



To think or not to think, that is the question: Individual differences in suppression and rebound effects in autobiographical memory



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ABSTRACT

Two studies explored the effects of forget instructions on autobiographical memory at immediate test and following delays of either 12–13 months, or 3–4 months. Using the Autobiographical Think/No-Think procedure (cf., Noreen & MacLeod, 2013), 24 never-depressed participants (Study 1) first generated 12 positive and 12 negative autobiographical memories and associated cues. Participants were then asked to recall the memory associated with some of the cues (i.e., ‘think’ condition), or to avoid saying or thinking about the memory associated with other cues (i.e., ‘no-think’ condition). Participants were then asked to recall the memories associated with all the cues at immediate test and following a delay of 12–13 months. Participants were found to be successful at forgetting both positive and negative autobiographical memories following ‘no-think’ instructions at immediate test but this forgetting effect did not persist following a 12–13 month delay. This pattern of remembering and forgetting was replicated in a second study (using 27 never-depressed participants) following a 3–4 month delay. Participants who had been less successful at forgetting ‘no-think’ memories at immediate test, were more likely to show rebound effects for those memories following a delay compared to memories which received neither ‘think’ nor ‘no-think’ instructions. Individual differences in inhibitory control and the efficacy of potential therapeutic interventions of ‘no-think’ instructions are considered.

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1. Introduction

Autobiographical memory is central to our conception of self, our understanding of who we are, and our ability to make sense of the past (James, 1890/1950). The availability of such memories about self also plays a critical role in maintaining a coherent notion of who we think we are (Bluck & Habermas, 2001; Conway, 2005; Conway, Meares, & Standart, 2004). When neurological structures underpinning memory encoding are damaged following illness or accident, marked discontinuities can emerge between our perceived self and actual self because of the unavailability of current information (Conway & Tacchi, 1996; Fotopoulou, Solms, & Turnbull, 2004). By the same token, debilitating effects can emerge as a function of the uncontrollable nature of autobiographical memory retrieval, as evidenced by cases of hyperthymia (e.g., Ally, Hussey, & Donahue, 2012; Parker, Cahill, & McGaugh, 2006), and other clinical conditions such as depression (Brewin, Reynolds, & Tata, 1999; Nandrino, Pezard, Poste, Reveillere & Beaune, 2002), phobia (Hackmann, Clark, & McManus, 2000), and post-traumatic stress disorder (Amir, Stafford, Freshman & Foa, 1998; Ehlers & Steil, 1995).

A reasonable deduction that can be drawn from such observations is that, under normal circumstances, we must possess some means of choosing—or, at least, preventing—which autobiographical memories enter conscious awareness. It would seem that, when we no longer possess this kind of control over memory, problems can ensue for our mental well-being and our notion of self. This assumption, however, may not be entirely warranted. What might seem as evidence of the operation of some executive mechanism may actually be a consequence of the social contexts in which we typically operate (e.g., Berntsen, 1996; Kuiper & Derry, 1981; Rogers, 1981; Waldfogel, 1948; Walker, Skowronski, & Thompson, 2003).

Recent innovative research in this field, however, has sparked renewed interest in the possibility that we might actually possess the ability to consciously prevent unwanted memories coming to mind. Using the ‘think/no-think’ (TNT) paradigm—a variant of the ‘go/no-go’ task (Donders, 1969)—Anderson and Green (2001) demonstrated that it is possible to train people systematically to forget previously learned material. In this paradigm, participants are typically required to learn a set of weakly related cue–target word pairs to criterion. Participants are then asked to recall the target words associated with some of those cues (i.e., ‘think’ condition) while, for others, they are asked to prevent the associated target words from coming to mind (i.e., ‘no-think’ condition). At final test, participants are asked to recall all the target words learned during the original study phase, irrespective of any subsequent instructions to think or not to think about them.

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Anderson and Green found that, while memory for items in the ‘think’ condition was facilitated, memory for items in the ‘no-think’ condition was significantly poorer in comparison to baseline items which received neither ‘think’ nor ‘no-think’ instructions (see also Anderson, 2003; Anderson & Levy, 2009; Anderson, Reinholz, Kuhl, & Mayr, 2011; Bergstrom, de Fockert, & Richardson-Klavehn, 2009; Hanslmayr, Leibold, & Bäuml, 2010). Anderson and colleagues have argued that their findings are consistent with an inhibitory control account in which active suppression causes a decrease in the availability of the representation itself, thereby rendering it inaccessible to subsequent retrieval (Anderson, 2003; Anderson & Green, 2001; Storm & Levy, 2012; although for alternative theoretical accounts see Bulevich, Roediger, Balota, & Butler, 2006; MacLeod, 2007; MacLeod, Dodd, Sheard, Wilson, & Bibi, 2003).

Irrespective of the nature of the mechanism underlying such systematic effects, the fact that people can be trained to forget particular items of information in memory has led some researchers to explore whether such forgetting effects might extend beyond the realm of relatively innocuous word pairs or pictures to highly complex and personally meaningful autobiographical memories. Using a variant of the TNT task—called the Autobiographical Think/No-Think task (ATNT)—Noreen and MacLeod (2013) asked participants to generate positive and negative autobiographical memories in response to a set of cues. Following TNT training, participants who had repeatedly been instructed to not think about particular autobiographical memories showed poorer recall for details associated with those memories than baseline memories which had received neither ‘think’ nor ‘no-think’ instructions.

Although Noreen and MacLeod found that participants had not actually forgotten that ‘no-think’ events had happened to them, systematic forgetting effects emerged for details concerning the consequences and personal meaning about those events. A similar reduction in retrieval specificity following ‘no-think’ instructions has also been reported in parallel work conducted by Stephens, Braid, and Hertel (2013) who found that both dysphoric (i.e., sub-clinically depressed) and non-dysphoric individuals demonstrated impaired recall for details of memories that had been subject to ‘no-think’ instructions when compared to baseline memories.

These results are of particular interest because they suggest we may be able to exercise some degree of control over autobiographical memory—or, at least, some aspects of these memories. If we accept the possibility that training people not to think about particular memories can alter the availability of particular details connected to such memories, one of the critical issues that needs to be addressed concerns the stability of such forgetting effects over time. Additionally, if we are to evaluate fully the possible therapeutic benefits of inhibitory control on psychological well-being, we need to determine what happens to those memories we have attempted to suppress but, for whatever reason were unable to prevent from entering conscious awareness. Given that there is good reason to believe that not everyone has the same ability to inhibit memories (Levy & Anderson, 2008), different patterns of forgetting and remembering may emerge over time for individuals who are successful or unsuccessful at suppression following ‘no-think’ instructions.

To date, a coherent picture has yet to emerge with regard to these various issues—perhaps because of the variability that exists in suppression ability (Anderson et al., 2011; Levy & Anderson, 2008). Hotta and Kawaguchi (2009), for instance, investigated whether forgetting effects for neutral words lasted up to 24 h. In their study participants underwent the TNT task and were then given a re-test for the target words 24 h later. Hotta and Kawaguchi (2009) found that TNT forgetting for neutral words was still evident following a 24-h delay. A more recent study by Nørby, Lange, and Larsen (2010), however, found that no such forgetting effects emerged for either neutral or emotional stimuli following a one week delay. Interestingly, they reported evidence of

a facilitation effect for emotional material following ‘no-think’ instructions when tested one week later (8% versus 2% facilitation for emotional and neutral material, respectively). An enhanced recall performance for ‘no-think’ items following a one week delay was also reported by Meier, König, Parak, and Henke (2011).

Taken as a whole, these studies might indicate that one’s failure to suppress a particular memory may lead to a level of cognitive preoccupation with the reasons as to why one was unable to suppress that particular memory effectively. This additional level of processing, in turn, may facilitate the subsequent retrieval of those memories one might prefer not to be reminded—presumably by strengthening the memory representation through repeated retrieval. The problem with such an interpretation in these TNT delay studies is that the efficacy of the ‘no-think’ instructions at immediate test is either weak or non-existent; that is, they failed to find a ‘no-think’ effect at immediate test. As a result, it becomes problematic to make the inference that the rebound effects observed at delay are a function of prior attempts to suppress memory.

Despite such complexities, the possibility that ‘no-think’ instructions may lead to rebound effects in the longer term is consistent with a parallel line of work on thought suppression (Wegner, 1989, 1994). Wegner, Schneider, Carter, and White (1987), for instance, demonstrated that, when instructed to avoid thinking about particular items (e.g., a ‘white bear’), thoughts of white bears came to mind more often than when participants were encouraged freely to express the same thoughts (see also Liberman & Forster, 2000; Wegner & Erber, 1992). Clearly, given the potential for suppression instructions to lead to increased rather than decreased accessibility, it would seem important to establish whether ‘no-think’ instructions in the TNT paradigm result in the effective suppression or facilitation of autobiographical memory.

The present article reports our attempts to address this important issue by detailing the findings of two follow-up studies based on the cohort of participants originally reported by Noreen and MacLeod (2013). Importantly, Noreen and MacLeod’s studies established the efficacy of the ‘no-think’ instructions employed at immediate test on the availability of particular autobiographical memories. By employing the same participants in which ‘no-think’ forgetting effects have already been established at immediate test, we could be more confident that any differences in memory performance that might emerge following a delay are likely to be a function of the ‘no-think’ instructions. Given that all of the studies investigating the long-term outcome of suppression have focused primarily on one day or one week intervals, we also wished to explore the efficacy of volitional forgetting over longer periods of duration.

In the current article, we report the effects of TNT instructions on autobiographical memory observed in two separate studies. Our first study considers the effects of TNT training following a delay of 12–13 months, while our second study explores the effects of TNT training following a delay of 3–4 months. In each case, we compare recall performance for ‘think’ and ‘no-think’ memories with baseline memories which received neither set of instructions, and also compare recall performance at delay with recall performance at immediate test. Finally, we consider the issue of individual differences in suppression ability and what this may mean for ‘no-think’ instructions as a therapeutic intervention.

2. Study 1

2.1. Method

2.1.1. Participants

Twenty-four never-depressed students (23 females and 1 male) attending the University of St. Andrews, Scotland (aged 18–29 years) volunteered to take part in *both* the initial study and the follow-up session 12–13 months later (median number of days between initial test

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