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Memory on the beach: an Australian memory (and hypnosis) laboratory

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Abstract The memory (and hypnosis) lab at the University of New South Wales investigates a broad range of memory topics. We try to find innovative methods from cognitive and clinical psychology to address theoretical and empirical questions about memory. We also use hypnosis as one major methodological tool in our investigations of memory (as well as other cognitive processes). In this paper, we review the projects currently underway in our memory (and hypnosis) lab.

Introduction

The University of New South Wales (UNSW) is located in Australia's largest city, Sydney, only minutes away from the city's famous beaches. As one of our country's leading teaching and research universities, UNSW is home to over 40,000 students (including over 8,000 international students) and over 5,000 academic and general staff. The School of Psychology, part of the Faculty of Science, has 30 academic staff, 45 research and support staff, and 60 PhD students. Researchers in the School are well known for their work in the areas of behavioural neuroscience, cognitive psychology, perception, social psychology, individual differences, developmental psychology, research methods, clinical psychology, organisational psychology, and forensic psychology. The members of our group have interests across many of these fields, but all with a focus on memory.

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Our research group, which consists of nine full time academic staff, research staff, and PhD students, as well as up to ten Honours and Masters students each year, is one of a number of Australian and New Zealand teams who are tackling a broad range of topics in memory. In our own department, for instance, Richard Kemp examines eyewitness evidence, especially identification evidence; Skye McDonald measures the impact of brain injury on memory and other cognitive processes; Michelle Moulds investigates the impact of rumination on memory functioning and intrusive memories in depression, Rick Richardson uses animal models to provide behavioural and neural analyses of memory; and Karen Salmon maps the development of memory in children and considers implications for clinical and forensic interviewing of children. Elsewhere in Australia and in New Zealand, memory research covers the spectrum of inquiry from brain to behaviour, clinic to culture and beyond. The Victoria University of Wellington in New Zealand recently hosted the Sixth Biennial Meeting of the Society for Applied Research in Memory and Cognition (SARMAC), and in 2006 UNSW will host the fourth International Conference on Memory (<http://www.psy.unsw.edu.au/Groups/ICOM4/>).

The work of our research group is distinguished by two main qualities. First, we try to find innovative methods from cognitive and clinical psychology to address theoretical and empirical questions about memory. Second, and relatedly, we use hypnosis as one major methodological tool in our investigations of memory (as well as other cognitive processes). Hypnosis is somewhat unique in psychology as a controllable manipulation of behaviour and awareness. Evidence indicates that following specific suggestions hypnosis influences the experience or evaluation, but not the construction, of particular cognitive events (Barnier and Lack 2001; Barnier and McConkey 2004; McConkey and Barnier 2004). This dissociation between cognitive and behavioural “doings” and experiential “happenings” (Bowers 1981) in hypnosis allows us to ask and answer questions in novel ways (Barnier 1999; Barnier and

McConkey 1999, 2003). The Hypnosis Research Laboratory, which overlaps some members and projects with our memory group, was established at UNSW in 1992 under the leadership of Kevin McConkey (following a long tenure at Macquarie University). It follows a long tradition of Australian contributions to the field of hypnosis dating back at least to the 1950s and 1960s at the University of Sydney.

The projects currently underway in our memory laboratory reflect broad interests in cognitive, clinical, and forensic psychology. Our work focuses especially on issues of amnesia, awareness, automaticity, and autobiographical memory. For instance, in our research we have compared hypnotic and nonhypnotic remembering and forgetting, explored the relationship between self and memory in hypnotically induced delusions and hypnotically regressed goal states, extended laboratory paradigms of forgetting to autobiographical memories, mapped personality styles in recall, examined the impact of cognitive and motivational factors on autobiographical memory errors, and measured interpersonal source monitoring of autobiographical memories. A summary of this research follows.

Hypnotically influenced memory

There is substantial research on the ability of hypnotic suggestions to improve memory, which shows that although hypnosis increases both recall productivity and individuals' confidence, hypnotically "recovered" memories may be accurate, inaccurate, or a combination of these (Barnier and McConkey 1992; Bryant and Barnier 1999; McConkey et al. 1998, 2003). One large ongoing project in our laboratory focuses not on the ability of hypnotic suggestions to improve memory, but instead on its ability to impair memory. We use the classic hypnotic phenomenon of posthypnotic amnesia (PHA) to investigate clinical amnesias (e.g. functional amnesia, dissociative identity disorder, and repressed memory). Such extreme forgetting is characterised by a subjectively compelling failure to recall autobiographical events appears and is experienced as outside the individual's control, is often resistant to challenge, and can be unexpectedly reversed. In addition, since evidence of the forgotten events is seen in emotion, thought, and action, forgetting involves a failure of retrieval rather than of encoding or storage (Bryant 1995; Kihlstrom and Schacter 1995).

PHA has long been considered a nonpathological laboratory parallel to clinical amnesias (Kihlstrom and Schacter 1995), and a perfect way to investigate memory disruptions (Barnier 2002a; Barnier and McConkey, 1999; Kihlstrom and Schacter 1995). PHA involves suggesting to a hypnotised person that after hypnosis they will be unable to recall targeted information or events. In response, high-hypnotisable, but not low-hypnotisable people show robust and dramatic memory impairments that almost perfectly mirror clinical for-

getting: disrupted retrieval, discrepancies between explicit and implicit memory, and reversibility of the effect following a prearranged cancellation cue (e.g. Barnier et al. 2001; Bryant et al. 1999; Kihlstrom 1980). The ability to experience PHA is correlated with hypnotisability; high-hypnotisable people (hereafter "highs") are more likely to experience amnesia, and more completely, than medium hypnotisable people (hereafter "mediums") or low-hypnotisable people (hereafter "lows") (Barnier et al. 2004b). This project tests the value of PHA as a model of clinical amnesias.

The first goal of this project is to extend PHA to autobiographical memories (Barnier 1999, 2002a; Barnier and McConkey 1999). This is important since the majority of PHA research has focused on simple, non-personal material learned or experienced during hypnosis (e.g. lists of words, events of hypnosis). Until recently, there was little evidence that PHA influences the kind of material that individuals forget in everyday life and clinical disorders. Accordingly, in one experiment we asked highs and lows to recall the most memorable episode from their first day of high school or their first day of university. We then administered a hypnotic induction and a PHA suggestion to forget one of the episodes. After hypnosis, the majority of highs (but not lows) failed to recall their memorable events until the prearranged cancellation cue, when their memories "came flooding back" (Barnier 2002b). These findings suggest that PHA can temporarily impair recall of complex, personal memories. In other experiments, we administered PHA for first romantic relationships and for recent family celebrations, such as birthdays and Christmas (Barnier et al. 2004a-c; Cox and Barnier 2003). Again, highs showed significant forgetting of these recently recalled experiences. In another experiment, Barnier et al. (2004a-c) found that PHA influenced not just the accessibility of targeted memories (for highs), but their phenomenal qualities (for highs and mediums; e.g. specificity, narrative thread, overall clarity, sensory and emotional details).

One important aspect of both clinical amnesias and PHA is that although information and memories are temporarily inaccessible to consciousness, they still influence cognitive processing (Kihlstrom and Schacter 1995). In traditional PHA research, this continuing influence of forgotten material has been indexed by standard implicit measures such as word stem completion or word fragment completion, which tap perceptual/repletion priming rather than the more conceptual processes involved in autobiographical memory. Similarly, measures such as word association or category generation, which target single words rather than complex representations, cannot really capture multi-faceted autobiographical episodes. Thus, the second goal of this project is to develop and use implicit measures appropriate for autobiographical memories. In our "first day" experiment, for instance, we created a social judgement task that drew on conceptually similar tasks in implicit social cognition (e.g. the false fame effect; Jacoby et al.

1989). We asked the participants to rate the likelihood of a large set of possible life events (from the “Life Events Inventory”; Garry et al. 1996); we inserted into the set participants’ own high school and university events, which were targeted by PHA earlier in the experiment. We considered this task implicit because participants did not need to, and were not instructed to, reflect back on their own events when making likelihood ratings. However, ratings should be influenced by participants’ earlier descriptions of the memories targeted by PHA. This is exactly what happened. Although the majority of highs were unable to recall the memorable episode targeted by PHA, they rated these events as highly likely (and gave the same ratings as low, nonamnesic, participants). In other words, as in clinical amnesias, our participants showed a single dissociation between explicit and implicit memory (Barnier 2002b; see also Cox and Barnier 2003).

The third goal of this project is to investigate the mechanism of forgetting in PHA, and by extension other forms of forgetting. PHA has been described as a temporary, retrieval-based dissociation between explicit and implicit memory (Hilgard 1991; Kihlstrom 1985), and PHA and parallel clinical amnesias are classed by some with “dissociative” or “repressive” phenomena. Our view is that PHA involves a nonhypnotic mechanism or mechanisms shared with less dramatic and everyday forgetting, even if it is experienced differently. To test this notion, we are considering a range of nonhypnotic explanations, including strategic response withholding, retrieval inhibition, output inhibition via selective tagging, and premature termination of the retrieval cycle. To focus on just two, response withholding views forgetting as due to the individual’s conscious strategy or motivation to not report memories, and retrieval inhibition views forgetting as due to goal-directed processes that temporarily impair the accessibility, but not availability of the targeted material.

We tested the first interpretation by comparing PHA with Daniel Wegner’s (1994) nonhypnotic paradigm of thought suppression (TS). TS measures individuals’ ability to strategically avoid or suppress images, memories or feelings about a topic or event. A comparison of memory patterns across an experiment involving PHA of positive and negative autobiographical episodes and another involving TS of similar episodes revealed that whereas PHA disrupted highs’ memory of both positive and negative events (although the effect was stronger for the positive event), TS had a relatively modest, asymmetrical effect on the emotional events (fewer thoughts of the positive event). Also, whereas PHA was experienced as effortless and its recovery was immediate following the cancellation, TS was experienced as effortful and its rebound was uncontrollable (Barnier et al. 2004a). These differences suggest that PHA is not adequately explained by strategic response withholding, which is consistent with a large body of other data on the relative difficulty of breaching PHA simply by motivating the individual to report more (for review, see Coe 1996).

We tested the second interpretation by comparing PHA with Robert Bjork’s (Bjork et al. 1998) nonhypnotic paradigm of directed forgetting (DF). DF measures recall of material learned first and intentionally forgotten relative to material learned second and intentionally remembered. This comparison has been made before, but only for lists of words (Basden et al. 1994). In one experiment, we asked highs and lows to generate specific autobiographical episodes in response to cue words. After generating the first set of memories to list 1 cues, we gave half the participants a PHA suggestion and half a DF instruction (the PHA group were tested during hypnosis; the DF group were tested in a waking control condition). We then asked them to generate a second set of memories to list 2 cues. On the final recall test, both groups recalled fewer list 1 than list 2 memories. However, PHA created more forgetting of list 1 and list 2 memories than DF. Both the PHA and DF groups recalled additional list 1 memories after the cancellation cue. However, PHA was associated with a more dramatic recovery than DF. These findings suggest that PHA and DF have somewhat similar effects on autobiographical episodes, although the degree of forgetting and recovery may be greater for PHA (for more on DF of autobiographical memory, see “Experimentally created autobiographical forgetting”). This is consistent with previous comparisons, and implies that PHA may be explained, at least in part, by retrieval inhibition. Indeed, PHA and DF share other features, including disruptions of recall (not recognition), a dissociation between explicit and implicit memory, and relatedness as a boundary condition. In DF, for instance, retrieval inhibition is initiated by competition between list 1 and list 2, and abolished by relatedness across the lists (Conway et al. 2000). Similarly, in our most recent experiments, PHA is substantially reduced when material targeted by the suggestion, whether word lists or autobiographical memories, is semantically or thematically related to material not targeted by the suggestion.

If PHA shares its mechanism with some forms of nonhypnotic, everyday forgetting, why does it feel so different, so unusual? As highlighted above, PHA and clinical amnesias share a compelling phenomenology; forgetting is experienced as dramatic, outside of the individual’s control, and is often maintained in the face of strong challenge. The discrepancy between an everyday mechanism and resulting experience raises the possibility that some circumstances alter the subjective quality of remembering and forgetting—effectively transforming intentional, motivated forgetting into something experienced as uncontrollable and unintentional. Hypnosis may be one such circumstance and the context of certain clinical disorders may be another. Here it helps to differentiate between the “construction” of any behaviour or response and its “evaluation”. This means that there may be nothing particularly “hypnotic” in the construction of forgetting in PHA, but something uniquely hypnotic in its evaluation or expe-

riencing. Equally, there may be nothing particularly “disordered” in the construction of clinical forgetting, but something uniquely disordered in its evaluation or experiencing. The final goal of this project is to explore the experience of forgetting guided by a cognitive-discrepancy model of hypnosis we are developing. This model builds on Hilgard’s (1991) insight that hypnosis alters the experience of hypnotic responding, but not its actual control, since hypnotic responding is in every sense goal-directed and intentional. This work builds also on the view that hypnosis shares features with many pathological conditions and thus is a powerful and valuable analogue.

Autobiographical memory and self

Other projects in our laboratory also use hypnosis as an analogue of clinical conditions. Two projects incorporate hypnotic methods to test elements of Conway and Pleydell-Pearce’s (2000) influential model of autobiographical memory. In their account, autobiographical memories are the product of a self memory system (SMS), which consists of the “working self” and an “autobiographical knowledge base”. Control processes operate within the SMS to facilitate or inhibit the retrieval of autobiographical memories from the knowledge base depending on current conceptions and goals represented in the working self. Conway and Pleydell-Pearce (2000) argued that self and memory exist in a reciprocal relationship such that goals of the self influence and constrain autobiographical memories that are retrieved, and in turn, autobiographical memories that are retrieved influence and constrain current conceptions and goals of the self. In one project, we extend this model to autobiographical remembering in identity delusions using hypnosis to create temporary states that share many of the features of clinical delusions (e.g. both clinical and hypnotic delusions are pre-occupying, held with absolute certainty, resistant to rational counter arguments, and involve beliefs not shared by others). In one experiment, we gave highs and lows a hypnotic suggestion to become a same sex friend or relative. To test the strength of the suggested delusion and its impact on autobiographical memory, we asked participants to provide personal semantic information (e.g. name, age, self description and personal likes and dislikes), and to recall autobiographical memories illustrating these preferences. Consistent with the previous research on hypnotic delusions (e.g. Burn et al. 2001), we found that highs in particular experienced a temporary, but compelling, shift to the suggested identity. More importantly, the delusion influenced autobiographical recall such that highs recalled specific memories consistent with the new identity; in contrast, lows recalled only general memories. The specific memories provided by highs during the delusion tended to be of previously experienced events, rather than confabulations, but were viewed from the perspective of the suggested identity.

This work highlights again the value of using hypnosis as a research method. It also shows that current self, in this case a temporary suggested identity, drives the recall of specific autobiographical memories from the knowledge base. Given the reciprocal relationship between self and memory (Conway and Pleydell-Pearce 2000), this suggests that in clinical delusions, as in hypnotic delusions, autobiographical recall consistent with the delusional self in turn may maintain and reinforce the delusional self.

We also use hypnosis to examine Conway and Pleydell-Pearce’s (2000) claim that goals of the self constrain and direct autobiographical memory. In a project just underway, these experiments use hypnotic suggestions for age regression to create a compelling change in goal state. We then examine the relationship between current goals and autobiographical recall. During hypnosis we suggest to hypnotised people that they are returning to a time when they were 12 years old. Highs strongly experience such suggestions. Following tests of the success of age regression, which should be influenced by the experience of being “age 12” (e.g. asking participants to describe themselves, solving a simple and difficult maths problem), we elicit a range of autobiographical memories. If goals and memories are inextricably linked, we predict that participants will recall memories consistent with their goals at regressed age 12, which should be different from memories recalled when not in this state. Although we are conducting this research in parallel with investigations of clinical populations, hypnosis is particularly valuable when it is not possible to manipulate goals in the clinical setting (for a similar analysis of hypnotically altered mood states and memory, see Maccallum et al. 2000).

Overall, these projects on memory take advantage of the unique methodological properties of hypnosis; in particular, its ability to shift behaviour and experience temporarily in ways that we believe shed light on the processes underlying both ordered and disordered cognitive and emotional processing. Other non-memory projects underway in the Hypnosis Research Laboratory provide further evidence of the value of hypnosis. For instance, we are investigating processes mediating traumatic time distortions. Given the practical and ethical constraints involved in conducting research on people as they are experiencing trauma, we use hypnosis to simulate responses implicated in traumatic time distortions, namely changes in body temperature. These experiments use hypnotic suggestions to increase and decrease subjective body temperature in participants before they undertake various time-related tasks, such as estimating the length of short tones (< 10 s). Based on the chemical clock model (Hoagland 1933), mild elevations in body temperature lead the clock to “tick” at a faster rate, resulting in overestimations of time. We predict that participants given warming suggestions will overestimate time compared to those given cooling suggestions. The outcomes of this research will offer insight into the role of body temperature and overestimations of sub-

jective time commonly reported by trauma-exposed people.

As another example, we are investigating the automaticity of word reading. Given the strong view that literate adults cannot help but read printed stimuli, as well as recent findings that hypnosis may “turn off” word reading (Raz et al. 2002), we examine the ability of hypnotic suggestions to eliminate or modulate the Stroop effect. These experiments involve a combined colour hallucination and word agnosia suggestion to alter participants’ ability to read words and their performance on the Stroop task. In some experiments we compare this suggestion with an attentional instruction to focus on just part of the presented word (e.g. the bottom of the last letter). Contrary to recent reports, we found that hypnosis alters the experience of word reading, but not fundamental cognitive processing; in other words, participants believe and claim that they cannot read, but their Stroop performance indicates that they can read. These findings are consistent with previous work on hypnotic alterations of perceptual processes, as well as clinical interpretations of functional blindness (Bryant and McConkey 1989, 1999).

Experimentally created autobiographical forgetting

In a major ongoing project that also draws on Conway and Pleydell-Pearce’s (2000) model of autobiographical memory, and in collaboration with Martin Conway, we examine how people forget some, but not other, personal memories. Conway and Pleydell-Pearce (2000) noted that memory is selective; we tend to remember events that place us in a good light, support our current self-image, or promote ongoing activities, whereas we try to forget with varying success memories of experiences that undermine the current self, contradict our beliefs, plans, and goals, and increase anxiety or other negative emotions. However, the exact way in which memories are kept out of (or in) awareness is unknown. Conway and Pleydell-Pearce (2000) proposed that access to some memories is reduced or lowered via inhibition imposed by central control processes (whereas access to others is facilitated or raised). But their model does not specify how inhibition operates. In a series of experiments, we consider the form(s) of inhibition that operate in autobiographical memory, its boundary conditions, and how and why some memories are inhibited. To do this, the project draws on three major experimental paradigms of forgetting—directed forgetting (DF), retrieval-induced forgetting (RIF), and think/no-think (TNT)—and extends them for the first time to autobiographical memory. These paradigms use different procedures to create inhibition, generate different patterns of memory, and involve different forms of inhibition (Anderson and Green 2001; Anderson and Spellman 1995; Bjork et al. 1998). They offer a powerful means to test candidate explanations of inhibition in autobiographical memory. A short summary of experi-

ments completed and underway within these three paradigms follows.

As noted above, DF models forgetting involved in updating old information with new. In the standard procedure, participants study two lists of items (lists 1 and 2). After list 1, but before list 2, half the participants are told to forget list 1 items (forget group) and half are told to remember list 1 items (remember group). Both groups are told to remember list 2 items. Later, they try to recall all items from both lists. Typically, “forget” participants’ recall of (to-be-forgotten) list 1 items is *lower* than “remember” participants’ recall of these items (and *lower* than their recall of to-be-remembered list 2 items; Conway et al. 2000). Inhibition is initiated by an intention to forget and the presentation of competing sets of information, and operates at the level of accessibility, not availability (Bjork et al. 1998). In a series of studies we examined DF of autobiographical memories (see Barnier et al. 2005). Adapting the standard paradigm, we asked participants to generate specific memories to a set of cue words (list 1). We then administered an instruction to either forget list 1 memories or to remember list 1 memories (but to remember list 2 memories to follow), and asked them to generate specific memories in response to a second set of cue words (list 2). Following two filler tasks, we asked participants to recall both list 1 and list 2 memories. Across six experiments we found a robust DF effect for autobiographical memories; people in the forget group recalled fewer list 1 memories than people in the remember group. Notably, this effect depended on the emotional valence of the targeted memories; whereas positive memories appeared more susceptible to DF, negative memories appeared less susceptible. Also, we mapped boundary conditions for DF of autobiographical memories similar to DF of simple material. For instance, in one experiment we found that when list 1 and list 2 memories were thematically related (via reference to the same lifetime period), DF was abolished. Conway et al. (2000) reported an identical result for word lists.

RIF models forgetting that is the unintentional, almost inevitable consequence of practising some memories at the expense of others. In the standard procedure, participants study a series of category cue-exemplar pairs (e.g. fruit-banana, fruit-apple, colour-blue, colour-yellow), and during the critical phase, repeatedly retrieve half of the exemplars from half of the categories (e.g. fruit-banana). Later, they try to recall all exemplars for each category cue. The impact of practising some words is measured against a baseline of words that are unpractised but related to practised words (via a shared category cue), as well as words that are unpractised and unrelated to practised words (related to a different category cue). Typically, participants’ recall of practised words from practised categories (R_{p+}) is *higher* than their recall of unpractised words from unpractised categories (N_{rp}), but their recall of unpractised words from practised categories (R_{p-}) is *lower* than their recall of unpractised words from unpractised categories (N_{rp}).

Inhibition is initiated by competition between practised and unpractised words within the same category, and operates at the level of availability (Anderson and Spellman 1995). In a series of studies we are examining the RIF of autobiographical memories (Barnier et al. 2004c). Adapting the standard paradigm, in the first experiment, we asked participants to generate 2–4 specific memories to nine category cue word. In the retrieval practice phase, we required participants to repeatedly retrieve half of their associated memories for half of the categories. Following two filler tasks, we asked participants to recall all memories. Much like our DF studies, we found a robust RIF effect for autobiographical memories; people recalled more $Rp+$ than Nrp memories, but fewer $Rp-$ than Nrp memories. Unlike DF, however, the emotional valence of the targeted memories had no impact on the magnitude or direction of the RIF effect.

In an experiment currently underway, we are testing whether motivation can overcome this RIF effect. It seems dysfunctional to indiscriminately forget memories that happen to be related to other memories that are rehearsed; surely some memories, particularly those that serve current goals, are protected from the sort of forgetting modelled by RIF. In our experiment, we are asking participants to imagine that they are on a first date and to recall positive memories they would tell their date to make a good impression and negative memories they definitely would not tell, to avoid making a bad impression. Later, we require participants to repeatedly retrieve either half of the positive memories (which according to the logic of RIF should lead to forgetting of related positive memories), or half of the negative memories (which should lead to forgetting of related negative memories). Finally, we ask participants to recall all the memories they would tell on their first date. Will RIF overcome motivation and create forgetting of positive memories that participants need to remember to impress their first date, or will the motivation to be an attractive first date overcome the inhibitory effects of RIF?

Our final paradigm, TNT, models forgetting involved in trying to keep an unwanted memory from mind when presented with strong reminders. In the standard procedure, participants study word pairs and learn to recall the second (target) word when presented with the first (cue) word. During the critical phase, participants repeatedly attempt to avoid thinking about and verbalising target words for some cue words, and repeatedly attempt to respond with target words for other cue words. Later they try to recall all target words. The impact of avoiding versus responding is measured against a baseline of words that are neither avoided nor responded to. Typically, participants' recall of words responded to is *higher* than their recall of baseline words, but their recall of avoided words is *lower* than their recall of baseline words. Inhibition is intentionally and effortfully initiated, and operates at the level of availability (Anderson and Green 2001). In a series of studies

we are examining TNT of autobiographical memories. Adapting the standard paradigm, we asked participants to generate specific autobiographical memories in response to cue words and then trained them to provide the target memory when presented with the cue word alone. In the TNT phase, we instructed participants that, whereas some cue words signal avoidance and to avoid thinking about and verbalising the associated target memories, other cue words signal response and to think about and verbalise the associated target memories. Following the two filler tasks, we asked participants to recall all target memories in response to the cues. In two experiments so far, we have failed to obtain a TNT effect for autobiographical memories (but see Barnier and Bergman 2005), which contrasts with our DF and RIF findings. Our first failure may have been due to too few avoidance trials (only three, which although sufficient for autobiographical RIF, were insufficient for TNT). Our second failure was despite increasing the trials from 3 to 12 and providing an alternate memory for participants to focus on during avoidance trials (much like thought suppression studies; Wegner 1994). Our next attempt, currently underway, grafts the category cue structure from RIF into the TNT procedure. It may be that competition between avoided and responded items is a necessary prerequisite for inhibition in TNT, at least of highly organised, personally relevant autobiographical memories.

Personality styles in recall

If research with hypnotic and nonhypnotic paradigms of forgetting offers insight into everyday and pathological states of inhibitory processing, then research with “repressors” offers insight into trait differences in such processing. The notion that individuals protect themselves by avoiding or inhibiting emotionally negative material is consistent with Conway and Pleydell-Pearce's (2000) predictions for autobiographical memory, and there is evidence that certain individuals are particularly adept at using these protective processing strategies. Weinberger (1990) identified individuals with a “repressive coping style”, who score low on self-report measures of trait anxiety but high on self-report measures of defensiveness; he contrasted “repressive copers” (or “repressors”) with low anxious (low anxiety, low defensiveness), high anxious (high anxiety, low defensiveness), and defensive high anxious (high anxiety, high defensiveness) individuals (collectively “nonrepressors”). Weinberger (1990) argued that “repressors fail to recognize their own affective responses ... [and] are likely to employ a variety of strategies to avoid conscious knowledge of their ‘genuine reactions’” (p. 338). One consistent finding is that repressors' defensive style leads to characteristic memory deficits for both personally generated (e.g. autobiographical memories in a cued recall task; Davis 1987) and experimentally generated (e.g. lists of words in a directed forgetting task; Myers

et al. 1998; Myers and Derakshan 2004) negative, self-relevant material.

Such findings tell us what repressors avoid or inhibit and perhaps why, but they do not really tell us how. In a project that uses Wegner's thought suppression paradigm (TS), we wanted to know whether repressors' management of negative self-referent memories represents an automatic response to memories; strategic, motivated attempts to control awareness of memories; or a combination of these (Dalgleish et al. 1999). In two experiments (Barnier et al. 2004a–c), we asked repressors and nonrepressors to recall an episode from their past that made them feel very proud and then an episode that made them feel very embarrassed (or vice versa). After recalling each episode we administered TS instructions—we instructed half the participants that for the next 2 min they should suppress all thoughts of the recalled episode and instructed the other half that for the next 2 min they could think of anything including the recalled episode. After monitoring and reporting thought intrusions, we gave all participants instructions that for the next 2 min they could think of anything including the recalled episode. During the suppression period, both repressors and nonrepressors reported few thoughts of the positive (proud) event when instructed to suppress. However, repressors reported few thoughts of the negative (embarrassed) event, *even when not instructed to suppress*. In contrast, nonrepressors reported many intrusive thoughts of this event when not instructed to suppress. Notably, repressors gave lower ratings of suppression effort than nonrepressors, but similar ratings of suppression success. Taken together, these findings indicate that repressors are highly effective, natural suppressors, who experience their avoidance as relatively effortless yet lack insight into its onset and outcomes. This suggests that over time and with repeated practice, effortful suppression may take the form of a habitual, automatic repressive style.

Autobiographical memory errors

Turning from autobiographical forgetting to autobiographical remembering, two projects focus on autobiographical memory errors. The first considers the factors that influence “imagination inflation” for autobiographical events, and the second considers the likelihood of accurately remembering past decisions about future preferences. Imagination inflation refers to an increase in people's confidence that fictitious events really happened in childhood, which can occur after they imagine those events (Garry et al. 1996). This inflation is the result of two processes. First, imagining the fictitious events allows them to be processed more fluently, and second, people confuse the details they imagined with details of their real childhood memories (Sharman et al. 2004, 2005b). Recent research indicates that when people are given information about this increase in processing fluency and the source of the imagined details,

they are able to resist imagination inflation (Sharman et al. *in press*). Although this research tells us about the cognitive processes involved in imagination inflation, it does not tell us about the role of other processes, such as motivation. As highlighted by other work in our laboratory, individuals are motivated to remember autobiographical events consistent with their self goals (Conway and Pleydell-Pearce 2000). We are extending the imagination inflation procedure to investigate whether people are motivated to falsely remember autobiographical events consistent with these goals. For example, do people who have a strong power motivation show more imagination inflation for events consistent with this motive (e.g. influencing a peer group or bullying another child) than events inconsistent with this motive, and does inflation depend on whether the suggested events support or undermine preferred views of the self?

In a second project, we investigate memory errors in a medical decision-making context. People make advance directives to dictate the treatments they would or would not like to receive if they were ever ill or injured and unable to speak for themselves. Research indicates that older adults forget 18% of their advance decisions after a 2 year interval (Gready et al. 2000). In a recent experiment, we investigated whether young adults show a similar pattern of forgetting and whether mood or information considered at the time of the decisions influences memory for those decisions. We found that 58% of 17–21 year olds forgot at least one—and on average, six—of their advance decisions after a 4-month interval (Sharman et al. 2005a). Interestingly, mood and information played only a small role in whether the decisions were remembered. These results have chilling implications: if young adults make advance decisions about their medical care, many may fail to update their directives, despite forgetting one or more of these decisions, because they do not realise that their current preferences are different to earlier preferences. In a worst-case scenario, they may not receive the life-sustaining treatment they need and want because of a simple memory error.

Interpersonal source monitoring of autobiographical memories

A final project in our laboratory, which is conceptually related to our work on imagination inflation, focuses on interpersonal source monitoring of autobiographical memories. Personal source monitoring is the process of evaluating the source of one's *own* memories based on their qualitative details. For example, memories containing many sensory and perceptual details are attributed to a real experience, whereas memories containing a lot of information about cognitive operations are attributed to imagination, dreaming, or thinking (Johnson et al. 1993; Mitchell and Johnson 2000). Interpersonal source monitoring then is the process of

evaluating the source of other people's memories using similar heuristics (Johnson et al. 1998). In two series of experiments, we investigated the qualitative differences between genuine, imagined, and deceptive autobiographical accounts, and people's ability to accurately judge the source of these accounts with and without instructions or with and without expertise.

In the first series of experiments, we examined the qualitative characteristics of genuine, imagined, and deceptive accounts of autobiographical events. We asked participants to provide accounts of events they genuinely experienced, accounts of events they did not experience but imagined happened to them, and/or accounts of events they did not experience but described in a way designed to deceive someone else that the event really happened. We then examined the qualities of these accounts and whether trained raters could discriminate them using the Memory Characteristics Questionnaire (MCQ; Johnson et al. 1998) and the Aberdeen Report Judgment Scales (ARJS; Sporer 1998), tools designed to differentiate the source of memory accounts. In different experiments we compared genuine, imagined, and/or deceptive accounts of positive and negative childhood events; of positive, negative, and neutral recent events; and of benign versus traumatic events. Using both the MCQ and ARJS, raters identified qualitative differences across the various accounts, whereby genuine accounts contained more details than other accounts (Barnier et al. in press). However, when participants were strongly motivated to deceive (e.g. by being threatened with unmasking as a fake), deceptive accounts actually contained more details than genuine accounts of the same experience (Barnier et al. 2005). This suggests that individuals can provide highly detailed and convincing accounts of events they never experienced, which are difficult even for trained raters to identify with sophisticated methods. This finding is clearly of forensic significance, but is tempered by the outcome of a follow-up experiment: participants had much more difficulty, and provided less detailed and convincing accounts, when they were asked to construct accounts of traumatic experiences they had never experienced, rather than the more benign, everyday experiences in the previous experiment.

In a second series of experiments, we examined the accuracy of interpersonal source monitoring judgements for the autobiographical accounts we collected. Since naïve raters left to their own devices typically discriminate deceptive accounts at no better than chance (Vrij 2000), and since our genuine, imagined, and deceptive accounts were qualitatively different (Barnier et al. in press), we were interested first in whether instructions (that directed people to base their decisions on the presence or absence of certain qualitative features) might increase the accuracy of judgements (Barnier et al. 2005). In one experiment, participants judged the source (or truth status) of genuine or deceptive accounts of positive, negative, or neutral events following instructions to help (*informed*) or hinder (*misinformed*) their

judgments, or no instructions (*uninformed*). Unexpectedly, participants' judgments were no better than chance; the instructions produced only a truth or deceptive bias. In a second experiment, participants judged the source of genuine or deceptive accounts of traumatic events following informed, misinformed, or no instructions; we also added instructions that encouraged judges to feel either *suspicious* or *sympathetic* toward the account-giver. Once again instructions were not helpful. Participants given no instructions made the most accurate source judgments; the other instructions produced only a truth or false bias.

Given that instructions did not improve the accuracy of interpersonal source monitoring, we were interested next in whether expertise might predict the accuracy of people's judgements. In one experiment, we asked parents and nonparents to judge whether children's (genuine, imagined, or deceptive) accounts of a hypnosis demonstration were genuine or deceptive. Although parental status made no difference, participants' judgements were more accurate for both genuine and imagined accounts than for deceptive accounts. In other words, adults were quite good at judging when children were telling the truth, but were not very good at judging when they were deliberately lying. In a second experiment currently underway, we are comparing clinical psychologists', forensic psychologists', criminal lawyers', and pharmacists' interpersonal source judgements of genuine and deceptive accounts of traumatic events. We predict that professionals who routinely make such discriminations in their everyday working life, forensic psychologists and lawyers, may be more accurate than other professionals.

A final comment

This brief summary of the projects and researchers in our laboratory hopefully communicates not only the scope of our work, but our enthusiasm for the questions and challenges of memory research. Our work has benefited from the support of UNSW and national granting bodies, from the talent and motivation of students and colleagues, and from the vitality of the field of memory itself, which continues to attract and involve us. It has benefited also from our proximity to the beach—there is no better brainstorming venue than a beer garden with a view of the ocean!

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