Measuring consistency of autobiographical memory recall in depression

Maria Semkovska *, Martha Noone, Mary Carton, Declan M. McLoughlin

Department of Psychiatry and Trinity College Institute of Neuroscience, Trinity College Dublin, St Patrick's University Hospital, James's Street, Dublin 8, Ireland

ARTICLE INFO

ABSTRACT

Autobiographical amnesia assessments in depression need to account for normal changes in consistency over time, contribution of mood and type of memories measured. We report herein validation studies of the Columbia Autobiographical Memory Interview — Short Form (CAMI-SF), exclusively used in depressed patients receiving electroconvulsive therapy (ECT) but without previous published report of normative data. The CAMI-SF was administered twice with a 6-month interval to 44 healthy volunteers to obtain normative data for retrieval consistency of its Semantic, Episodic-Extended and Episodic-Specific components and assess their reliability and validity. Healthy volunteers showed significant large decreases in retrieval consistency on all components. The Semantic and Episodic-Specific components demonstrated substantial construct validity. We then assessed CAMI-SF retrieval consistencies over a 2-month interval in 30 severely depressed patients never treated with ECT compared with healthy controls ($n = 19$). On initial assessment, depressed patients produced less episodic-specific memories than controls. Both groups showed equivalent amounts of consistency loss over a 2-month interval on all components. At reassessment, only patients with persisting depressive symptoms were distinguishable from controls on episodic-specific memories retrieved. Research quantifying retrograde amnesia following ECT for depression needs to control for normal loss in consistency over time and contribution of persisting depressive symptoms.

© 2012 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Autobiographical memory (AM) is a personal representation of one's past (Conway and Pleydell-Pearce, 2000). A generally accepted distinction in AM function is that between semantic and episodic memory or, more specifically, between decontextualised knowledge about an individual's past and event memories situated in a particular time and place (Moscovitch et al., 2005; Piolino et al., 2009). Consolidation and retrieval of personal memories are dynamic processes that change over time resulting in AM being continuously constructed and reconstructed with episodic AM being more vulnerable to effect of time than semantic AM.

Up to the late 1980s, AM was studied mainly via cue-word methods where one is required to describe autobiographical incidents related to given cue-words (e.g. vacation, dog, etc.; Crovitz and Schiffman, 1974). However, this technique cannot distinguish between an individual's personal bias and the ability to report events from particular time periods. Three semi-structured autobiographical questionnaires overcame this bias by requesting production of memories from predetermined time periods (Borrini et al., 1989; Kopelman et al., 1989; Piolino, 2003). All three were standardised and validated for assessment of retrograde amnesia. However, they

did not seek to validate consistency in AM reports over time as amnesia usually occurs unexpectedly; AM assessment is therefore post factum, without collecting premorbid AM abilities. These questionnaires have rarely been used in depression research.

The most consistent finding of AM research in depression is "overgeneral" retrieval (Williams et al., 2007; King et al., 2010; Sumner et al., 2010). When asked to evoke personal memories specifically situated in time and place, depressed patients tend to recall either personal semantic memories (i.e., general knowledge regarding oneself), extended events that occurred over a period greater than 1 day, or a frequently repeated event (Williams and Dritschel, 1992). AM studies in depression have mainly used the Autobiographical Memory Test (Williams and Broadbent, 1986) that is a cue-word technique. Although this tool allows tracking changes in AM specificity over time, it does not control for retention time interval (i.e., delay between acquisition and moment of retrieval) and encoding age that are both critical for quality of AM retrieval (Piolino et al., 2002).

Retrograde amnesia in depression has been most frequently studied in research on electroconvulsive therapy (ECT) (McElhiney et al., 1995). Since the 1950s, assessment of retrograde AM amnesia following ECT evolved independently from studies on brain injury or depression. Research on AM dysfunction following ECT has mainly used variations of the Personal Memory Questionnaire (Weiner et al., 1986) that employs a structured format with specific, rather than open-ended, questions where one is requested to generate details about given topics (e.g. closest family member, most recent

* Corresponding author at: Dept. of Psychiatry TCD, St. Patrick's University Hospital, P.O. Box 136, James's Street, Dublin 8, Ireland. Tel.: +353 1 249 3532.
E-mail address: semkovsm@tcd.ie (M. Semkovska).

job). No distinction is made between possible semantic and episodic AM components. Only questions answered before ECT are re-administered and only consistency with baseline is measured. Retrograde amnesia is defined as percentage AM lost from baseline score.

Although autobiographical retrograde amnesia has been reported by ECT patients as a major concern (Rose et al., 2003), its objective quantification remains problematic and sensitivity of instruments used has been questioned (Fraser et al., 2008; Semkovska and McLoughlin, 2010; Semkovska et al., 2011). Autobiographical retrograde amnesia is most frequently defined as % failure to retrieve the same details on particular themes relative to initial assessment. However, major limitations include lack of normative data in either healthy volunteers or depressed patients not treated with ECT. This limitation is highlighted by the authors of one of the most frequently used variations of the Personal Memory Questionnaire, McElhiney et al.'s (1995; p.513) Autobiographical Memory Interview: "Without normative information on the extent of inconsistency in recall over time, it is impossible to determine whether the treatment groups that showed the least retrograde amnesia after ECT, nonetheless, had short- or long-term deficits."

This methodological issue remains unresolved despite both the above cautionary note and the growing literature on natural loss in AM consistency over time. The highest percentages of consistency loss reported in the ECT literature range 28–40% for reassessments 4–8 weeks after initial (pre-treatment) assessment (Sackeim et al., 1993, 2000). Interestingly, this corresponds to extent of loss in AM consistency observed in healthy volunteers: 27% after 6 weeks (Talarico and Rubin, 2003); 31–42% after 2 months (Anderson et al., 2000); and 37% over 5 months (Coluccia et al., 2006). In one ECT study, Sackeim et al. (2007) describe having tested 24 healthy volunteers using the AM loss of consistency paradigm, but the authors do not report observed results.

Only two ECT studies have reported on the validated Kopelman AMI (Kho et al., 2006; Sienaert et al., 2010). Neither study distinguished between episodic and semantic components, but both suggested the Kopelman AMI is not sensitive in detecting ECT-induced retrograde amnesia.

Assessing extent of post-ECT autobiographical retrograde amnesia reveals the following conundrum. On the one hand, various existing standardised instruments can assess and differentiate well-established AM components but without providing measures of consistency. On the other hand, instruments used in ECT research concentrate on consistency without considering different AM components, effects of depression itself on AM, or extent of normal loss in AM consistency over time.

To attempt overcoming this difficulty, we established a new scoring system for the Columbia Autobiographical Memory Interview — Short Form (CAMI-SF; McElhiney et al., 2001), the most widely used AM instrument in recent ECT literature (FDA, 2011). This new system allows: differentiation between semantic and episodic components; assessment of specific and extended AMs; and measure of their respective retrieval consistencies over time.

We provide here an assessment of its reliability and validity, and normative data for AM retrieval consistency in healthy controls and depressed patients who have never received ECT.

2. Methods

We performed two related studies. Study 1 focused on assessment of reliability, convergent and discriminant validity of the new CAMI-SF sub-scores, and exploration of normative data for AM consistency in healthy volunteers observed at 6-month reassessment. Study 2 similarly investigated convergent and discriminant validity in unipolar depressed patients never treated with ECT, and further examined discriminant validity relative to a different control group reassessed after 2 months (i.e., corresponding to average interval between pre-ECT and end-of-treatment AM assessments).

2.1. Participants

All participants were aged over 18, with no history of alcohol or substance abuse in the previous 6 months with English as first language. Participants provided informed written consent to enter the study, which was approved by local research ethics committee.

In Study 1, healthy volunteers were enrolled using volunteer websites and had to score ≤8 on 24-item Hamilton Rating Scale for Depression (HRSD-24, ECDEU version; Beckham and Leber, 1985). Exclusion criteria were history of psychiatric or neurological disorder, current major medical illness or use of psychoactive medication.

In Study 2, in-patients with unipolar major depressive episode, according to Structured Clinical Interview for DSM-IV disorders (First et al., 1994), and HRSD-24 score ≥21were recruited from St. Patrick's University Hospital, Dublin. Remission was defined as HRSD-24 ≤10 on reassessment after 2 months. Exclusion criteria were neurological disorder, bipolar depression, co-morbid psychiatric disorder or previous ECT. A second group of healthy volunteers served as controls for the depression group with comparable age, gender ratio and mean estimated Intellectual Quotient (IQ). The National Adult Reading Test (NART; Nelson and Willison, 1991) provided an IQ estimate for all participants. A different healthy control group was used in Study 2 to avoid amplification of test–retest effects for Study 1.

2.2. Neuropsychology measures

2.2.1. Columbia Autobiographical Memory Interview — Short Form (CAMI-SF, McElhiney et al., 2001)

2.2.1.1. Content and administration format. The CAMI-SF was initially constructed to quantify retrograde amnesia for autobiographical information following ECT via a structured interview format (McElhiney et al., 2001). It contains six themes (*Family Member*, *Last Major Trip*, *Last New Year's Eve*, *Last Birthday*, *Last Employment*, *Last Physical Illness*) and, within each theme, five questions requiring specific details are asked (Fig. 1). At initial assessment, each of these 30 questions is scored either 2, if a specific answer is provided, or 0 if no answer or vague answer is provided. At retesting, only items that elicited specific answers (received a score of 2) on initial assessment are re-administered. As such, it is not possible for retest scores to improve beyond initial performance. AM ability is scored as percentage consistency on retesting relative to initial assessment, regardless of initial performance.

2.2.1.2. New scoring system. The concept of consistency was kept; only information consistent with initial assessment was analysed for retest scoring and any additional information was ignored. As our main interest was measuring ability to retrieve specific information, each separate specific detail provided in response to individual questions within a theme was given 1 point at initial testing. The original scoring system does not allow measuring specificity-richness of retrieved AMs, as only one score (i.e., 2) is possible for any specific answer, regardless of number of details produced. Fig. 2 provides an example of the difference between the two scoring systems.

The score given per item can be limited given the nature of the question. For example, the item "Counting the days you spent travelling, how many days were you away?" (*Last Major Trip* theme, Q.1) can elicit only a score of 1 or 0 points. However, the new total score is unlimited as scoring on other questions is determined by number of specific AMs produced (e.g. "Describe what did you do at midnight?" from *Last New Year's Eve* theme, Q.5). Thus the ceiling effect imposed by the original scoring system is overcome. Additionally, three component scores can now be recorded with the new scoring scheme.

- ■ Semantic component: total of specific details provided on themes *Family Member* and *Last Employment*;
- ■ Episodic-Extended component: total of specific details provided on themes *Last Major Trip* and *Last Physical Illness*;
- ■ Episodic-Specific component: total of specific details provided on themes *Last New Year's Eve* and *Last Birthday*.

2.2.2. Standard neuropsychological tests

Theories generated by recent reviews and meta-analyses of neuroimaging studies on the cortical underpinnings of autobiographical, episodic, semantic and spatial memory support hypotheses regarding correlations between tests measuring these functions. Specifically, episodic AM has been related to visuo-spatial memory consistent with the concept that retrieval of episodic AM requires vivid revival (or perceptual re-experiencing) of an incident specifically situated in a spatio-temporal context (Moscovitch et al., 2005; Svoboda et al., 2006; Conway, 2009). In addition, both episodic AM and semantic memory share overlapping activation patterns with working memory prefrontal underpinnings (Burianova and Grady, 2007; Piolino et al., 2009). Finally, episodic AM has been only partly related to traditional neuropsychological episodic memory tests and has been consistently dissociated from semantic memory tests (Gilboa, 2004; McDermott et al., 2009).

Based on these patterns of associations, the following battery was used to test convergent and discriminant validity of the new CAMI-SF components: (1) Digit span forward (Wechsler, 1997; WAIS-III), for auditory attention; (2) Digit span backward (Wechsler, 1997; WAIS-III), for working memory; (3) Free total recall and delayed recall from Free and Cued Selective Reminding Test (FCSRT; Van der Linden and GREMEM, 2004) for, respectively, verbal learning and verbal memory retrieval; (4)