues hamper its precise determination. Various methods for constraining the target of mentalizing include varying task *content* (e.g., whether the task contains stimuli relevant to the self or to another), task *context* (e.g., whether the task is performed alone or with others), or task *instructions* (e.g., whether the perceiver is told to think about their own thoughts and feelings or those of another). However, these techniques rely on assumptions that are difficult to establish, including (1) that self-relevant stimuli and solitary tasks produce only self-focused mentalizing, and other-relevant stimuli and interactive tasks (e.g., trust games) produce only other-focused mentalizing, and (2) that the target of mentalizing remains static in a situation rather than, for example, dynamically shifting between the self and other(s). While these assumptions may hold true in simplified and contrived task designs, they are unlikely to maintain during complex, *naturalistic* instances of social cognition (Zaki & Ochsner, 2009). As such, little is known about natural variation in the degree to which individuals actually mentalize about themselves or others (but see Bryant, Coffey, Povinelli, & Pruett, 2013) or how “target-switching” might dynamically unfold during a social interaction.

Adding to the difficulty in determining the target of mentalizing is the question of whether and how the processes underlying mentalizing about the *self* differ from the processes underlying mentalizing about *others* (e.g., Legrand & Ruby, 2009). It has been suggested that, during self-focused mentalizing, we have access to multiple facets of our inner experience, such as physiological states, affective reactions, and memories (Damasio, 2010; Varela, Thompson, & Rosch, 2017), that provide privileged information about ourselves not available when mentalizing about others. Further, it intuitively *feels* like we know ourselves better than anyone else. Despite these intuitions, we are prone to significant self-perception biases that limit our self-knowledge, including the suggestion that many facets of personal experience occur largely outside of conscious awareness and thus cannot be readily

accessed for the purposes of mentalizing (Vazire & Carlson, 2010; Wilson & Dunn, 2004).

Self-focused mentalizing may, instead, occur primarily through a constructive process, operating similarly to how we are believed to understand others. That is, we may use observations of our behaviors and reactions (rather than introspective processes) to make inferences about our mental states and then construct a personal narrative from these inferences (Bem, 1972; Bollich, Johannet, & Vazire, 2011; Wilson & Dunn, 2004). Supporting this idea, it has been proposed that self-focused mentalizing can be improved by seeking out information from others, both through observing other people's reactions to one's own actions and through exploring other people's differing views (Bollich et al., 2011; Wilson & Dunn, 2004). In other words, seeking out *other*-focused mentalizing may be critical in improving *self*-focused mentalizing, highlighting the interdependence of self and other processes in mental state inference.

Neural correlates. Numerous studies have sought to identify the neural correlates of self-focused mentalizing and other self-related processes, reliably identifying activity within the core structures of the DMN, including the medial prefrontal cortex (mPFC), posterior cingulate cortex (PCC), and anterior cingulate cortex (ACC) (Andrews-Hanna et al., 2014; Northoff et al., 2006; Qin & Northoff, 2011; van der Meer et al., 2010). Yet, recent evidence suggests that regions involved in mentalizing about the self overlap with many regions involved in mentalizing about others, raising the question of what, if any, activation in the brain is self-specific (Legrand & Ruby, 2009; Qin & Northoff, 2011; van der Meer et al., 2010).

Within mentalizing research, particular attention has been given to the mPFC (Denny, Kober, Wager, & Ochsner, 2012; Schilbach, Eickhoff, Rotarska-Jagiela, Fink, & Vogeley, 2008; Spreng & Andrews-Hanna, 2015), especially for its hypothesized role in distinguishing between self and other. Specifically, the mPFC has been theorized to map representations of *self* and *other* along a spatial gradient, with more ventral mPFC portions proposed to predominately represent the *self*, and more dorsal mPFC proposed to predominately represent *others* (Denny et al., 2012; Lieberman, Straccia, Meyer, Du, & Tan, 2019; van der Meer et al., 2010).

Supporting this distinction, more ventral portions of the mPFC are involved in a range of processes related to the self, including encoding and prioritizing self-relevant information in memory (Kumaran, Banino, Blundell, Hassabis, & Dayan, 2016; Macrae, Moran, Heatherton, Banfield, & Kelley, 2004), retrieving autobiographical facts and episodes (Svoboda, McKinnon, & Levine, 2006), referencing information to one's self (Northoff et al., 2006), and constructing personal meaning from stimuli (Roy, Shohamy, & Wager, 2012). However, brain activity in ventral mPFC regions has been found to track not only the degree of self-relatedness of a stimulus but also its perceived value (Andrews-Hanna, Reidler, Sepulcre, Poulin, & Buckner, 2010; Bartra, McGuire, & Kable, 2013; Moran, Heatherton, & Kelley, 2009), with recent pattern-based neuroimaging studies suggesting at least partial overlap of these two processes at the representational level (Chavez, Heatherton, & Wagner, 2017; Yankouskaya et al., 2017). Ventral mPFC regions may therefore play

a broader role in computing the personal significance or motivational salience of external or internal information, rather than processing self-relatedness per se (Andrews-Hanna et al., 2014; D’Argembeau, 2013; Moran et al., 2009). In line with this notion, ventral portions of the mPFC become engaged to a greater degree when mentalizing about psychologically close or similar others, as compared to strangers or dissimilar others (Krienen, Tu, & Buckner, 2010; Mitchell, Macrae, & Banaji, 2006; Murray, Schaer, & Debbané, 2012; Tamir & Mitchell, 2010).

In contrast to its ventral portions, activation in dorsal mPFC (dmPFC) is often observed during tasks that involve *other*-focused mentalizing, including theory of mind paradigms and other controlled or *reflective* (as opposed to automatic or *reflexive*) social cognitive tasks (Lieberman, 2007; Saxe, 2015). Within the DMN, the dmPFC, along with the inferior frontal gyrus (IFG), temporoparietal junction (TPJ), superior temporal sulcus, and temporal poles, is thought to form a functionally coherent “dmPFC subsystem” (Andrews-Hanna et al., 2014; Yeo et al., 2011; but see Braga & Buckner, 2017) that strongly overlaps with several regions of the “mentalizing network” (Spreng & Andrews-Hanna, 2015). Despite evidence for preferential activity within the dmPFC subsystem for other-focused mentalizing, many of these regions are also recruited when mentalizing about the self, particularly when making reflective self-focused inferences (Denny et al., 2012). Further, a growing body of research has begun to highlight the role of the dmPFC and other regions in the subsystem in high-level non-social processes involving abstract constructs (Baetens, Ma, Steen, & Van Overwalle, 2013; Baetens, Ma, & Van Overwalle, 2017) and narrative comprehension (Mar, 2010; Tamir, Bricker, Dodell-Feder, & Mitchell, 2015). This suggests that activity in the dmPFC is not specific to other-focused mentalizing, paralleling findings regarding ventral mPFC activity and self-focused mentalizing.

Given these alternative accounts of their function, ventral and dorsal subregions of the mPFC have been proposed to be “agent-independent”—that is, they do not inherently distinguish between representations of self and other but rather encode qualities that often *correspond* with differences between self and other, such as abstraction, subjective value, relevance (e.g., information related to the self is more likely to be experienced as concrete, valuable, and relevant) (Garvert, Moutoussis, Kurth-Nelson, Behrens, & Dolan, 2015; Nicolle et al., 2012). We suggest that the dmPFC subsystem plays an important role in both other-focused *and* self-focused mentalizing, particularly when processes involve conceptually abstract, reflective mental processes represented verbally or symbolically (Gilead, Trope, & Liberman, 2019; Raffaelli, Wilcox, & Andrews-Hanna, 2020).

Relevance to social anxiety. Excessive and maladaptive self-focused mentalizing is thought to be critical to the generation and maintenance of SAD (Alden, Auyeung, & Plasencia, 2014; Heimberg et al., 2010). During social situations, individuals with SAD are hypothesized to focus their attention on themselves, monitoring their own thoughts, feelings, and internal sensations to form an image of how others might be seeing them, rather than on social or environmental cues (Heimberg et al., 2010; Maresh, Allen, & Coan, 2014; Maresh, Teachman, & Coan, 2017).

We hypothesize that, in addition to exacerbating social anxiety and other negative outcomes, excessive self-focus in SAD likely interferes with mentalizing about others. Surprisingly little work has examined other-focused mentalizing in SAD, despite ample research linking SAD with interpersonal difficulties (reviewed in Alden, Regambal, & Plasencia, 2014). We posit at least three ways that self-focused mentalizing in SAD might interfere with other-focused mentalizing: (1) by diverting limited attentional resources away from understanding the other and toward monitoring the self (Eysenck & Derakshan, 2011), (2) by shifting other-focused mentalizing to be about self-relevant information (i.e., *reflected self-appraisals*; Wallace & Tice, 2012), and (3) by facilitating avoidance behaviors, such as eye gaze avoidance or restricted speech, that are intended to reduce anxiety but also prevent attending to information about one's conversation partner (Plasencia, Alden, & Taylor, 2011). Thus, during social situations, in which a focus on understanding the mental states of others is critical, individuals with SAD may be focusing on "self-monitoring," spending considerable effort analyzing social interactions for self-referential cues, and restricting social behaviors at the expense of gathering accurate other-focused information.

Individuals with SAD may spend less time engaging in other-focused mentalizing due to heightened attention to the self, but how do they perform when they *are* mentalizing about others? While many studies suggest that social anxiety confers impairments in other-focused mentalizing, mixed results indicate a more complicated picture. Individuals higher in social anxiety report lower tendencies toward taking others' perspectives (Beitel, Ferrer, & Cecero, 2005; Davis, 1983; Davis & Franzoi, 1991), paralleled by poorer performance on perspective-taking tasks compared to their non-anxious counterparts (Buhlmann, Wacker, & Dziobek, 2015; Hezel & McNally, 2014; Lenton-Brym, Moscovitch, Vidovic, Nilsen, & Friedman, 2018; Washburn, Wilson, Roes, Rnic, & Harkness, 2016). When specific *types* of mentalizing errors are assessed, individuals with SAD make errors indicative of *over-mentalizing* (Hezel & McNally, 2014; Washburn et al., 2016)—that is, reading too much into what others are thinking and feeling. In addition to over-mentalizing, socially anxious individuals may be more likely to inaccurately infer that others' thoughts are focused on them, evaluating their appearance and/or performance (Hope, Burns, Hayes, Herbert, & Warner, 2010; Stopa & Clark, 1993).

Although the majority of studies find that social anxiety corresponds with impairments in other-focused mentalizing, some studies have found that individuals high in social anxiety exhibit *superior* other-focused mentalizing—at least during certain tasks and under certain circumstances. For example, socially anxious individuals under social-evaluative threat were more accurate at evaluating others' negative emotions (Auyeung & Alden, 2016), and socially anxious women (but not men) were more accurate at gauging whether another person was lying (Sutterby, Bedwell, Passler, Deptula, & Mesa, 2012). Other studies find no differences in other-focused mentalizing abilities related to SAD (Morrison et al., 2016). Due to the wide variety of methods, sample characteristics, and analytic approaches used in these studies, whether SAD interferes with other-focused mentalizing, and whether excessive

self-focus is a key mechanism in this interference, remain important avenues of future research.

Neurally, individuals with SAD, relative to healthy controls, show aberrant processing of self-referential stimuli across regions of the DMN—including the mPFC. SAD corresponds with heightened activity in ventral mPFC during a broad array of self-referential tasks regardless of stimulus valence, including viewing self-referential words (Blair et al., 2008), receiving social feedback (Peterburs, Sandrock, Miltner, & Straube, 2016), and viewing second-person compared to first-person self-referential statements (Blair et al., 2011). Interestingly, SAD also corresponds with heightened activity in the dmPFC during self-referential tasks—but predominately in response to *negative* stimuli, such as receiving negative criticism (Blair et al., 2008), viewing social anxiety-related scenes/words (Heitmann et al. 2016, 2017), anticipating unpleasant stimuli (Brühl et al., 2011), viewing distracting emotional faces (Boehme et al., 2015), and experiencing public embarrassment (Müller-Pinzler et al., 2015). Rather than encoding differences in self and other, increased ventral mPFC activation may indicate greater salience of general self-related stimuli in SAD relative to non-socially anxious individuals, whereas increased dmPFC activation—seen specifically during processing of negative self-referential stimuli—may support heightened abstract, narrative, and ruminative processes adopted during negative self-focused thought in SAD (Andrews-Hanna, Christoff, & O’Connor, 2020).

Self as Source: Egocentricity in Mentalizing Representations

Regardless of whether the *target* of mentalizing is the self or another, the individual serving as the primary *source* from which mental state inferences are drawn can also be either the self or another. It has been proposed that successful mentalizing involves not only accurately inferring the target’s mental state, but also inhibiting irrelevant perspectives—that is, one’s own perspective if mentalizing about others, and others’ perspectives if mentalizing about oneself (Leslie, Friedman, & German, 2004; Samson, Apperly, Kathirgamanathan, & Humphreys, 2005). For various reasons, however, we sometimes fail to inhibit irrelevant perspectives when mentalizing, leading to either *egocentric biases*, in which our own beliefs become the source of our inferences about others (Peters, 2016), or *altercentric biases*, in which another person’s beliefs become the source of our self-inferences (De Vignemont & Mercier, 2016). Here, we will focus on egocentric biases, in which the *target* of mentalizing is another person, but the *source* of mentalizing is the self.

Relying on one’s own mental states to understand another can be problematic across multiple circumstances, resulting in erroneous self-attributions onto the target (Keysar, Barr, Balin, & Brauner, 2000; Steinbeis & Singer, 2014). For example, inaccurate egocentric biases are more likely to occur when the perceiver has different traits than the target (Krueger & Clement, 1994), experiences a different affective response than the target (Steinbeis & Singer, 2014), or possesses privileged

information that is unknown to the target (Apperly, Back, Samson, & France, 2008). To overcome egocentricity biases, an *anchor-and-adjust* approach may be deployed in which inferences about another person's perspective are first egocentrically "anchored" in self-knowledge and are then "adjusted" according to known and estimated discrepancies between the self and other (Epley, Keysar, Van Boven, & Gilovich, 2004; Tamir & Mitchell, 2010, 2013). Although largely beneficial, the anchor-and-adjust approach has limitations. Chiefly, it is constrained by an individual's preexisting knowledge about the other person—if you know little relevant information about someone, there will be little adjusting you can do. Further, adjusting from egocentric self-knowledge is cognitively demanding, with greater perceived differences between *self* and *other* requiring more effortful, stepwise cognitive processing. To reduce effort when mentalizing about a dissimilar other, perceivers may anchor their mental state inferences in a familiar, well-known person (e.g., a significant other) instead of their own self-knowledge. This anchoring in another appears to occur primarily when the familiar other is a better exemplar than the self of the aspect being assessed in the target person (Willard & Markman, 2017).

Given that overcoming egocentricity is an effortful process, what determines whether we remain with our default egocentric biases or put forth effort to adjust our attributions? Sufficient time and motivation can increase the likelihood of anchoring-and-adjustment (Epley et al., 2004; Stern & West, 2016). However, even when engaged in anchoring-and-adjustment, a perceiver may cease making effortful adjustments prematurely, settling on a "satisfactory" estimate of the other person's mental state based on the amount of effort the perceiver is willing to expend (Epley & Gilovich, 2006). We are more likely to effortfully anchor-and-adjust with those who are similar to us than with those who are dissimilar to us, at least with unfamiliar others (Tamir & Mitchell, 2013). Rather than using egocentric biases to understand dissimilar others, however, we may instead rely on stereotypes (Ames, 2004), possibly because adjusting to the perspective of someone unlike us is deemed too effortful. Surprisingly, with familiar others, such as friends or spouses, we are more likely to rely on egocentric biases than to adjust our inferences (Savitsky, Keysar, Epley, Carter, & Swanson, 2011), suggesting that we overestimate the degree to which close others share our perspectives. Future research may wish to examine how familiarity and similarity interact to influence egocentricity, given their seemingly divergent effects on whether self or other is the source of mental state inference.

Although much research casts egocentricity in a negative light, egocentric inference can provide a useful heuristic in which readily accessible self-knowledge is used to gain insight into others' experiences (Hoch, 1987; Keysar et al., 2000). Further, making egocentric inferences is related to reduced stereotyping, increased prosocial behavior, and greater intimacy, suggesting that egocentric inferences may, in some cases, be tied to viewing others more like the self (Coan & Maresh, 2014; Galinsky, Ku, & Wang, 2005)—a process conceptually similar to "self-other overlap" (Aron, Lewandowski, Mashek, & Aron, 2013). Perhaps most importantly, egocentric inferences can be accurate when applied to people who are similar to us, allowing us to save resources when applied judiciously (Ames, 2004; Ames, Weber, & Zou, 2012; Hoch, 1987; Keysar et al., 2000). It is important to note that

egocentric inferences are usually only identified as egocentric *because* they are inaccurate; accurate egocentric inferences are more difficult to identify (Wallin, 2011). As such, although literature has emphasized the role of egocentricity in mental state attribution *errors*, it is possible that egocentric attributions are, in general, more accurate than the literature would suggest (Eyal, Steffel, & Epley, 2018; Keysar et al., 2000).

Neural correlates. Inhibiting egocentric mental states when mentalizing about another is thought to be related to a broader ability to flexibly switch between representations of self and other (de Guzman, Bird, Banissy, & Catmur, 2016). Control of self-other representations is supported by regions implicated in general inhibitory control, such as the IFG and dorsolateral PFC (Hartwright, Apperly, & Hansen, 2012; Rothmayr et al., 2011; Van der Meer, Groenewold, Nolen, Pijnenborg, & Aleman, 2011), as well as two regions of the DMN found in right temporoparietal cortex—the TPJ and supramarginal gyrus (SMG)—that show differential control over cognitive and affective states (de Guzman et al., 2016; Silani, Lamm, Ruff, & Singer, 2013; Steinbeis, 2016). The right TPJ (rTPJ), particularly the posterior sub-region (Igelstrom, Webb, & Graziano, 2015), contributes to inhibiting cognitive mental states, including beliefs (Hartwright et al., 2012; Rothmayr et al., 2011; Van der Meer et al., 2011) and visual perspectives (Santesteban, Banissy, Catmur, & Bird, 2012). Inhibiting affective mental states, on the other hand, appears related to activation of the right SMG (rSMG), which lies anterior to the rTPJ (Silani et al., 2013; Steinbeis, Bernhardt, & Singer, 2015). Supporting their roles in different aspects of perspective inhibition, rTPJ and rSMG show distinct connectivity profiles, with posterior rTPJ coupling with other regions implicated in cognitive mental state attribution, such as the PCC, precuneus, and mPFC, and rSMG coupling with regions related to affective empathy, including the midcingulate cortex and anterior insula (Hoffmann, Koehne, Steinbeis, Dziobek, & Singer, 2016; Steinbeis et al., 2015).

While a number of studies have examined the neural correlates of *inhibiting* egocentric inferences, relatively few have examined neural correlates of what underlies egocentric inferences in the first place. Egocentricity biases may be partially rooted in, and/or influenced by, *shared representations* of mental states—overlapping neural activity seen both when experiencing (or imagining) a mental state and when interpreting another as experiencing the same mental state (Ochsner et al., 2008; Oosterwijk et al., 2017; Steinbeis & Singer, 2014). Shared representations may be inherently egocentric because they ultimately rely on not only our idiosyncratic patterns of neural activity when representing a given mental state but also our personal interpretation of what mental state an individual is likely to be experiencing (Lamm, Bukowski, & Silani, 2016); as such, shared representations are thought to include activity in self-related core DMN regions, such as the mPFC, precuneus/PCC, and ACC (Lombardo et al., 2010; Northoff et al., 2006; van der Meer et al., 2010). Greater egocentricity when judging others’ emotions has also been linked with reduced recruitment of the rSMG and reduced coupling between the rSMG and dIPFC (Steinbeis et al., 2015).

The process of adjusting from egocentric inferences to adopt another person's perspective is linked to activity in the dmPFC, which shows a linear increase in activation with greater perceived discrepancy between the self and other (Tamir & Mitchell, 2010). While this may support the hypothesis that the dmPFC is specific to other-focused mentalizing, we believe it provides more compelling evidence for the role of the dmPFC in reflective, abstract thought more broadly, as attempting to understand someone—especially someone very different from oneself—likely involves high-level construal (Koster-Hale et al., 2017). More ventral regions of the mPFC also show increased activity in response to perceived discrepancies between self and other, but, unlike the dmPFC, this does not vary based on the extent of the discrepancy. Following an anchor-and-adjust model, activity in more ventral mPFC may represent initial anchoring in self-knowledge, whereas the dmPFC underlies the subsequent adjustment process (Tamir & Mitchell, 2010).

Relevance to social anxiety. Although the role of the self as a *target* of mentalizing in SAD is well established, little research has explicitly examined the role of the self as a *source* of mentalizing in SAD. However, cognitive models suggest that socially anxious people rely on egocentric inferences to understand others' mental states, particularly in relation to reflected self-appraisals (Clark & Wells, 1995; Heimberg et al., 2010). Individuals with SAD create mental images of themselves during social situations that are purported to model the perceptions of *others*; yet, these images appear to be composed predominately of negative internal self-perspectives, including distorted self-schemas, images of past distressing social situations, and current physiological manifestations of anxiety (Hope et al., 2010; Stopa & Clark, 1993). In other words, the experience of social anxiety may evoke egocentricity biases in which the socially anxious individual's negative self-appraisal is used as a template for others' perceptions of the self.

Although speculative, some evidence suggests that individuals with SAD also show egocentricity biases more generally, in the absence of self-referential stimuli. For example, individuals with SAD display over-mentalizing errors when making mental state inferences about characters acting in a film (Hezel & McNally, 2014; Washburn et al., 2016), indicating that over-mentalizing in SAD is not necessarily tied to self-focused fears, such as searching others for signs of negative evaluation. Rather, over-mentalizing may be evidence of a general egocentricity bias, such that those with SAD, who experience more negative emotions and beliefs than healthy individuals (Gros & Sarver, 2014), project these emotions and beliefs onto others. However, whether SAD corresponds with difficulty inhibiting one's self-perspective during mentalizing is largely untested.

Some evidence suggests that egocentricity bias in social anxiety offers some benefits. In general, people tend to underestimate others' pain, both physical and social (Kappesser, Williams, & Prkachin, 2006; Nordgren, Banas, & MacDonald, 2011). Interestingly, individuals higher in social anxiety showed less underestimation—indicating better accuracy—when mentalizing about others' negative social emotions, but only while they were under social-evaluative threat (Auyeung & Alden, 2016). It is possible that socially anxious participants experienced

heightened negative affect while being evaluated, which they projected onto others (Todd, Forstmann, Burgmer, Brooks, & Galinsky, 2015)—ultimately resulting in less underestimation of others’ negative affect. Although speculative, this could be further evidence that, under certain circumstances, egocentricity biases can be beneficial. It should be noted that in this study, the link between social anxiety and improved accuracy for negative emotions was identified in a *non-selected* sample—that is, participants were not recruited based on levels of social anxiety, and no diagnostic information was collected (Auyeung & Alden, 2016). Thus, it is unknown how clinical levels of social anxiety might interact with social-evaluative threat to impact mentalizing.

Self as Object: Visual Perspective During Mentalizing-Related Imagery

Through mental imagery, we are able to engage in “mental time travel” in which we construct internal representations of the past, present, or future that can be derived from actual events (e.g., autobiographical memory) or imagined ones (e.g., future episodic thinking, counterfactual thinking) (Moulton & Kosslyn, 2009; Schacter, Benoit, De Brigard, & Szpunar, 2015; Suddendorf, Addis, & Corballis, 2009). Simulating events via mental imagery is hypothesized to serve many social cognitive functions, allowing us to generate predictions to guide future social behavior, rehearse responses to upcoming interactions, review an interaction after it has taken place, and reflect on our own thoughts and feelings following an interaction (Bar, 2009; Honeycutt & Ford, 2006; Libby & Eibach, 2013; Moulton & Kosslyn, 2009). One important aspect of mental imagery likely to influence mentalizing is the *visual perspective* used to picture it. Individuals can perceive mental imagery as if through their own eyes, called the *field* or *first-person perspective*, or as if through the eyes of a spectator observing the scene, called the *observer* or *third-person perspective* (Libby & Eibach, 2011; Nigro & Neisser, 1983; Sutin & Robins, 2008).¹

The visual perspective adopted during mental imagery impacts several phenomenological features of the imagined event. When using a first-person perspective, our field of view more closely resembles how we visually perceive the world in “real life”—embodied within our imagined self, acting as the *subject* of the scene. Accordingly, compared to third-person imagery, first-person imagery tends to be more visually vivid (Butler, Rice, Wooldridge, & Rubin, 2016) and more physically and emotionally intense (Holmes, Coughtrey, & Connor, 2008; McIsaac & Eich, 2002; Pronin & Ross, 2006). In contrast, adopting a third-person perspective

¹We acknowledge that the term “perspective” has many meanings, particularly in mentalizing research. In this section, we will use the term “perspective” solely to indicate the *visual viewpoint* adopted during mental imagery and not to indicate the concept of adopting another person’s mental state in the here and now as it is used in psychological perspective-taking literature (e.g., Galinsky et al., 2005).

requires constructing a visual image of the self, such that the imagined self is perceived as an *object* of mental imagery, rather than the embodied, agentic *subject* (Libby & Eibach, 2011; Sutin & Robins, 2008). Memories recalled from a third-person perspective de-emphasize visual detail and affective salience, instead tending to focus on the “actors” in the scene and evaluating their traits, behaviors, and appearance (Libby, Valenti, Pfent, & Eibach, 2011; McIsaac & Eich, 2002). From this perspective, the imagined scene, including the image of the “self,” is often perceived as distant in time and/or relevance to the present self (Libby & Eibach, 2002; Nigro & Neisser, 1983; Valenti, Libby, & Eibach, 2011).

While visual perspective clearly influences qualities of our mental representations, there is debate about what determines the visual perspective adopted and, more importantly, what function it serves. A compelling theory proposed by Libby and Eibach (2011) suggests that visual perspective in mental imagery represents the level of construal of the imagined event. From a first-person perspective, significance is given to concrete, experiential aspects of the imagined scenario, whereas from a third-person perspective, significance is given to the overarching personal meaning of the event in relation to its broader context (Libby & Eibach, 2011). To this end, the perspective adopted during mental imagery may reflect the nature of mental state attributions—or whether mental state attributions are occurring at all—with first-person imagery corresponding with more defined, concrete interpretations of targets’ mental states (e.g., “He was smiling”), and third-person imagery corresponding with more abstract interpretations (e.g., “He was enjoying the moment”) that integrate the motivations, reasons, or context for a target’s mental state (Libby, Shaeffer, & Eibach, 2009).

Neural correlates. A large body of evidence finds that processes that engage mental imagery, such as autobiographical memory, prospection, and imagination, exhibit overlapping activity in regions across the DMN, including the dorsal and anterior/ventral mPFC, medial temporal lobe, precuneus, PCC, retrosplenial cortex, TPJ, and superior temporal sulcus (Addis, Wong, & Schacter, 2007; Beaty, Thakral, Madore, Benedek, & Schacter, 2018; Spreng, Mar, & Kim, 2009). However, only a handful of studies have characterized the neural correlates related to adopting different visual perspectives during mental imagery.

Adopting a first-person perspective, whether when recalling episodic memories (Eich, Handy, Holmes, Lerner, & McIsaac, 2012), imagining painful episodes (Christian, Parkinson, Macrae, Miles, & Wheatley, 2015; van der Heiden, Scherpiet, Konicar, Birbaumer, & Veit, 2013), or visualizing action (Ruby & Decety, 2001), shows common activation in the insula and regions of the somatosensory/somatomotor cortex (but see Grol, Vingerhoets, & De Raedt, 2017)—areas implicated in affective salience and interoception (Critchley, Wiens, Rotshtein, Öhman, & Dolan, 2004; Seeley et al., 2007). Across the same paradigms, adopting a third-person perspective is linked to greater activity predominately in the right inferior parietal lobule (IPL) and PCC/precuneus (Grol et al., 2017; Ruby & Decety, 2001; St. Jacques, Szpunar, & Schacter, 2017; van der Heiden et al., 2013; but see Christian et al., 2015; Eich, Nelson, Leghari, & Handy, 2009)—regions of the mentalizing network.

However, it has been suggested that the posterior parietal cortex, particularly the precuneus, may play a key role in *shifting* visual perspectives more generally, rather than adopting a third-person perspective specifically (Ciarumelli, Rosenbaum, Solcz, Levine, & Moscovitch, 2010; St. Jacques et al., 2017; St. Jacques, Carpenter, Szpunar, & Schacter, 2018). Of note, the majority of these studies use tasks in which participants are instructed to recall memories from a certain perspective, which may require more effortful retrieval and result in different neural correlates than observing naturally induced visual perspectives during imagery.

Additional relevant neural evidence comes from studies of emotion regulation that differentiate between “self-immersed” and “self-distanced” perspectives (Kross, Ayduk, & Mischel, 2005), which share similarities with first-person and third-person perspectives, respectively. These constructs have been used to contrast maladaptive versus adaptive methods of reflecting on negative emotions, with self-immersion increasing negative arousal and physiological reactivity and self-distancing reducing it (Kross & Ayduk, 2017; Wang, Yang, Yang, & Huang, 2019). Self-distancing has been found to engage neural regions that overlap with adopting a third-person perspective, including the IPL and PCC/precuneus (Dörfel et al., 2014; Koenigsberg et al., 2010; Ochsner et al., 2004). However, as noted by Libby and Eibach (2011), manipulations intended to promote self-distancing often include instructions to adopt a “detached,” “objective,” or “distant” view, terms which may influence the perceived discrepancy between one’s current and imagined self beyond what would result from spontaneously adopting a third-person perspective. Thus, it is unclear to what degree neural activity related to self-distancing can be generalized to indicate neural activity related to adopting a third-person perspective.

Relevance to social anxiety. Use of the third-person perspective has received particular attention in social anxiety research, given the significant role of negative and distorted self-imagery in the maintenance of SAD (Heimberg et al., 2010; Hirsch, Clark, Mathews, & Williams, 2003; Ng, Abbott, & Hunt, 2014). During social situations, socially anxious individuals form spontaneous images of themselves as a *social object*, imagining from a third-person perspective how others might be seeing them based on their own thoughts, feelings, and internal sensations (Clark & Wells, 1995; Heimberg et al., 2010). Socially anxious people report experiencing these self-focused images not only *during* social situations (Hackmann, Surawy, & Clark, 1998), but also in the period leading up to a social situation (Hinrichsen & Clark, 2003) and in the period after a social situation (D’Argembeau, Van der Linden, d’Acremont, & Mayers, 2006; Ng et al., 2014; Wells, Clark, & Ahmad, 1998). In individuals with SAD, use of the third-person perspective when recalling a social situation becomes even more pronounced over time, whereas non-socially anxious individuals recall social memories predominately from a first-person perspective both immediately after and in the weeks following the event (Coles, Turk, & Heimberg, 2002). Interestingly, when recollecting memories *without* social anxiety-provoking content, individuals with SAD, like their healthy counterparts, engage in mental imagery primarily from the first-person perspective (Heimberg et al., 2010).

The tendency for individuals with SAD to use the third-person perspective during social situations suggests that these situations elicit more abstract processing, including understanding the self in its broader context (Libby & Eibach, 2011). It is possible that individuals with SAD are engaging in more balanced self- and other-focused mentalizing during this mental imagery, such as attempting to understand how one's own behavior might be affecting a social partner. However, because individuals with SAD tend to have more negative self-concepts compared to healthy individuals (Moscovitch, Orr, Rowa, Reimer, & Antony, 2009), they may be more susceptible to detrimental effects from taking a third-person perspective (Libby & Eibach, 2011). Indeed, interview data suggest that social anxiety-related mental imagery in SAD is mainly focused on the self, consisting of negative images of how one might appear to others (e.g., blushing, shaking, looking nervous) (Hackmann et al., 1998; Wild, Hackmann, & Clark, 2008). Thus, it is more likely that excessive use of third-person perspective in SAD reflects abstract processing of negative self-images to support broad, distorted self-focused beliefs—for example, that one is unlikable, an outsider, or a failure.

Use of the third-person perspective may be maladaptive in SAD not only because of the abstract, negative content of this imagery but also because of its use across contexts where it is unhelpful. When healthy individuals, as well as socially anxious individuals, are instructed to adopt a third-person perspective during a speech performance, they report increased negative thoughts and poorer self-evaluations of their performance (Spurr & Stopa, 2003). This suggests that, for anyone, adopting a third-person perspective during an anxiety-provoking, performance-based situation—as individuals with SAD often do (Hackmann et al., 1998)—may be disruptive, as it indicates attempts to assess broader abstract meaning during a situation in which more concrete, experiential processing may be advantageous.

Integrating Constructs in the Real World

In this chapter, we have delineated three constructs to inform our understanding of the role of the self in mentalizing: the *target* of mentalizing, the *source* of mentalizing representations, and the *visual perspective* used in mental imagery (summarized in Table 1). These constructs share similarities in terms of their neural and psychological correlates—for example, processing aspects relevant to the self tends to be less cognitively demanding than processing aspects relevant to others, and a greater degree of self-processing in one construct likely correlates with a greater degree of self-processing in other constructs. Although similar, each construct describes a unique aspect of mentalizing, and it is likely that these constructs must flexibly work together to facilitate adaptive social cognition. We hypothesize that within each of these constructs, people shift between emphasizing the *self* or the *other* in a dynamic fashion that is influenced by external factors (e.g., the context, topic of conversation, and people involved), by internal factors (e.g., one's mood, physical state, and beliefs), and by these constructs' interactive effects on each

Table 1 Correlates of *self*-focus in constructs related to self-other processing in mentalizing

Construct	Definition	Similar terms	Key brain regions involved	Relevant clinical disorders
Self as target vs. other as target	Inferring one’s own mental states	Self-focus, self-reflection, self-referential thought, introspection	↑ amPFC/ vmPFC, dmPFC, ACC, PCC	SAD, MDD, GAD, PTSD
Self as source vs. other as source	Using one’s own mental state as basis for inference about another’s	Egocentricity bias, failure to inhibit self-perspective, low self-other distinction, low self-other control, high self-other overlap, self-projection	↓ IFG, dlPFC, rTPJ/ rSMG	SAD, MDD, GAD, ASD, SZ, PD
Self as object vs. self as subject	Viewing oneself in mental imagery, as if from an observer’s perspective	Third-person perspective, observer perspective, self-distanced perspective	↑ rIPL, PCC, precuneus	SAD, MDD, PTSD, BDD, SZ

Note. Due to space limitations, relevant citations can be found in the text
Abbreviations: *amPFC* anterior medial prefrontal cortex, *vmPFC* ventromedial prefrontal cortex, *dmPFC* dorsomedial prefrontal cortex, *ACC* anterior cingulate cortex, *PCC* posterior cingulate cortex, *IFG* inferior frontal gyrus, *dlPFC* dorsolateral prefrontal cortex, *rTPJ* right temporoparietal junction, *rSMG* right supramarginal gyrus, *rIPL* right inferior parietal lobule, *SAD* social anxiety disorder, *MDD* major depressive disorder, *GAD* generalized anxiety disorder, *PTSD* post-traumatic stress disorder, *ASD* autism spectrum disorder, *SZ* schizophrenia, *PD* personality disorders, *BDD* body dysmorphic disorder

other. Psychological disorders, like SAD, may be related to difficulty flexibly shifting between *self* and *other* within these constructs when it is contextually appropriate. To lend clarity to how these constructs might unfold and interact in a clinically healthy individual, consider the following scenario, also illustrated in Fig. 1a:

Helen is at the grocery store and runs into Steve, an old friend from college. Helen hasn’t seen Steve for several months and asks how he is doing. From his flat expression and vague reply, Helen can tell he is not doing well [other as target]. She reflects on her discomfort [self as target] about potentially probing into his personal life in the middle of the grocery store and chooses to stick with lighter content for now. The conversation turns to reminiscing about the last time they saw each other—at Helen’s former college roommate’s wedding last year—and Steve mentions the memorable toast Helen gave to the new bride and groom. Helen begins to recall her experience during this event [self as target], seeing, as if through her own eyes, the sea of guests as she clutches a glass of champagne and begins her toast [self as subject]. She relives the initial twinge of nervousness and subsequent delight as she visualizes the audience roaring with laughter at tales of her and her college roommate’s youthful shenanigans. While basking in the glow of this memory [self as target], Helen notices a sad smile on Steve’s face [other as target] and realizes he may have had a different experience that night [other as source]. Concerned, she asks if he is okay. His smile vanishes and his eyes well up as he reveals that at the



Fig. 1 Constructs related to self-other processing in mentalizing as they might unfold during a social interaction in (a) a clinically healthy individual and (b) a socially anxious individual. In (a), the healthy individual engages in a healthy balance of self- and other-related mentalizing processes while interacting with her friend, whereas in (b), the socially anxious individual overrelies on self-focused mentalizing processes to the ultimate detriment of her social interaction. See text for detailed vignettes

wedding, he discovered his now ex-partner in the coatroom with the caterer. Helen remembers her own pain following a recent messy breakup and imagines Steve must be feeling similarly [self as source]. Helen takes Steve's hand and leads him to the beer and wine aisle.

This relatively brief but complex scene exhibits the ongoing dynamics of adaptively shifting between self and other in relation to the target, source, and visual perspective adopted during mentalizing. In this scene, Helen flexibly switches between reflecting on her own mental states and the mental states of her friend Steve. She recalls the memory of her wedding toast from an embodied first-person perspective, allowing her to experientially relive the emotions of that night. Even during this memory, she notices Steve's sad expression and is able to inhibit her own perspective to infer his differing emotional state. Later, Helen draws from her own similar experience and makes an egocentric inference about his mental state following a breakup, allowing her to understand his experience with minimal effort.

Now, consider the scenario from the perspective of a socially anxious individual (Fig. 1b):

Helen is at the grocery store and runs into Steve, an old friend from college. Helen hasn't seen Steve for several months and starts to feel anxious, so she monitors how she feels [self as target] and conjures an image from an outsider's perspective of how she might look [self as object] to make sure she doesn't embarrass herself. Helen asks how Steve is doing, and drawing from her own feelings of discomfort, she can tell he is unhappy to see her [self as source]. The conversation turns to reminiscing about the last time they saw each other—at Helen's former college roommate's wedding last year—and Steve mentions the memorable toast Helen gave to the new bride and groom. Helen begins to recall this event as if a member of the audience, watching herself stand in front of a sea of guests with her hand trembling as she clutches her glass of champagne [self as object]. She

remembers people laughing during her toast but suspects it was either out of surprise at realizing she has a sense of humor, or—worse yet—pity [self as source]. Helen mutters, “Yeah, it was a pretty terrible toast.” Steve looks confused by this statement and replies, “Are you kidding? It was great!” He frowns and adds, “Definitely better than finding my partner in the coatroom with the caterer...” Helen interprets his response as a jab at her toast [self as source] and feels the heat in her face as she experiences intense embarrassment [self as target]. She quickly makes an excuse to leave the conversation and heads toward the checkout line. Steve looks on, bewildered by Helen’s abrupt exit following his attempt at disclosing his painful breakup.

In this scenario, Helen appears to over-rely on self-related mentalizing processes. She focuses primarily on examining her own mental states rather than inferring Steve’s; she projects her own thoughts and feelings onto Steve instead of working to understand his possibly differing view; she elicits images of herself as a social object when recalling past experiences. As a result, she misses important cues from Steve, egocentrically misinterprets his mental states, and relies on distorted, abstract mental images of herself to guide her behavior. Ultimately, this self-focus will likely prevent Helen from finding evidence to disconfirm her negative self-image, serving to perpetuate her social anxiety in future interactions.

Broader Clinical Implications

We have focused on the pathology of SAD due to its strong empirical evidence of dysfunctional self- and other-processing in mentalizing. However, each of the three self/other constructs described in this chapter has been linked to several other psychological disorders. Although a detailed discussion of the role of these constructs across psychological disorders is beyond the scope of this chapter, we will briefly touch on particularly relevant disorders here, which are also highlighted in Table 1. Heightened focus on the self as a *target* of mentalizing, as seen in ruminative self-focus (Moberly & Watkins, 2008; Treynor, Gonzalez, & Nolen-Hoeksema, 2003), is widely recognized as a transdiagnostic marker (Andrews-Hanna et al., 2020; Kaplan et al., 2018) and features prominently in disorders including depression (Watkins & Teasdale, 2004), anxiety symptoms (McLaughlin & Nolen-Hoeksema, 2011), and post-traumatic stress disorder (PTSD; Michael, Halligan, Clark, & Ehlers, 2007). Overreliance on the self as the *source* of mentalizing representations, resulting in egocentricity biases, is seen in depression (Erle, Barth, & Topolinski, 2018; Hoffmann, Banzhaf, et al., 2016), anxiety symptoms (Todd et al., 2015), autism spectrum disorders (ASD; Hoffmann, Koehne, et al., 2016), psychopathy (Bresin, Boyd, Ode, & Robinson, 2013), and schizophrenia (van der Weiden, Prikken, & van Haren, 2015). A greater tendency toward adopting a third-person, *other* perspective during mental imagery has been identified in depression (Lemogne et al., 2006), PTSD (Berntsen, Willert, & Rubin, 2003), body dysmorphic disorder (Osman, Cooper, Hackman, & Veale, 2004), schizophrenia (Potheegadoo, Berna,

Cuervo-Lombard, & Danion, 2013), and narcissistic personality disorder (Marchlewska & Cichocka, 2017). Thus, overreliance on the self as the target, source, or object of visual perspective may be shared features across many psychological disorders, warranting research on their utility as transdiagnostic markers.

Given their presence across multiple disorders, these constructs may provide useful targets for therapeutic intervention. Indeed, some empirically supported treatments have already been found to alter these constructs. For example, mindfulness-based therapies may reduce maladaptive self-focused mentalizing (Baer, 2009); mentalization-based therapy may reduce egocentricity biases resulting from poor self-other differentiation (Fonagy & Luyten, 2009); and imagery rescripting techniques may rely on adaptive use of visual perspectives to change the meaning of negative self-related imagery (Çili & Stopa, 2015; Lee & Kwon, 2013). In future work, it will be important to identify whether heightened self-focus in each construct serves as a cause or correlate of dysfunction in the psychological disorders in which they are seen.

Future Directions

We have attempted to integrate research on the many ways emphasis on the *self* can impact mental state inferences about *others*, with the goal of improving our awareness of what we know—and don't know—about functional and dysfunctional mentalizing. As is evident, many avenues remain to be explored. To date, most research on self- and other-focused mentalizing involves tightly controlled, laboratory-based studies, providing little real-world understanding of how mentalizing processes naturally occur across different social and non-social contexts, including whether and how different categories of “others”—such as strangers, acquaintances, friends, or partners—correspond with alterations in mentalizing. Additionally, little is known about how these processes and their neural underpinnings unfold *dynamically*, either in the short term or long term, or how they change developmentally within individuals.

Although dysfunctions in constructs related to self- and other-processing are linked to multiple psychological disorders, it is unclear whether they are causal factors in initiating and/or maintaining mental illness or simply correlates of mental illness, warranting careful research into the possible mechanistic role of mentalizing deficits in psychopathology. Relatedly, future work may want to examine what additional factors interact with dysfunctional self/other processing to yield divergent psychological disorders. For example, both social anxiety and depression are related to a greater tendency toward adopting a third-person perspective; however, individuals high in social anxiety may be more likely to adopt this perspective when imagining social situations (D'Argembeau et al., 2006), whereas those high in depression may be more likely to adopt the perspective when recalling positive autobiographical events (Lemogne et al., 2006; Nelis, Debeer, Holmes, & Raes, 2013). Finally, despite substantial research examining alterations in self- and

other-processing in psychopathology, a dearth of studies links this research to the brain. Broadening our understanding of the neural correlates of self-other processes in clinical populations would both aid in identifying targets for treatment across multiple disorders and contribute to our understanding of adaptive and maladaptive mentalizing.

In sum, the interplay between self and other processes and their impact on mentalizing can be illustrated through multiple constructs. While we have detailed three such constructs here—the *target* of mentalizing, the *source* of mentalizing, and the *visual perspective* adopted during mentalizing-related mental imagery—there are likely many other ways of conceptualizing self/other differences during mental state inference. These constructs share similarities in terms of neural and psychological correlates but also provide unique contributions to mental state attribution, working together dynamically to produce adaptive mentalizing. Dysfunctions in these constructs, such as overreliance on the self, may contribute to mentalizing deficits and other symptoms seen across psychological disorders, including SAD. Identifying and expanding on the precise ways that processes related to the self and other differ, overlap, and interact will likely be necessary to attain a complete understanding of mentalizing, including its basic mechanisms, the ways in which it can go awry, and how it can be treated effectively.

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