

Mental Imagery and Post-Event Processing in Anticipation of a Speech Performance Among Socially Anxious Individuals

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The present study investigated whether post-event processing (PEP) involving mental imagery about a past speech is particularly detrimental for socially anxious individuals who are currently anticipating giving a speech. One hundred fourteen high and low socially anxious participants were told they would give a 5 min impromptu speech at the end of the experimental session. They were randomly assigned to one of three manipulation conditions: post-event processing about a past speech incorporating imagery (PEP-Imagery), semantic post-event processing about a past speech (PEP-Semantic), or a control condition, ($n = 19$ per experimental group, per condition [high vs low socially anxious]). After the condition inductions, individuals' anxiety, their predictions of performance in the anticipated speech, and their interpretations of other ambiguous social events were measured. Consistent with predictions, high socially anxious individuals in the PEP-Imagery condition displayed greater anxiety than individuals in the other conditions immediately following the induction and before the anticipated speech task. They also interpreted ambiguous social scenarios in a more socially anxious manner than socially anxious individuals in the control condition. High socially anxious individuals made more negative predictions about their upcoming speech performance than low anxious participants in all conditions. The impact of imagery during post-event processing in social anxiety and its implications are discussed.

Keywords: social anxiety; social anxiety disorder; post-event processing; imagery; interpretation bias

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SOCIAL ANXIETY DISORDER (SAD) IS CHARACTERIZED by an intense fear of negative evaluation from others in social and/or performance situations (American Psychiatric Association [APA], 2000). Socially anxious individuals' heightened concerns about their performance in social situations and their beliefs that they are inept in these situations often lead them to brood about social events before they occur (anticipatory processing), as well as after social situations (post-event processing; Brozovich & Heimberg, 2008; Clark & Wells, 1995; Heimberg, Brozovich, & Rapee, 2010). Research has shown that the content of one's self-focused thoughts while engaging in anticipatory and post-event processing often includes negative images and perceptions of the self in the social situation as well as negative memories of the self in other social situations (Abbott & Rapee, 2004; Chiupka, Moscovitch, & Bielak, 2012; Hackmann, Clark, McManus, 2000; Hackmann, Surawy, & Clark, 1998; Mellings & Alden, 2000; Morgan, 2010; Morgan & Banerjee, 2008, Spurr & Stopa, 2002; Stopa & Jenkins, 2007). The most widely cited cognitive-behavioral models of SAD (Clark & Wells; Rapee & Heimberg, 1997) suggest that anticipatory and post-event processing lead individuals to perceive themselves in a more negative manner. Anticipatory and post-event processing have been conceptualized as intermediate processes between one's interpretation and memory, which may increase anxiety and negative interpretation biases for future social situations (Clark & Wells, 1995; Heimberg et al., 2010).

Social situations are often ambiguous and demand some sort of interpretation. Socially anxious individuals find social situations threatening and anxiously await the situation by engaging in anticipatory processing (Clark & Wells, 1995). The anticipatory processing literature has provided mixed findings about the impact this cognitive process has on individuals' anxiety, cognitions, and behaviors. Some research has shown that, when socially anxious individuals engage

in anticipatory processing, they experience increases in physiological symptoms, subjective report of anxiety, negative beliefs, and memories for past failures (Chiupka et al., 2012; Hinrichsen & Clark, 2003; Moscovitch, Suvak, & Hofmann, 2010; Vassilopoulos, 2005; Wong & Moulds, 2011). However, other studies have found neutral or beneficial outcomes of anticipatory processing. For example, Stevens et al. (2011) found that socially anxious individuals displayed greater accuracy in detecting their heartbeat when anticipating a speech than low anxious individuals. Vassilopoulos (2005) found that distraction produced greater negative memory bias than anticipatory processing. Brown and Stopa (2007) discussed both positive and negative effects of anticipatory processing on speech performance. Given the mixed findings, further research is needed to examine what aspects of anticipatory processing are most detrimental.

Several studies have examined post-event processing among socially anxious individuals using self-report questionnaires, diary data, and experimental manipulations (for a review, see Brozovich & Heimberg, 2008). These studies have demonstrated that socially anxious individuals' post-event processing often affects their levels of anxiety, other negative emotions, and interpretations of events (Abbott & Rapee, 2004; Brozovich & Heimberg, 2011; Edwards, Rapee, & Franklin, 2003; Kashdan & Roberts, 2007; Kocovski, MacKenzie, & Rector, 2011; McEvoy & Kingsep, 2006; Perini, Abbott, & Rapee, 2006; Rachman, Gruter-Andrew, Shafran, 2000). The process also appears to distort socially anxious individuals' memory for events over time so that these events are recalled in a more negative light (Abbott & Rapee, 2004; Mellings & Alden, 2000; Morgan, 2010; Morgan & Banerjee, 2008) and more from an observer perspective (Coles, Turk, & Heimberg, 2002). Socially anxious individuals are also more likely than low anxious individuals to recognize negatively biased feedback about their performance after post-event processing (Cody & Teachman, 2010). Cognitive-behavioral therapy appears to decrease levels of post-event processing; however, individuals with higher levels of post-event processing at baseline improve more slowly (Price & Anderson, 2011). Thus, throughout the literature, post-event processing appears to maintain individuals' distorted thinking and anxiety.

Anticipatory and post-event processing are both self-focused thought processes that occur at various times before and after social situations, and they are quite likely to be intertwined. Socially anxious individuals may engage in post-event processing when they anticipate an upcoming social event (i.e., they may analyze their past, presumably inadequate,

performances when anticipating their performance in an upcoming event, and they may worry that the upcoming event may represent a repetition of that previous perceived poor performance). In the present study, we were interested in examining the behavioral and cognitive effects when individuals engage in post-event processing about a past event while anticipating a similar upcoming event. Our study relates back to the writings of Ingvar (1985), who discussed how imagining future events necessitates retrieval of memories of past events. Several social anxiety researchers have also discussed how an upcoming situation activates post-event processing and the retrieval of memories for similar situations (Brozovich & Heimberg, 2008; Clark & Wells, 1995; Heimberg et al., 2010; Mellings & Alden, 2000; Rapee & Heimberg, 1997). These postulations have been supported by neuroscience research. Schacter, Addis, and Buckner (2007) reviewed several studies involving positron emission tomography and functional magnetic resonance imaging of brain regions involved when individuals retrieve specific memories or imagine future events. The same brain regions were involved in both activities: the prefrontal and medial temporal lobes and specific posterior regions (i.e., the precuneus and the retrosplenial cortex). Schacter et al. (2007) suggest that the emerging research on these brain regions supports their "constructive episodic simulation hypothesis," which emphasizes how imagining future situations requires reshuffling and putting together pieces of information from past memories (p. 659). They also note that memory is a constructive process by nature, and one of its main purposes is to provide information for future events. Thus, the literature on retrospective and prospective thoughts helped guide our current study examining how post-event processing is engaged during the anticipation of similar situations.

To better understand the detrimental elements of post-event processing, we investigated mental imagery, another important feature of socially anxious individuals' cognition. Several studies have shown that socially anxious individuals' concerns about being humiliated or embarrassed are often demonstrated in their mental images of themselves in social situations (Hackmann et al., 1998, 2000; Moscovitch, Gavric, Merrifield, Bielak, & Moscovitch, 2011). Socially anxious individuals report spontaneous images that are negative, recurrent, and involve multiple sensory modalities (Hackmann et al., 1998, 2000; Hackmann & Holmes, 2004). These images also tend to have origins in memories of events that occurred at the time the person first began having difficulty with social anxiety (Hackmann et al., 2000) and are often characterized as self-defining (Conway, Singer, & Tagini, 2004). Socially anxious individuals

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