THE ACCESSIBILITY AND ORGANISATION OF SELF

STATEMENTS IN AUTOBIOGRAPHICAL MEMORY

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The candidate confirms that the work submitted is his/her own, except where work which has formed part of jointly-authored publications has been included. The contribution of the candidate and the other authors to this work has been explicitly indicated below. The candidate confirms that appropriate credit has been given within the thesis where reference has been made to the work of others.

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ABSTRACT

It is considered that our memories of experience constrain what the self can be because this tethers the self in reality. Likewise, what we can retrieve about our past probably also influences how we describe and think about our self. Furthermore, one way of thinking about the self is as a store of personally relevant information meaning that it is linked to the very notion of memory. Using a novel fluency paradigm, this thesis explores the idea that the accessibility and organisation of self statements is intimately associated with autobiographical memory.

Experimental work in Study 1a revealed that it is possible to use memory in order to 'boost' access to the self. Recall of an autobiographical memory increased the retrieval of self statements in a novel fluency task, and psychological selves in particular (e.g., *I am* kind). Study 2 showed that the accessibility of self statements varies across the lifespan and that selves emerge around key autobiographical milestones (e.g., during the period of the reminiscence bump). In Study 3, a neuropsychological approach was used to explore the impact of amnesia on the accessibility of temporally extended aspects of the self (i.e. *past*, *present* and *hoped for* self) in a single case study on patient SA. Findings showed that retrograde amnesia had no impact on the accessibility of self statements, yet SA failed to generate a single psychological description of her current identity. Study 4 indicated that autobiographical memories cluster around times when a new self emerges, reflecting the importance of memory in maintaining a coherent sense of self in spite of change. Finally, Study 5 aimed to extend the results from Study 3 to a group of people with severe memory impairment. Unlike SA, these participants were impaired in their ability to access self statements, but no relationship between episodic impairment and the accessibility of psychological selves was found.

Across all chapters, this thesis presents the *I Am Fluency Task* as a valuable tool for meaningfully 'measuring' the self, and the clinical implications of this will be considered

throughout. The experiments in this thesis help to delineate more clearly the role of memory processes in the retrieval of self statements. On the whole, it is found that whilst episodic retrieval processes seem to be implicated in the retrieval of self statements, such as in the first experiment, the other studies show that even when autobiographical memory is impaired, access to certain aspects of the self - probably maintained by semantic memory - persist. Thus, the self is a complex dynamic structure which draws upon both autobiographical memory and also personal semantics, and may be updated and maintained by a complex co-ordination of information from multiple memory systems.

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1. GENERAL INTRODUCTION

"We are what we remember" Wilson & Ross (2003)

1.1 Overview

The term autobiographical memory (AM) describes knowledge of personal facts and memories of events from one's own life and as such, it is fundamentally related to the self (Conway, Rubin, Spinnler & Wagenaar, 2013). Indeed the idea that there is a relationship between the self and memory is not new. For instance, in one the earliest examples of a neuropsychological case study, Claparède (1951) described how 'an object is recognised because it evokes a feeling of 'me-ness' to which it is tied by virtue of its previous presentations to the subject's consciousness' (p. 61-62).

Contemporary memory theory maintains that a person's current self-concept plays a crucial role in guiding the retrieval of autobiographical memory. The commonly held idea that our self is (at least in part) a cognitive structure that is stored or retrieved as part of a memory system has been less tested empirically. This is a critical issue, as it is argued that memory deterioration in (for example) Alzheimer's disease (AD) leads to a degradation - or lack of access to - the self (e.g., Addis & Tippet, 2004). The main aim of this thesis was to examine the extent to which memory retrieval is involved in the accessibility and content of self statements. The development of a novel *I Am Fluency Task*, in which people were asked to generate as many descriptions of themselves in a given time, was central to this aim, as it allows for quantitative exploration of the accessibility of self, as well as qualitative exploration of the content of self-knowledge. This was fundamental to the goal of measuring

identity statements whilst preserving the subjective and idiosyncratic nature of the self-construct.

This thesis presents a detailed examination of the accessibility and organisation of self statements within an influential model that considers the self from a cognitive viewpoint - the Self-Memory System (Conway, 2005; Conway & Pleydell-Pearce, 2000). This conceptual model highlights the interrelatedness of self-concepts and memory and proposes a bidirectional relationship between the two. With regards to self statements, Conway (2005) regards them as being abstracted from temporally defined incidents and thus conceptual in nature. Indeed there is a growing body of research that supports the idea that self can be known in this conceptual manner in the absence of episodic memories (e.g., Klein, 2010; Klein & Gangi, 2010; Klein & Lax, 2010; Rathbone, Moulin & Conway, 2009). The work presented within this thesis explores a particular role for AM in maintaining a coherent self during transitional periods, in the formation of new selves and in maintaining access to self statements that are dynamic, context-dependent and psychological in nature.

This chapter describes a detailed examination of autobiographical memory and the self, from a cognitive and neuropsychological perspective, before reviewing the literature that has emphasised a link between memory and the self. To conclude, a rationale for the work described within this thesis is given, and a list of aims and expected results. In sum, whilst the idea of a relationship between the self and memory is not a new one, this is an area where there is some debate about whether or not memory impairment leads to difficulties in accessing self statements, and critically, this is an area of both theoretical (underpinning the role of memory in wellbeing and selfhood) and clinical (understanding the impact of memory impairment on self) importance.

1.2 Autobiographical Memory

1.2.1 The Functions of Autobiographical Memory

Much of the empirical research on autobiographical memory focuses on how much or how well we remember, and less so, on questions regarding why or how (Bluck, Alea, Habermas & Rubin, 2005; Pillemer, 2003). Theoretical work supports the existence of three broad functions of AM, conceptualised by Bluck as directive, social and self (Bluck, 2003; Bluck et al., 2005). Pillemer (2003) stated that autobiographical memory functions to 'inform, guide, motivate and inspire' (p. 193). This relates to the directive function of AM i.e. the capacity for the past to be used to 'guide present and future thought and behaviour' (Bluck et al., 2005, p. 93). Indeed this is regarded as having a strong evolutionary purpose given that people use memories of past experiences to aid successful functioning, as well as to avoid harmful situations (Pillemer, 2003).

In contrast, Neisser (1988) argued that the primary purpose of AM relates to social functioning. At the most basic level, AM provides topics for conversation – reminiscing on shared experiences can promote social bonds (Fivush, Haden, & Reese, 1996), whilst discussing past events with a person who was not present provides a means of sharing self-relevant information. The act of reminiscing can also enhance intimacy (e.g., Alea & Bluck, 2007). Cohen (1998) described how AMs facilitate social interaction and Bazzini et al. (2007) found marital satisfaction to be associated with the retrieval of memories of shared experiences, as opposed to individual events. More recently, AM has also been linked with enhancing a person's capacity for empathy (e.g., Bluck, Baron, Ainsworth, Gesselman & Gold, 2013; Bender, Lachmann, Pohl & Chasiotis, 2008; Pohl, Lachmann & Bender, 2005).

A number of theoretical and empirical papers have considered the social and directive functions of AM (see Alea & Bluck, 2003; Nelson, 1993, 2003; Pillemer, 2003) , but a comprehensive consideration of these is beyond the scope of this thesis. Instead the focus is on the third function of AM, that of maintaining a coherent and consistent sense of self

(Barclay, 1996; Conway, 2005; Fivush, 1998). It is reasonable to assume that memory is necessary in order to maintain a self that is tethered in reality and it has been argued that this function is particularly important during times that necessitate self-change (Robinson, 1986). One of the main themes of the work presented within this thesis was to explore how the accessibility and organisation of self and AM are related during times of change or 'transitions' (for a detailed discussion see Section 5.1).

1.2.2 Episodic and Semantic Distinctions in Autobiographical Memory

Empirical investigations of AM began over 100 years ago, with Galton's (1883) explorations of the capacity for cue words to elicit memories of personally-experienced past events. However, debate still exists with regards to what constitutes AM (for a detailed consideration see Conway et al., 2013). Generally speaking, declarative memory (i.e. that which is intentionally recalled) is fractionated into two distinct types - episodic and semantic. Tulving (1972) is most often described as the originator of this distinction. He described semantic memories as those of general facts that are abstracted from the context in which they are learnt. Episodic memories, on the other hand, constitute personally experienced events that are specific in time and place, and are accompanied by a sense of 'mental time travel'. Tulving (2001) described how 'With one singular exception, time's arrow is straight… The singular exception is provided by the human ability to remember past happenings. When one thinks today about what one did yesterday, time's arrow is bent into a loop. The rememberer has mentally travelled back into her past and thus violated the law of the irreversibility of the flow of time' (p. 1-2). He also proposed that this capacity for mental time travel is uniquely human.

It has been suggested that episodic memory and AM are synonymous (see McCarthy & Warrington, 1991). Indeed by definition, both are accompanied by a sense of self in the past. However, others such as Conway (2005) view episodic memory as a subcomponent of AM and it is in this way that AM is conceptualised throughout this thesis. That is, AM is a mental construction which will draw upon episodic memories. From this viewpoint it is also

possible to have episodic memories that are not necessarily autobiographical in nature, such as memories for recently presented word lists (for examples see Gilboa, 2004). Moreover, it is possible to have semantic knowledge that is autobiographical (e.g., I have pet rabbits called Finley and Lola). In this thesis, AM will be considered as a complex interaction between episodic and semantic memory subsystems (see Figure 1.1), a view which is developed below.
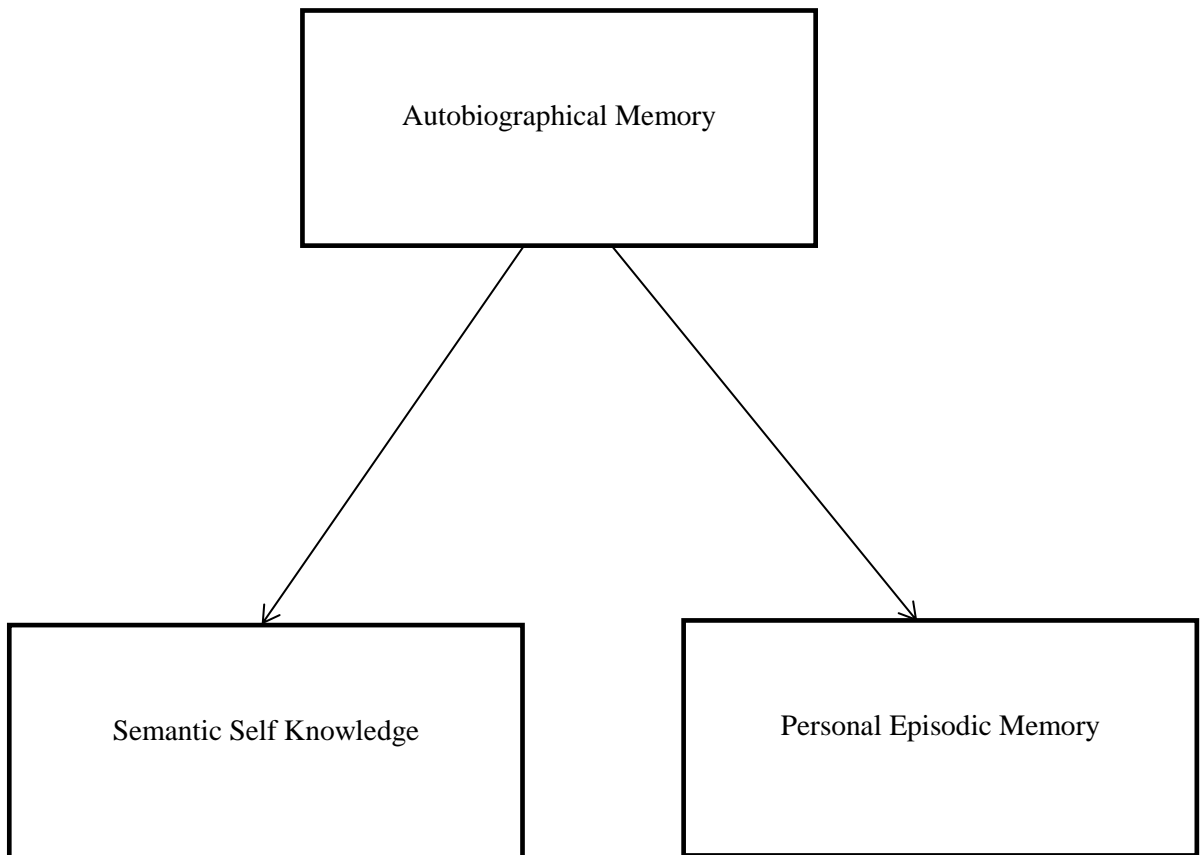
Figure 1.1. Schematic representation of episodic and semantic components of AM as conceptualised in this thesis.

Thus, at present it is widely accepted that AM is dissociable into episodic and semantic components (e.g., Baddeley, 1992; Brewer, 1996; Conway, 1996; Conway & Bekerian, 1987; Larsen, 1992; Robinson & Swanson, 1990; Schacter, 1996). Much of the evidence for

this distinction comes from neuropsychological cases. For instance, in the classic case of KC, Tulving, Schacter, McLachlan and Moscovitch (1988) describe how this patient with considerable damage to both the left frontal-parietal and right parieto-occipital regions was able to recall 'fragmentary general knowledge about his autobiographical past, but he did not remember a single personal event or happening from any time of his life' (p. 3). A similar pattern of findings has also been reported in a case of transient global amnesia (Evans, Wilson, Wraight & Hodges, 1993), and on a larger scale, Greene, Hodges and Baddeley (1995) found that people in the earliest stages of AD show a decline in their ability to access personal incident memory and yet not personal semantic memory. Ageing research has also proved to be fruitful in providing support for the distinction - episodic AM tends to show a temporal gradient with age whilst semantic AM does not (e.g., Levine, Svoboda, Hay, Winocur & Moscovitch, 2002; Piolino, Desgranges, Benali & Eustache, 2002). The most often used clinical instrument for measuring AM, the AMI (Kopelman, Wilson & Baddeley, 1989) is also divided into episodic and semantic sections, and is employed in Chapters 3, 4 and 6. Arguably, the most convincing way to shed light on the functions of AM is to explore what happens in instances where memory is lost or degraded (Kihlstrom, 1995). This is discussed in more detail in Section 1.2.4. and is also an approach that was adopted in several studies within this thesis (see Chapters 3, 4 and 6). This thesis will consider, for instance, if there are separable roles of episodic and semantic memory in maintaining or accessing the self.

1.2.3   The Organisation of Autobiographical Memories

Autobiographical memories are not distributed evenly across the lifespan. Research shows that when people over the age of 40 are asked to recall AMs they reliably and consistently cluster between the ages of 10 and 30 (e.g., Rubin, Wetzler & Nebes, 1986; for a review see Rubin, 2002). Peoples' favourite films (Sehulster, 1996), music (Holbrook & Schindler, 1989) and books (Larsen, 1996) also date back to this period. Various explanations have been proposed to account for this reminiscence bump. Berntsen and Rubin (2002; Rubin &

Berntsen, 2003) proposed that AMs are organised around life scripts, or in other words 'culturally shared expectations as to the order and timing of life events in a prototypical life course' (Berntsen & Rubin, 2004, p. 427). Consistent with this account, the reminiscence bump is most often found for positive, happy and expected life events (e.g., childbirth and marriage) and yet tends not to emerge for sad or traumatic experiences. There is mixed evidence for an account that maintains that it is the novelty of events during this period that lead to heightened accessibility. Cohen and Faulkner (1988) found that 93% of all lifetime memories that were reported by participants were of first experiences. However, more recently, Janssen and Murre (2008) showed that the reminiscence bump is unexplained by the novelty, emotionality, valence or importance of autobiographical events.

Several authors maintain that 'events from the period covered by the bump have a privileged relation to the self' (Conway & Haque, 1999, p. 35; see also Conway, 1997; Conway & Rubin, 1993; Fitzgerald, 1992; Rubin, Rahhal & Poon 1998). In particular, Conway and Holmes (2004) showed that memories formed in the second decade relate most often to the themes of identity and identity confusion, thus reflecting Eriksonian (1950, 1997) stages of psychosocial development. Conway and Holmes argued that such memories remain highly accessible given that they 'ground the self in past goal configurations and so provide a personal, psychological, history of changes to the self' (p. 462). To this end, memories help to maintain a sense of self that is coherent and consistent over time (more detail on the importance of self-coherence is provided in Section 1.4).

Heightened accessibility of AM can also occur outside of the period of the reminiscence bump and this is also around times that are important in the formation of identity. For instance, Conway and Haque (1999) found a reminiscence bump between the ages of 35 and 55 in a sample of Bangladeshi people – this bump corresponded to a period of national conflict in Bangladesh and as such a period that was cluttered with highly self-relevant experiences. More recently, Zebian and Brown (2014) found that 'collective transitional events which produce a marked change in the fabric of daily living engender historically

defined autobiographical periods which give structure and organisation to how individuals remember their past' (p. 194). Importantly, it seems possible for public events to organise AM, but only when such events are also of personal significance in that they change 'what people do, where they do it and with whom' (Brown et al., 2009, p. 399).

An idea that unites the accounts described above is that AMs are organised around transitional lifetime periods (i.e. life script events, Berntsen & Rubin, 2002, 2004; transitional events, Brown et al., 2009; Brown & Lee, 2009) and particularly around the boundaries of such periods (e.g., Burt, Kemp & Conway, 2003; Pillemer, Goldsmith, Panter & White, 1988; Steiner, Pillemer, Thomsen & Minigan, 2014; Thomsen & Berntsen, 2008; Thomsen, Pillemer & Ivcevic, 2011). At a more detailed level, the Self-Memory System (Conway & Pleydell-Pearce, 2000) describes how AMs are constructed from lifetime periods, general events and event specific knowledge (ESK). According to Conway (2005) all individuals have a 'life story' in which autobiographical memory is organised hierarchically. The most general level consists of knowledge of lifetime periods (e.g., when I was at school), here temporal knowledge about the duration of a period is stored alongside knowledge of the common themes of that period (Conway, 1992; Linton, 1986). At a more specific level is knowledge of general events, where conceptual representations of extended and repeated events are stored, such as, going on school trips (e.g., Burt et al., 2003; Conway, 1996; Haque & Conway, 2001). Finally, the most intricate level of the autobiographical knowledge base contains event-specific knowledge, that is, highly detailed knowledge of a single event (e.g., meeting Joe on a school trip to Oxford). Transitional lifetime periods are a particular focus in this thesis, which explores the impact of starting university (Chapter 5) and sustaining an acquired brain injury (Chapter 6) on the accessibility and content of self statements (for a more detailed discussion of the clustering of memories around transitional lifetime periods see Section 5.1). Importantly, this approach allowed for a detailed consideration of the impact of two very different life events, given that starting university is a positive event that is also a social norm (for many at least),

whereas acquired brain injury tends to be a negatively valenced event that is also invariably unexpected.

1.2.4 Autobiographical Memory, the Brain and Impairment

Interest in determining the neural correlates of AM has heightened in the past decade, with neuroimaging reliably showing that autobiographical retrieval employs a well-defined set of frontal, parietal and temporal regions (D'Argembeau, Cassol, Phillips, Balteau, Salmon & Van Der Linden, 2013; for meta-analyses and reviews, see Svoboda et al., 2006; Spreng, Mar & Kim, 2009; Martinelli et al., 2013). The task of deriving a sense of self from AM is said to be closely related to the task of 'autobiographical reasoning' (Habermas & Bluck, 2000; McAdams, 1993, 2001; McLean & Fournier, 2008; Pals, 2006a; Pasupathi, Mansour & Brubaker, 2007; Singer, 2004), that is, 'an ever-evolving, interpretive process of connecting past events to self' (Lilgendahl & McAdams, 2011, p. 391). D'Argembeau et al. (2013) showed that autobiographical reasoning recruits a widespread left-lateralized network 'composed of the dorsal MPFC, inferior frontal gyrus, middle temporal gyrus and angular gyrus' (p. 4).

Given that AM recruits a vast network of regions, it is also vulnerable to neurological deterioration, and of many different types. AM impairment has been noted in mild cognitive impairment and the earliest stages of Alzheimer's disease (e.g., Addis & Tippett, 2004; Leyhe, Muller, Milian, Eschweiler & Saur, 2009), semantic dementia and frontotemporal dementia (e.g., Piolino et al., 2003), Korsakoff's syndrome (e.g., Dalla Barba, Cipolotti & Denes, 1990; Kopelman, 1989), traumatic brain injury (e.g., Piolino, Desgranges, Manning, North, Jokic & Eustache, 2009), acquired brain injury (e.g., Berry et al., 2007) and temporal lobe epilepsy (e.g., Addis, Moscovitch & McAndrews, 2007; Viskontas, McAndrews & Moscovitch, 2000; St-Laurent, Moscovitch, Levine & McAndrews, 2009) to name a few.

As previously discussed, a fundamental role of AM is in maintaining a coherent and consistent sense of self over time (Barclay, 1996; Conway, 2005; Fivush, 1998). Thus it follows that AM impairment should lead to a degradation - or lack of access to - the self.

Amongst others, this was put forward by Addis and Tippett (2004), who showed that identity strength is directly related to one's ability to retrieve personal episodic and personal semantic AMs. The possibility that there is an association between the accessibility of AM and that of self has critical implications for clinical groups, particularly those highlighted above. In response, a key aim of this thesis was to explore this relationship in more detail in both neuropsychologically intact and neuropsychologically impaired groups (the impact of impaired AM on self is considered in more detail in Section 1.4, and empirically in Chapters 4 and 6).

Perhaps of most note, deficits in autobiographical memory can be due to episodic deficits or semantic deficits (or even a combination of both). By far, the literature on episodic deficits and AM is better developed than the literature on semantic deficits and AM, and this thesis will only present data on patients where the predominant problem is one of episodic memory. However, it should be noted that even restricted, well-circumscribed semantic deficits do lead to AM impairment. For instance, Piolino, Belliard, Desgranges, Perron and Eustache (2003) describe the case of patient AT, a 69 year old male diagnosed with semantic dementia who showed good recall for episodic information in spite of selective impairment in the recall of semantic facts. With regards to personal semantic details, this persons deficit 'extended to the names of places where he went, his different addresses, or important dates along with a relative sparing of current information' (p. 633).

1.3   The Self

James (1890) stated that self is the fundamental concept in psychology around which all else revolves (as cited in Klein, 2012, p. 253). Indeed the study of the self has received empirical attention in a multitude of psychological subdisciplines, including (but not exclusive to) neuropsychology, social psychology, cognitive psychology, developmental psychology, personality psychology and clinical psychology. Self also has a long and detailed history in the field of philosophy, although a consideration of this is beyond the scope of this thesis,

readers are directed towards Chalmers (1996), Dennett (1993), Gallagher (2000) or Searle (1997) for philosophical understandings of the self. James (1890) famously conceptualized the self as the *I* and the *Me*. *I* is the present moment self – the experiencer, and *Me* is the knower – the experienced self that extends across time, aware of what self is, was and will be. In these terms, the focus of this thesis is on the *Me* aspect of the self and the idea that this aspect of self might have a special relationship with AM. The following sections consider the self in detail before paying attention to how the self and memory are inextricably linked.

1.3.1   Defining the Self

Despite considerable attention being paid to studying the self, it is a concept that has proved notoriously difficult to define, indeed, the term 'self' has been used to refer to a variety of constructs and processes (e.g., Leary & Tangney, 2012). For instance, the self has been defined as a social construction (e.g., Mead, 1913; Prinz, 2003). This school of thought rejects the notion of self as an internal construct and maintains that self emerges as a result of socialisation processes, in which our views of self are a reflection of the way others see us. Others perceive self as a narrative (e.g., McAdams, Josselson & Lieblich, 2006) – a product of the stories we tell, and still others assume that self is a cognitive structure that exists as part of a 'self memory system' (the SMS; Conway & Pleydell-Pearce, 2000; see also Greenwald, 1981).

Naturally, this final idea that the self exists as part of a memory system, is the idea that is under consideration in this thesis. From a cognitive viewpoint: the self can be seen as essentially the reproduction of information from a cognitive structure. In particular, the focus of the present work is on self-knowledge and the self statements (often described as self images, Conway, 2005; Rathbone et al., 2008) that people use to describe the different aspects of their identity, such as *I am a woman, I am a student, I am ambitious*. Operationalising the self as in part being reflected by identity statements possibly oversimplifies the multi-faceted nature of the self (as discussed below) and certainly sidesteps difficult issues such as subjectivity and phenomenology, but the generation of such

statements, rather like the reproduction of autobiographical memories, does yield measurable and concrete entities (reviewed below).

1.3.2 Self as a Multidimensional Construct

A pre-requisite to psychological well-being is the feeling of self as a unified whole (e.g., Conway, 2005). However, empirical progress in this area has been encumbered by the conceptualisation of self as a unitary construct (see Prebble, Addis & Tippett, 2012). Indeed Klein and Gangi (2010) point out how attempts to produce a universal definition of the self fail because there exists no single thing to be defined. On the basis of a series of neuropsychological case studies, Klein (2012) describes how the self emerges from the union of functionally independent systems, including (but not limited to) personal event memories, personal semantic knowledge, a sense of personal agency and ownership, the ability to self-reflect, the experience of self as continuous over time, the ability to recognise inanimate representations of self (e.g., in photographs, mirrors etc.) and (of central interest to this thesis) representations of one's own personality traits.

It is thus now generally accepted that self is a multifaceted structure (e.g., Klein, 2001; Klein, 2004; Klein, 2012; Klein & Gangi, 2010), with different elements being more salient and accessible at different times and in different contexts - if this is the case, is it not counterintuitive to maintain that a consistent and coherent sense of self over time is crucial to psychological well-being? Historically, Goffman (1959) argued that there was no persistent sense of self, maintaining instead that self was a product of situations, emerging as a response to societal cues. In particular, he likened selves to actors acting out roles to different audiences. Indeed self-concepts or primes related to the self have been shown to influence performance across a range of tasks. For instance, a female in a room filled with males is substantially more likely to reference gender in self-description tasks (McGuire & Padawer-Singer, 1976), Asian-Americans primed with their Asian self are more likely to generate socially oriented memories than self-focused ones (Wang, 2008), and people primed with their student identity perform better on a test than those primed with their

athlete identity (Yopyk and Prentice, 2005). However, this thesis is based on the assumption that people possess a core self that is also dynamic across situations. Key to this stance is Markus's (1977) ideas about self-schemata. She proposed that people derive enduring cognitive generalisations of self from AMs and that these generalisations subsequently 'guide the processing of self-related information' (p. 63). Importantly, amongst these cognitive representations are the self-concepts, or self statements, that people extract from repeated episodes. The view is that whilst self-schemata are enduring, it is self statements that are fluid and context dependent. In fact, Chapter 2 of this thesis will test the idea that the type of self-statement that people generate at a given moment is influenced by the retrieval of episodic AMs.

It is also widely suggested that self can be fractionated temporally into past, present and future selves. For instance, Markus and Nurius (1986) introduced the concept of possible selves, which they proposed 'represent individuals ideas of what they might become, what they would like to become and what they are afraid of becoming' (p. 954). Possible selves are important because they act as incentives for future behaviour and allow us to integrate changes to self more easily. Awareness of our past selves also guides behaviour, and taken together, the capacity to envisage who we were, are and will be ensures a continuous sense of self over time. The importance of memory in maintaining a coherent and continuous self is considered in detail in Section 1.4.3.

1.3.3   Measuring the Self

Given that self is notoriously difficult to define, it is unsurprising that self is also difficult to measure. One aspect of self that lends itself to empirical investigation is the knowledge of one's own personality traits, referred to throughout this thesis as self statements. The following Section considers attempts that have been made to examine this aspect of self, and presents in more detail the novel approach that is taken in this thesis.

As discussed in the previous section, self was originally conceptualised as a unitary construct, as such, early attempts to measure self were widely judged to be unreliable,

difficult to interpret and of general poor quality (see Marsh & Richards, 1988). However, as our understanding of the different facets of the self evolved so too did the means of measuring it. One of the most popular and highly cited measures of self-concept is the Tennessee Self Concept Scale (TSCS; Fitts, 1965). This scale was designed to be a simple tool for measuring the multidimensional nature of self-concept. The original version comprised of 100 statements that are rated for self-descriptiveness (e.g., I am an attractive person, I am an untidy person) and then collapsed into categories, allowing for the evaluation of five aspects of identity (physical, moral, personal, family, social, self-criticism) over three broad domains (identity, satisfaction and behaviour). This measure has been used to explore self-concept cross culturally and across the lifespan (e.g., Ezeilo, 1982; Farag & Ibrahim, 1997; Kamsani, 2015; Ling, Luo & Zhang, 2013; Ling & Huang, 2009; Tori, 2004), as well as in various clinical groups (e.g., Hellstrom-Kinder, 2014; Lalanne, Rozenberg, Grolleau & Piolino, 2013; Peens, Pienaar & Nienaber, 2008; Picard et al., 2013; Pongracz, 2014; Ponsford, Kelly & Couchman, 2014; Thayer, 2015). Of particular interest to the present work is that of Addis and Tippett (2004), which showed that people with AD are more vague about their current self-concept than neurologically intact, age-matched controls. Crucially the authors demonstrated how this decrement in the strength of identity was directly related to the degree of AM impairment (see Section 1.4 for a detailed consideration of the impact of AM impairment on sense of self).

Despite its extensive use, the TSCS has received mixed reviews with regards to its reliability and validity (e.g., Marsh & Richards, 1988; Wylie, 1974). In addition, by providing participants with fixed format items, this measure lacks the ability to capture the subjective and idiosyncratic nature of self-concept, which is arguably critical when measuring something as personal as the self. In contrast, narrative approaches explore self-concept in a qualitative manner by examining the stories people tell about themselves. Such approaches yield rich and detailed information about the facets of self-concept (e.g., Douglas, 2013; O'Bryan, 2015), but are not feasible for exploring large samples, or for use in groups where

succinct and simple measures are beneficial e.g., in clinical settings. Perhaps one method that transcends both approaches is the Twenty Statements Test (TST Kuhn and McPartland, 1954). This widely-used empirical tool provides an open-ended means of determining the contents of one's self-concept by asking participants to generate twenty statements in response to the phrase 'I am…' (for a more detailed explanation of the TST see Section 2.1.1). A modified version of the TST formed the basis for several studies (1a, 2, 3 and 5) within this thesis. In a novel adaptation of the TST, participants were given one minute to generate as many statements as possible beginning with the phrase *I am*. The assumption was that the ability to generate statements in a given time reflects accessibility to self-concept. As described in more detail in Section 2.1.2., this measure allows for quantitative and qualitative exploration of the self, whilst preserving the subjective and idiosyncratic nature of this construct.

One obstacle that emerges from such open-ended approaches to exploring self statements is deciding how the statements could be coded objectively. Indeed there has been a debate about how to code the statements since at least the 1970s (e.g., Franklin and Kohout, 1971). To this end, various coding schemes have been devised. Originally, Kuhn and McPartland (1954) created a dichotomous coding scheme for responses generated on the TST, in which statements were categorised as being either consensual or subconsensual. The authors defined consensual statements as those that are objectively verifiable (e.g., student, girl, husband) and subconsensual statements are those that involve some level of subjective opinion (e.g., happy, bored, pretty good student). In contrast, other researchers have sought to classify statements using a considerably larger number of categories. Rhee, Uleman, Lee and Roman (1995) opted for 8 categories and 33 subcategories to explore differences in spontaneous self-concept across individualistic and collectivist cultures.

As previously highlighted, the body of work that is presented in this thesis considers the content of self and thus maps neatly onto the *Me* component of James' (1890) dichotomy. Damon and Hart (1988) developed a coding scheme that allowed them to track

developmental changes in the so called 'me self', and it is this particular coding scheme that is adapted and used throughout this thesis. In particular, self statements are coded into one of three categories – physical, social or psychological (see Table 1.1). This coding scheme has yielded meaningful differences in previous experimentation. For instance, Damon and Hart (1988) describe how knowledge of and preference for each category changes during the course of development, and in Aspergers syndrome (Jackson, Skirrow & Hare, 2012), changes in the reporting of one aspect of the self relative to the others have been found (i.e. people with Aspergers report fewer psychological selves).

Table 1.1. Self-statement coding categories

	Description	Examples
Physical self	Statements describing attributes that were apparent from appearance.	Small, brunette, 20, female, overweight, black, curly haired, pale
Social self	Statements describing a social category that was objectively verifiable.	Student, hockey player, Irish, musician, friend, single, athlete, from Leeds, planning to be a psychologist
Psychological self	Statements describing a personality trait that required the participant to be introspective and were also subjective in nature.	Helpful, patient, self-conscious, perfectionist, good friend, a bit weird, lucky, loyal

Regardless of how identity statements are coded, research that has sought to examine them has contributed a great deal to current understandings of self. Approaches based on the TST have been particularly useful in shedding light on the organisation of identity statements, as those generated first (i.e. those that are most accessible) are found to be the most personally significant and are also most closely associated with highly accessible sets of AMs (Rathbone & Moulin, 2014). Importantly, the task has been adopted for use in clinical groups and has shown that the accessibility of self is diminished in AD (Addis & Tippett, 2004). A particular aim of the work presented within this thesis was to explore the impact of neurological impairment on the accessibility of self, and the following section considers the impact of neurological impairment on self more generally.

1.3.4 Neuropsychology of the Self

Freud (1930) noted that certain pathologies can blur the lines between a sense of self that is tethered in reality and that which is party or wholly inaccurate. In contemporary literature, the degree to which self is maintained in certain neuropathologies is a contentious issue and will be discussed in more detail in Section 1.4. For now, disorders that compromise the authenticity of self are considered. Feinberg (2001, 2009a, 2010, 2011) described how such disorders disturb either the bodily, relational or narrative self. Disorders of the bodily self are described as those that 'impact the manner in which a person views the nature or limits of his or her physical being' (Feinberg, 2011, p.75). One example of this is Cotard's syndrome, that is, the steadfast belief that one is dead, or has at least lost their blood, body parts or organs (Pearn & Gardner–Thorpe, 2002). Oliver Sacks (1985) provides a detailed example of Cotard's syndrome in the case of *The Man who Fell out of Bed*. Sacks described how this patient wakes from an afternoon nap convinced that his leg is no longer his own, but rather that of a severed corpse that has been placed in his bed as a practical joke. When asked what had happened to his own leg, this patient replies that it is nowhere to be found. In contrast, disturbances of the relational self impact upon 'the manner in which the individual interacts with objects and persons' (Feinberg, 2011, p. 75). For instance, Venneri, Shanks, Staff and Della Sala (2000) describe the case of a lady with AD who 'regularly fed a photograph of her dead husband to the point that the mouth area of the portrait was worn away' (p. 215) and in another case of AD, Shanks and Venneri (2002) describe AL who related to her teddy bear as if she were a live companion. In fact, the authors describe how this lady was so convinced that the bear was real that it was made an allowance of one pound a week. Finally, disturbances of the narrative self 'affect the way the individual describes personal past and present circumstances' (Feinberg, 2011, p. 75). Delusional forms of confabulation are relevant to consider here, indeed lack of awareness is common in neuropsychological illness (e.g., Clare, 2003; Flashman & McAllister, 2002; Lehmann, Black, Shore, Kasper & Rabins, 2010; Prigatano, 2005) and in such cases it can be difficult

for an individual to make sense of their current circumstances. Take for example the case of a male with acquired brain injury (ABI) who participated in Study 5 of this thesis. This participant maintained that he was an employee at the rehabilitation unit where testing took place and vehemently denied that he had sustained a brain injury or indeed had any ongoing health concerns. His confabulations about working daily alongside staff provided an explanation for his current situation in the face of his impaired awareness.

Feinberg (2001, 2009a, 2010; Feinberg & Keenan, 2005) adopted a neuropsychoanalytical approach to explain the incidence of neuropathologies of the self (NPS i.e. disorders of the self and identity that occur in the incidence of neuropathology). He proposed that anatomical abnormalities in the right frontal lobe create a disruption of ego boundaries that subsequently facilitate the 'emergence of developmentally immature styles of thought and ego functioning and the return of psychologically primitive defences' (Feinberg, 2011, p.78). More specifically, he describes how cognitive deficits interact with self-related deficits and immature defence mechanisms to produce syndromes such as those described above. In the context of this thesis, it is proposed that the absence of AMs might play a particularly key role. Indeed if AMs are necessary in order maintain a self that is tethered in reality it is reasonable to assume that amnesia will lead to a self that is delusional somehow. For instance, in the case of KR (Klein, Cosmides & Costabile, 2003), a patient with advanced AD who was unable to update her trait self-knowledge in the face of profound anterograde and retrograde memory impairment. Instead the self-knowledge that she possessed was that of her pre-illness self. To explore this in detail, Chapter 4 examines the impact of amnesia on the accessibility and content of past, present and future self-knowledge.

1.4 The Self and Memory

In reviewing contemporary theories of AM, it is clear that one of the functions of AM is to maintain or organise the self. Moreover, in the section on the self, it appears that tasks which rely on the declaration of the self (or self-knowledge; Baumeister, 1999), such as the

TST or the TSCS rely on retrieval of information about oneself, which, from a cognitive viewpoint, could be construed as a memory task. In this last section before summing up with the aims of this thesis, the relationship between self and memory as seen in the robust self reference effect, and other empirical work is reviewed. In short, this section considers what the evidence is for memory and the self being related.

1.4.1 The Self Reference Effect

Thus far, this thesis has highlighted that self and memory are inextricably linked. However, in assuming that these two constructs are intimately related, the task of isolating the effect that one has on the other becomes inherently difficult. Nonetheless, one approach that has received considerable attention is the Self Reference Effect (SRE; Rogers, Kuiper & Kirker, 1977) i.e. the finding that information is more powerful encoded with reference to the self. In the first study to report this effect, Rogers et al. (1977) asked participants to rate trait descriptions (e.g., honest) in tasks that were designed to initiate four different levels of encoding: structural encoding (e.g., does the word have capital letters?), phonemic encoding (e.g., does the word sound the same as flower?), semantic encoding (e.g., does the word mean the same as lovable?) and self-referent encoding (e.g., does the word describe you?). The authors found that recall was enhanced for adjectives encoded with reference to self, and this is a finding that has been replicated many times (for a meta-analysis, see Symons & Johnson, 1997). For instance, using various methodological approaches (see Bellezza, 1984; Bower & Gilligan, 1979; Brown, Keenan & Potts, 1986; Klein & Loftus, 1988; Kuiper & Rogers, 1979; Maki & McCaul, 1985; Reeder, McCormick & Esselman, 1987) and a number of different participant groups, including children (Sui & Zhu, 2005), older adults (e.g., Glisky & Marquine, 2009; Gutchess, Kensinger & Schacter, 2010; Gutchess, Kesinger, Yoon & Schacter, 2007; Hamami, Serbun & Gutchess, 2011) and people with mild depression (Derry & Kuiper, 1981).

More recently, research has extended these findings to show that self referencing enhances memory for specific details as well as for general items. Serbun, Shih and Gutchess (2011)

explored the capacity for self referencing to enhance the encoding of visual and verbal details. In this study participants viewed a series of purchasable objects (e.g., a camera, an ice cream, a pair of earrings) prior to which they had been asked one of three questions, each designed to force one of three levels of encoding: self (Is this an object you would buy?), personally significant other (Is this an object your mother would buy?) or publicly significant other (Is this an object Bill Clinton would buy). Findings showed that 'self-referential encoding is an effective strategy to use to remember not only the "gist" of information, but also the specific details such as visual properties' (p. 1012).

Although the SRE has been found to be a relatively robust phenomenon it has also been subject to scrutiny (e.g., Bower & Gilligan, 1979; Ferguson, Rule & Carlson, 1983; Kuiper, 1982; Kuiper & Rogers, 1979; Lord, 1980), and debate still exists regarding the mechanisms through which self functions to boost memory. In response to reviewing the literature, Symons & Johnson (1997) concluded that 'the SRE appears to result primarily because the self is a well-developed and often-used construct that promotes elaboration and organisation of encoded information' (p. 371). Alternatively, Klein and Kihlstrom (1986) argued that the SRE can be explained simply by the process of organisation, which enhances recall by 'encouraging the encoding of relationships between list words that share the same category, resulting in the development of multiple retrieval paths' (Symons & Johnson, 1997, p. 374). In response, Klein and colleagues proposed that any items encoded in relation to a highly organised structure will improve remembering.

On the other hand, it has been argued that self is special in that it is 'a unique cognitive structure that possesses extraordinary or additional mnemonic abilities' (Kelley, Macrae, Wyland, Caglar, Inati & Hetherton, 2002, p. 785, see also Maki & McCaul, 1985; Rogers et al., 1977). Indeed this argument is strengthened by neuroimaging studies that demonstrate that self-referenced memories recruit a unique neural network relative to other-referenced memories (e.g., Kelley et al., 2002). In the context of a bidirectional relationship between self and memory (e.g., Conway, 2005), Chapter 2 explores the idea that it is possible to use

memory to 'boost' the self, by asking whether people can retrieve more information about themselves following the retrieval of an autobiographical memory. In this way, whilst the self-reference effect is not directly of interest to the current thesis, it provided an inspiration for some of the empirical work. The self reference effect presumably arises because the self is a powerful organizational structure in episodic memory: one can measure a change in memory function according to the activation of self concepts. Would the same be true of memories? We should hypothesise that the activation of autobiographical memories should in turn increase access to self concepts.

1.4.2 Studies using *I am* statements

One particular aspect of the SMS (Conway, 2005, for a detailed description, see Section 1.4.4.) that lends itself to empirical investigation is the conceptual self (i.e. conceptual self-constructs that are not temporally specified) and the number of studies that have used open-ended approaches to examine this construct has increased considerably in recent years. Particularly following the introduction of the Twenty Statements Test (Kuhn & McPartland, 1964) and more recently, the I Am Memory Task (IAM task, Rathbone et al., 2008). The IAM task explores the relationship between self-concept and memory by using participants most salient, self-reported *I am* statements (e.g., I am a sister) as cues in an autobiographical memory task. More specifically, participants generate ten *I am* statements, select the three that are most personally significant, and then produce ten memories that they feel exemplify each one (e.g., being a bridesmaid for my sister). In order to determine the temporal distribution of self-supporting memories, participants are also asked to specify the age that they were when each memory occurred. The original study proved useful in demonstrating how the self plays an organisational role in memory, as the authors showed that AMs cluster around times of self image formation. Adaptations of this task have also proven useful in demonstrating how sense of self persists in retrograde amnesia (Rathbone et al., 2009), and temporal lobe epilepsy (Illman et al., 2011), and yet is qualitatively different in people with Aspergers syndrome (AS; Tanweer, Rathbone & Souchay, 2010). Specifically, Tanweer and

colleagues showed that participants with AS are more likely to describe themselves in relation to trait like descriptions and less likely to describe themselves in relation to social self-descriptions than controls. Indeed this is in keeping with literature that describes impaired social interaction as a distinguishing feature of AS (e.g., Lee & Hobson, 1998).

Tasks that explore the conceptual self have also proven useful in demonstrating how memory impairment affects self-concept, and a handful of studies have shown that self statements are less accessible to people with memory impairment. For instance, Addis and Tippett (2004) showed that people with AD generate fewer items on the TST and despite the fact that Rathbone et al. (2009) report that the self remained coherent and continuous in a case of retrograde amnesia, they describe how their participant was able to generate just twelve *I am* statements when asked to produce twenty (they also report that this was fewer than the number generated by controls). Unfortunately, neither of the aforementioned studies report the general fluency speed of their participants. This is problematic given that wider cognitive deficits are common in both AD (e.g., Nebes, 1992) and following traumatic brain injury (e.g., Arciniegas, Held & Wagner, 2002). Thus impaired performance on the TST could be explained by a more general deficit in fluency speed across both of the aforementioned studies. A more recent study by Azouvi and Piolino (2015) explored the accessibility of self concept following traumatic brain injury (TBI i.e. physical injury to the brain that causes temporary or permanent impairment in brain functioning, Parikh, Koch & Narayan, 2007). In this case they did assess general fluency speed and subsequently included this measure as a covariate in their analyses that compared *I am* fluency in TBI to that in controls. Critically, when the effects of general fluency were removed, the effect of group remained significant, demonstrating that participants with acquired brain injury (ABI, for a definition see Section 6.1.2) had reduced access to self-concept even after taking any general fluency deficits into account. This study provides convincing evidence that the accessibility of self is reduced in TBI, yet this conclusion warrants further investigation, particularly given that is the only study of its type to take general fluency into account. Chapter 4 and

Chapter 6 of this thesis build on these initial findings to further explore the relationship between the accessibility of self-concept and that of AM in brain injury.

Another notable way in which studies that are based on this methodology have been useful is in highlighting a role for semantic memory in maintaining identity. Indeed there is considerable debate about the relative contribution made by episodic and semantic AM to identity.

1.4.3 The Contribution of Episodic and Semantic AM to the Self

Traditionally, researchers presumed that the self is supported by episodic autobiographical memory (e.g., Piolino et al., 2009; Schacter,1996; Tulving, 2002). This was somewhat of an intuitive assumption, given that this type of memory evokes a feeling of experiencing the self in the past. Indeed Claparede claimed that 'episodic remembering begins and ends with the self' (as cited in Kihlstrom, 1995, p. 384). As a result, consideration of the role of episodic AM has dominated research that examines the contribution of AM to the maintenance of the self. For instance, research with neurologically intact adults has shown that autobiographical memories cued by self statements tend to be episodic in nature (e.g., Bennouna-Greene et al., 2012) and deficits in episodic AM have been shown to be related to the degradation of self in people with Alzheimer's disease (e.g., Addis & Tippett, 2004; Prebble, 2014).

In a relatively recent study, Haslam, Jetten, Haslam, Pugliese and Tonks (2011) emphasised the importance of episodic memory in contributing towards the self. Using a sample of older adults, these authors found evidence to suggest that the accumulation of episodic self-knowledge is critical in supporting the integrity of the self. More specifically, they propose that episodic AM is important because it is from episodic AM that semantic knowledge about self is derived (see the Self-Knowledge and Identity Model, Haslam et al., 2011). In other words, they suggest that knowledge about the conceptual self is derived from personal episodic experiences. Indeed this finding fits well with research that has emphasised the role

of semantic AM in maintaining identity (e.g., Klein et al., 2002; Klein & Gangi, 2010; Rathbone et al., 2009).

Klein (2001) argues that the emphasis placed on the role of episodic AM in maintaining identity is merely an artefact of not considering the contribution that personal semantic knowledge makes. Indeed there is now a number of neuropsychological case studies that demonstrate that self can be known in the absence of episodic AMs. Perhaps most famously, is the case of KC, who was so profoundly amnesic that he was unable to recall a single episodic event from his lifetime, yet he was unimpaired in his ability to rate traits for self-descriptiveness (Rosenbaum et al., 2005). The capacity to accurately rate traits for self descriptiveness has also been documented in cases of head injury (Klein, Loftus & Kihlstrom, 1993), anoxia (Klein, Rozendahl et al., 2002) and Alzheimer's disease (Klein et al., 2003), all alongside at least some degree of episodic impairment. Such studies have shown that semantic AM is used to ground the self when episodic AMs are unavailable, as such, authors tend to conclude that self is 'maintained' in spite of AM decrements. Yet more often than not, when reviewing such cases it becomes evident that when memory is impaired something happens to self. For instance, McCarthy and Hodges (1995) described the case of PS, a 67 year old male who became densely amnesic following a bilateral thalamic stroke. This patient failed to recall any memories that were accurate when probed about major family events from the three decades prior to his illness (Warrington, 1996). Intriguingly he was also perpetually stuck in the past; PS held a firm belief that he was in the navy and that he was still living in the period of World War II (it was in fact 1989 at the time of testing). Similarly, Klein et al. (2003) described the case of a lady with Alzheimer's disease who failed to update her identity following the onset of retrograde amnesia for recent times. In response to such findings it could be suggested that episodic AM plays an especially crucial role when forming new selves and thus updating one's self-concept. Indeed Prebble (2014) describes episodic memory as 'a prerequisite for phenomenological continuity' (p. ii). To

explore this, Chapters 5 and 6 consider what happens to the organisation and accessibility of self during times of change.

In addition to exploring the accessibility of self-concept, research has also considered the type of self-statement that people use to describe their identity (e.g., Kuhn and McPartland, 1954; Rhee et al., 1995), but only relatively recently have researchers considered how this might be linked with memory, or indeed a lack of. A recent example is provided by Grilli and Verfaellie (2015) who explored the role of semantic AM in supporting current self concept in both healthy adults and those with medial temporal lobe amnesia. Participants were asked to generate eight *I am* statements, following which they were required to provide memories that qualified these statements. Finally participants completed an episodic task, in which they generated six episodic memories that supported each *I am* statement. The authors described how both groups demonstrate a preference for generating semantic memories to support their self, further highlighting the importance of semantic memory in supporting the self. With regards to statement type, participants with amnesia were less likely to generate psychological, trait-like descriptions of themselves relative to controls, and traits that were generated were supported by fewer semantic memories than were statements that related to social roles. This finding alludes to the existence of a particular relationship between episodic memory and psychological selves, and a key part of the work presented within each chapter of this thesis describes attempts to further elucidate this relationship.

1.4.4   Defining the Self-Memory Relationship

As highlighted above, there is now a widely held belief that both episodic and semantic AM contribute to one's knowledge about the self (e.g., Grilli & Verfaellie, 2015; Kopelman et al., 1989; Levine et al., 2002; Piolino et al., 2002; Tulving et al., 1988). So how have researchers sought to define the relationship between these constructs?

On the basis of a large body of work with both neurologically intact and neurologically impaired groups, Klein and colleagues (for reviews, see Klein, Cosmides, Tooby & Chance, 2002b; Klein & Gangi, 2010) proposed that trait self-knowledge is extracted from episodic

exemplars (either during initial encoding or during recollection) and stored within semantic AM in subsystems that hold trait summaries. As such, these authors propose that self knowledge might be functionally independent from episodic AM. This theory is consistent with aforementioned studies that show that it is possible to accurately rate traits for self descriptiveness despite a complete loss of episodic memory (e.g., Rosenbaum et al., 2005), and yet doesn't explain why access to current self might be disrupted somehow following episodic AM impairment (e.g., Addis & Tippet, 2004; Azouvi & Piolino, 2015; Prebble, 2014), nor does it acknowledge the bidirectional nature of the relationship between self and AM. Building on this theory, the Self Knowledge and Identity Model (SKIM; Haslam et al., 2011) emphasises the importance of episodic AM and suggests that 'semantic self-knowledge mediates a bidirectional relationship between episodic self-knowledge and identity' (p. 184). More specifically, these authors describe how episodic memory generates a sense of self by giving rise to semantic self knowledge, and how a strong sense of identity may enhance the recollection of self-relevant episodic events via semantic self knowledge. Whilst what is currently known about identity, episodic AM and semantic self knowledge fits well within the SKIM, one issue is that it focuses on defining the self in relation to self knowledge, and yet this is widely considered to be just one aspect of the self. For instance, as highlighted in Section 1.3.2, Klein (2012) maintains that the self emerges from the union of functionally independent systems.

Conway and colleagues (Conway & Pleydell-Pearce, 2000; Conway, 2005) provide a model that is more broad in its scope - the Self-Memory System (SMS, see Figure 1.2). The SMS consists of two major components - the working self and the autobiographical knowledge base. According to Conway (2005), a bidirectional relationship exists between these two constructs, such that memories of experience constrain what the self can be because it is tethered in reality, but likewise, what a person can retrieve about their past also influences how they describe and think about themselves. The working self is said to comprise of episodic autobiographical memory and conceptual self knowledge (Rathbone et al., 2009),

and to be strongly influenced by one's current goals. The autobiographical knowledge base represents a hierarchy of autobiographical knowledge with varying degrees of specificity (see Section 1.2.3).
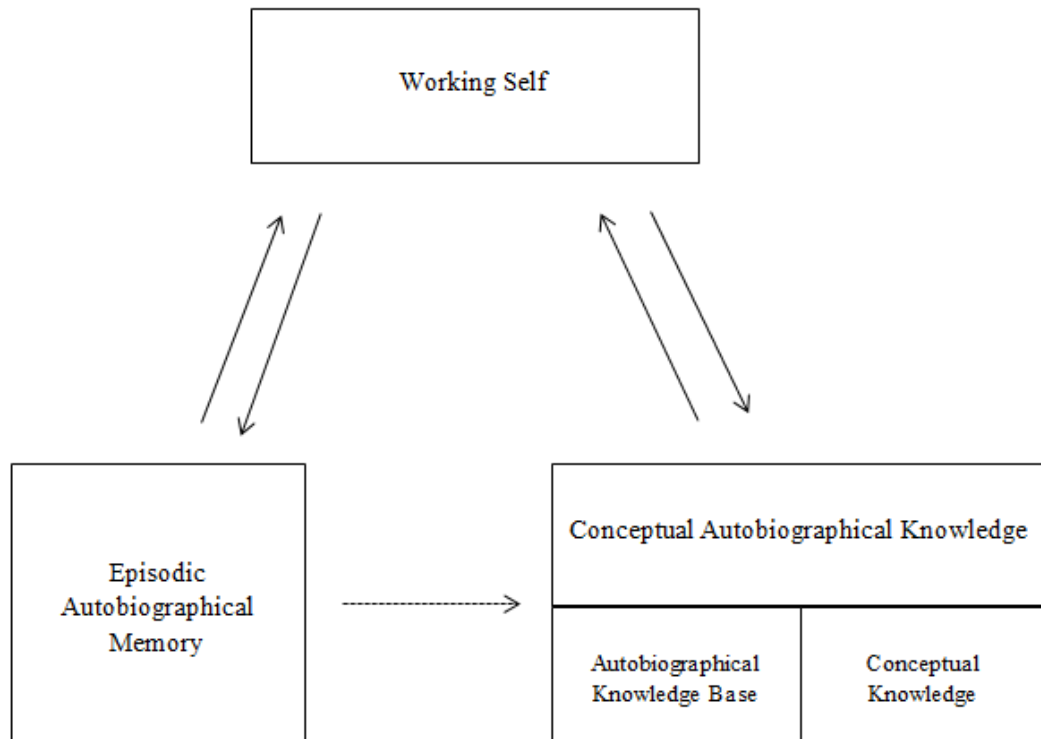
Figure 1.2. The Self Memory System (Conway, 2005)

The SMS places particular emphasis on the importance of maintaining coherence, as the working self is said to manipulate the accessibility and encoding of memory according to one's current perceptions of the self. A classic example (as cited by Conway, 2005) is provided by History and Cantril (1952) in their description of a particularly 'rough' game of football between Dartmouth and Princeton in 1951. The authors describe how 'the "game" actually was many different games and that each version of the events that transpired was just as "real" to a particular person as other versions were to other people' (p. 132). In other

words, the memory of each spectator was biased in accordance with their belief that their team was highly skilled and sportsman-like. Conway (2005) claims that coherence is crucial to psychological well being and as such, at any given time memories that are coherent with current self are more active. Chapters 5 and 6 explore this directly in both neurologically intact and memory impaired groups by asking whether or not ones most accessible memories are self-related.

One criticism of the self-memory relationship, as conceptualised by Conway, is that the relationship between the two constructs is somewhat circular. For instance, in professing that the self influences memory (in order to maintain coherence), and similarly that the self is influenced by memory (in order for one's self to correspond with reality) it becomes difficult to disentangle the two ideas. However, this thesis attempts to do so in several ways - for instance, by increasing the accessibility of AM (in an experimental task in Studies 1a and 1b), by examining cases where the accessibility of AM is diminished (i.e. in memory impairment in Studies 3 and 5), and during times of development and/or change (Studies 2 and 4). In this way it is possible to examine how changes in autobiographical memory effect selfhood. Alternatively, the other way of doing it might be to focus on times where we think there should be a change in self. This thesis also attempts to answer what happens to the accessibility of AMs at such times.

1.5 Aims of the Thesis

Rather than being encumbered by definitions of what the self is, and what it might be for, this thesis intended to elucidate the accessibility and content of self-statements, using a novel set of approaches that placed emphasis on the quantitative and qualitative analysis of self-concepts that are generated by the person themselves. Table 1.2. describes the specific research questions that were asked in each chapter.

Table 1.2. Research questions asked by each chapter

Chapter	Research questions
2	What is the impact of autobiographical retrieval on the accessibility and content of self statements?
3	How does the accessibility and content of the self change across the lifespan? How does this relate to changes in autobiographical memory?
4	Does autobiographical impairment reduce access to the self and does it affect the content of self-knowledge?
5	How are self statements organised around positive transitional lifetime periods?
6	What is the impact of acquired brain injury on the accessibility and content of self statements?

Wilson and Ross (2003) argued that '*we are what we remember*' (p. 137). If this is the case, and our self is a product of our memories, it implies that the self is stored somehow. The question is, in what way is the self stored? How is it tied to autobiographical memory, and is it stored as part of an episodic system or is it conceptual in nature? As previously discussed, the self is a complex and multifaceted structure and as such, it is necessary to operationalise the self in order to attempt to answer such questions. This thesis operationalises the self as in part being reflected by self statements and adopts an approach that has been relatively popular in recent times – the use of statements that participants generate to describe themselves. In an attempt to tease apart the intimate relationship between the self and

memory, this thesis utilises the process of change during transitional periods, and across the lifespan, to determine how the accessibility of self and autobiographical memories might be related. A neuropsychological approach is also key, in order to explore what happens to self statements when memory is lost or degraded. The starting point was to explore the relationship in the context of an experiment, which examines whether the retrieval of autobiographical memories does alter access to self statements.

2. WHO AM I? THE ACCESSIBILITY AND CONTENT OF THE SELF FOLLOWING AUTOBIOGRAPHICAL RETRIEVAL

"Who in the world am I? Ah, that's the great puzzle."

Lewis Carroll (1865)

2.1 Introduction

It is considered that an individual's current self-concept plays a crucial role in guiding the retrieval of autobiographical memory. Using a novel fluency paradigm, the studies within the present chapter examined whether or not the reverse is also true, i.e. does memory retrieval influence the description of the conceptual self? Specifically, this study examined the effect of prior autobiographical retrieval on the accessibility and content of stored self statements.

The most influential model to consider the self from a cognitive viewpoint is Conway and Pleydell-Pearce's (2000) Self Memory System (SMS; as described in Chapter 1, Section 1.4.4). Within this model, Conway (2005) describes the 'working self', a dynamic entity that organises the encoding and retrieval of autobiographical memories in line with current goals and self-images. The working self is constrained by autobiographical memories that are, in turn, a product of episodic memories and the semantic contents of the long-term self. The SMS predicts that, at any given time, the most salient aspects of the self are supported by a set of relevant autobiographical memories which are preferentially active. In support of this theory, Rathbone and Moulin (2014) showed the accessibility of memory varies according to the salience of the self. These authors used "a novel autobiographical fluency paradigm... to

investigate memory accessibility for different levels of self-related knowledge" (p.1661). More specifically, participants completed the Twenty Statements Test (Kuhn & McPartland, 1954), in which they were asked to describe their sense of self by generating twenty statements in response to the question 'Who am I?'. Following the generation of identity statements, participants completed a series of autobiographical fluency tasks, in which their 1st, 5th, 10th, 15th and 20th *I am* statements were used as cues, the prediction being that more memories would be generated for self-concepts in the first serial position. The findings supported this prediction and also the idea that the working self is a dynamic entity that provides an online description of the self in relation to memories that are accessible in the autobiographical memory base.

A key finding in the literature regarding the accessibility of autobiographical memory concerns the reminiscence bump. As described in Chapter 1 (Section 1.2.3), the reminiscence bump emerges when participants are asked to recall memories from across the lifespan – consistently memories cluster between the ages of 10 and 30 and it is considered that such memories remain highly accessible as a result of their relevance to identity formation and the self. According to this view, memories should cluster around times of self-image formation. Indeed, Rathbone et al. (2008) showed that this was the case when asking participants to generate memories that were cued by *I am* statements. In the same vein, Conway and Haque (1999) showed that memories cluster outside of the reminiscence bump when selves emerge beyond the age of 30. They found that a second reminiscence bump emerged between the ages of 35 and 55 years in a sample of older Bangladeshi participants. This represented a time of national conflict in Bangladesh that was filled with highly self-relevant experiences.

There are now a number studies that provide weight to the idea that the accessibility of memory is dependent on self (see Section 1.4.2.), but the idea that the accessibility of self is dependent on the accessibility of memory has received less empirical support. This is a critical issue, as it is argued that people with memory impairment are less able to generate

statements about themselves (e.g., Addis & Tippet, 2004). The present chapter uses an experimental procedure to test this idea explicitly: does autobiographical retrieval increase access to self-concepts? In order to do so, an adapted version of the TST (Kuhn & McPartland, 1954) was used.

2.1.1   The Twenty Statements Test

The Twenty Statements Test (Kuhn & McPartland, 1954) is a widely used empirical tool that was devised as a means of determining the contents of one's self-concept (Carpenter & Meade-Pruitt, 2008).   More specifically, the task asks participants to generate twenty statements in response to the phrase 'I am…' and as such, it allows for an open-ended exploration of the subjective and idiosyncratic contents of the self.   As a result of the simplicity and usefulness of this task it has been applied across a multitude of populations and contexts. More specifically, the TST has been used to explore self-concept across gender (e.g., Gigy, 1980; Grace & Cramer, 2002), age (e.g., Montemayor & Eisen, 1977; Noppe, 1983), cultures (e.g., Abdukeram, Mamat, Luo, & Wu, 2015; Lam, Chan, Marcet, Wong, Wong, & Wong, 2014; Rhee et al., 1995) and clinical groups (e.g., Addis & Tippett, 2004; Hsiao, Kaiser, Fong, & Mendez, 2013; Pison, 2012). Of particular relevance to this thesis is the finding that people with AM impairment generate fewer items on the TST. For instance, Addis and Tippett (2004) explored the relationship between AM and identity in 20 people with AD and 20 age-matched controls. They administered two tests of AM (the Autobiographical Memory Interview; Kopelman et al., 1989, and a measure of episodic and semantic autobiographical fluency; Dritschel, Williams, Baddeley & Nimmo-Smith, 1992) alongside the TSCS (Fitts, 1965) and the TST. The authors found that 'impairments of some components of autobiographical memory, particularly autobiographical memory for childhood and early adulthood, were related to changes in the strength and quality of identity' (p. 56). In relation to the TST, findings showed that that the number of items a participant with AD generated on this task was directly related to autobiographical fluency

for childhood and early adulthood, suggesting that a particular relationship exists between the accessibility of memory and that of self statements.

2.1.2 The *I Am Fluency Task*

In order to examine the accessibility of self statements, the TST was modified such that participants are given one minute to generate as many statements as possible beginning with the phrase *I am*. The assumption being that the ability to generate statements in a given time reflects accessibility to self-concept. This task is simple, open-ended, quick to administer and able to access both narrative (e.g., *I am* married) and trait based (e.g., *I am* cheerful) knowledge of the self. By asking participants to retrospectively rate their statements, it allows for examination of the organisation, perceived importance and emotional valence of statements. By asking them to assign an age of emergence to self statements it is also possible to examine the temporal characteristics of identity formation. In sum, it is proposed that this novel tool will allow for both quantitative and qualitative exploration of the self, whilst preserving the subjective and idiosyncratic nature of this construct. A major pragmatic motivation for this tool is its potential usefulness in clinical settings and patient work. For instance, the *I Am Fluency Task* might be used in clinical work to establish aspects of the self that a person currently feels connected to, as well as those they may wish to develop. These ideas are explored in the context of neuropsychological research in Chapter 4 and Chapter 6.

To summarise, the aims of this chapter were based on a single core concept: if there is a relationship between the self and memory, it should be possible to use an experimental design to observe changes in the accessibility of self statements following a memory manipulation. Specifically, the studies presented within this chapter examined self-concept retrieval in the *I Am Fluency Task* following memory retrieval by asking participants to retrieve a personally-relevant autobiographical memory (or perform a control task that was non-self related) prior to the generation of self-concept statements. The prediction was also straight forward: if dwelling on an autobiographical incident activates self statements, then it

should be possible to measure an increase in the accessibility of self statements, relative to a control condition.

2.2 Study 1a: Autobiographical Retrieval and Self-Related Fluency

In an attempt to ensure that participants retrieved highly self-relevant and important autobiographical memories, Study 1a asked participants to recall a past life event that they thought about in a 'nostalgic' way. Wilschut, Sedikides, Arndt and Routledge (2006) suggested that such 'descriptions of nostalgic experiences typically featured the self as a protagonist …in momentous events' (p.975).

As the working self is dynamic and context dependent, and because contemporary theory supports the idea of a bidirectional relationship between self and memory (e.g., Conway, 2005), it was predicted that participants in the autobiographical memory condition would generate significantly more self statements than those in the control condition. Since the *I Am Fluency Task* is open-ended it was also possible to consider whether autobiographical retrieval influenced the particular aspects of the self that were most accessible. It was proposed that examining the impact of autobiographical memory on different types of self statement would shed light on the way that these two constructs are represented and linked.

2.2.1 Method

2.2.1.1. Participants

The 48 participants (4 males) aged 18-24 ($M = 19.02$, $SD = 1.08$) were Psychology students at the University of Leeds who received course credit for participation. In a between-participants design, participants were randomly allocated to one of two experimental conditions (autobiographical memory vs. control). Groups were matched on gender, age (t (46) = .66, p = .51) and years of education (t (46) = .25, p = .81). Informed consent was obtained from each participant and research was approved by the School of Psychology's (University of Leeds) ethics committee (ref: 12-0228).

2.2.1.1   Materials and Procedure

Participants were tested in groups ranging in size from one to six participants. Participants were seated at separate desks. They were provided with a booklet for their responses and all instructions were read aloud by the experimenter. Tasks are described in the order in which they were completed by participants.

2.2.1.1.1   Autobiographical memory manipulation

Participants were randomly assigned to either the autobiographical memory or control condition. In the autobiographical memory condition participants were instructed to write a detailed description of a personal event from their past. The following instructions (adapted from Wildschut, Sedikides, Arndt & Routledge, 2006) were read aloud to participants;

Please think of a past event in your life that has personal meaning to you. This should be an event that you think about in a nostalgic way. Nostalgia refers to a sentimental longing for the past, typically for a time or place with happy personal memories associated with it. Please try to think of an important part of your past that makes you feel most nostalgic. Write down this nostalgic experience in all its vivid detail, you should be as detailed, thorough, and descriptive as possible.

In the control condition, participants wrote a description of the solar system, as this was unlikely to cue self-relevant memories. Participants were instructed to write a detailed, factual description that contained no personally relevant information. Specifically, the following instructions were read aloud;

Please write a description of the solar system. This should be a factual description, and should not include descriptions that have any personal relevance to you. For instance, think of defining features or any facts that you know about the solar system for instance, the solar system consists of the sun, and Mercury is the planet that is closest to the sun. You should be as detailed, thorough, and descriptive as possible. Don't worry if you think that some of the things that you write are inaccurate, that doesn't matter, just write as much as you can.

In both conditions participants were given four minutes to write their description and an additional minute to generate four keywords relevant to their description.

2.2.1.1.2 The *I Am Fluency Task*

To measure the accessibility of self statements, the *I Am Fluency Task* was administered. Participants were asked to produce stable and enduring aspects of their self, in the form of statements that they felt were essential to defining who they were. To avoid cuing statements, no specific examples were given, but participants were told that they might include roles, personality traits or physical traits. Participants were told that each statement must begin with the phrase *I am*, and were given one minute to write down as many of these statements as possible.

2.2.1.2.3. Subjective Experience Scales

Questions were administered to assess participants' mood, emotionality, feelings of nostalgia and how much they thought about themselves whilst writing their description, examples are provided in Table 2.1. The question that assessed feelings of nostalgia also allowed a manipulation check to ensure that participants engaged with the description writing task.

Table 2.1. Questions administered to assess subjective experience during the description writing task.

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1   Whilst I was writing the description my mood was…

1. Very negative, 2. Somewhat negative, 3. Neither positive nor negative 4. Somewhat positive or 5. Very positive.

2   Whist I was writing the description I felt…

1. Not emotional at all, 2. A little bit emotional, 3. Slightly emotional, 4. Strongly emotional or 5. Very intensely emotional.

3   How important do you feel that the description that you wrote is to the person you are? Rated on a scale of 1 to 5, with 1 being "not at all" and 5 being "extremely".

4   How nostalgic did you feel after writing the description? Rated on a scale of 1 to 5, with 1 being "not at all" and 5 being "extremely".

5   How much did you think about yourself whilst writing the description? Rated on a scale of 1 to 5, with 1 being "not at all" and 5 being "extremely".

2.2.1.1.3 Self-Statement Ratings

After the fluency part of the task, participants returned to their self statements and were asked to rate each one on two dimensions. Firstly, they rated how important and central each *I am* statement was to defining their identity, using a scale of 1 to 10, with 10 being very important and 1 being not important at all. Secondly, participants rated each statement on emotional valence i.e. how positive or negative they felt about each *I am* statement, again on a scale of 1 to 10, with 10 being extremely positive and 1 being extremely negative. Finally, participants were asked to retrospectively date each of their *I am* statements, whereby they gave an age at which they became a person who would define themselves using that

statement. Participants assigned '0' to statements that had been self-defining for as long as they could remember.

2.2.1.1.4 Fluency Control Tasks

As the task of primary interest involved generating statements under time pressure, a series of fluency tasks were included to examine group differences. Category fluency was assessed by asking participants to write as many animals as they could in one minute. Letter fluency was assessed using the FAS Controlled Oral Word Association Test (Benton, 1968) that asked participants to generate as many words as they could beginning with the letters 'F', 'A' and 'S'. Participants were given one minute for each letter, with a fluency score derived by averaging the number of words generated for each letter.

2.2.1.1.5 Data Coding

Data was coded by three independent judges; the experimenter and two postgraduate students at the University of Leeds who were blind to the hypotheses. Data was coded according to three categories; physical, social and psychological. Self-statements were coded as physical if they reflected attributes that were apparent from appearance (e.g., small, brunette, 20, female, overweight, black, curly haired, pale), social if they described a social category that was objectively verifiable (e.g., student, hockey player, Irish, musician, friend, single, athlete, from Leeds, planning to be a psychologist) and psychological if they referred to a personality trait that required the participant to be introspective and were also subjective in nature (e.g., helpful, patient, self-conscious, perfectionist, good friend, a bit weird, lucky, loyal).Whilst some self statements were easy to assign to a particular category e.g., small and student, some were more difficult e.g., good friend. In such instances where an evaluative statement was used, statements were coded as psychological. If a statement was repeated during the task e.g., if a participant generated the statement *female* twice, this was scored as one correct response. Post-coding comparisons revealed 100% agreement between judges.

2.2.2 Results

Note that in instances where proportional data has been used in an analysis of variance (ANOVA) the main effect of group is not reported. This is the case throughout this thesis and is due to the fact that proportional data is used. More specifically, the use of proportional data means that no group differences emerge, as group differences always sum to 1.0. In instances where assumptions regarding the homogeneity of variance have been violated, Greenhouse-Geisser corrected degrees of freedom are reported. Throughout this thesis, all findings that are described as being non-significant are non-significant at p > .05, and where p < .10, findings are described as demonstrating a strong trend towards significance.

2.2.2.1 *I Am* Fluency

A total of 415 *I am* statements were collected across conditions, with 225 generated by participants in the autobiographical memory condition and 190 generated in the control condition. On average, participants in the autobiographical memory condition generated 9.38 (SD = 2.02) *I am* statements in one minute, and participants in the control condition generated an average of 7.92 (SD = 1.91) statements in one minute. Univariate ANOVA revealed a significant effect of manipulation (F (1, 46) = 6.62, p = .01), with participants in the autobiographical memory condition generating significantly more *I am* statements than those in the control condition. The self-statement ratings that participants assigned to each *I am* statement (importance and emotional valence) were also considered, but between groups analyses revealed no group differences (p > .23 in each case).

Due to the nature of the *I Am Fluency Task* it was necessary to consider group differences on alternative fluency measures. Independent samples t-tests revealed no group differences in category fluency (t (46) = 0.04, p =.97), yet there was a marginal but non-significant group difference in letter fluency, with participants in the autobiographical memory condition being somewhat faster than those in the control condition (t (46) = 1.78, p =.08) . To investigate the idea that autobiographical retrieval had an overall effect on fluency,

performance of participants in this condition on the letter fluency task was correlated with that on the *I Am Fluency Task*. Analysis revealed no correlation between the performance on these two tasks ($r = .195$, $p = .36$).[1]

A manipulation check confirmed that the autobiographical memory induction was successful. Participants in this condition rated themselves as feeling significantly more nostalgic after writing their description than those in the control condition ($t (46) = 8.61$, $p < .001$). Participants in the autobiographical memory condition also rated their mood as being more positive following the descriptive writing task ($t (46) = 3.75$, $p < .001$). This was important given that participants were provided with a direct instruction to retrieve a happy personal memory, thus elevated mood suggests that memory retrieval was truly episodic and re-experienced.

2.2.2.2   Type of Statement

Next, findings were analysed in terms of the types of *I am* statements that were generated by participants in each condition. Given that the number of *I am* statements generated varied across participants, proportional data was considered. First of all, the mean proportion of physical, social and psychological statements were calculated and are presented in Figure 2.1.

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[1] To check that verbal fluency did not underlie the difference in *I am* statement generation that was observed between conditions, an analysis of covariance was carried out, adding in letter fluency score as a covariate. The significant effect of group was unchanged.
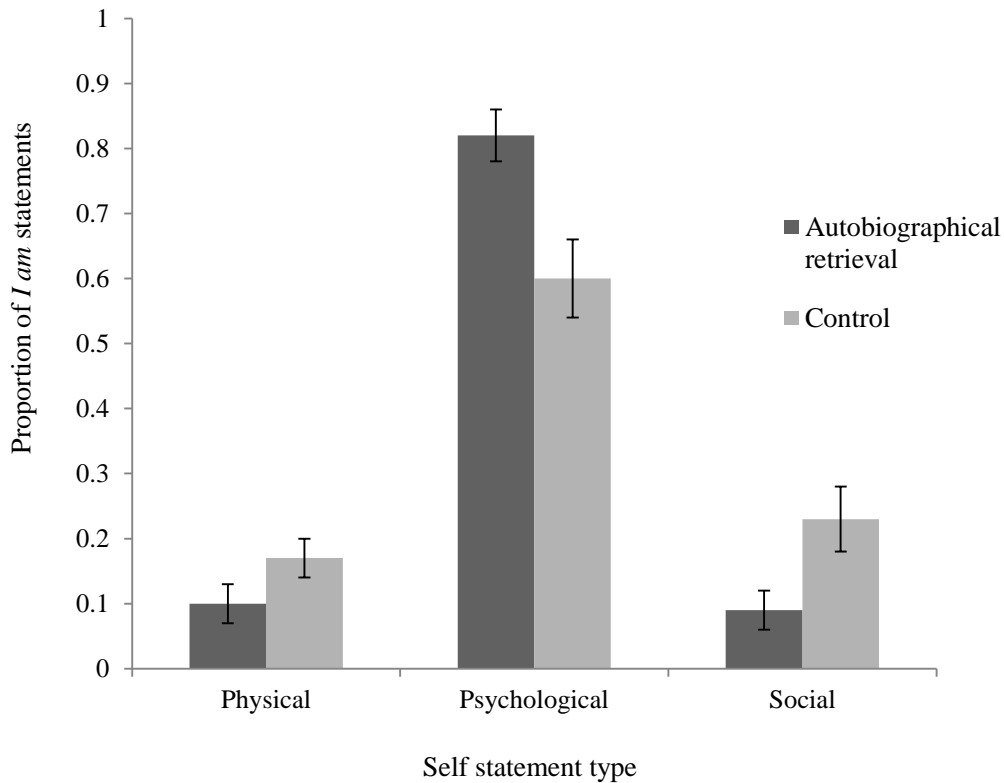
Figure 2.1. Mean proportion of physical, social and psychological statements generated by participants in each experimental condition. Error bars represent standard error of the mean.

The type of statement generated by participants in each condition was examined using a 2 x 3 (condition x statement type) mixed design ANOVA, allowing for the incidence of an interaction between condition and statement type to be explored. There was no main effect of group ($F (1, 46) = .73$, $p = .40$), which is unsurprising given that proportional data was used and thus the three statement types summed to 1.0 across groups. But there was a main effect of statement type ($F (1.46, 67.09^2) = 73.67$, $p < .001$), with participants generating a higher proportion of psychological statements, relative to social and physical statements. Furthermore, a significant statement type x group interaction was found ($F (1.49, 67.09) = 6.56$, $p = .006$), with significantly higher proportional rates of psychological statements

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[2] Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated here, thus increasing the risk of a Type I error. To ensure that a valid critical F value was obtained, Greenhouse-Geisser corrections were applied to the degrees of freedom, which were adjusted from 2, 92 to 1.46, 67.09.

produced in the autobiographical memory condition, relative to the control condition (t (38.38[3]) = 2.92, p = .006). Between groups t tests also revealed that participants in the control condition generated significantly more social statements than those in the autobiographical memory condition (t (37.98) = 2.29, p = .028), but no difference between the proportion of physical statements was found (t (46) = 1.84, p = .073). To explore the preference for generating psychological statements within groups, data was split by group and repeated measures ANOVA was used. First of all, analysis compared statement type for participants in the autobiographical memory condition and showed a main effect (F (2, 46) = 106.21, p < .001); Bonferroni corrected pairwise comparisons revealed that participants in this condition generated significantly more psychological statements than physical (p < .001) or social (p < .001) statements. With regards to participants in the control condition, analysis revealed a main effect of statement type, F (1.39, 31.97) = 13.13, p <.001, Mauchly's test of sphericity indicated unequal variances (p = .002), so degrees of freedom were adjusted from 2, 46 to 1.39, 31.97. Pairwise comparisons showed that participants in this group were also significantly more likely to describe themselves in relation to psychological statements than physical (p < .001) or social (p = .012) statements.

2.2.2.3 Emotional Valence

Participants rated each *I am* statement in terms of how positive or negative they felt about it. This was responded to on a scale of 1 to 10, with 10 being extremely positive and 1 being extremely negative. When analysing responses all ratings of 5 and 6 were removed given that they represented neutral points; thus ratings of 7-10 were categorized as statements that participants felt positive about, and ratings of 1-4 were categorised as statements that participants felt negative about. Following this, the percentage of positive and negative statements generated by participants in each group was calculated.

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[3] Levene's test indicated unequal variances for each between groups statement type comparison, so degrees of freedom were adjusted from 46 in each case.

Across groups, participants showed an overwhelming bias for generating positively valenced *I am* statements; 72.19% (SD = 16.85) of the statements generated by participants in the autobiographical retrieval condition were positive in nature, relative to 75.14% in the control condition. In contrast, only 15.37% (13.92) of all statements generated by participants in the autobiographical retrieval condition, and 12.10% (14.26) of all statements generated by those in the control condition, were negatively valenced. The bias for generating positive statements was significant across groups - in the autobiographical retrieval condition (t (23) = 9.95, p < .001) and the control condition (t (23) = 8.78, p < .001). Between group comparisons revealed no significant differences in the percentage of positive statements (p = .63) or negative statements (p = .43) generated according to group.

2.2.2.4 Importance

Participants rated self statements in relation to how important each was in defining their sense of self. Again, this was responded to on a scale of 1 to 10, with 10 being very important and 1 being not important at all. Between participants analysis revealed that ratings did not differ in relation to experimental group (t (46) = 0.89, p = .38) and so data was collapsed across conditions to examine the overall importance of statements generated. The mean importance rating was 6.92, illustrating that the self-statements that are most accessible to participants are of moderately high importance to defining one's sense of self.

2.2.2.5 Age of Emergence

For each *I am* statement generated, participants were asked to give an age at which that statement became identity defining, referred to as the age of emergence. It was of interest to explore whether autobiographical retrieval impacted upon the age at which individuals retrieved *I am* statements from. To this end, analysis was carried out by comparing age of emergence across experimental group in relation to average age of emergence, earliest age of emergence, most recent age of emergence and the percentage of statements that had always been identity defining (see Table 2.2).

Table 2.2. Mean (SD) of the average age, earliest age of emergence and most recent age of emergence, as well as the percentage of statements that had always been identity defining.

	Average	Earliest	Most recent	Always (%)
Autobiographical memory	12.88 (2.78)	8.04 (4.53)	16.92 (1.93)	35.53 (22.39)
Control	12.44 (2.78)	7.58 (3.88)	17.21 (1.35)	28.9 (14.5)

Between groups analysis revealed no difference between the average age given according to group (t (46) = 0.53, p = .59), nor the youngest (t (46) = 0.38, p = .71) age given by participants. Participants in the autobiographical retrieval condition tended to generate a higher percentage of statements that had always been a defining feature of their identity relative to those in the control condition, yet this difference was not significant (p = .23).

Since age of acquisition did not vary in relation to experimental group, data was collapsed across condition to explore age of self-image formation. The average age of emergence for the entire sample was 12.31 (SD = 6.94), the median age of emergence was 13 and the most frequent response was '0', which represented 31.81% of all responses on this question, and reflected statements that had been identity defining for as long as the participant could remember. The distribution of selves emerging across the lifespan is presented in Figure 2.2.
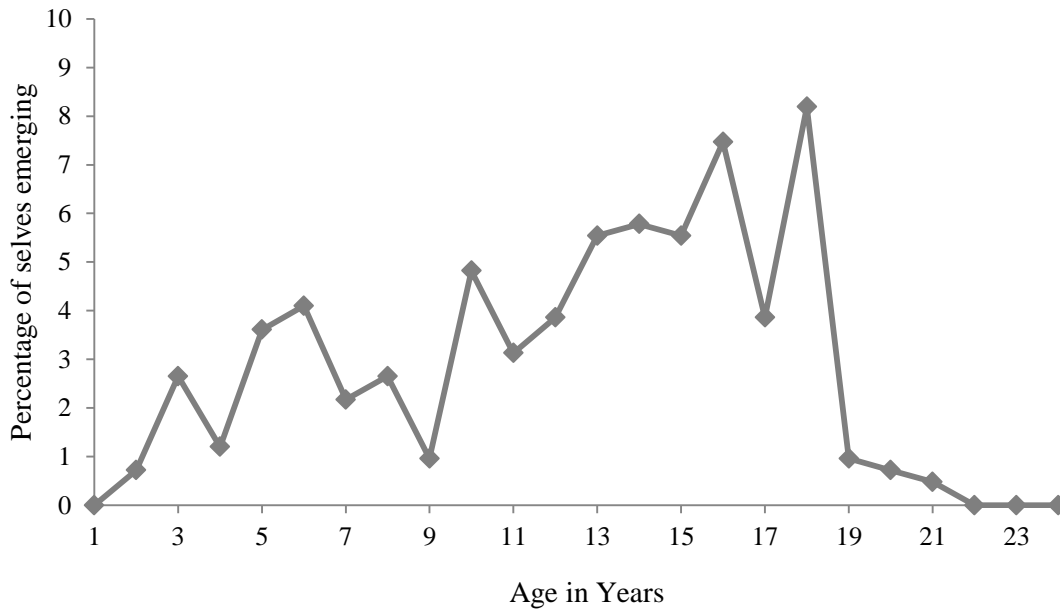
Figure 2.2. Graph to show the percentage of selves emerging across the lifespan (collapsed across experimental group).

Overall, Figure 2.2 shows a positive relationship between age and the emergence of selves, with a notable peak at the age of 18, followed by which there is a dramatic decline in the emergence of self statements for most recent times. This decline may be partially explained by the fact that a relatively small number of participants were aged 20-24 (21% of the entire sample); however, the majority of participants were aged 19 (48%) at the time of testing, and so this does not explain why relatively few statements emerged at age 19. It is possible that this peak identity formation corresponds to the time when the participants in the present sample adopted a new student identity. To explore this idea in more detail, Chapter 5 examines the clustering of selves around the start of university.

2.2.2.6 Subjective Experience Scales

Subjective experience scales were analysed to explore which aspects of description writing might have contributed to the significant effect of manipulation. Scales were included to assess mood, emotionality, feelings of nostalgia and how much participants had thought about themselves whilst writing their description. An additional scale was included to assess how important the participant felt that their description was to the person they were at the

time of testing. Since the emphasis here was on the effect of subjective experience on the number of *I am* statements generated data was collapsed across condition. Correlational analyses revealed that the number of *I am* statements generated was positively correlated with mood ($r = .36$, $p = .01$) and importance ($r = .32$, $p = .32$). Interestingly, there was no correlation between how much participants thought about themselves during description writing and the number of self statements that they subsequently generated, suggesting that the memory manipulation itself did not explicitly activate self-concept statements. Feelings of nostalgia were most strongly related to the number of *I am* statements generated ($r = .43$, $p = .002$), reiterating the main finding that increased accessibility of *I am* statements was driven by autobiographical recall.

In sum, participants in the autobiographical memory condition were able to generate significantly more *I am* statements than those in the control condition; confirming the idea that autobiographical retrieval increased accessibility of self-concepts, and this was independent of any variation between groups in general fluency ability. Age of emergence data showed a clustering of selves around the time that participants experienced a transitional lifetime event and mood ratings also confirmed that autobiographical memory retrieval induces positive mood. Furthermore, the type of statement generated varied between conditions - following retrieval of a self-relevant memory participants were more likely to generate psychological, trait-like descriptions.

2.3   Study 1b: Autobiographical Retrieval and Psychological Selves

While Study 1a made predictions about autobiographical memory increasing access to self statements in general, as evident in increased *I am* fluency, Study 1b was designed to further explore the particular type of self statement generated in response to autobiographical retrieval. In particular, this experiment examined whether or not the finding that autobiographical retrieval increases access to psychological self statements would be replicated. To this end, an online questionnaire was developed that allowed for the effect to

be explored in a larger and more diverse sample. Participants carried out broadly the same (between participants) tasks, although the fluency component was removed. Specifically, all participants were asked to generate 10 self-images, and due to internet format and a focus on statement type rather than accessibility, no time limit was imposed.

2.3.1 Method

2.3.1.1 Participants

87 participants (26 males and 60 females; 1 participant did not disclose this) were recruited via psychology questionnaire websites. Participants were aged 18-64 (mean age = 29.98, SD = 10.64) and groups were matched on age (t (85) = 1.36, p = .18).

2.3.1.2 Materials and Procedure

Participants completed an online questionnaire that was similar to that used in Study 1a. The fluency component of the procedure was removed, as type of statement generated was of primary interest, but all other elements remained identical. Each participant was asked to generate 10 *I am* statements. No time limit was given for this task, but participants were instructed to respond with the first statements that came to mind and to avoid editing their statements. Tasks were presented to participants in the order described in Study 1a.

2.3.1.3 Data Coding

Data was coded according to the three categories described in Study 1a (physical, social or psychological). In addition to experimenter coding, data was also coded by a second independent judge who was blind to the hypotheses; Pearson's correlation revealed high inter-rater reliability between the two judges (physical: r = .80; psychological: r = .98; social: r = .99).

2.3.2 Results

A total of 865 *I am* statements were collected in Study 1b; all but two of the participants were able to generate 10 statements (both of these participants were in the control condition - one generated 6 *I am* statements, and the other generated 9 statements).

2.3.2.1 Statement Type

Figure 2.3 shows the proportion of each type of statement generated and demonstrates replication of the previous finding; retrieving a highly self-relevant autobiographical memory increases access to psychological self statements.
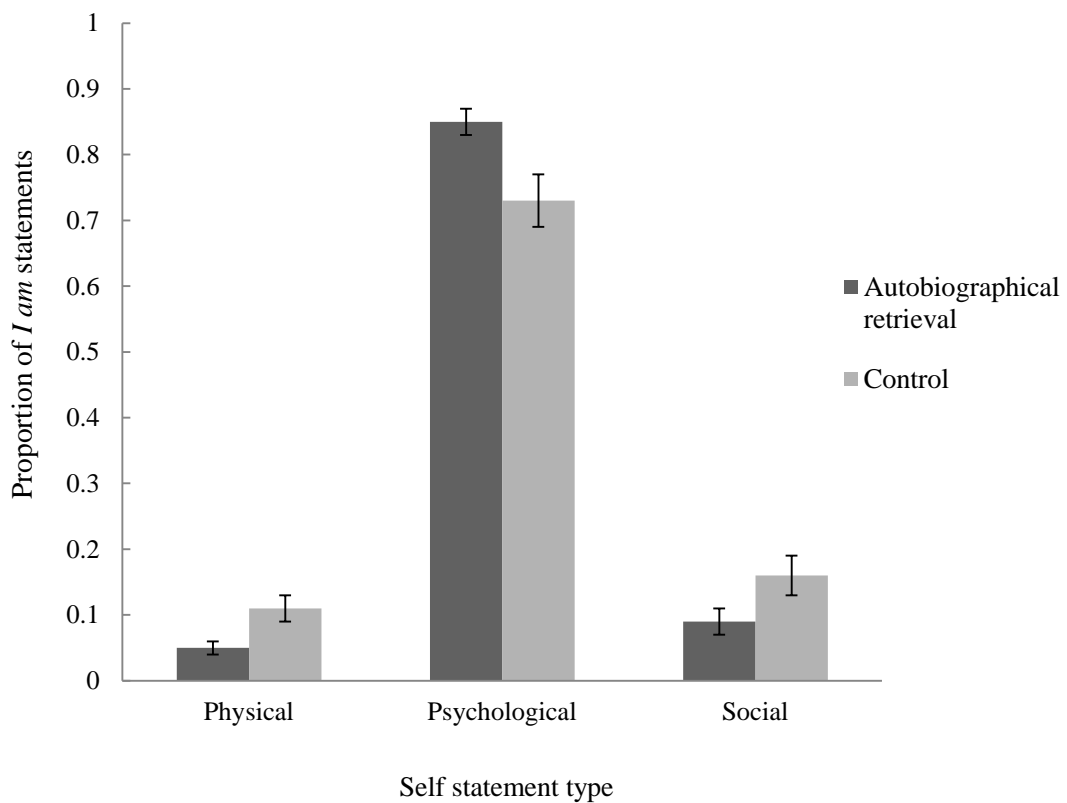
Figure 2.3.Mean proportion of physical, social and psychological statements generated by participants in each experimental condition. Error bars represent standard error of the mean.

Type of statement generated by participants in each condition was examined using a 2 x 3 (condition x statement type) mixed design ANOVA, with condition as a between participants variable and statement type as a within participants variable. Findings replicated

those in Study 1a and revealed a main effect of statement type (F (1.30, 110.08[4]) = 320.82, p <.001) and a significant statement type x group interaction (F (1.30, 110.08) = 6.38, p = .008).

To explore the preference for generating psychological statements within groups, repeated measures ANOVA was used. First of all, analysis compared statement type for participants in the autobiographical memory condition and showed a main effect (F (1.30, 50.68[5]) = 384.25, $p < .001$); Bonferroni corrected pairwise comparisons revealed that participants in this condition generated significantly more psychological statements than physical ($p < .001$) or social ($p < .001$) statements. They also generated significantly more social than physical statements ($p = .029$). With regards to participants in the control condition, analysis revealed a main effect of statement type (F (1.29, 59.44) = 90.59, $p <.001$). Pairwise comparisons also showed that participants were significantly more likely to describe themselves in relation to psychological statements than physical ($p < .001$) or social ($p < .001$) statements. There was no difference between the proportion of physical and social statements generated ($p = .262$)

In sum, the presence of an interaction indicated that whilst both groups generated a higher proportion of psychological statements, significantly higher proportional rates of psychological statements were produced in the autobiographical memory condition, relative to the control condition (t (76.13[6]) = 2.93, $p = .005$). Significantly fewer physical statements were also generated by participants in the autobiographical memory condition (t (73.41) = 2.85, $p = .006$), but there was no between group difference in the proportion of social statements generated (t (78.18) = 1.79, $p = .078$).

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[4] Mauchly's test of sphericity indicated unequal variances and so degrees of freedom were adjusted from 2, 170 to 1.30, 110.08.

[5] In this instance, degrees of freedom were adjusted from 2, 78 to 1.30, 50.68.

[6] Levene's test indicated unequal variances for each between groups statement type comparison, so degrees of freedom were adjusted from 85 in each case.

Between groups analysis was carried out to explore group differences in self-statement ratings assigned by participants to each *I am* statement, but no group differences were found ($p > .20$ in each case).

Findings from this study provide support for those from Study 1a regarding the impact of retrieval of a self-relevant memory on the type of *I am* statement generated. Importantly, this replication used a different version of the original *I Am Fluency Task* with a larger sample that was also considerably more diverse in terms of age, occupation type and gender; this was crucial given that Study 1a included only 4 males out of a total of 48 participants, whereas 29.89% of the participants in the present study were male.

2.3.2.2   Self Statement Ratings

With regards to emotional valence, the bias that was found in Study 1a was replicated, as 69.69% (SD = 29.90) of the statements generated by participants in the autobiographical retrieval condition were positive in nature, relative to 61.89% (SD = 28.62) in the control condition. In contrast, 20.96% (SD = 26.68) of all statements generated by participants in the autobiographical retrieval condition, and 15.74% (SD = 14.31) of all statements generated by those in the control condition, were negatively valenced. The bias for generating positive statements was significant across groups in the autobiographical retrieval condition (t (39) = 5.57, $p < .001$) and in the control condition (t (46) = 8.27, $p < .001$), but between group comparisons revealed no significant differences in the percentage of positive statements ($p = .22$) or negative statements ($p = .27$) generated according to group.

Between group comparisons also revealed that importance ratings did not differ significantly according to experimental group (t (85) = 1.30, $p = .20$). As such, data was collapsed across conditions, revealing an overall average importance rating of 7.84, thus providing further evidence that, regardless of experimental manipulation, the self statements that are most accessible to participants are of relatively high importance in defining their sense of self.

2.3.2.3   Age of Emergence

Analysis was carried out to compare age of emergence across experimental group, specifically in relation to average age of emergence, earliest age of emergence, most recent age of emergence and the percentage of statements that had always been identity defining, findings are presented in Table 2.3.

Table 2.3. Mean and standard deviation of average age, earliest age of emergence and most recent age of emergence, as well as the percentage of statements that had always been identity defining.

	Average	Earliest	Most recent	Always (%)
AM retrieval	18.30 (7.58)	9.93 (6.65)	25.85 (10.34)	25.00 (29.18)
Control	16.83 (4.92)	8.43 (5.39)	25.06 (8.98)	24.89 (22.73)

Between participants analysis revealed no significant differences between groups on any of the age of emergence measures ($p > .25$ in each case), as such, data was collapsed across groups to allow for exploration of age of emergence across the lifespan. Data is presented in Figure 2.4.

As in Study 1a, the most frequent answer generated in response to the age of emergence question was '0' i.e. a statement that had been a defining feature of a participants identity for as long as they could remember, in this instance, this represented 25.59% of all responses on this question. Responses of '0' were excluded from Figure 2.4 below, which represents only *I am* statements with a specified age of emergence.
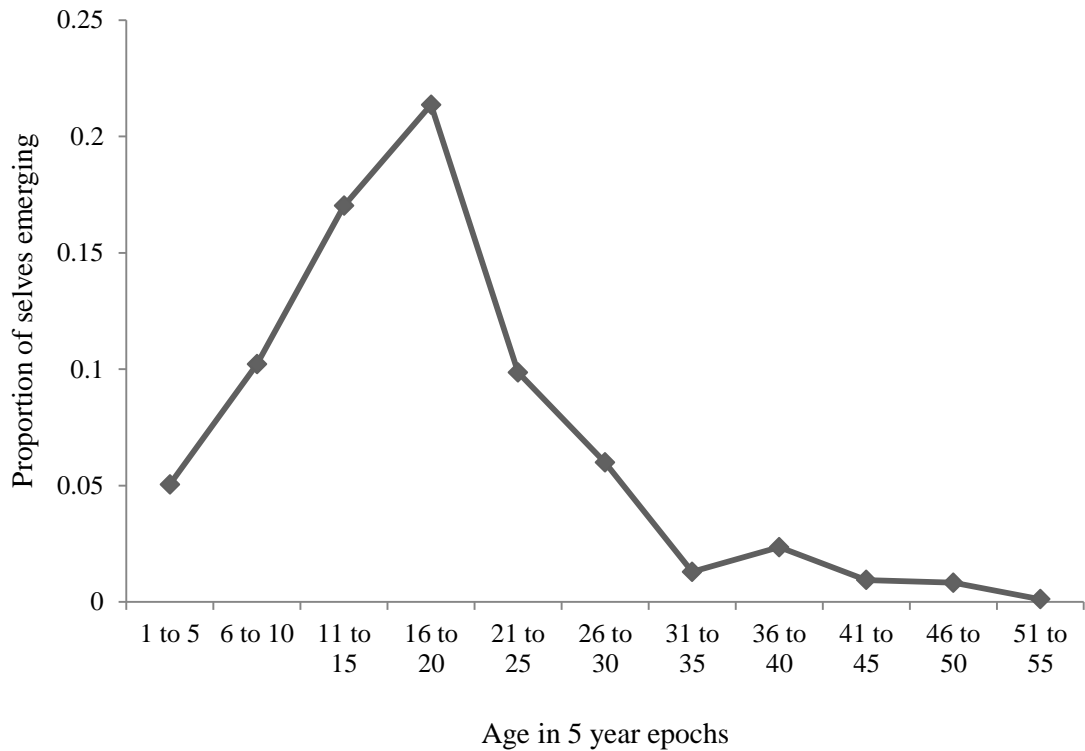
Figure 2.4. Graph to show the emergence of selves across the lifespan.

Figure 2.4 demonstrates a notable clustering of self statements that emerge between the ages of 16 and 20. Most interestingly, this is also within the period of the reminiscence bump (e.g., Fitzgerald, 1988). It is important to note that the bump in the emergence of selves might be exaggerated, and the scarcity of emergence in later life under-represented, as the average age of the participants was 29.99 years (SD = 10.69), and as such, the majority were sampling from an earlier portion of the lifespan. Nonetheless, this finding is consistent with research that proposes an identity based account of the reminiscence bump (e.g., Rathbone et al., 2008).

2.3.2.4   Subjective Experience Scales

Several questions were included to determine each participant's subjective experience of the description writing task. In particular, questions assessed mood, emotionality, feelings of nostalgia, how much the participant had thought about themselves whilst writing their description and how important the participant felt that their description was to the person

they were at the time of testing. Questions were responded to on a scale of 1 to 5, with a higher number representing a more salient feeling. Findings are presented in Table 2.4.

Table 2.4. Mean and standard deviation of the subjective experience ratings generated by participants in each experimental condition

	Mood	Emotionality	Nostalgia	Self	Importance
AM retrieval	4.43 (0.75)	3.35 (1.19)	3.7 (1.38)	3.95 (1.15)	3.2 (1.14)
Control	3.49 (0.91)	1.51 (0.80)	1.98 (1.17)	1.77 (0.87)	1.70 (1.02)

To explore group differences, between participants t-tests were employed. Analysis revealed that AM retrieval led to more positive mood (t (85) = 5.20, $p <$ .001), a more intensely emotional experience (t (66.72[7]) = 8.30, $p <$ .001) and greater feelings of nostalgia (t (85) = 10.07, $p <$ .001). It also resulted in participants thinking more about themselves (t (85) = 6.48, $p <$ .001) and generating a description that was of more importance to them than those in the control condition (t (85) = 6.29, $p <$ .001).

2.4   General Discussion of Studies 1a and 1b

The studies within this chapter examined whether the accessibility of stored self statements was influenced by the retrieval of personal experiences from memory, as is predicted in Conway's Self Memory System (e.g., Conway, 2005).   As such, they provided an experimental evaluation of the idea that self and memory are inextricably linked.

In Study 1a, the *I Am Fluency Task* was used to examine the effect of autobiographical retrieval on the generation of stored self statements. Participants wrote a description of an autobiographical memory or a control topic of no relevance to the self and then generated as

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[7] Levene's test indicated unequal variances, so degrees of freedom were adjusted from 85 to 66.72.

many self-defining statements as possible in one minute, each beginning with *I am*. Participants in Study 1a who retrieved a personally relevant memory were able to generate significantly more statements than those in the control condition; suggesting that autobiographical retrieval increases access to the self. In contrast, Study 1b used a shortened version of the Twenty Statements Test (Kuhn & McPartland, 1954) to explore the type of statement generated and thus no fluency component was included. Despite this difference in methodology and the use of a larger and more diverse sample in Study 1b (this sample was more diverse in terms of age, gender and years of education), results across the two studies were remarkably similar.

In both studies, the type of statement generated varied following retrieval of a self-relevant memory. For both experiments, and in both groups, the majority of statements generated were psychological in nature, but between-group comparisons revealed that participants in the autobiographical memory condition generated proportionately more psychological, trait-like descriptions. Across both studies, memory retrieval had no impact on the personal significance nor the emotional valence ratings assigned to self statements, suggesting that the impact of memory was specific to the accessibility of statements. Age of emergence data was also similar across groups, as participants most often generated self statements that had been identity defining for as long as they could remember and showed a clustering of selves emerging in early adulthood. Overall, this suggests that findings are generalisable beyond the sample of university undergraduates employed in Study 1a.

What implications might these findings have for the SMS? Findings show that the self is a dynamic construct insofar as there is a response to having generated an autobiographical memory on the accessibility of self-concepts. Indeed Conway (2005) describes the working self as changing constantly according to the constraints of autobiographical memory. Conway also suggests that one of the fundamental control processes of the working self is to ensure that memory is coherent with self-images; this directional link is illustrated well by studies that have examined the self-reference effect (Rogers, Kuiper & Kirker, 1977) and

demonstrated that the self functions to boost memory. In this case, it has been shown that the reverse is also true; participants can retrieve more information about themselves following retrieval of an autobiographical memory. Thus it seems possible to use memory to 'boost' the self. It is somewhat difficult to tease apart the direction of the relationship between self and memory, given that the two are inextricably linked, and as such, there is a possibility that the AM task activated self statements, which subsequently modulated memory search and recall. However, results from Study 1a showed that the degree to which participants reported thinking about themselves during description writing was unrelated to the number of *I am*'s that they subsequently generated, suggesting that despite the fact that the AM condition activated the self, it did not activate self-concept explicitly. What is unclear from the data is whether there was an overlap between self statements and memories, that is, whether the content of the self statements reflected the content of the autobiographical memories that were recalled. It would be valuable for future research to tease apart the distinction between autobiographical recall increasing the accessibility of relevant self-concepts, or self-concept more generally.

There is considerable debate over whether conceptual self-knowledge is dependent on autobiographical memory. Within the context of the SMS, Conway (2005, p. 597) claims that the conceptual self is 'connected to autobiographical knowledge and the episodic memory system to activate specific instances that exemplify, contextualize, and ground their underlying themes or concepts' (as cited in Prebble et al., 2012). Consistent with this, Addis and Tippett (2004) found that individuals with Alzheimer's disease who presented with diminished autobiographical memory were less able to generate statements about themselves, and these two abilities were correlated. The studies within the present chapter demonstrate that retrieval of a memory offers an immediate benefit in terms of access to self-concept in neurologically intact individuals, thus implying that a chronic inability to think about oneself in the past may limit the number of self-concepts generated. This finding is in line with those of Addis and Tippett (2004), yet is at odds with a growing body of

literature that suggests that the self-concept can be known in the absence of episodic memory. For instance, Klein and colleagues (Klein, 2010; Klein & Gangi, 2010; Klein & Lax, 2010) have provided considerable evidence that episodic memories are not necessary in order for related trait self-knowledge to be accessed. Similarly, Rathbone et al. (2009) provide further support in their consideration of self in a case of retrograde amnesia; the authors demonstrate how conceptual autobiographical knowledge is used to support the self in the absence of episodic memory. Perhaps the most convincing evidence comes from work with patient KC, who was able to accurately update his conceptual self-knowledge in spite of severe episodic memory impairment (Tulving, 1993). In response, it is proposed that disparities may relate to the need for a more nuanced view of the self-memory relationship in neuropsychological groups, one that emphasises the relationship between memory, psychological selves and the reduced accessibility of self statement, as opposed to a global loss of self. This idea is explored in a case of amnesia in Chapter 4.

To our knowledge, the present study is the first of its type to demonstrate that autobiographical memory can be used to access the self, and thus identity can be supported by autobiographical memory. In fact most of the autobiographical memories retrieved by participants were episodic in nature. For instance, one participant wrote:

"I was sitting with three friends on the edge of a cliff which went down to a beach and the sea. It was really hot, about 30 degrees centigrade, the sky was completely blue and it was really peaceful. We had a picnic with bread, dips, crisps, those sorts of things. We had music playing on shuffle. We were all lying on towels, just really relaxed. There was a panoramic view around us, we could see all the sailing boats and some people swimming in the sea".

In response, it is proposed that whilst the neuropsychological research described above highlights that episodic memory might not be essential to the retrieval of self-knowledge, these two constructs are not entirely independent. We suggest that our findings, together with those of previous work (e.g., Klein & Loftus, 1990, 1993b; Rathbone et al., 2009; Tulving, 1993), can be interpreted in relation to the Self-Knowledge and Identity Model

(SKIM Model; Haslam, Jetten, Haslam, Pugliese & Tonks, 2011), which proposes that 'semantic self-knowledge mediates a bidirectional relationship between episodic self-knowledge and identity' (Haslam et al., 2011, p. 184). It may be the case that, as has been shown with knowledge, self statements undergo a process of semanticisation, encoded initially as a response to a particular event or occurrence, but that over time, the trait, quality or disposition becomes a more enduring and context-free aspect of personality. To test this, it would be necessary to examine the acquisition of new aspects of the self over presumably quite long time scales.

There is a general view that our memories of experience constrain what the self can be because it is tethered in reality, but likewise, our findings illustrate that what we can retrieve about our past probably also influences how we describe and think about our self. In this instance, autobiographical retrieval led participants to think more introspectively about their conceptual self and increased access to psychological trait-like descriptions in particular. In relation to findings from Study 1a, it is proposed that both the increased accessibility of self-concept statements and the psychological nature of the selves generated relates to the fact that the majority of participants were within the period of the reminiscence bump. Thus it is likely that the memories that were generated were particularly salient and personally significant. Indeed, very recent salient memories are likely to affect the selves generated more than a distant, less meaningful memory and this is consistent with literature on the reminiscence bump, which suggests that autobiographical memories from early adulthood years are particularly vivid and also contribute to the shaping of a stable identity (e.g., Holmes & Conway, 1999).

Study 1a demonstrated that in young adults the majority of the selves that were associated with a particular age of emergence clustered around the age of eighteen, which is perhaps unsurprising given that this coincides with the age at which the majority of participants in this sample started university and thus presumably underwent a period of identity change. When sampling from more widely across the lifespan, Study 1b demonstrated a clustering of

selves during late adolescence and early adulthood. The finding that selves most often emerge during this period can be interpreted as evidence for a self-based account of the reminiscence bump, and the idea that that the reminiscence bump emerges in order to support the formation of new selves is explored in detail in Chapter 5.

2.4.1 Conclusion

In sum, the findings presented within this chapter promote the value of using the *I Am Fluency Task* to explore the self. Data confirms Conway and Pleydell-Pearce's (2000) conceptualisation of the working self as dynamic and fluid, demonstrates that self-concept and episodic autobiographical knowledge are interactive, and supports the idea that the self is reconstructive in relation to memories - we provide evidence that it is possible to use memory in order to increase the accessibility of self statements. Of particular interest is the finding that autobiographical retrieval is most closely associated with psychological selves in young adults. In order to explore the relationship between the accessibility of self and AM across a wider age range, the following chapter explores the self and AM across the lifespan.

3. THE ACCESSIBILITY OF THE SELF AND AUTOBIOGRAPHICAL MEMORY ACROSS THE LIFESPAN

"How puzzling all these changes are! I'm never sure what I'm going to be, from one minute to another."

Lewis Carroll (1865)

3.1 Introduction

Using an experimental design, Chapter 2 demonstrated that autobiographical retrieval increases access to self. The type of self that was most accessible also changed following retrieval of an autobiographical memory, with this manipulation increasing access to psychological selves in particular. Within this chapter, the relationship between the self and memory is examined from a different perspective, through an exploration of what happens to the self as the accessibility of autobiographical memory changes across the lifespan. In particular, the accessibility of self statements (assessed using the novel *I Am Fluency Task)* and that of autobiographical memory were explored in four age groups – young adolescents (aged 11-12), older adolescents (aged 15-17), young adults (aged 18-22) and older adults (aged 60-81).

3.1.1 The Accessibility of the Self and Memory

In his model of the self-memory system (SMS; Conway & Pleydell-Pearce, 2000, Conway, 2005), Conway (2005) proposes an association between the accessibility of the self and that of autobiographical memory. More specifically, this model suggests that the activation of a

particular self will subsequently activate a set of relevant and associated autobiographical memories that function to provide context for that particular self. In support of this, Rathbone and Moulin (2014) showed that AMs are most accessible when cued by self-concepts that are also most salient (i.e. those generated in the first serial position on the TST or those rated highest in terms of personal significance).

In the context of a bidirectional relationship between the self and memory, the SMS also predicts that retrieval of an autobiographical memory influences the aspects of the self that are most active at any given time. Consistent with this, Chapter 2 illustrated that the retrieval of an autobiographical memory increases access to self statements and psychological, trait-like descriptions of self in particular. Thus research supports the idea that that there is a bidirectional relationship between the accessibility of the self and that of autobiographical memory, which has critical implications for the self across the lifespan - it implies that as memory changes with age, so will access to the self.

3.1.2   The Self and Memory in Adolescents and Young Adults

It is widely considered that the self-memory relationship begins in infancy, when identity develops alongside the evolution of autobiographical memory (for a detailed consideration of the development of autobiographical memory, see Fivush, 2004). However, it seems that it is not until adolescence that one is faced with the task of identifying 'Who am I?' (e.g., Kroger, 2004). Erikson (1950) proposed that adolescence is a time of identity formation and subsequent 'crisis', in which adolescents are faced with the dual task of maintaining social and cultural connections, whilst developing an autonomous self. Adolescence is a time of emerging and evolving identity that culminates in the emergence of a stable and enduring self in early adulthood. As such, early adulthood is judged to be the lifetime period that is most identity defining (e.g., Erikson, 1950, 1968; Schwartz, 2006; Waterman, 1999). Consistent with the theme of this chapter, early adulthood is also the period in which our most enduring and accessible autobiographical memories are formed (e.g., Fitzgerald, 1988).

To examine the idea explicitly, this chapter compares the accessibility of self statements across the lifespan using the *I Am Fluency Task*. It was predicted that if a relationship between the accessibility of the self and that of AM does exist, selves will be most accessible during the period of the reminiscence bump. That is, we should expect to see participants between the ages of 10 and 30 generating more *I am* statements in a given time. In particular, it was proposed that selves would be most accessible to young adults, who occupy the highest point of the reminiscence bump and have a recently stabilised self. Given that Chapter 2 highlighted a particular association between episodic memory and psychological selves, it was also predicted that psychological selves would be most accessible to young adults, relative to adolescents and older adults.

3.1.3 The Self and Memory in Older Adults

In general, cognitive function declines with age (e.g., Park, 2000), but with regards to autobiographical memory, changes are less clear cut. Research exploring autobiographical memory in older adults demonstrates that they have reduced access to personal episodic details relative to younger adults, and yet their personal semantic memory remains largely intact (e.g., Hay & Jacoby, 1999; Jennings & Jacoby, 1993; Martinelli, Anssens, Sperduti & Piolino, 2012). More specifically, older adults have been found to be impaired in retrieving contextual and perceptual details (Hashtroudi, Johnson, & Chrosniak, 1990; McIntyre & Craik, 1987; Spencer & Raz, 1995) and describe their autobiographical recollections as being less vivid than do middle aged adults (Borrini, Dall'Ora, Della Salla, Marinelli, & Spinnler, 1989). Levine, Svoboda, Hay, Winocur and Moscovitch (2002) introduced the Autobiographical Interview as a novel tool to assess the semantic/episodic distinction in age-related memory functioning. The interview asked participants to recall events from five lifetime periods - childhood, adolescence, early adulthood, middle age and the previous year – and showed that 'whereas younger adults were biased toward episodic details reflecting happenings, locations, perceptions, and thoughts, older adults favoured semantic details not connected to a particular time and place' (Levine et al., 2002, p. 677).

Based on the hypothesis that there is a particular association between the self and episodic AM, then it was predicted that older adults would have reduced access to self statements, relative to adolescents and younger adults. More specifically, it was expected that older adults would generate fewer statements on the *I am Fluency Task* than all other age groups. Alternatively, as discussed in Section 1.4.3, recent research supports the idea that trait self-knowledge is conceptual in nature and resilient in spite of profound neurological insult (e.g., Klein & Lax, 2010). As such, it could be the case that the accessibility of self statements remains consistent across the lifespan once a stable self has emerged in young adulthood, that is.

3.1.4 Measuring the Accessibility of the Self Across the Lifespan

Given the design of this chapter, it was important to consider possible general changes in fluency across the lifespan. In general, fluency tasks are known to rely on executive processes (e.g., Bolla, Lindgren, Bonaccorsy, & Bleecker, 1990; Ruff, Light, Parker, & Levin, 1997; Stuss et al., 1998) that improve during childhood (for a review of the development of executive function in childhood, see Anderson, 2002), and as such, a positive linear relationship between age and fluency performance is found in school-aged children (e.g., Koren, Kofman & Berger, 2005; Porter, Collins, Muetzel, Lim & Luciana, 2011). Adult levels of performance tend to be obtained in adolescence, specifically between the ages of 11 and 16 (Anderson, Anderson, Northam, Jacobs, & Catroppa, 2001; Porter et al., 2011; Sauzéon et al., 2004; Temple, 1997). Thus it was expected that young adults might perform better than adolescents on tasks of general fluency speed i.e. young adults would generate more statements in a given time.

With regards to older adults, research shows that ageing has a differential effect on fluency tasks, such that there is no effect of age on letter fluency (e.g., Axelrod & Henry, 1992; D.Hughes and Bryan, 2002; Koss, Haxby, DeCarli, Schapiro & Paroport, 1991; Kozora & Cullum, 1995; Tomer & Levin, 1993), but a negative relationship between age and semantic fluency (e.g., Fama, Sulliva, Shear et al., 1998; Kozora & Cullum, 1995; Tomer & Levin,

1993; Troyer, 2000; Wiederholt et al., 1993). For the purposes of this study it was necessary for fluency to be measured by means of written responses. Notably, writing fluency declines earlier than oral fluency (Benton & Sivan, 1984). For instance Kelland and colleagues (Kelland & Lewis, 1994; Lewis, Kelland & Kupka, 1990) assessed writing speed across the lifespan using the Sentence Writing Time task from the Repeatable Cognitive-Perceptual-Motor Battery (RCPM; Lewis & Rennick, 1979), in which participants are required to write a short sentence as quickly as possible with their dominant hand. The authors report a mean writing time of 7.1 (+/- 1.3) seconds for participants aged 18-30, whereas this increased to 11.0 (+/- 3.3) for participants aged 70 and over. However, it was necessary to adopt a written method in the present study, given that testing was carried out in groups. Thus asking participants to give verbal responses was not possible. As such, it was anticipated that age related changes in fluency would have an impact on the findings of this study unless general fluency speed was controlled for at the point of analysis. Therefore, both letter fluency and category fluency were assessed and are included as covariates in the analysis that determined whether or not differences exist in the accessibility of self-concept across the lifespan.

3.1.5   Predictions

The present study aimed to explore the relationship between the accessibility of self statements and autobiographical memory across the lifespan using the *I Am Fluency Task* as a measure of self-concept and an adapted version of the Autobiographical Fluency Task (Dritschel et al., 1992) to determine the accessibility of autobiographical memories from different lifetime periods (childhood, early adult life and recent times). Consistent with the aforementioned findings it was predicted that, if there is a relationship between the accessibility of self statements and that of episodic memory, performance on tasks that measure these two constructs should be correlated. That is, *I am* fluency should be positively correlated with AM fluency, specifically on the episodic components of the Autobiographical Fluency Task. In addition, it was predicted that age differences in the accessibility of self statements would be evident in the present study. This is related to the

notion that the salience of the self changes across the lifespan in accordance with the accessibility of AM.

The final prediction was made in response to the findings from Chapter 2, which demonstrated that retrieval of an AM increased access to psychological, trait like descriptions of the self in particular. Thus it was anticipated that the content of self-knowledge would change across the lifespan, such that psychological selves would be most accessible in early adulthood, which coincides with the peak of the reminiscence bump. More specifically, young adulthood is considered to be a period of intense identity formation (e.g., Fitzgerald, 1988) in which memories that are formed are particularly salient and personally significant. Thus it is expected that this will lead to heightened accessibility of self statements that are introspective and self-centred. To our knowledge, this is the first study of its type to consider changes in the content of trait self knowledge across the lifespan. However, research has shown that old age leads to a particular focus on social goals (see Carstensen, Fung & Charles, 2003; Carstensen, Isaacowitz & Charles, 1999). Thus we might expect to see a shift from emphasis being on the psychological self in younger participants to the social self in older adults.

To summarise, the aims of this study were twofold - first of all, to determine how the self might change in the context of the lifespan, and secondly, to establish whether or not a relationship exists between the accessibility of the self and that of autobiographical memory, as is predicted by Conway's (e.g., 2005) self-memory system.

3.2   Method

3.2.1   Participants

Four groups of participants were recruited for the purpose of this study. The first group consisted of 24 children (12 males and 12 females) in their 7th year of schooling (Y7) and their first year of secondary school (mean age = 11.42, SD = 0.50), the second group

consisted of 19 children (10 females and 9 males) in their 11th year of schooling (Y11) and their final year of secondary school (mean age = 15.74, SD = 0.56), the third group consisted of 20 young adults (YAs; 1 male and 19 females) who were undergraduate students at the University of Leeds (mean age = 19.65, SD = 0.99) and the final group consisted of 20 older adults (OAs; 12 females and 8 males) who were recruited via personal connections (mean age = 68.4, SD = 5.79).

Both groups of children were recruited from the same school in North Yorkshire, UK and were tested in groups in classroom settings. All YAs were psychology students at the University of Leeds and were also tested in groups (ranging in size from 1 to 6 participants). OAs were tested individually in their own homes. Informed consent was obtained from participants prior to testing and research was approved by the School of Psychology's (University of Leeds) ethics committee.

3.2.2   Materials and Procedure

All participants were provided with a booklet in which to record their responses. Instructions were read aloud by the experimenter and tasks are described in the order in which they were completed by participants.

3.2.2.1   The *I Am Fluency Task*

To measure access to self statements, the *I Am Fluency Task* was administered. Participants were given one minute to write down as many *I am* statements as possible. To avoid cuing statements, no specific examples were given, but participants were told that they might include roles, personality traits or physical traits.

3.2.2.2   Self Statement Ratings

Following the *I Am Fluency Task*, participants were asked to rate each of their self statements on two dimensions. First, they rated how important and central each *I am* statement was to defining their identity (using a scale of 1 to 7, with 7 being very important and 1 being not important at all). Second, participants rated each statement in relation to

emotional valence i.e. how positive or negative they felt about each statement (again, this was on a scale of 1 to 7, with 7 being extremely positive and 1 being extremely negative). Finally, participants were asked to retrospectively date each of their *I am* statements, whereby they gave an age at which they became a person who would define themselves using that statement. Participants assigned '0' to statements that had been self-defining for as long as they could remember.

3.2.2.3 Fluency Control Tasks

Category fluency was assessed by asking participants to write down the names of as many animals as they could in one minute. Letter fluency was assessed using the FAS Controlled Oral Word Association Test (Benton, 1968); participants were given one minute for each letter and a score was derived by averaging scores across the three letter trials.

3.2.2.4 Autobiographical Fluency Task

The final task that was administered was a version of the Autobiographical Fluency Task (e.g., Dritschel et al., 1992) that was adapted according to each participant group. All participants were asked to generate semantic facts (names of people) and episodic events from certain lifetime periods, but lifetime periods varied according to group. The Y7 participants were asked to generate autobiographical information from recent times, specifically the past 5 years. Both the Y11 participants and the YA participants generated autobiographical information from childhood and recent times, and the OA group generated autobiographical information from childhood, early adult life and recent times. For each task, participants were given one minute to generate as much information as possible, in the form of either names of people known to them or memories of events. To ensure that participants didn't use this time writing detailed descriptions of memories the following instructions were given, '*You do not have to provide much detail, just a short sentence, as if writing a headline for a newspaper, and then move onto writing the next'*.

Once participants had completed all of the autobiographical fluency tasks they were asked to give an importance rating for each event that they had generated (as above, ratings were given on a scale of 1 to 7, with 7 being very important and 1 being not important at all). Finally, participants were asked to retrospectively date each memory, whereby they gave an age at which the event had occurred. Y7, Y11 and YA participants were also asked to complete a future thinking task, in which they were given one minute describe events that they thought might happen to them in the future; however, given that this task is not relevant to the aims of the present chapter, findings are not reported here.

3.3   Results

As highlighted above, it was anticipated that individual differences in fluency speed might influence the findings from the *I Am Fluency Task*, especially since written fluency changes across the lifespan (Kelland & Lewis, 1994; Lewis, Kelland & Kupka, 1990). In an attempt to account for this, analysis first considers the group differences in performance on the control fluency tasks. Where appropriate, analysis of covariance is used, and correlational analyses are also presented. Pairwise comparisons were made using Bonferroni corrected *t* tests, unless otherwise specified. Mauchly's Test of Sphericity is used to explore assumptions regarding the homogeneity of variance and Greenhouse-Geisser corrected degrees of freedom have been applied in instances where this assumption has been violated. Similarly, the Levene's test is used to assess equality of variance when an independent samples *t* test is used and corrected degrees of freedom is reported. In this Results section, the tasks are considered in detail separately before then examining the issue of the relationship between autobiographical fluency and *I am* fluency.

3.3.1   General Fluency Speed

To explore differences in fluency speed across the lifespan, two tasks were carried out – letter fluency and category fluency. Letter fluency was assessed using the FAS Controlled Oral Word Association Test (Benton, 1968) and category fluency was assessed using

animals as the category of choice. Descriptive statistics from both tasks are presented in Table 3.1.

Table 3.1. Mean (SD) number of items generated on letter and category fluency across the lifespan.

	Y7	Y11	YA	OA
Letter	8.35 (2.98)	9.38 (2.01)	12.30 (3.47)	9.30 (3.37)
Category	14.21 (2.86)	17.05 (3.41)	20.70 (3.60)	12.60 (3.38)

Table 3.1 shows that all groups were more fluent at generating category specific responses than at generating items sampled from different categories in the letter tasks. With regards to group differences, univariate ANOVA revealed a significant group difference in letter fluency (F (3, 79) = 6.72, p <.001). Specifically, YA participants were significantly more fluent than Y7 participants (p <.001), Y11 participants (p = .02) and older adults (p = .01). The superior fluency of Y11 participants relative to older adult participants also approached significance (p = .06), but no difference between Y7's and OA's was found (p = 1.00). With regards to category fluency, again a significant effect of group was found (F (3, 79) = 23.610, p <.001), such that young adults were significantly more fluent than Y7 participants (p <.001), Y11 participants (p = .005) and older adults (p <.001). Pairwise comparisons also revealed that Y11 participants were significantly more fluent than the two remaining groups - Y7s (p = .04) and OAs (p < .001). Overall, data is consistent with the literature described above and the notion that fluency increases throughout adolescence, peaks in young adulthood, and declines in old age.

Given these group differences, letter fluency and category fluency are included as covariates in the analysis that compares *I am* fluency across groups. The analysis of covariance is reported below.

3.3.2 *I Am* Fluency

In order to explore the accessibility of self statements, participants completed the *I Am Fluency Task*. Findings are presented in Figure 3.1.
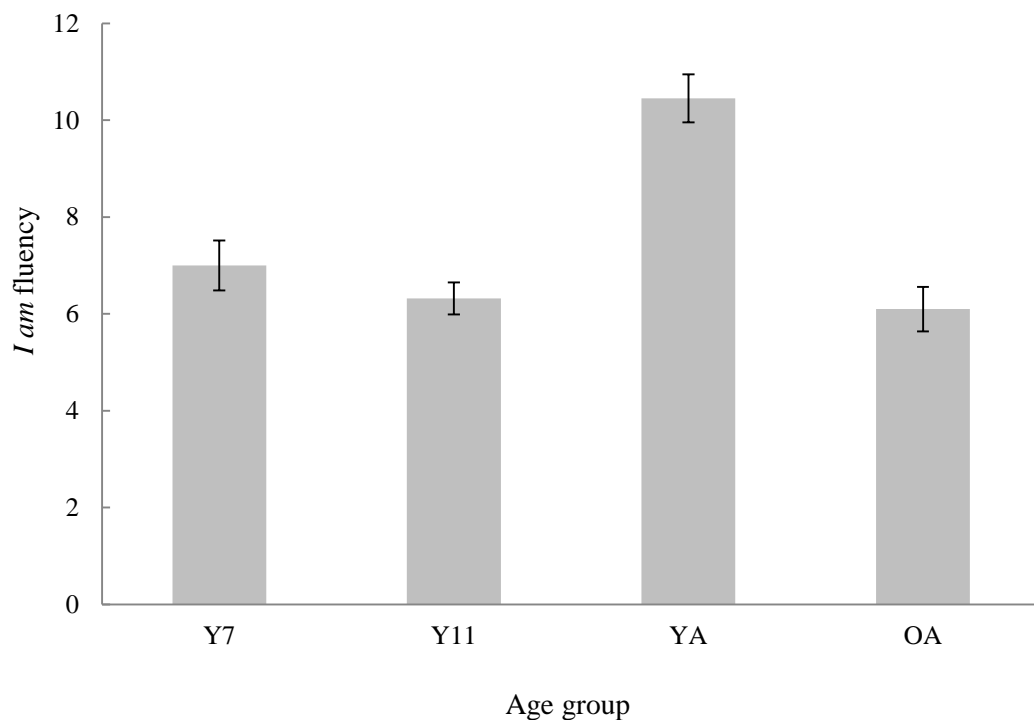
Figure 3.1. Mean number of self statements generated by all age groups on the *I Am Fluency Task*. Error bars represent standard error of the mean.

To explore the significance of the group differences illustrated in Figure 3.1, analysis of covariance was used. This allowed general fluency to be included as a covariate and thus examined whether or not this third variable explains the difference in *I am* statement fluency that was observed between groups. Analysis revealed a significant effect of group when the effect of both category and letter fluency was controlled for (F (3, 77) = 7.39, $p < .001$). In particular, Bonferroni corrected pairwise comparisons showed that young adult participants

were significantly more fluent in generating statements to describe their identity than Y11 participants ($p < .001$) and OA participants ($p = .008$), but there was no significant difference between the number of statements generated by YA relative to the Y7 group ($p = .085$). No significant differences were found between the fluency scores of the three remaining groups (in each case, $p > .335$). Thus, YA's demonstrate greater accessibility of self statements relative to adolescents and OA's after taking their general fluency speed into consideration, yet this difference does not emerge between YA's and the Y7 group.

3.3.3   Type of Statement

Given that the number of *I am* statements generated varied across participants, proportional data was considered in the following analyses. First of all, the mean proportion of physical, social and psychological statements generated by each group was calculated and findings are presented in Figure 3.2.
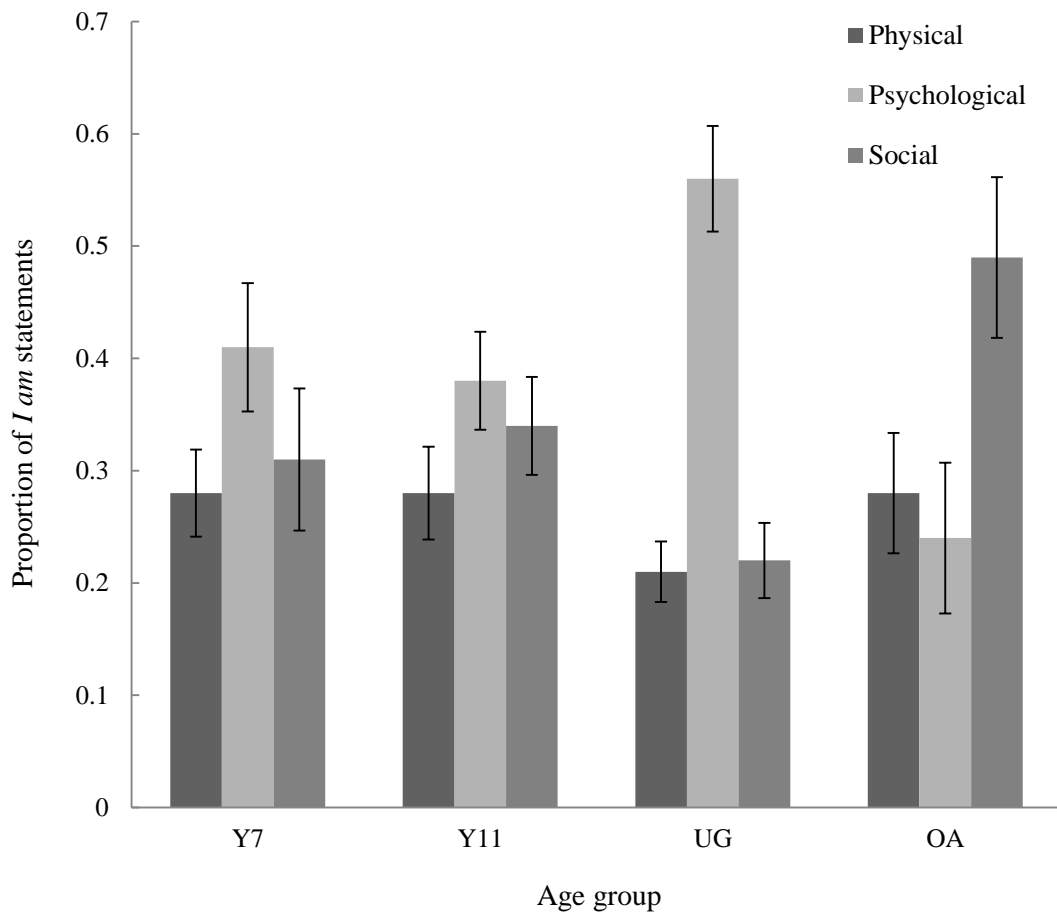
Figure 3.2. Mean proportion of physical, social and psychological statements generated by participants in each group. Error bars represent standard error of the mean.

In adolescents there is a relatively even distribution of physical, psychological and social statements generated, demonstrating no particular bias in the way in which they choose to define their identity. In young adults however, there is a notable bias for generating statements that are psychological in nature. Critically, this bias disappears in older adults who demonstrate a preference for describing the self in relation to their social roles.

The significance of these findings was examined using a 4 x 3 (group x statement type) mixed design ANOVA, allowing for the incidence of an interaction between group and statement type to be explored. Findings showed no main effect of group (F (3, 79) = 1.77, p = .160), given that proportional data was used and thus the three statement types summed to

1.0 across groups. There was a main effect of statement type (F (1.81, 143.05[8]) = 4.85, p = .011) and pairwise comparisons revealed that, in general, participants generated a higher proportion of psychological statements (however, given the proportions of statement types found in older adults, this main effect is driven by the results from the other three age groups). Most importantly, a significant statement type x group interaction was found (F (5.43, 143.05) = 4.35, p = .001), such that the type of *I am* statement that participants generated varied according to age.

To explore the statement type x group interaction, analysis was split by age group and a series of one-way repeated measures ANOVAs was carried out. Findings showed no main effect of statement type in either the Y7 or Y11 groups (in each case p >.25), demonstrating no bias for a particular type of self statement in adolescence. There was a main effect of statement type in younger adults (F (1.42, 27.12) = 18.12, p < .001). Specifically, YAs generated significantly more psychological statements relative to both social (p = .001) and physical (p < .001) statements, but there was no difference between the proportion of social and physical statements generated (p = 1.00). There was also a main effect of statement type in OAs, (F (2, 38) = 3.29, p = .048); however, pairwise comparisons revealed no significant differences (in each case p > .15).

Next, a series of one-way ANOVAs was used to examine statement type between groups. Analysis showed that there was no significant difference between the proportion of physical statements generated by participants across the four groups (F (3, 82) = .64, p = .59). There was however a significant difference between the proportion of psychological statements generated across groups (F (3, 82) = 5.90, p = .001) and Bonferroni corrected pairwise comparisons revealed that YAs generated significantly more psychological statements than did older adults (p < .001), but no other group differences emerged (in each case p > .15). A third one-way ANOVA revealed that there was a significant difference between the

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[8] As described on p. , Greenhouse-Geisser corrected degrees of freedom were used in instances where assumptions regarding the homogeneity of variance have been violated. Here degrees of freedom were adjusted from 2, 158 to 1.81, 143.05.

proportion of social statements generated across groups (F (3, 82) = 4.98, p = .003). Bonferroni corrected pairwise comparisons showed that OAs generated proportionately more social statements than Y7 (p = .048) and YA participants (p = .002), no other group differences emerged (in each case p > .24).

In sum, adolescents show no biases in relation to the type of statement that they generate to describe their identity, yet a significant bias for generating psychological, trait-like descriptions of the self emerges in early adulthood. Importantly, this bias disappears in older adults, who are most likely to describe themselves in relation to their social roles and least likely to refer to their individual traits.

3.3.4 Self Statement Ratings

All participants rated their self statements in terms of how important each was in defining their sense of self, as well as how positive or negative they felt about each statement (see Table 3.2).

Table 3.2. Mean (SD) importance and valence ratings assigned to *I am* statements by participants in each age group.

	Y7	Y11	YA	OA
Importance	4.59 (1.80)	4.33 (2.10)	4.86 (1.88)	5.85 (1.94)
Valence	5.15 (1.67)	5.15 (1.79)	5.21 (1.88)	5.95 (1.97)

Note. Ratings of importance were given on a scale of 1 to 7, with 7 being very important and 1 being not important at all. Ratings of emotional valence were also given on a scale of 1 to 7, with 7 being extremely positive and 1 being extremely negative.

Table 3.2 highlights that in general, the self statements that participants accessed tended to be classed as positive and important. To explore differences between groups, one way ANOVA were used. With regards to importance, there was a significant effect of age group (F (3, 614) = 15.02, p < .001). In particular, pairwise comparisons revealed that OA's ratings of importance were significantly higher than ratings generated by all other age groups (in each case p < .001). No other group differences were found (in each case p = 1.00). A significant effect of age group was also found with regards to valence ratings (F (3, 614) = 5.88, p = .001), such that OA's rated feeling significantly more positive about their self statements than participants in all other age groups (in each case p <.005). Again, no other group differences were found (in each case p = 1.00).

3.3.5 Age of Emergence

For each *I am* statement that participants generated they were asked to assign an age of emergence, that is, an age at which that particular statement became a defining part of their identity. Across all groups the most frequent response given was '0', which represented statements that had been identity defining for as long as the participant could remember, or in other words, fixed traits. Specifically, fixed traits represented 28.57% of all statements generated by Y7, 37.82% of statements generated by Y11, 35.27% of statements generated by YAs, and 25.62% of all statements generated by OAs. For all remaining statements, participants assigned a particular age in years and such statements are referred to as emergent traits. Figure 3.3 illustrates the proportion of *I am* statements that emerge during each year across the lifespan in Y7, Y11 and YA participants. Given that OAs were sampling from a considerably larger time frame, age of emergence data for this group is presented separately in Figure 3.4.
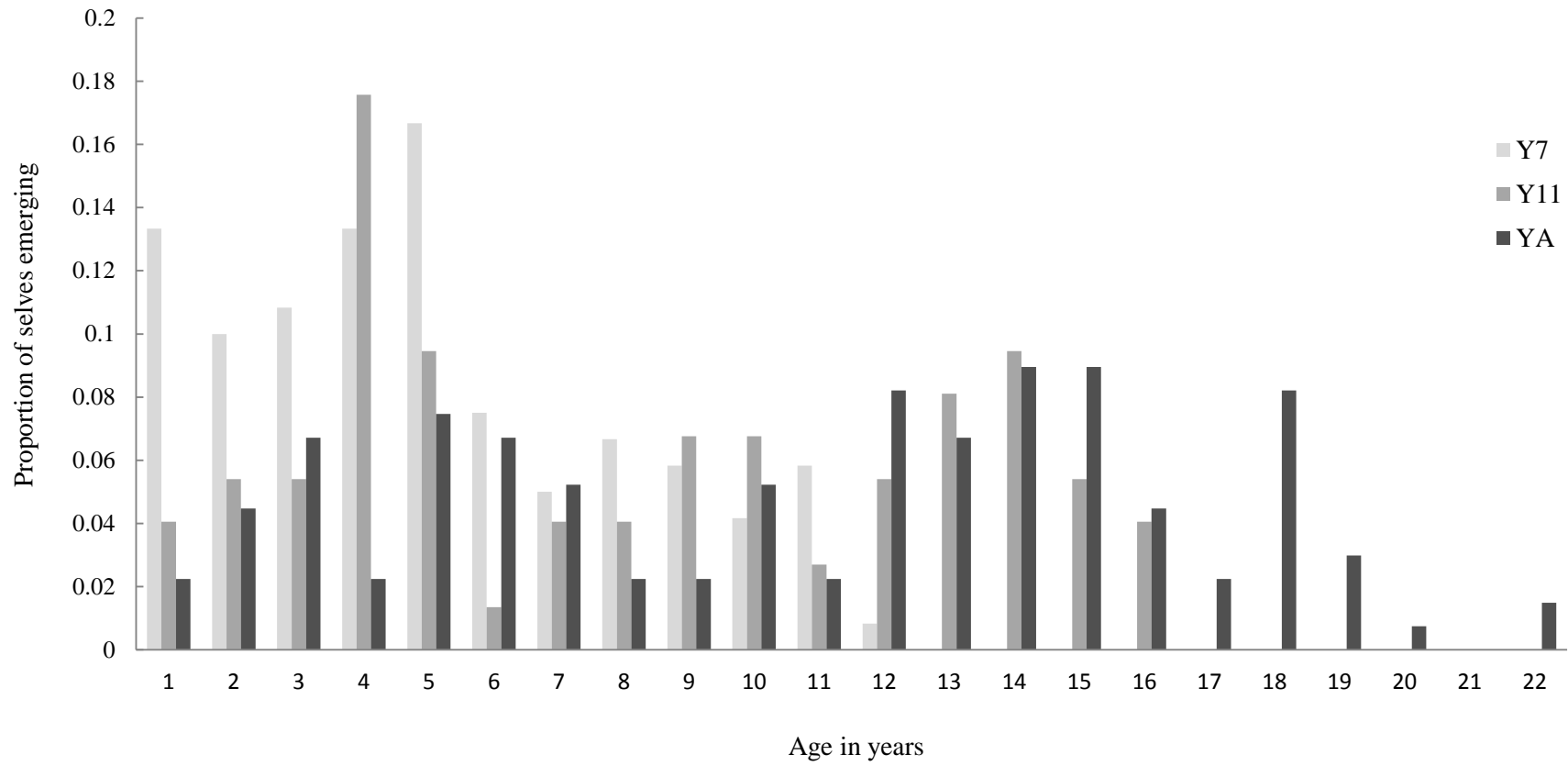
Figure 3.3. Graph to show emergence of *I am* statements across the lifespan in Y7, Y11 and YA participants.

For the three youngest groups of participants there is a peak in age of emergence at the ages of 4 and 5, and this is also the age at which older adults report that selves begin to emerge. This is notable in relation to identity based accounts of the reminiscence bump, as it coincides with the end of the period of childhood amnesia and the emergence of one's first autobiographical memories. In Y11 and YA participants, peaks are also evident between the ages of 13 and 15, which represents a period of preparing for the final phase of high school education and thus possibly a change in goal status. The final clustering of selves in the YA group emerges at the age of 18. Chapter 5 explores the idea that this peak relates to the emergence of a new identity, in this case that of a new student identity. Next, age of emergence data generated by OA's is considered and is presented in Figure 3.4.
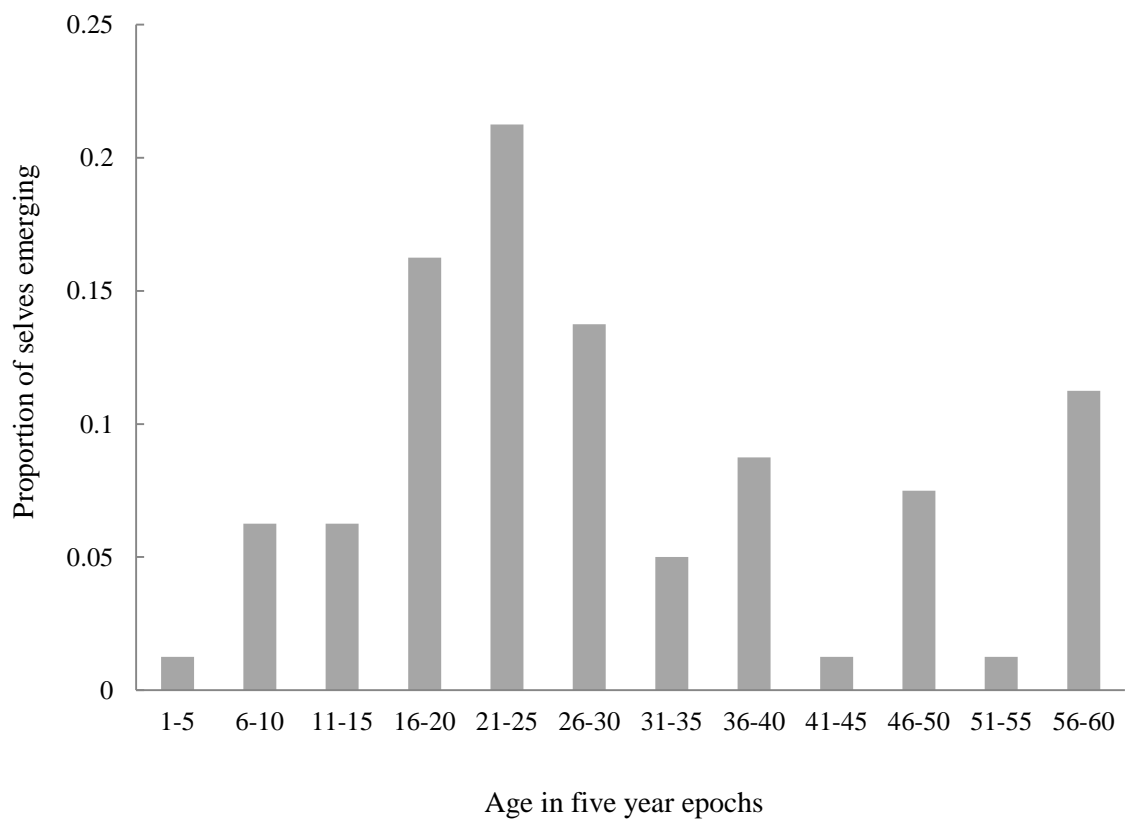
Figure 3.4. Graph to show emergence of *I am* statements across the lifespan in older adult participants. Age of emergence was truncated at the age of 60 so that all OA participants were sampling from the same age range.

With regards to OA's, the majority of selves emerge between the ages of 16 and 30, which is also consistent with an identity based account of the reminiscence bump (e.g., Rathbone et al., 2008). A second notable peak is occurs at the age of 60 and when examining the selves that OA's generate for this time period three particular themes emerge - retirement, ageing and becoming a grandparent.

3.3.6   Autobiographical Fluency

To explore autobiographical fluency, participants generated semantic facts (names of people) and episodic events from various lifetime periods. The aim was to determine whether or not there is a relationship between *I am* fluency and AM fluency, as is predicted by Conway and Pleydell-Pearce's (2000) self-memory system. To this end, AM data was collapsed across age groups into three lifetime periods – childhood, early adulthood and recent times, and simple correlations were used to explore the relationship between these and *I am* fluency (see Table 3.3). It is important to note that sample number varied across the three AM categories given that younger participants could not complete tasks that referred to 'early adulthood', for instance. To this end, Y7 participants were asked to generate autobiographical information for recent times only, Y11 participants and YA participants generated autobiographical information for childhood and recent times, and the OA group generated autobiographical information for childhood, early adult life and recent times.

Table 3.3. Simple correlations between *I am* fluency and AM fluency

		Recent times (*n* = 63)		Childhood (*n* = 59)		Early adulthood (*n* = 40)	
		Episodic	Semantic	Episodic	Semantic	Episodic	Semantic
I am	(*r*)	.37**	.31*	.39**	.48**	.61**	.51**

Note. **$p < .004$, *$p = .014$

Table 3.3 shows that, *I am* fluency was significantly correlated with AM fluency, and this was regardless of whether the task was episodic or semantic in nature. To explore the relationship in more depth, AM fluency was correlated with the proportion of each type of statement that was generated, that is, physical, social or psychological. In relation to the finding that psychological selves emerge most frequently during the period of the reminiscence bump, it was of interest to determine whether the generation of psychological selves correlated better with AM than did social or physical selves. Findings are presented in Table 3.4.

Table 3.4. Simple correlations between AM fluency and *I am* statement type

Statement type		Recent times		Childhood		Early adulthood	
		Episodic	Semantic	Episodic	Semantic	Episodic	Semantic
Physical	*r*	.03	-.02	.02	.03	-.15	-.154
Psychological	*r*	-.08	.08	-.06	.23	.36*	.52**
Social	*r*	.06	-.08	.05	-.27*	-.29	-.47**

Note. *$p < .03$, ** $p < .003$

Of the three types of *I am* statement, those categorised as psychological positively correlate with AM fluency. Critically, this is not the case for social or physical statements. There is a negative relationship between social selves and semantic items generated for childhood and early adulthood, but it is likely that this negative relationship is an artefact of using proportional data and there being a strong positive association between psychological selves and semantic items from early adulthood.

3.4 Discussion

Building on findings from Chapter 2, the aim of Chapter 3 was to explore the relationship between the accessibility of the self and that of autobiographical memory across the lifespan. In line with the predictions, findings demonstrated that self statements were most accessible to young adults relative to older adults and adolescents - young adults were able to generate significantly more *I am* statements in one minute and critically, this advantage remained even after taking general fluency speed into consideration. Interestingly there was no difference between the number of statements generated by young adults and the Y7 participants.

With regards to type of statement, adolescents showed no particular bias in the way in which they chose to define their identity. Both groups of adolescents (Y7 and Y11) generated a relatively even distribution of physical (e.g., *I am* tall), social (e.g., *I am* a daughter) and psychological (e.g., *I am* friendly) self-statements. In contrast, young adults showed an overwhelming bias for describing self in relation to psychological, trait like descriptions, and this was also consistent with predictions made at the start of this chapter. Notably, there was a shift in bias in older adults, who were least likely to define themselves in relation to psychological traits, and most likely to describe their identity in relation to their social roles. Older adults also rated their identity statements as significantly more positive and more personally significant than did all other age groups.

Despite differences in identity accessibility, valence and content, no consistent pattern of findings emerged in relation to autobiographical fluency across the lifespan, yet *I am* fluency and AM fluency were strongly and consistently related across all lifetime periods. More specifically, of the three types of self-statement, psychological selves were most strongly related to AM fluency, particularly for early adulthood and recent times. Finally, in support of an identity based account of AM, the emergence of *I am*'s clustered around key AM milestones, such as the end of the period of childhood amnesia, during the period of the reminiscence bump and at times that signalled a change in goal status.

3.4.1   The Accessibility of the Self Across the Lifespan

Young adults (mean age = 19.65) generated more *I am* statements in one minute than Y11 participants and older adults. However, there was no difference between the number of statements generated by young adults and Y7 participants (albeit a numerical trend towards young adults generating more *I am* statements than Y7 participants, $p = .085$). One interpretation of this finding is that self was highly accessible to the young adult group given that young adulthood is the period in which a stable identity emerges following a period of identity uncertainty and 'crisis' between the ages of 12 to 18 (Erikson, 1950). Here, the focus will be on how this finding might be related to a robust finding from the autobiographical memory literature.

Young adulthood is also a time when ones most enduring and accessible AMs are formed. For instance, when people over the age of 40 years are asked to recall memories from across the lifespan, memories reliably and consistently cluster between the ages of 10 and 30, but most prominently around the age of 20 (see Conway, 1990; Conway & Rubin, 1993, for reviews).   Various explanations have been proposed to account for the reminiscence bump. For instance, Rubin, Rahhal and Poon (1998) proposed that it is the novelty of events during this period that lead to heightened accessibility, whereas Conway and colleagues (e.g., Conway, 1997; Conway & Rubin, 1993; Conway & Haque, 1999)

suggest that 'events from the period covered by the bump have a privileged relation to the self' (Conway & Haque, 1999, p. 35). If the self account is accurate then it might be expected that *I am* fluency should be significantly related to AM fluency. Indeed this study suggests that could be the case - *I am* fluency positively correlated with AM fluency for all lifetime periods, specifically childhood, young adulthood and recent times. The fact that the accessibility of self is related to the accessibility of AM is consistent with findings from Addis and Tippett (2004), who demonstrated that the number of responses that individuals with Alzheimer's disease generate on the TST (a task that is not dissimilar to the *I Am Fluency Task*) is directly related to their ability to retrieve personal episodic and personal semantic AMs from childhood and early adulthood. Findings are also in line with those from Chapter 2, which showed that autobiographical retrieval increases access to self-concept. It is not clear why there was no significant difference between YA and Y7 participants and additional research would be helpful to explore the possibility that this was due to inadequate power to detect an effect in the Y7 group.

It was also predicted that self statements would be least accessible to older adults, given that episodic memory deteriorates with age. However, findings showed that this was not the case, as self was as accessible to older adults as it was to both groups of adolescents. It is possible that this finding relates to the fact that the older adults in the present sample had no particular deficits in episodic memory, and indeed this was confirmed by their performance on the Autobiographical Fluency Task (Dritschel et al., 1992). In order to better explore the notion that episodic memory impairment decreases access to the self, Chapters 4 and 6 employ a neuropsychological approach in the context of acquired brain injury and ask - what is the impact of amnesia on the accessibility and content of self-knowledge?

3.4.2 The Content of the Self Across the Lifespan

In the context of age, what happens to the content of self-knowledge? An interesting pattern of findings emerged when adopting a more nuanced approach to examining the self-memory relationship. In particular, this study allowed for exploration of the relationship between AM and distinct categories of self statement, specifically, physical, social and psychological. In adolescence, no particular biases emerged in relation to the way in which participants chose to define their identity, whereas young adult participants demonstrated an overwhelming bias for defining themselves in relation to their psychological traits. Critically, this bias disappeared in older adults, who were most likely to define themselves in relation to their social roles. Again, this finding is consistent with those of Chapter 2, which showed a particular association between memory and psychological selves, but why are psychological selves most accessible at a time when one's most self defining AMs are formed? It is possible that knowledge about ones psychological self relies most heavily on memory, given that social selves can be gleaned from interactions with others and physical selves are objectively observable (see Section 7.4 for a more detailed consideration of this suggestion). In addition, researchers have suggested that autobiographical memory function changes with age (for a discussion, see Cohen, 1998), such that, reminiscence in the first three decades of life serves the primary purpose of identity construction (Webster & Cappeliez, 1993), whereas in older adulthood, the focus is on establishing a positive self-concept, in order to maintain well-being (Schlagman, Kvavilashvili & Schulz, 2007). The task of constructing an independent self in young adulthood is likely to lead one to think more introspectively about their conceptual self and thus increase access to psychological trait-like descriptions in particular. In contrast, older adults preference for generating social aspects of self-concept, which are generally more concrete and less dynamic, might relate to the idea that a consistent sense of self is crucial in maintaining well-being (Conway, 2005).

Consistent with the suggestion that AM functions to maintain well-being in old age, this study also demonstrated that older adults rated their *I am* statements as significantly more positive and personally significant than all other age groups. Whilst no particular prediction was made in relation to this finding, it is likely to relate to the discovery that older people show a preference for positive information despite the negative connotations associated with ageing. More specifically, research demonstrates that older adults show better remembering of positive visual images relative to negative ones (Charles, Mather & Carstensen, 2003), are less likely to remember negative features of past choices than young adults (Mather & Carstensen, 2003) and remember their past more positively than originally reported (Kennedy, Mather & Carstensen, 2004). Carstensen and colleagues (e.g., Carstensen, Fung & Charles, 2003; Carstensen, Isaacowitz & Charles, 1999) have suggested that the positive bias is an artefact of finite time in old age, which leads to a particular focus on social goals that are emotionally satisfying and have meaning. This could further explain the bias for generating social statements, and suggests that positive biases in memory might relate to a need to maintain a positive self-concept in old age (see also Schlagman, Schulz & Kvavilashvili, 2006).

Another possibility is that differences in the type of self-concept generated are attributable to generational differences between the younger and older adult groups. For instance, Fivush, Habermas, Waters and Zaman (2011) describe how in traditional cultures individuals were defined in relation to their social roles and relationships, whereas modern culture is much more transitory – people are more likely to 'move in and out of multiple geographical locations, social relationships, and vocational roles' (p. 323) and thus, are more likely to gain coherence from psychological traits. To explore this, future research might examine the self-memory relationship in present day young adults once they reach older age

3.4.3   The Age of Emergence

If the self account of the reminiscence bump is accurate then the emergence of selves should not be distributed evenly across the lifespan. Instead, self-emergence should - for the most part - replicate the pattern of the lifespan retrieval curve. In particular, there should be a paucity of selves emerging prior to the age of five, with selves beginning to emerge following the period of childhood amnesia. Next, selves should cluster between the ages of 10 and 30 when people show increased remembering relative to all other lifetime periods. Finally, the frequency of new selves emerging should decrease from the age of 30 to recent times (given that the final period of the lifespan retrieval curve is explained by the recency effect, this was not expected in relation to selves). The present study illustrated that selves do emerge in a pattern that is consistent with the lifespan retrieval curve, and thus support the idea that the self is grounded in memory.

More specifically, the ages of four and five were important across all age groups, as peaks in identity emergence were present at this age in Y7, Y11 and YA participants. OA's also reported their first selves emerging at the age of five. With regards to the period of the reminiscence bump, selves clustered generally during this period in older adults, and in young adults and adolescents more distinct peaks were visible. Critically, peaks corresponded with times of transition and change in goal status (e.g., preparing for the final phase of high school education and starting university), as did the final peak in identity emergence in older adults, which corresponded with the themes of retirement, ageing and becoming a grandparent. These findings are highly relevant to Conway and Pleydell Pearce's (2000) theory of the self-memory system, which maintains that the accessibility of autobiographical memory is mediated by the goals of the working self. To further explore how memories and selves are organised around times of change in goal status, Chapter 5 describes an investigation into the relationship between the self and memory at the start of a lifetime period, when a new and independent self emerges – that of being a university student

In sum, the results of this study show that the accessibility and content of self statements change across the lifespan according to changes in the accessibility of autobiographical memory. In order to explore the implications of these findings for people with autobiographical memory impairment, the following chapter examines the accessibility and content of the self in the case of an individual with retrograde amnesia.

4. PSYCHOLOGICAL SELVES AND AMNESIA

"I'm afraid I can't explain myself, sir. Because I am not myself, you see?"

Lewis Carroll (1865)

4.1   Introduction

Thus far, this thesis has examined the impact of autobiographical retrieval on the accessibility of self statements. Chapter 2 demonstrated that autobiographical retrieval increases access to self statements, and psychological selves in particular and Chapter 3 showed that self is most accessible to young adults, whose age lies at the peak of the reminiscence bump. The present chapter considers the relationship between memory and the self in the context of a neuropsychological case study and asks, what is the impact of amnesia on the accessibility and content of self-knowledge?

As described in Section 1.4.2, neuropsychological research has provided strong and convincing evidence for a relationship between self and memory (e.g., Della Sala, Freschi, Lucchelli, Muggia & Spinnler, 1996; Hehman, German & Klein, 2005; Mills, 1998). From a clinical perspective this is a critical issue, as it has been shown that both episodic and semantic autobiographical memory loss contribute to a diminished sense of self (Addis & Tippet, 2004). Indeed Chapter's 2 and 3 provide evidence that is consistent with the idea that there is a positive relationship between the accessibility of self statements and the accessibility of AM. However, research has demonstrated that the self can be "known" in the absence of episodic AMs (e.g., Klein, Rozendal & Cosmides, 2002; Rosenbaum et al., 2005), and case studies with people who experience retrograde amnesia have been particularly pertinent in exploring this issue. For instance, Tulving (1993) documented the

case of KC, an individual who was so profoundly amnesic that he was unable to recall a single episodic event from his lifetime, yet he was unimpaired in his ability to rate traits for self-descriptiveness. Similarly, Wilson and Wearing (1995) describe how Clive Wearing, a well-documented amnesic case, was able to know that he was a musician – they reported that he claimed *I am a world famous musician!* – despite being unable to remember any day previous to the current one.

Based on the current literature, it might be presumed that a sense of self persists in amnesia, and yet is diminished somehow. The *I Am Fluency Task* provides a novel means by which to explore this more nuanced view of the self following AM impairment, by allowing an open-ended exploration of the facets of the self that might be impaired. For instance, Clive Wearing knew that he was a musician, and reports also suggest that he was aware that he was a husband, but it is unclear whether or not he was able to describe any aspects of his personality e.g., was he able to know whether he was, or indeed used to be, generous, kind or hardworking?

The present chapter explores this issue in a case of autoimmune limbic encephalitis (LE), an inflammatory disorder predominantly affecting structures of the limbic system, such as, the hippocampus, medial temporal lobes, amygdala and orbitofrontal cortex (e.g., Graus & Dalmau, 2007; Machado, Pinto & Irani, 2012; Posner & Dalmau, 2000). Much of the research carried out with people with LE has focused on anterograde deficits (e.g., Butler et al., 2014). Of the research in LE that has considered retrograde impairment, the majority shows that deficits present in episodic AM alongside preserved semantic AM (Miller et al., 2014). As such, the present case study provides a unique opportunity to explore the separable roles of episodic and semantic memory in the maintenance of the self, using a novel identity task.

In this Study, the continuity of self-concept was also explored in relation to theoretical assumptions about the role of AM in providing a consistent sense of self over time

(Conway, 2005). To this end, the *I Am Fluency Task* was adapted in relation to the Y-shaped model of rehabilitation, proposed by Gracey, Evans and Malley (2009). These authors cite discrepancies between current self, and both pre-injury self and hoped for self, as being crucial in relation to psychological wellbeing following acquired brain injury. From a clinical perspective, it will be fruitful for the present research to consider whether disruptions to the continuity of self might be related to deficits in AM and thus *I Was* and *I Hope To Be Fluency Tasks* are introduced in this chapter. These tasks replicate the design of the *I Am Fluency Task*, but allow for exploration of the constructs highlighted by Gracey and colleagues (2009).

In relation to the research described above, it was predicted that SA would be able to access self statements, even in the face of episodic memory impairment, yet findings presented earlier in this thesis suggest that her ability to do so might be reduced relative to control participants. In particular, based on the effects of episodic memory recollection on psychological selves in Study 1a and 1b, it was anticipated that SA would have reduced access to psychological self statements.

4.2   Case Report

In October 2013, SA, a right-handed 53 year old female, suffered acquired brain injury as a result of autoimmune limbic encephalitis. This illness resulted in SA being hospitalised for several weeks, during which time she presented with severe anterograde and retrograde amnesia. For instance, she was able to retain new information for periods of no more than ten minutes, and was unable to recall the fact that she was married, and had been for the past 27 years. An MRI at the time of her illness revealed cerebral oedema within the left hippocampus and a PET scan showed evidence of hypermetabolism within the left medial temporal lobe, with no significant extra-cerebral findings. After treatment with immune suppression and steroids, SA's anterograde amnesia dissipated somewhat and she was able to return home in mid-November, six weeks following her admission. Once SA returned

home, certain long term memories began to re-emerge and she was able to reacquire some facts and events from her autobiography. However, her pre-illness autobiographical memory for both episodic events and semantic facts could not be considered normal and she was also typically unable to remember tasks that she had completed during testing sessions that had taken place up to one week previously. As such, SA was forced to work hard to compensate for her enduring memory problems. Ongoing simple partial seizures also prevented her from driving and returning to her job as a maths teacher. Most notably, SA had self-reported persistent retrograde amnesia for a period of approximately twelve months prior to her acquired brain injury (ABI); when looking through her own diary from 2013, she was unable to recognise a single event, stating: "This could be someone else's diary, but I recognise that it's my own handwriting". In order to objectify SA's memory impairment, she completed an adapted version of the TEMPau task (see Piolino, Desgranges & Eustache, 2009; Picard et al., 2013), which allowed for exploration of both episodic and semantic autobiographical memory across the entire lifespan (see Table 4.1). Findings corroborate SA's subjective memory complaints and highlight a significant period of amnesia for events that occurred in the year of her illness, as well as the year prior to her illness and the year after her illness. Table 4.1 also shows that SA's episodic score for the 0-10 lifetime period is also low, but is considered to be normal relative to scores obtained by neurologically intact participants in previous research (see Picard et al., 2013). The low score obtained by participants for this lifetime period is to be expected given that episodic memory is relatively poor in childhood and this period also includes the period of childhood amnesia.

SA's semantic impairment seems to be constrained to the time of her illness and the preceding year. It was of particular interest to explore how SA's self-knowledge might have been affected by her retrograde amnesia and some degree of persistent anterograde amnesia for episodic events.

Table 4.1. Table to show SA's scores on the TEMPau task according to lifetime period.

Lifetime period (years old)	Semantic score (/12)	Episodic score (/6)
0-10	12	2.5
11-20	11.5	4
21-30	12	4
31-40	12	5
41-50	12	5
52 (year before illness)	4	2.5
53 (year of illness)	6	-
54 (year after illness)	12	2.5

Note: Task instructions, contents and scoring procedures were based on those of Picard et al. (2013). Semantic memory was explored across four topics 1) names of acquaintances (e.g., friends, colleagues) 2) personally relevant famous names (e.g., book characters, movie heroes) 3) information about school/work life (according to lifetime period) 4) information about a leisure activity or holiday. For each topic, SA was asked to generate three responses and each response required two pieces of information e.g., when asked about a personally relevant famous name from childhood SA responded "Jo March, a character from Little Women". One point was awarded for each correct response, half a point was awarded if only one correct piece of information was given (e.g., name of book character with incorrect book) or if the information given was incomplete (e.g., name of book character without book). The maximum possible score for each lifetime period was 12. With regards to episodic memory, SA was asked to generate one emotionally positive and one emotionally negative memory from each lifetime period. Instructions asked for an event that had

occurred only once, at a particular place and time, and that lasted several minutes or hours but never more than a day. Each memory was assigned a specificity score (one point for a unique event, one point if it lasted less than a day; max = 2) and a details score (one point given for each of the following: factual details, spatial details, temporal details, phenomenological details; max = 4) based on criteria defined by Piolino et al. (2009). Total episodic score for each lifetime period was calculated by summing the specificity and details score and then averaging this score across the two episodic memories (this explains why the episodic column presents scores with decimal places).

4.2.1   Neuropsychological Tests

SA completed a battery of standard neuropsychological tests between the months of June and October 2014, eight to twelve months post-illness (when SA was aged 54). A summary of these results is presented in Table 4.2. Firstly, it is important to note that SA's score on the Weschler Test of Adult Reading (WTAR; Wechsler, 2001) suggests a very superior pre-morbid IQ, and this is consistent with her presentation as an intelligent and knowledgeable woman, as such it was predicted that SA would also score within the superior/very superior range on all other neuropsychological tests, unless she was experiencing neuropsychological deficits. Her scaled scores from the subscales of the Weschler Memory Scale (WMS-IV; Wechsler, 1997) ranged from borderline to superior; in particular, her scores on tests of immediate and delayed visual and verbal anterograde memory are below what is expected for someone scoring in the very superior range on the WTAR. Scores on tests of executive function are all within the normal range, although again, this is below what might have expected given SA's presentation, background and score on the WTAR.

In sum, despite subjective complaints of an anterograde nature, SA's neuropsychological data demonstrates no evidence of an anterograde memory deficit. However, on the basis of estimated premorbid IQ, it is reasonable to assume that her functioning was reduced relative to before the onset of her illness. With regards to retrograde deficits, all objective data was consistent with her description of a period of amnesia for the year of her illness.

Her episodic deficit also extended to the year before and after the onset of her illness, yet she was able to recall some personal semantic facts from these times, suggesting a more profound episodic deficit. Scores from all other lifetime periods are consistent with data from neurologically intact control participants that is presented elsewhere in the literature (e.g., Picard et al., 2013), and as such, it is presumed that her AM impairment is confined to the year before, during and after her illness.

Table 4.2. Table to show SA's neuropsychological test results.

Function	Test	SA's score
Pre-morbid intellectual functioning	WTAR	50/50
Learning and Memory	WMS-IV	
	Auditory memory	
	Logical Memory - immediate	12
	Logical Memory - delayed	10
	Verbal paired associates (immediate)	6
	Verbal paired associates (delayed)	5
	Visual memory	
	Designs (immediate)	8
	Designs (delayed)	11
	Visual reproduction (immediate)	12
	Visual reproduction (delayed)	8
	Visual working memory	
	Spatial addition	12
	Symbol span	14
Executive function	DKEFS	
	Trail making tests	
	Visual scanning	10
	Number sequencing	11
	Letter sequencing	9
	Number-letter switching	13
	Motor speed	12
	Fluency tasks	
	Letter	8
	Category	8
	Colour-word interference	
	Inhibition	11
	Inhibition/switching	10
	Tower test	
	Total achievement score	11

Note: All scores shown are scaled scores (except for that on the WTAR), thus a score of 5 represents borderline impairment, a score of 6 represents a low average performance, scores that fall between 8 and 11 represent average performance, a score of 12 or 13 represents high average and 14 is

considered to be superior. WTAR, Wechsler Test of Adult Reading (Wechsler, 2001); WMS III, Weschler Memory Scale- Third edition (Wechsler, 1997); DKEFS, Delis-Kaplan Executive Function System (Delis, Kaplan & Kramer, 2001). Dates of test, 06/2014-10/2014. SA also completed the Crimes Test of accelerated long term forgetting (Baddeley, Rawlings & Hayes, 2014), and showed some evidence to suggest impairment, but given that no control data was collected on this task, these data are not reported.

4.3   Method

All tasks below were completed by both SA and control participants, and are described in the order in which they were administered. Control participants were tested individually in one session that lasted approximately 1 hour and 30 minutes. Due to SA experiencing illness-related fatigue, she completed the tasks in two sessions, lasting approximately 45 minutes each.

4.3.1   Control Participants

The comparison group consisted of ten female participants who were closely matched with SA for age (SA's age at time of testing = 54, mean control age = 53.3, SD = 1.89) and years of education (SA = 17; controls, M = 16.9, SD = 1.85). The use of ten control participants was deemed to be appropriate on the basis of similar research published by our research group (e.g., Illman et al., 2011; Rathbone et al., 2009). All control participants were recruited from a volunteer panel at the School of Psychology, University of Leeds. None reported past history of memory disorder, neurological illness or injury, drug or alcohol abuse, or past or current psychological illness, and all were native English speakers. Prior to testing, this study was approved by the ethics committee at the School of Psychology, University of Leeds (ref number: 14-0064).

4.3.2   Self Fluency Measures

To measure self-concept the *I Am Fluency Task* was administered. Participants were asked to produce stable and enduring aspects of their identity, in the form of statements that they felt were essential to defining who they were. To avoid cuing statements, no specific examples were given, but participants were told that they might include roles, personality traits or physical traits. Participants were told that each statement must begin with the phrase *I am*, and were given one minute to generate as many of these statements as possible. In an attempt to control for variations in writing speed, participants were instructed to say each statement out loud and the experimenter wrote down responses.

Next, participants completed the *I Was Fluency Task*, in which participants were asked to generate statements to describe stable and enduring aspects of their identity before a particular life event. In the case of SA, her illness was chosen as the life event, given a motivation to examine her perception of self before the onset of her memory problems. With regards to controls, they were asked to think of a life event that occurred in 2013 (the year of SA's illness), and a list of the life events that they generated is presented in Table 4.3. As above, participants were told that they might include roles, personality traits or physical traits, and were given one minute to generate as many *I was* statements as possible.

The final self fluency measure that was administered was the *I Hope To Be Task*, again this was an adapted version of the *I Am Fluency Task* that asked participants to produce statements that they hoped would define their identity at some time in the future. Again, participants were told that they had one minute to generate as many of these statements as possible, and no specific examples were given.

Table 4.3. Life events generated by control participants

Participant	Life event	Age (years)
1	New job	51
2	New job	50
3	Winning national squash championship	53
4	25th wedding anniversary	51
5	Son's graduation	52
6	New job	55
7	Met new partner	51
8	Career change	52
9	Travelling in Australia	51
10	Son leaving home	50

4.3.3   Lifespan Retrieval Curve

In an attempt to explore SA's subjective impression of her recall across the lifespan, participants were asked to draw their own lifespan retrieval curves (as in Rathbone et al., 2009). To do so, participants were presented with a blank graph that depicted years of age on the x axis and ease of memory recall on the y axis (a scale of 0 to 6 was used, 0 = difficult to recall memories, 6 = easy to recall memories). Participants were asked to draw a continuous line that represented the ease with which memories came to mind at different times in their life.

4.3.4 Self Statement Ratings

After drawing a lifespan retrieval curve, participants were asked to rate each of the self statements that they generated in the self-fluency tasks. Firstly, they rated how important and central each *I am* statement was to defining their identity, using a scale of 1 to 7, with 7 being very important and 1 being not important at all. Secondly, participants rated each *I am* statement for emotional valence i.e. how positive or negative they felt about each statement, again on a scale of 1 to 7, with 7 being extremely positive and 1 being extremely negative. Finally, participants were asked to give an age of emergence for each *I am* statement, whereby they gave an age at which each statement became a defining part of their identity. Participants were also told that they should assign '0' to statements that had been self-defining for as long as they could remember (e.g., *I am* female).

These tasks were repeated for *I was* statements. Participants assigned importance, valence and age of emergence to each statement, in particular they were told to give importance and valence ratings based on how they felt about the statement at the time, as opposed to how they felt about it now. Finally, these tasks were repeated for *I hope to be* statements, the only difference being that age of emergence was to reflect an age at which participants predicted that the statement would become a defining part of their identity. Participants were instructed to give an age in years unless a particular statement was already part of their identity, in which case they were instructed to state 'ongoing'.

4.3.5 Fluency Control Tasks

As the tasks of primary interest involved generating statements under time pressure, a series of fluency tasks were included to examine group differences. Category fluency was assessed, using animals as the category of choice and letter fluency was assessed using the FAS Controlled Oral Word Association Test (Benton, 1968). Participants were given one minute for each task. Responses were given verbally and recorded verbatim by the experimenter.

4.3.6   Head Injury Semantic Differential Scale

The Head Injury Semantic Differential Scale (HISDS; Tyerman & Humphrey, 1984) was completed next, as an additional measure of the discrepancy between SA's past, present and future self. This task probed evaluation of trait descriptions that are considered to be particularly relevant to participants with acquired brain injury. Specifically, the scale comprises 20 adjective pairs that are rated for self-descriptiveness (e.g., bored-interested, dependent-independent) on a 7 point scale (1 = negative pole, 7 = positive pole). The adjective pairs were read aloud by the experimenter and participants were instructed to respond verbally by selecting an appropriate number for each. As in Tyerman and Humphrey (1984), this task was repeated three times to allow assessment of Present Self (over the last few days), Past Self (6 months prior to head injury) and Future Self (1 year into the future). Responses were summed to give a total out of a possible 140, with higher scores representing a more positive identity.

4.3.7   Tennessee Self Concept Scale

The final identity task that was administered was the Tennessee Self Concept Scale (TSCS; Fitts, 1965). In this task participants were presented with 100 statements that were rated for self-descriptiveness on a 5-point scale (1 = always false, 5 = always true). The TSCS allowed for evaluation of 5 aspects of identity (physical, moral, personal, family, social, self criticism) over three broad domains (identity, satisfaction and behaviour). To score the task, responses on items within each of the 8 subscales were summed and again a higher score represented a more positive identity. Quality of identity was also determined by summing the total number of vague responses (a response of '3', which corresponded to 'partly false and partly true'), relative to the total number of definite responses (responses of '1' (always false) or '5' (always true)).

4.3.8   Autobiographical Fluency Task

The final task that was administered to both SA and controls was an adapted version of the Autobiographical Fluency Task (Dritschel et al., 1992). For the purposes of this research, participants were asked to generate semantic facts (names of people) and episodic events from 7 lifetime periods; 0-10, 11-20, 21-30, 31-40, 41-50, 2012, 2013 and 2014, given that it was of interest to shed light on the temporal gradient of SA's memory impairment, particularly for acute pre- and post-illness years. The 5 decades that were included also allowed for an objective lifespan retrieval curve to be plotted for each participant and compared with the subjective self-report versions that were described above. For each task, participants were given 90 seconds to generate as many items as possible. As in the aforementioned fluency tasks, responses were given verbally and recorded verbatim by the experimenter.

4.4   Results

Relative performance levels demonstrated by SA and the control participants were primarily considered in terms of . That is, SA's scores were considered relative to the range of scores generated by control participants in order to get an impression of whether or not she was performing "abnormally". In instances where SA's score fell outside of the controls range of scores, findings were analysed using the modified t-test method described by Crawford and Howell (1998).

4.4.1   Autobiographical Memory Measures

4.4.1.1   Autobiographical Fluency Task

It was necessary to attempt to objectify SA's autobiographical memory impairment, before consideration of how deficits might relate to the self. To this end, findings from the Autobiographical Fluency Task are described first. In particular, fluency for episodic events is considered first and findings are presented in Figure 4.1.
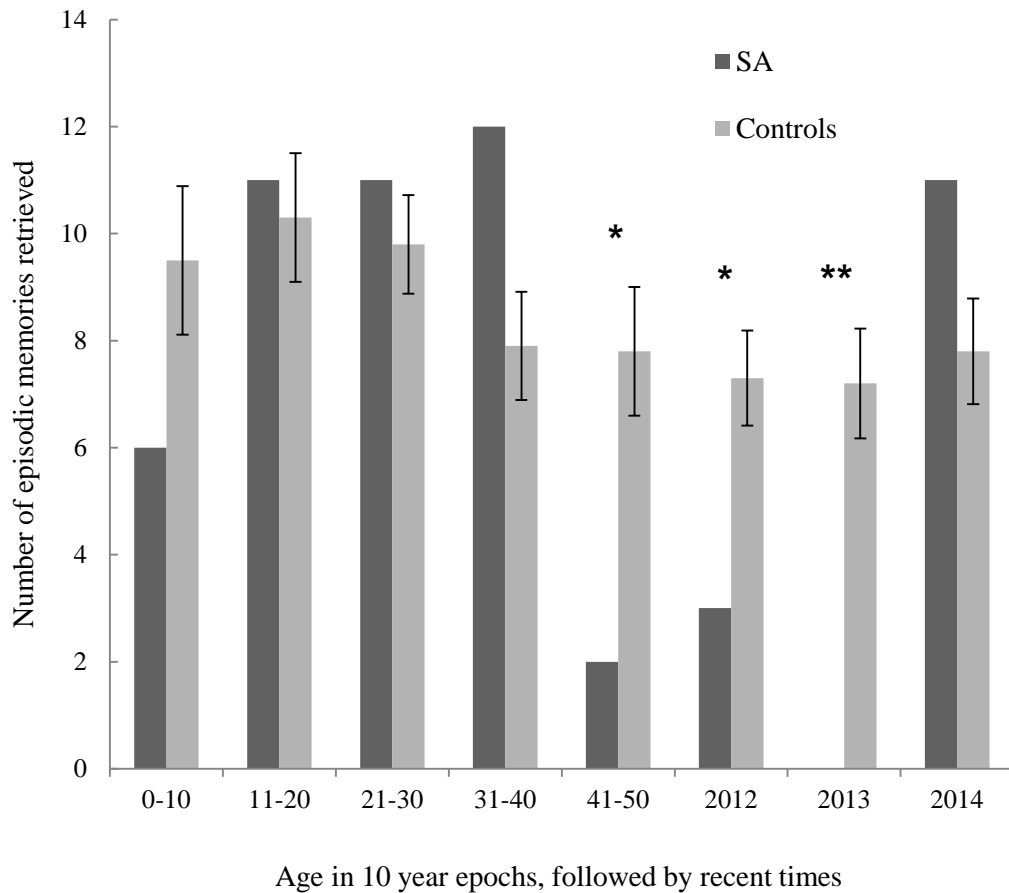
Figure 4.1. Graph to show the number of episodic events retrieved in the Autobiographical Fluency Task, * = *p* <.10, ** = *p* <.05. Error bars represent standard error of the mean.

Findings from control participants illustrate a typical lifespan retrieval pattern, in which retrieval peaks in late adolescence and early adulthood, and then peaks again for recent times. The pattern of SA's episodic retrieval is somewhat different, peaking later in adulthood, between the ages of 31 and 40, and as was expected, decreasing dramatically around the time of her illness. Specifically, SA is unable to recall a single episode from the year of her illness, which is consistent with her self-reported deficit. Here SA's score fell outside the range of control participants' scores (range = 5 - 13) and Crawford-Howell's modified *t* test showed that this difference was significant (*t* (9) = 2.71, *p* < . 02), that is, SA recalled significantly fewer episodic memories from this year than controls did. This

impairment also shows a temporal gradient extending to the year and decade immediately before her illness, which is common in cases of retrograde amnesia. SA's score on each lifetime period was compared with the range of scores generated by control participants – for the two periods that precede the year of illness, SA's score fell outside the range of control participants' scores (for 2012, range = 4 – 12, for the period 41 – 50, range = 4 - 15). Further analysis showed a numerical trend in the same direction for these periods (for 2012, t (9) = 1.56, p < .10 and for 41-50, t (9) = 1.56, p < .10). Importantly, SA's memory performance for most recent times (2014) was found to be intact (t (9) = 0.98, p > .10). Next, performance on the semantic component of the Autobiographical Fluency Task is considered. Data is presented in Figure 4.2.
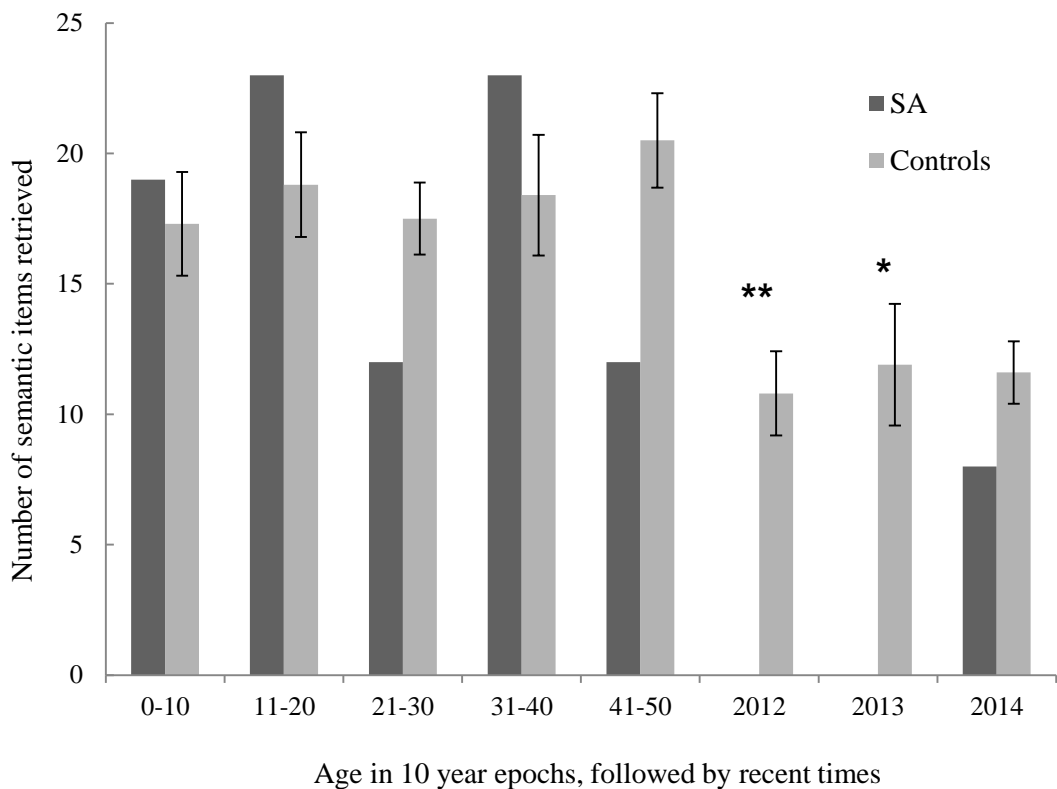
Figure 4.2. Graph to show the number of semantic items retrieved in the Autobiographical Fluency Task, * = p <.10, ** = p <.05. Error bars represent standard error of the mean.

In addition to SA's episodic impairment, findings from this task illustrate impairment in semantic autobiographical memory. SA's semantic memory impairment extends across a similar temporal gradient as her episodic impairment, being particularly profound for the year of her illness (year 2013) and the year before the onset of her illness. SA's scores for these two lifetime periods fell outside the range of control participants' scores (for 2012, range = 5 - 15, for 2013, range = 5 − 23) and analysis revealed that her performance was poorer. In particular, analysis showed that SA recalled significantly fewer semantic memories from 2012 (t (9) = 2.49, $p < .02$) and the discrepancy between her scores and those of controls showed a numerical trend in the same direction for 2013 (t (9) = 1.68, $p < .10$) and 41-50 (t (9) = 1.50, $p < .10$). SA's semantic memory for recent times is also similar to that of controls (t (9) = 0.89, $p > .10$), suggesting that she is able to encode new semantic information and that her anterograde performance is superior to her retrograde performance.

4.4.1.2 Lifespan Retrieval Curve

In order to assess SA's self-awareness of her memory performance across the lifespan, SA was asked to draw a curve that represented the ease with which memories came to mind (as in Rathbone et al., 2009). Controls also completed this task, and in order to compare findings, controls responses were averaged to produce Figure 4.3 below.
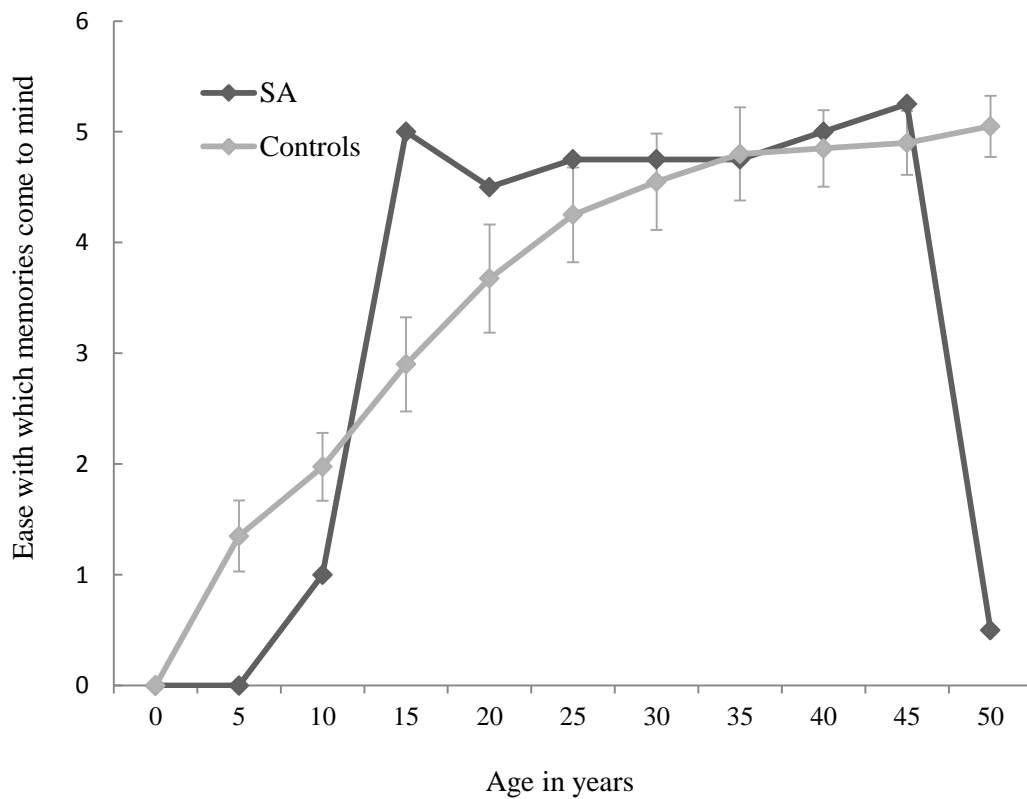
Figure 4.3. Lifespan retrieval curve as drawn by SA, and mean ratings from the lifespan retrieval curves drawn by controls. Retrieval curves were truncated at the age of 50 so that SA and control participants' ratings were sampled from the same age range. Error bars represent standard error of the mean.

Interestingly, SA's self-reported lifespan retrieval curve is somewhat similar to the standard lifespan retrieval curve, with a paucity of memories generated in childhood and increased retrieval through adolescence. It is evident that SA also feels that her memory throughout adulthood is good, yet she indicated that it drops sharply for the most recent years (age 50), which are closest in time to the year of her illness. In relation to findings from the episodic component of the Autobiographical Fluency Task, the data implies that SA might be more accurate in judging her capacity to retrieve items from episodic memory than controls. One interpretation of this could be that SA has accurate self-awareness of her

memory problems and no sign of anosognosia, yet further consideration of this is beyond the scope of this thesis.

In sum, autobiographical memory tasks confirm SA's self-reported memory deficits, and this was true for both episodic and semantic AM. Data also suggested that SA has good self-awareness of her memory performance across the lifespan, which has interesting implications with regards to metacognition in cases of AM impairment. Whilst no other research has examined metamemory evaluations of retrieval across the lifespan, metacognitive awareness of forgetting had been explored in shorter intervals with neurologically intact groups (e.g., Koriat, Bjork, Sheffer & Bar, 2004).

4.4.2   Self Measures: Present, Past and Future Self

4.4.2.1   Self Statement Fluency and Ratings

In order to explore the accessibility of self-concept SA and control participants completed *I Am, I Was* and *I Hope To Be Fluency Tasks*. Overall, findings were not in the predicted direction - SA was more fluent in describing her identity than controls, demonstrating no self-related fluency deficit. In particular, SA was able to generate 15 *I am* statements to describe her current identity in one minute. Similarly, controls generated an average of 14.2 (SD = 4.13, range = 8 - 23) *I am* statements in one minute. With regards to pre-illness identity, SA generated 12 *I was* statements, with controls generating an average of 8.40 (SD = 4.13, range = 2 - 14). SA was also slightly more fluent in generating *I hope to be* statements, producing 11 statements that she hoped would define her identity at some point in the future, relative to controls who generated 9.50 (SD = 3.54, range = 4 - 16).

 With regards to the ratings that participants assigned to each self statement, SA's ratings of importance and emotional valence were lower (on average) than those of controls (see Table 4.4), suggesting that SA generated identity statements that were more negative and also less personally significant. However, all of SA's scores fell within the range of those

generated by control participants and so no further between-participants analysis was conducted.

Table 4.4. Mean (SD) importance and valence ratings assigned to self statements by SA and controls.

	SA		Controls	
	Importance	Valence	Importance	Valence
I am	4.44	4.25	5.44 (1.33)	5.21 (1.53)
I was	5.25	3.58	5.78 (1.22)	4.44 (2.06)
I hope to be	6.09	6.09	5.85 (0.98)	6.18 (0.86)

Note. Ratings 1 = low, 7 = high

Next, analysis considered the ratings generated by SA across the three tasks. Here ratings assigned to each statement were considered, as opposed to her average ratings that were used in the previous analysis. Thus variance between each item enabled ANOVA to be used. One way ANOVA compared these importance ratings across the three fluency tasks, and showed a significant main effect of task type (F (2, 38) = 5.87, p = .006). In particular, pairwise comparisons revealed a significant difference between the importance ratings assigned to current self, relative to future self (p = .005), such that SA's *I am* statements were less personally significant than she predicted that her *I hope to be* statements would be.

With regards to valence, SA was most negative about her pre-injury self. This is contrary to the literature on identity in acquired brain injury, which tends to illustrate a negatively valenced current self, relative to both past self and future self (e.g., Nochi, 1998). Again, a one way ANOVA revealed a significant main effect of task type (F (2, 38) = 10.12, $p <$ .001), with pairwise comparisons showing that valence was significantly higher for future self relative to current self (p = .005) and also significantly higher for future self relative to

past self ($p < .001$). Overall, SA was most positive about the person that she hopes to become.

With regards to controls, one way ANOVA revealed no main effect of task type when considering the importance ratings assigned to self-statements, thus there was no difference in the perceived importance of *I am*, *I was* and *I hope to be* statements generated by controls (F (2, 28) = 1.33, p = .28). There was however, a significant main effect of task type on the valence ratings assigned to self statements (F (2, 28) = 7.19, p = .003) and Bonferroni corrected pairwise comparisons revealed that control participants were significantly more positive about hoped for self relative to past self (p = .002). no other differences emerged (in each case $p > .13$).

In sum, SA differed from controls in that her current self statements were less personally significant than past or hoped for selves, whereas the personal significance of *I am*, *I was* and *I hope to be* statements did not differ in controls. This could be interpreted as suggesting that SA is less certain about her sense of self in the present moment than controls and thus provides some support for the idea that her perception of her current self is changed following ABI. With regards to changes in the valence of self statements over time, control participants were equally positive about current and hoped for self, but SA was significantly less positive about current self relative to hoped for self, again suggesting a difference in the perception of her current self. Both SA and controls were most negative about past self.

4.4.2.2 Control Fluency Tasks

Fluency was considered on a number of alternative control tasks, in particular, category fluency was assessed by using animals as the category of choice and letter fluency was assessed using the FAS Controlled Oral Word Association Test (Benton, 1968). SA's category fluency score was slightly higher than that of controls; SA was able to name 31 animals in one minute, relative to controls who named 27.60 on average (SD = 7.26, range

= 15 - 36). In contrast, controls were able to generate more words in the letter fluency tasks than SA, generating 15.60 on average (SD = 4.07, range = 10 − 23.33), relative to SA who generated 13.33. However, in both instances, SA's score falls within the range of scores generated by control participants. Critically, SA doesn't show evidence of a deficit on any of the fluency tasks completed up to this point.

4.4.2.3 Type of Statement

Next, the type of statement that SA generated to describe her identity in the face of persistent autobiographical memory problems is considered. To account for differences in the number of statements generated by participants, the mean proportion of physical, social and psychological *I am* statements was calculated and is presented in Figure 4.4.
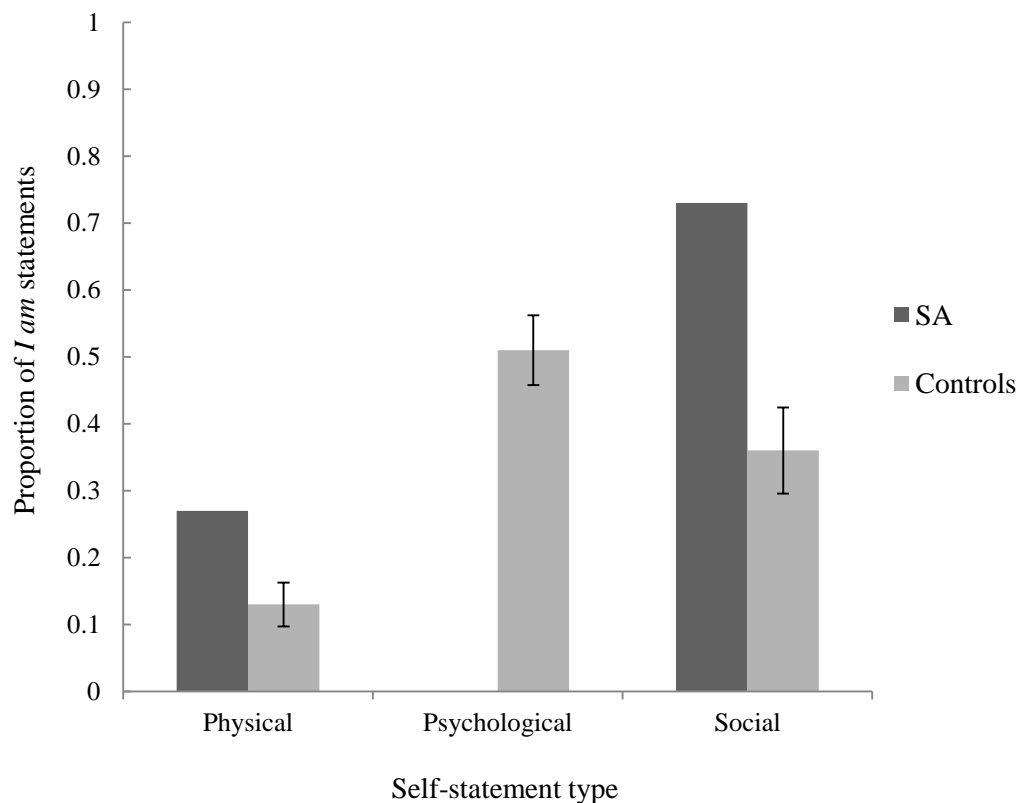
Figure 4.4. Mean proportion of physical, social and psychological *I am* statements generated by SA and controls. Error bars represent standard error of the mean.

Most strikingly, SA failed to generate any psychological, trait-like descriptions of her current identity, compared with the control group, for whom .51 proportion of their statements were psychological in nature (SD = .16, range = .25 - .82). This finding was statistically significant (t (9) = -3.04, p <.01)[9]. Whilst SA generated proportionately more social statements, such as *I am a mother*, *married* and *from Northern Ireland* than controls, this difference was not significant. (t (9) = 1.76, p <.10). The proportion of physical statements generated by SA fell within the range of that generated by controls.[10] Both SA and controls generated physical statements that most often referred to height, weight and hair colour, for instance, SA stated that she was "tall for a woman".

A repeated measures ANOVA was carried out to determine whether controls generate significantly more psychological statements than other statements types. Analysis revealed a significant main effect of statement type (F (2, 18) = 9.42, p = .002). Pairwise comparisons revealed a significantly higher proportion of psychological statements was generated relative to physical statements (p < .001), but there was no significant difference between the proportion of psychological and social statements generated (p = .195).

Given that SA failed to generate any trait-like descriptions of her current identity, it was of particular interest to explore whether these types of statements emerged when SA was describing herself prior to the onset of her illness and subsequent memory problems. As above, the mean proportion of physical, social and psychological *I was* statements was calculated and is presented in Figure 4.5.

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[9] It should be acknowledged that a score of 0 can exaggerate a finding, given that variance is also 0. However, only 2.56% of all neurologically intact adults who have completed the *I Am Fluency Task* as part of the work presented across all experiments in this thesis have failed to generate any psychological statements. Thus making a convincing argument for the fact that SA is performing abnormally here.
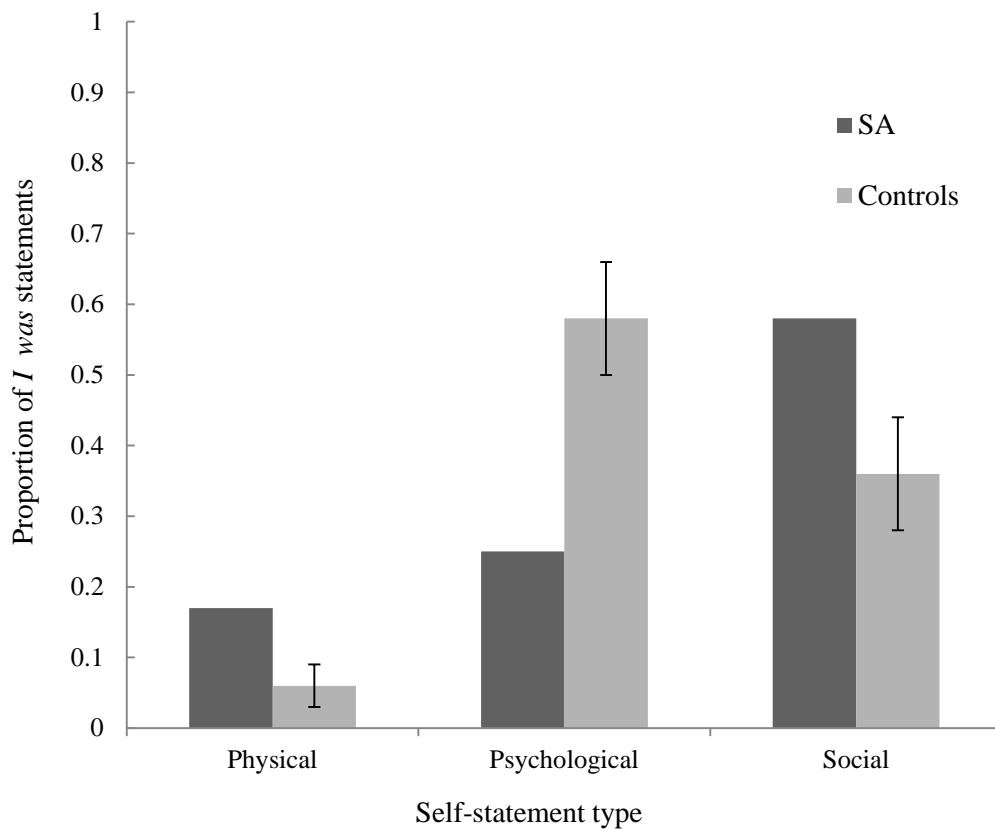
Figure 4.5. Mean proportion of physical, social and psychological *I was* statements generated by SA and controls. Error bars represent standard error of the mean.

Unlike when asked to generate statements to describe her current identity, SA is able to generate psychological statements to describe her pre-illness identity e.g., *I was* busy *and I was* worried. She generates proportionately less than controls, yet this difference was not statistically significant (t (9) = 1.09, p > .05). Thus despite the numerical differences that are highlighted in Figure 4.5, outcomes suggest that overall SA describes her past self in much the same way as controls.

Finally, the proportion of type of *I hope to be* statement generated by SA and controls was considered (see Figure 4.6).
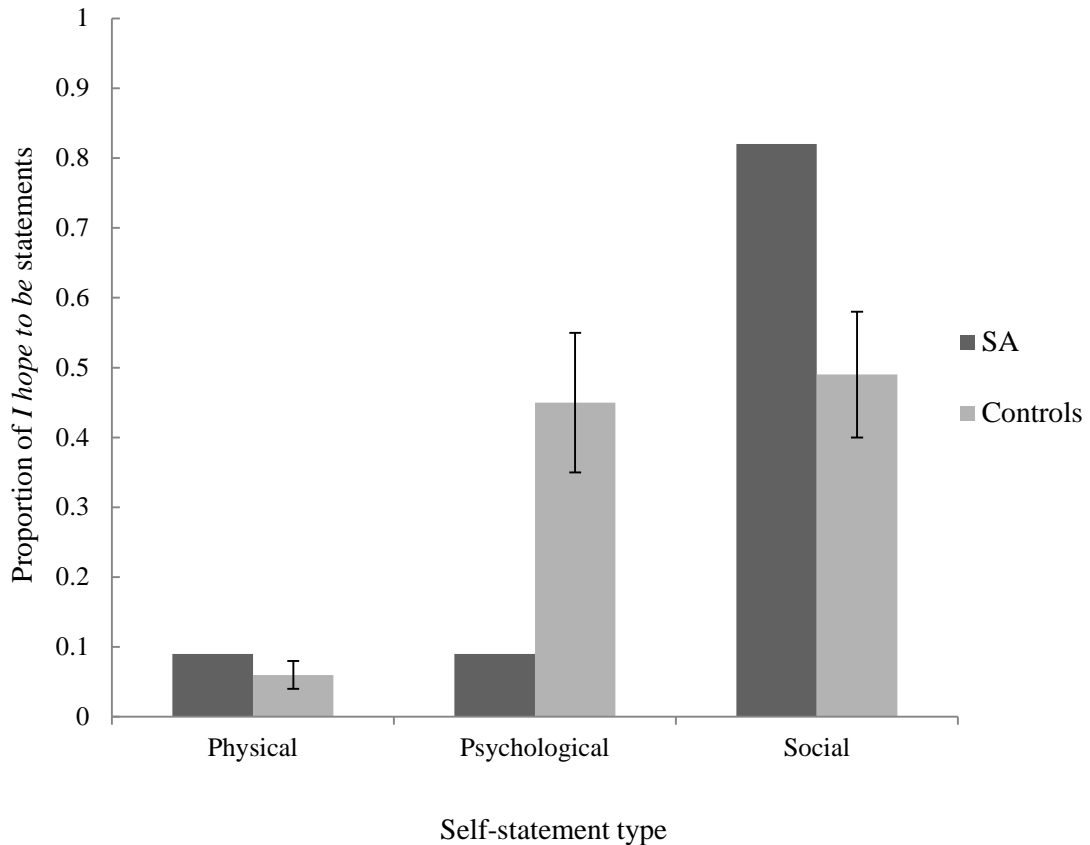
Figure 4.6. Mean proportion of physical, social and psychological *I hope to be* statements generated by SA and controls. Error bars represent standard error of the mean.

As was the case for both current and past identity, SA's *hoped for* selves are predominantly social in nature, for instance, she stated that she hoped to be "working", "close to her children" and "contributing financially". SA generates proportionately fewer psychological statements, and proportionately more physical statements than controls, but analysis revealed that the proportions generated by SA fell within the range of those generated by controls across all three self-statement types (control ranges; physical = 0 - .17, psychological = 0 - .91, social = .10 − 1.00)[11] . Thus as per *I was* statements, the way in which SA describes her *hoped for* self is similar to that of controls.

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[11] The range of control responses likely makes the analysis insensitive to detecting differences here. Nonetheless, the rationale for using ranges was to determining whether or not SA was performing "abnormally" relative to age and gender matched

4.4.2.4 Age of Emergence – Current Self Statements

Chapter 3 demonstrated that self-images emerge in a pattern that is similar to that of the reminiscence bump, such that, participants report that the majority of their self statements emerge in late adolescence and early adulthood (see also Rathbone et al., 2009). To explore age of emergence in the present study, the emergence of current self-images across SA's lifespan was compared with that of controls. Figure 4.7 illustrates the proportion of *I am* statements that emerge during each decade across the lifespan.
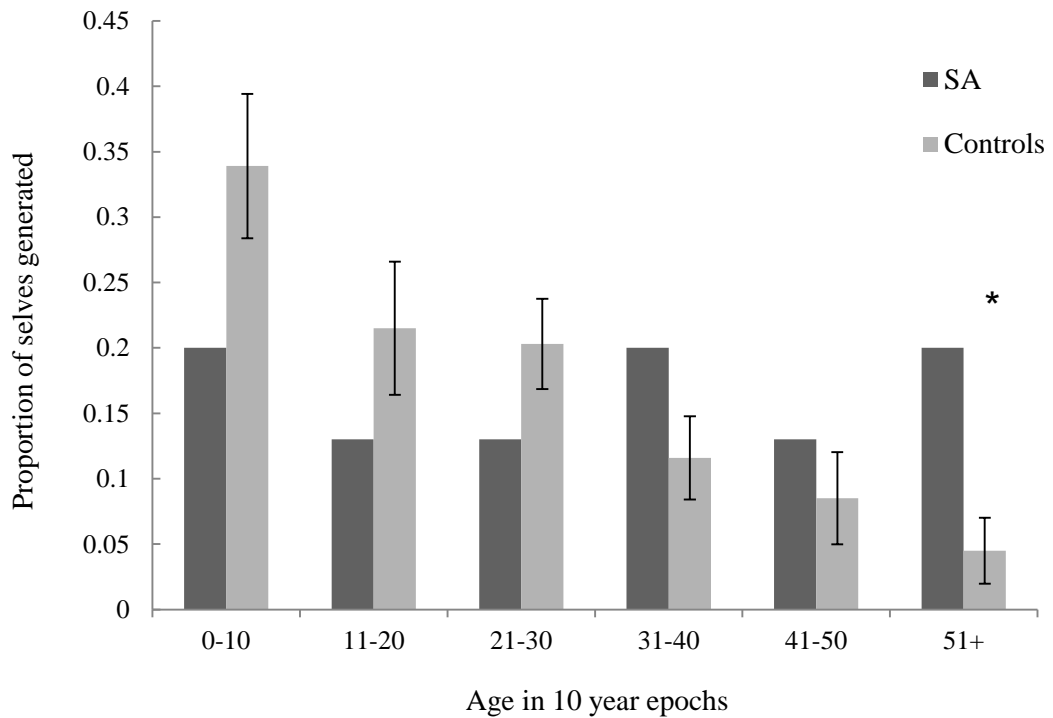
Figure 4.7. Graph to show emergence of current self statements across the lifespan, $* = p <$ .10. Error bars represent standard error of the mean.

Overall, Figure 4.7 illustrates a different pattern of self-emergence for SA relative to control participants, yet neither follows the pattern of the standard reminiscence bump. For

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controls, and it does not appear that this is the case in this instance, as it was when considering *I am* statements.

SA, aspects of her current self emerge relatively consistently across her lifespan, with no notable peak. In contrast, age of emergence peaks in childhood for controls and then declines steadily across the lifespan. Anecdotally, SA reported that she had acquired new selves since the age of 51 (e.g., "ill", "tired" and "enjoying gardening"). Figure 4.7 also demonstrates the most marked difference in the proportion of new selves generated during this lifetime period, which is notable given that this is also the time in which she became ill and subsequently experienced considerable memory deficits. Analysis compared the proportion of selves generated by SA and the range of proportions generated by controls in each decade, this revealed no differences for the first five decades and a numerical trend towards more selves being generated by SA compared to controls for the most recent time period (51+; $t(9) = 1.77$, $p < .10$).

Studies have shown that changes to one's sense of self are common following periods of illness and memory loss (e.g., Frank, 1995; Nochi, 1998). Indeed SA alluded to the fact that her identity had changed when speaking about her most salient current identity, which she described as being "a mother". She described how, given that her children are grown up, her most salient identity prior to the onset of her illness was that of a very busy maths teacher, whereas her illness prevented her from returning to work and thus re-establishing this identity. If SA is trying to compensate for the loss of her most salient identity following her illness, this might explain why new selves have emerged. For instance, one of the new self statements that SA generated was "I am enjoying gardening", and following completion of the *I Am Fluency Task*, she commented that this was a surprising new aspect of her identity ("I can't believe I said I like gardening, I would never have said that before, its only recently that I have started gardening").

Next the age of emergence for past self was explored, thus the analysis described above was repeated to look at the age of emergence of *I was* statements. Findings are shown in Figure 4.8.
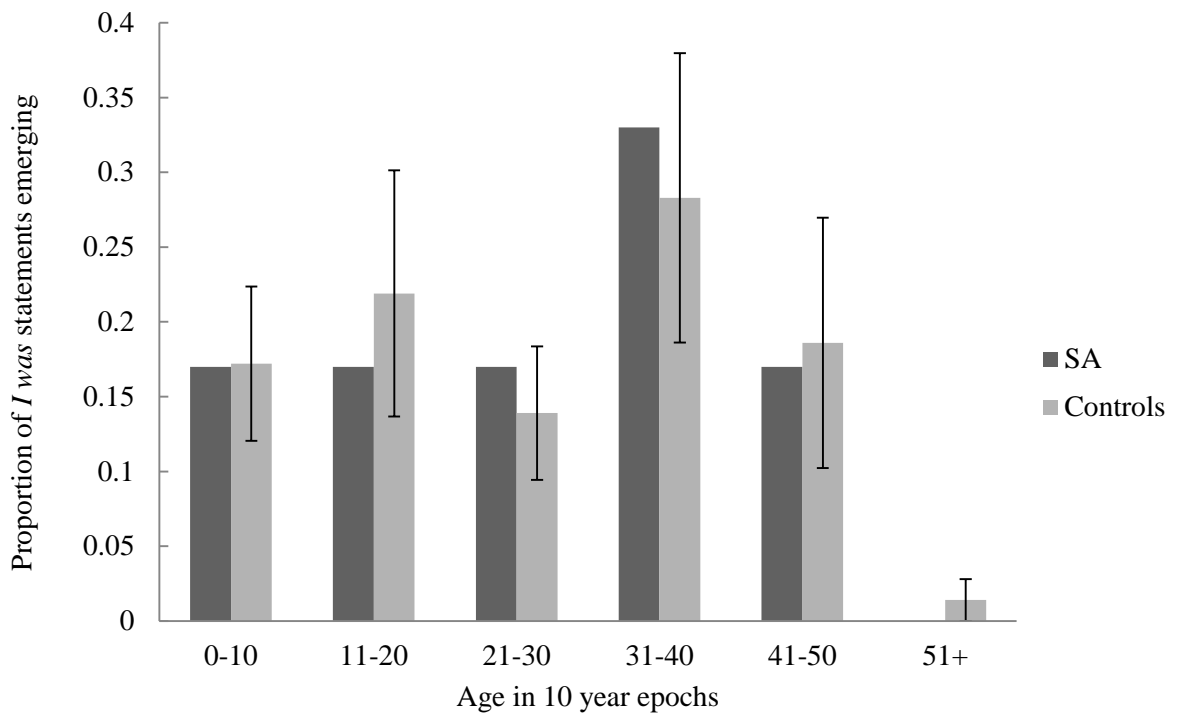
Figure 4.8. Graph to show emergence of *I was* statements across the lifespan. Error bars represent standard error of the mean.

The age of emergence of *I was* statements is more similar for SA and controls than it was for current identity statements, indeed analysis revealed no differences between age of emergence for *I was* statements (the proportion of selves generated by SA and the range of proportions generated by controls in each decade and revealed no differences). Figure 4.8 illustrates a notable peak of age of emergence at the period of 31-40. This is a somewhat later than what might have been expected, given that research shows that selves emerge in a pattern that is similar to that of the reminiscence bump. Figure 4.1 and Figure 4.2 illustrate that memories from this time period are particularly accessible to SA, which is consistent with the idea that memories cluster around periods of self image formation (e.g., Chessell et al., 2014), yet this is not the case for controls.

Overall, the findings described thus far suggest that SA has experienced some self-related changes following her illness. In particular, SA reports a shift in her most salient identity,

the content of her current identity is qualitatively different to that of controls. Data also shows a trend towards more self statements emerging in very recent times for SA but not in controls. In response, it was of interest to explore whether or not SA predicted ongoing changes to her identity, to do so, the *I hope to be* statements that she generated were considered. Comparisons were made between the clustering of *I hope to be* statements around the present time in SA and control participants, with data illustrated in Figure 4.9.
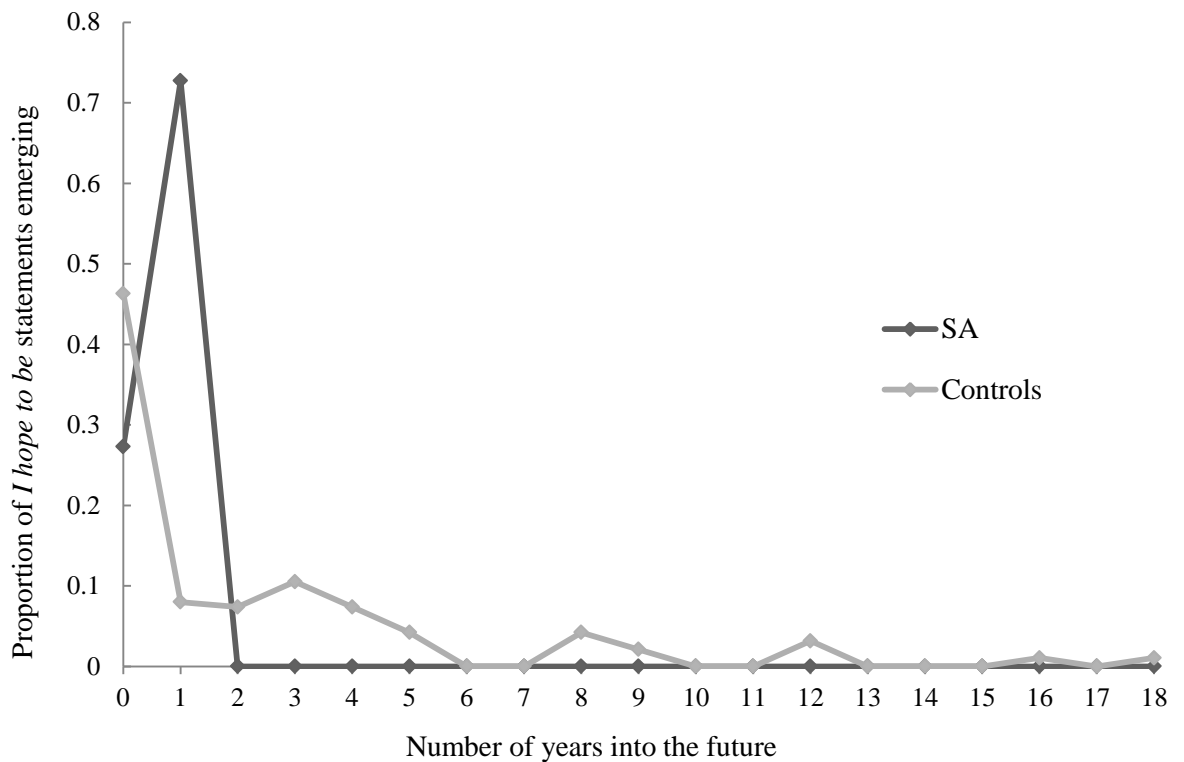
Figure 4.9. Graph to show the (predicted) emergence of *hoped for* selves. Note. 0 represents statements that participants reported to be ongoing features of identity that they hoped would also persist into the future.

Figure 4.9 illustrates a difference in the distribution of SA's *I hope to be* statements relative to those of controls. In particular, the majority of controls *hoped for* selves were already established as defining features of their identity (represented as '0' in Figure 4.9), suggesting that, in general, they hope to maintain their current identity into the future. In contrast, the majority of SA's *hoped for* selves are not existing components of her identity,

rather they are things that she is yet to become, such as "busy", "a driver" and "someone who reads for pleasure". Notably, SA reported that these *hoped for* selves had been identity defining prior to the onset of her illness, thus the focus for her was on regaining aspects of her past self, as opposed to maintaining current self. SA also hopes that this process of regaining past self will be happen quickly, she predicted that any statement that is not an existing part of her identity will have emerged within one year. Analysis showed that SA generated significantly more selves that she hoped would emerge within one year (t (9) = 3.91, p < .003) relative to controls, but the proportion of *hoped for* selves that was reported to be ongoing was not significantly different to controls (t (9) = 0.49, p > .05). Given that this difference was not significant, no further statistical analysis was carried out to compare the proportions represented in Figure 4.9. Figure 4.9 also illustrates that controls generate *I hope to be* statements that extend further into the future. Overall, findings could be interpreted as suggesting that SA is going through a period of change, and as such, she is unable to look as far into the future as controls do.

4.4.2.5   Head Injury Semantic Differential Scale

To explore whether or not discrepancies existed between SA's perception of her present self, in relation to both her pre-illness self and her future self, in a more quantitative manner than described above, SA and controls completed the Head Injury Semantic Differential Scale (HISDS; Tyerman & Humphrey, 1984). Findings are presented in Table 4.5.

Table 4.5. SA's scores on the HISDS and mean (SD) control ratings.

	SA	Controls
Present	103	109.75 (12.80)
Past	96	99.63 (17.16)
Future	107	117 (9.59)

Given that the higher the score on the HISDS (max score = 140) the more positive the identity, findings indicate that for both SA and controls, past self is regarded negatively in relation to both present self and future self, with future self being rated highest.

Across the three tasks, SA's scores fall within the range of scores generated by control participants. Notably, findings from SA are inconsistent with previous research that has used the HISDS in populations with acquired brain injury, and yet consistent with the valence ratings that she attached to *I am* statements, revealing that she is most negative about past self and most positive about future self. People with acquired brain injury tend to rate present self most negatively, and past and future self very similarly, given that they predict a return to past self at some point in the future (e.g., Nochi, 1998). SA's ratings of a more negative past self relative to the present could be indicative of the fact that she was experiencing some difficulties prior to the onset of her illness; she reported difficulty sleeping, worrying about her children and being stressed because of work. Alternatively, given that SA's ratings are very similar to controls, the discrepancies could be related to the fact that previous research with the HISDS has been conducted with participants with more severe and debilitating injuries than SA (e.g., Ellis-Hill & Horn, 2000; Nochi et al., 1998; Tyerman & Humphrey, 1984).

4.4.2.6 Tennessee Self Concept Scale

SA's scores on each of the eight subscales of the Tennessee Self Concept Scale (TSCS; Fitts, 1965) are shown in Figure 4.10, alongside the average ratings generated by participants in the control group.
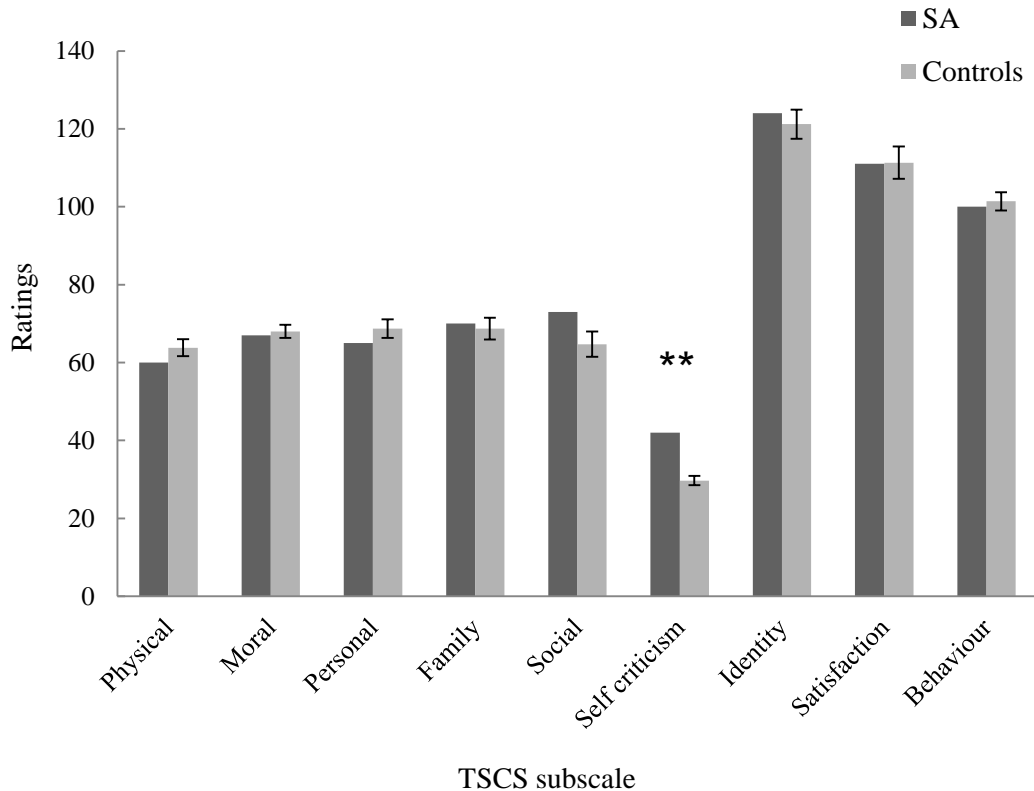
Figure 4.10. SA and mean control ratings on the eight subscales of the TSCS. Error bars represent standard error of the mean, ** = $p < .01$.

SA's ratings on the subscales of the TSCS are very similar to those of controls. Indeed her scores fell within the range of scores generated by control participants on 7 of the 8 subscales, suggesting that SA's self-concept is equally as positive as control participants. In fact, SA's score on the self-criticism subscale is significantly higher than controls (t (9) = 3.19, $p < .01$), demonstrating that SA is less self critical. To explore the quality of SA's identity, relative to controls, the number of vague and definite responses were also

considered, but revealed no differences. SA generated 17 vague responses, relative to controls who generated an average of 20.3 (SD = 13.70, range = 4 - 54), and 28 definite responses, relative to controls who generated an average of 30.5 (SD = 15.51, range = 3 - 54). Importantly, findings from the HISDS and the TSCS suggest that, whilst SA fails to recognise a single event in her diary from 2013, the strength of her identity is comparable to that of controls.

4.5   Discussion

The aim of Study 3 was to explore how sense of self might be affected in a case of autobiographical memory impairment, especially in relation to identity strength, content and continuity. First of all, findings from the self fluency tasks and the TSCS revealed that the strength of SA's identity was unimpaired relative to controls, and this was despite profound deficits in her ability to recall autobiographical information for the time of her illness. Findings from the HISDS and the emotional valence ratings (those assigned to self statements) also revealed no differences, demonstrating that SA is as positive about her past, present and future self as controls. Despite similarities in identity valence, differences emerged when examining the type of self statement that SA generated to describe her current identity. SA failed to generate a single psychological, trait-like description of her current self on the *I Am Fluency Task*, whereas 51% of the *I am* statements generated by controls were psychological in nature. There was also evidence, both objective and anecdotal, of SA experiencing a change in self following the onset of her memory problems. SA described how her most salient self-concept prior to her illness was that of a teacher, however her ongoing difficulties had prevented her from returning to work, and as such, she was forced to replace this most salient self-concept. Her self-report was somewhat consistent with data on the age of emergence of her current identity statements, as more of SA's current self statements emerged in recent years relative to controls (although is a tentative suggestion given that this finding was not significantly significant,

but showed a numerical trend in this direction). In comparison to controls, SA also predicted that significantly more new selves would emerge within one year. Together these findings might suggest that, at the time of testing, SA was experiencing a period of identity change and a disruption to the continuity of her sense of self. The critical issue is whether the changes in the self that were observed are associated with the fact that she has a profound memory deficit – at least for a certain period – or whether they are just a normal reaction to a major illness event (this issue is also explored further in Chapter 6).

4.5.1   AMs and Identity Strength

On each of the *I am, I was* and *I hope to be* tasks there were no differences in the number of statements generated by SA and the number generated by controls, demonstrating that SA has no deficit in her ability to access stored self-concepts. Importantly, this finding was not in the predicted direction, given that Study 1a presented evidence that AMs increase access to self-concept, it was predicted that someone with AM deficits would demonstrate impaired performance on self-related fluency tasks. However, this finding does fit with the temporal characteristics of SA's autobiographical memory impairment. Findings from the autobiographical fluency tasks revealed that SA's memory was profoundly impaired for the year of her illness, such that she was unable to generate a single item on either the semantic or episodic component of this task; in addition, her impairment extended to the year, and also the decade (41-50), prior to the onset of her illness (SA was able to generate autobiographical memories from each of these two time periods, but she generated numerically fewer than controls). However, SA showed no impairment in her ability to access memories from any other lifetime period; she was able to generate memories from recent times, suggesting that her anterograde deficits are much less pronounced than her retrograde deficits, and she showed no deficits in her ability to generate memories from childhood or early adulthood.

It is suggested that, for SA, the persistence of memories from childhood and early adulthood is crucial in explaining the persistence of her identity strength. Autobiographical memories from this time period are argued to be critical in the maintenance of identity, indeed this is echoed in empirical work by Addis and Tippett (2004), which showed that the number of responses that an individual generates on the TST is directly related to their ability to retrieve personal episodic and personal semantic AMs from childhood and early adulthood.

4.5.2   AMs and the Content of Self-Knowledge

In healthy control participants, the majority of the self statements that were generated were psychological in nature, that is, they reflected trait-like descriptions that required the participant to be introspective (e.g., *I am* cheerful, *I am* disorganised, *I am* thoughtful). When asked to describe her past and future self, SA generated a similar proportion of psychological statements to controls; however, when asked to describe her current identity, SA generated none. This particular finding is in line with the predictions made at the beginning of this chapter, and further, findings suggest that SA thinks of her past self just as controls do, yet qualitative differences exist in the way in which she conceptualises her current self.

The idea that AM is crucial in order for one to possess trait self-knowledge is not without precedence, indeed findings from Studies 1a and 1b illustrate that AM increases access to psychological self-concept, and here findings demonstrate that the reverse is also true – degradation of AM is associated with decreased access to psychological selves. Given that SA demonstrates impairment in both semantic and episodic AM, it is difficult to tease apart the relative contributions of these memory systems to the self-related changes she exhibits. However, the fact that SA is able to rate traits for self-descriptiveness, despite failing to generate them in a fluency task, lends itself to a theory proposed by Klein and colleagues (for reviews, see Klein, Cosmides, Tooby & Chance, 2002b; Klein & Gangi, 2010). Klein

postulates that trait self-knowledge is extracted from episodic exemplars (either during initial occurrence or during recollection) and stored within semantic AM, in subsystems that hold trait summaries. It is further suggested that 'trait summaries form a fast access database, which provides quick answers to decision processes that require trait judgements' (Klein & Lax, 2010, p.921). Thus we might predict that this database was utilised by controls to complete the *I Am Fluency Task*, and yet was degraded in SA. It is possible that on tasks that required SA to rate traits for self-descriptiveness yet imposed no time limit (i.e. the TSCS and HISDS) she was able to draw on trait-consistent episodes from before her period of amnesia, which is in line with Klein's theory that episodic AMs are referred to when trait summaries are unavailable. The finding that SA was able to generate trait descriptions on the *I Was* and *I Hope To Be Fluency Tasks* also lends itself to the idea that there exists multiple subsystems for one's knowledge of past, present and future self, and that trait-like descriptions are stored distinctively from concrete self-knowledge about social roles and physical characteristics. These ideas about the multiplicity of stored self-concepts demand further investigation.

4.5.3   AMs and the Continuity of the Self

Age of emergence data showed that SA's current self statements emerged consistently across her lifespan, in addition she generated as many self statements that emerged in the past year as she did for the period that she described as being most identity defining (between the ages of 31 and 40), suggesting that SA was in the midst of a second identity defining period. This finding is important from a theoretical perspective, as it highlights that transitional life events can bring about identity changes at any age, as opposed to the view that identity formation follows a set of predetermined stages. This idea is consistent with findings from the distribution of *I hope to be* statements, as the majority of *I hope to be* statements generated by controls were already established as defining features of their identity, whereas the majority of SA's *hoped for* selves were concepts that she was yet to

become. Specifically, SA hoped that significantly more identity defining concepts would emerge within one year than did controls.

A key feature of AM is its capacity to allow for mental time travel (e.g., Tulving, 2002), that is, AM allows us to relive the past, as well as imagine the future, and it is suggested that the role of projecting oneself into the future is crucial here. The ability to project oneself into the future gives rise to the ability to imagine a 'possible self' that is full of ideas about what one might become (Markus & Nurius, 1986). Research shows that this capacity to imagine future selves allows for a sense of personal continuity over time (e.g., D'Argembeau, Lardi & Van der Linden, 2012). Perhaps the lack of coherence to SA's sense of self (that is, the sense that SA is rediscovering and redefining who she is) was a response to the formation of an identity that was never within her repertoire of possible selves. Indeed studies frequently describe how negative and unexpected life events, such as traumatic brain injury, give rise to reports of self-related changes and a 'loss of self' (e.g., Nochi, 1998). Future research might compare the impact of expected and unexpected selves on the experience of self-coherence.

There remains a possibility that personality differences led to the lack of psychological selves that SA generated - perhaps she would always have fallen within the 2.56% of people who choose not to define their self in relation to their traits. Nevertheless, it is much more likely that something about the self is changed, and this is true from the data collected with her, as well as the anecdotal evidence gathered from time spent in her company. For instance, when discussing the issue of identity, SA was certain that she had maintained a sense of self throughout the course of her illness, and yet there were features of her identity that were different than they had been prior to its onset. She described new selves emerging - she was particularly surprised by her newfound identity as a gardener - and also aspects of her 'old self' that had disappeared - she described how her family had always relied on her sense of direction, and how this had been lost since her illness. It is possible that any differences in selves could be explained by changes in psychological or social

circumstances i.e. as a reaction to the change in her life, as opposed to a change in neural mechanics and subsequent amnesia. This idea is explored in greater detail in Chapter 6, using a sample of people with a range of acquired brain injuries, and thus varying degrees of memory impairment.

4.5.4   Conclusion

In sum, the results of the present study suggest that there are aspects of the multifaceted self that are preserved in the face of profound impairment in AM. Namely, an individual is able to maintain a strong sense of who they are, who they were and who they hope to become. Yet, when AM is impaired the self does not go unscathed. This study demonstrates impairment in the self statements that are most accessible to us, as well as possibly highlighting disruption in the continuity of one's self over time. The impact of a fragmented self on psychological well-being is a crucial avenue to be explored in further research and it is proposed that the identity fluency tasks described within this chapter are a promising tool with which to do so. To explore this further, Chapter 6 employs *I am, I was* and *I hope to be* tasks with a larger and more heterogeneous sample of people with acquired brain injury. In particular, the relationship between self and memory during transitional life events is the focus of the following chapters.

5. SELF STATEMENTS, AUTOBIOGRAPHICAL MEMORY AND THE LIFE STORY

"I know who I was when I got up this morning, but I think I must have been

changed several times since then"

Lewis Carroll (1865)

5.1 Introduction

So far, the chapters within this thesis have emphasised that self is a dynamic and fluid construct that is reconstructed in relation to memory. The present chapter describes an investigation into the relationship between the self and memory at the start of a lifetime period, when a new and independent self emerges – that of being a university student. Chapter 4 described how both the content and continuity of self are affected when a transitional lifetime period is defined by amnesia. The present chapter attempted to elucidate this relationship in a neurologically intact sample. To this end, the aims were threefold. Firstly, to examine how memories are organised around the formation of a new self. Second, to explore the content of self-knowledge during a transitional lifetime period and finally, to determine whether there is an association between current self statements and one's most accessible life story memories.

According to Conway (2005) all individuals have a 'life story' – a personalised story about one's life, which 'organises autobiographical memory and forms the basis of identity and self-understanding' (Thomsen, Olesen, Schnieber, Jensen & Tonnesvang, 2012, p. 366). Within the life story, autobiographical memory is organised hierarchically. The most general level consists of knowledge of lifetime periods (e.g., when I was at school), where

temporal knowledge about the duration of a period is stored alongside knowledge of the common themes of that period (Conway, 1992; Linton, 1986). At a more specific level is knowledge of general events, where conceptual representations of extended and repeated events are stored, such as, going on school trips (Barsalou, 1988; Burt et al., 2003; Conway, 1996; Haque & Conway, 2001; Williams, 1996). Finally, the most intricate level of the autobiographical knowledge base contains event-specific knowledge, that is, highly detailed knowledge of a single event (e.g., meeting Joe on a school trip to Oxford). According to this model, autobiographical memory arises from graded activation across the three structures (Conway & Pleydell-Pearce, 2000).

It is clear that not all memories make it into one's life story (Berntsen & Rubin, 2004; Bluck & Habermas, 2000) and in response researchers have sought to determine the characteristics of memories that acquire this privileged status. With regards to temporal characteristics, one consistent finding is that life story memories cluster at the beginning of life time periods (e.g., McAdams, 1993; Pillemer, Goldsmith, Panter & White, 1988; Steiner, Pillemer, Thomsen & Minigan, 2014; Thomsen & Berntsen, 2008; Thomsen, Pillemer & Ivcevic, 2011). For instance, Pillemer et al. (1988) explored long-term memories from the first year of college in alumni students who had graduated two, twelve or twenty two years earlier. The authors found that the temporal distribution of these memories was not consistent with a simple decay function, in which the availability of memories decreased overtime; counterintuitively, the most accessible memories were those that were encoded at the start of college. An earlier study by Pillemer, Rhinehart, White and Sheldon (1986) also showed this effect in current college students. In their study, participants were asked to recall their first four memories of freshman year and findings showed a marked clustering of remembered events from the time of entering into college.

This overrepresentation of memories at the beginning of lifetime periods is consistent with a self-based account of the lifespan retrieval curve, which proposes that 'a reminiscence bump is formed at any point where one generates a new self-image' (Rathbone et al.,

2008, p.1412, see also Conway & Haque, 1999). In relation to this, Study 2 of this thesis demonstrated that older adults report a peak in identity emergence between the ages of 16 and 30, which is also the time during which memories are recalled more frequently than in any other period (e.g., Conway & Haque, 1999; Rubin, Rahaal & Poon, 1998; Rubin, Wetzler & Nebes, 1986). In order to expand our understanding of the relationship between self and the reminiscence bump, the present chapter explored the self and autobiographical memory at the start of a new life story chapter, at a time when a new identity was emerging. To this end, the temporal distribution of personally significant autobiographical memories was examined in first year university students. Consistent with the literature described above, it was expected that memories would cluster around the university induction weeks, given that this time presumably marks the start of a new life time period, as well as the formation of a new self.

In an extension of the previous literature, the present chapter also explored self statements before, during and immediately after the start of a new life time period. Specifically, participants completed *I am* tasks at three time intervals during their first year at university – before the start of university, at the end of Semester 1 and at the end of Semester 2. In response to findings presented in Chapter 2 and Chapter 3 it was predicted that young adult participants would demonstrate a bias for generating psychological trait like descriptions, as opposed to statements that related to physical appearance or social roles, and that this bias would be stable across the three time intervals. Research has however demonstrated that memories encoded during transitional lifetime periods are later judged to be more emotionally positive (e.g., Gluck & Bluck, 2007; Thomsen et al., 2011) and more important for identity development (Demiray, Gulgoz & Bluck, 2009) than memories from other time periods. As such, it was predicted that both the positivity and personal significance of self statements might increase following the transitional phase. An *I will be* task was also completed at the first time point in order to explore participants' predictions about how the self might change following the beginning of a new life story period.

Finally, this study allowed for a unique exploration of the association between life story memories and self statements, as participants were asked to consider whether the *I am* statements that they generated were related to their most accessible memories from their first year at university. More specifically, once participants had generated *I am* statements and autobiographical memories, they were asked to record the number of *I am* statements associated with each memory. An example of a related pair from this particular study is the memory 'going to my first lecture' and the statement 'I am a student'. The assumption here was that the more *I am*'s that are associated with a memory, the more self-relevant that memory is. Given that the life story has been proposed to form the basis of identity and self-understanding (Conway et al., 2004; Fitzgerald, 1988; McAdams, 1996) it was predicted that the majority of one's most accessible life story memories would be directly related to current self statements. To explore this further, correlational analysis was used and it was expected that the more important the memory, the more closely associated with the self that memory would be.

5.2 Overview of Methods

Students at the School of Psychology, University of Leeds, took part in a three part study that was designed to examine the impact of university on identity, and the role of autobiographical memory in the formation of a new 'student' identity. This life event was chosen as it represents a transitional period that is emotional, important and novel enough to prompt the formation of a new identity. Approximately four weeks prior to the start of Fresher's Week (i.e. a week held at the start of term to induct and welcome new students) questionnaires were mailed to 180 people who were scheduled to start their undergraduate Psychology degree at the University of Leeds in the following month. Questionnaires examined self statements and predicted changes in the self, and were returned by 40% (n = 73) of recipients prior to the start of the academic year. Towards the end of Semester 1 (10 weeks after the start of university), all individuals who returned the initial questionnaire

were invited to complete a second questionnaire, representing Part 2 of this study. Again, this second questionnaire asked participants to generate self statements, in order to examine changes in self-concept. Autobiographical memories from the first semester were also recalled, and participants rated the accuracy of the self statements that they had predicted during Part 1. The final part was completed at the end of the academic year (following 20 weeks at university). All 57 participants who completed Part 2 were emailed a link to an online questionnaire that asked participants to generate self statements and autobiographical memories from their first year at university. Participants then dated and rated their autobiographical memories, allowing for an exploration of the characteristics of memories that make it into one's lifestory.

Prior to any data collection, this research was approved by the School of Psychology's (University of Leeds) ethics committee (ref number: 13-0113), and participants were assured that their participation would not be linked in any way to their on-going academic life at the department.

5.3   Part 1: Before University

5.3.1   Participants

In Part 1, questionnaires were mailed to 180 prospective psychology undergraduate students at the University of Leeds.   Participants were asked to return questionnaires and signed consent forms to the School of Psychology (using stamped addressed envelopes provided) by the 15th September 2013. This was to ensure that questionnaires were completed before any events associated with the start of university (e.g., Fresher's week, moving into student halls etc.). Of the 180 questionnaires that were sent, 73 (40%) were returned. Of these 73 participants, 6 were male, and ages ranged from 17 to 29. The average age of the sample was 18.36 years (SD = 1.39).

5.3.2   Procedure and Materials

Prospective students received a sealed envelope containing an information sheet that described the purpose of the study, a consent form, a questionnaire booklet and an instruction sheet that provided guidance for completing the questionnaire. Participants were asked to read the information sheet and sign the consent form if they wanted to take part. Next, they were asked to complete the questionnaire booklet, starting on page one and working through all questions in order of appearance. Tasks are described in the order in which they were completed by participants.

5.3.2.1   *I Am* Task

The first task was an adapted version of the *I Am Fluency Task* that asked participants to produce 10 short statements to describe themselves, but due to the postal format, no time limit was imposed. Specifically, participants were instructed to produce stable and enduring aspects of their identity, in the form of statements that they felt were essential to defining who they were. To avoid cuing statements, no specific examples were given, but participants were told that they might include roles, personality traits or physical traits. Participants were told that each statement must begin with the phrase *I am*, they were asked to write down the first ten statements that came to mind and to avoid editing their statements.

Next, participants were asked to rate each of their *I am* statements on two dimensions. Firstly, they rated how important and central each *I am* statement was to defining their identity, using a scale of 1 to 10, with 10 being very important and 1 being not important at all. Secondly, participants rated each statement in terms of emotional valence i.e. how positive or negative they felt about each self statement, again on a scale of 1 to 10, with 10 being extremely positive and 1 being extremely negative. Finally, participants were asked to retrospectively date each of their *I am* statements, whereby they gave an age at which they became a person who would define themselves using that statement. Participants were

instructed to assign '0' to statements that had been self-defining for as long as they could remember.

5.3.2.2 *I Will Be* Task

The second task was very similar in design, the difference being that participants were asked to produce statements to describe themselves in the future. Specifically they were asked to generate statements that they predicted would describe them at the end of their first semester at university. Participants were instructed to generate ten statements, and for the sake of clarity, they were told to imagine that they were responding to the phrase 'After my first semester at university, *I will be…*'. Again participants were asked to produce stable and enduring aspects of their identity, in the form of statements that they felt would be essential to defining who they would become. As in the *I Am Task*, all future self-images were rated in terms of importance and emotional valence.

5.3.2.3 Transitional Impact Scale

Next participants completed an adapted version of the Transitional Impact Scale (TIS; Svob, Brown, Reddon, Uzer & Lee, 2014, see Appendix 1). The TIS is a 12-item questionnaire designed to measure the material (e.g., "This event has changed where I live") and psychological (e.g., "This event has changed my attitudes") impact of life events. In this instance, questions were adapted to assess the perceived impact of going to university (e.g., "Going to university will change where I live" and "Going to university will change my attitudes"). Participants rated their level of agreement with each statement on a scale of 1 to 5, with 1 being completely disagree and 5 being completely agree.

5.3.2.4 Tennessee Self Concept Scale

The final task was a shortened version of the Tennessee Self Concept Scale (TSCS; Fitts, 1965, see Appendix 2), which is frequently used in research that attempts to objectively measure self-concept (e.g., Addis & Tippet, 2004). Traditionally, this tasks presents participants with 100 self-descriptive statements that they are required to rate for self-

descriptiveness, but for the purposes of this research only the 30 items measuring the identity component of self-concept were used.

5.3.3 Results

The purpose of this study was to examine the self and memory before and after the start of a new lifetime period. Since Part 1 of this research took place prior to the transitional lifetime period, initial analysis considered current self and predicted changes in the self.

5.3.3.1 Type of Statement

In total, 730 *I am* and 730 *I will be* statements were collected, with all participants able to generate 10 present self-concept statements and 10 future self-concept statements. As in previous chapters, present and future self statements were analysed in relation to whether they were physical, social or psychological in nature (Figure 5.1).
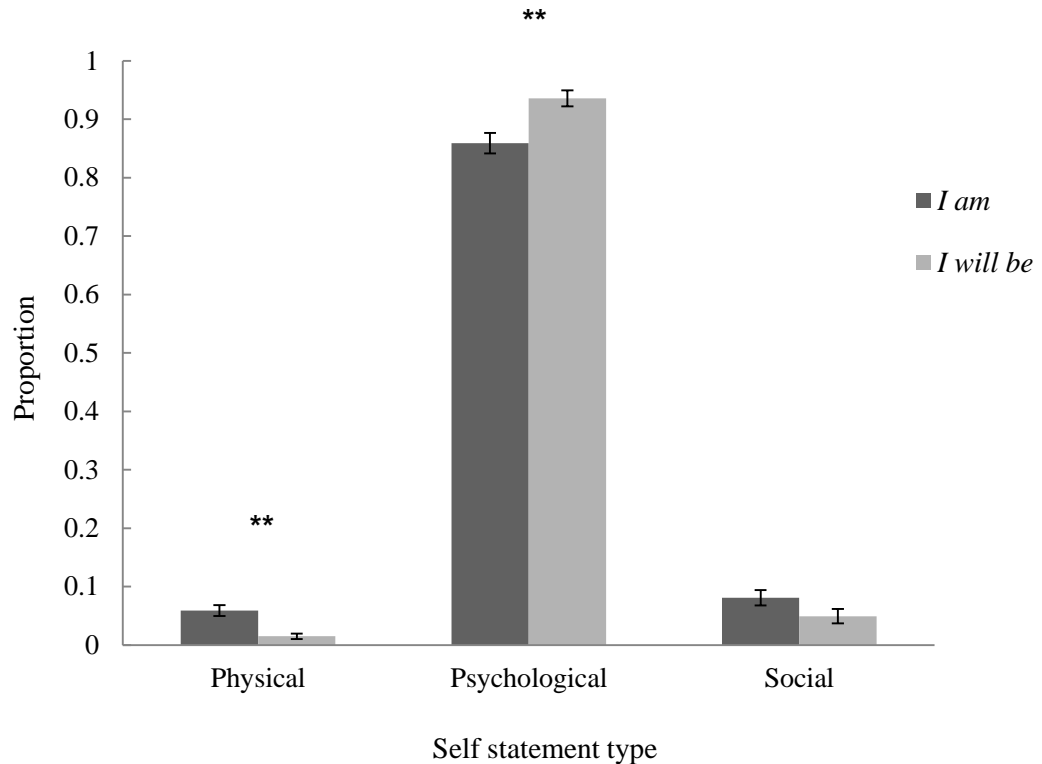
Figure 5.1. Mean proportion of physical, social and psychological *I am* and *I will be* statements generated by participants, ** = $p < .001$. Error bars represent standard error of the mean.

Consistent with previous Studies (1a and 2), young adults show an overwhelming bias for describing their self in relation to psychological, trait-like descriptions, and this was true of both *I am* and *I will be* statements (see Figure 5.1). However, comparisons revealed some significant differences between present and future self statements. A 2 x 3 repeated measures ANOVA demonstrated a main effect of statement type ($F (1, 72) = 1423.72$, $p < .001$), such that participants generated a higher proportion of psychological statements, relative to social and physical statements. There was also a significant task x statement type interaction ($F (2, 144) = 13.68$, $p < .001$), with *I will be* statements being significantly more psychological ($t (71) = 4.69$, $p < .001$) and significantly less physical in nature ($t (71) = 4.50$, $p < .001$) than *I am* statements. There was no significant difference between the proportion of social *I am*'s and the proportion of social *I will be*'s ($t (71) = 1.05$, $p = .297$).

Overall, this finding implies that young adults expect university to have the greatest impact on their psychological traits, relative to physical appearance or social roles. This might relate to the fact that university involves a move away from family and friends and a move towards developing a fully autonomous self. Participants also rated each *I am* and *I will be* statement in terms of importance and emotional valence. Ratings are shown in Table 5.1.

Table 5.1. Mean (SD) importance and valence ratings assigned to *I am* and *I will be* statements.

	Importance	Valence
I am	6.65 (2.41)	6.62 (2.78)
I will be	7.30 (2.20)	7.86 (2.11)

Note. Ratings were given on a scale of 1 to 10, with 10 being very important/extremely positive and 1 being not important at all/extremely negative.

Paired samples t tests revealed that *I will be* statements were rated as significantly more positive (t (72) = 8.91, p <.001) and more personally significant (t (72) = 6.08, p <.001) than *I am* statements. Thus young adults also expect that university will have a positive and self-affirming impact on their identity.

According to the SMS (Conway, 2005) and previous research by Rathbone and Moulin (2014), one's most important self statements should also be the most accessible. In support of this, there was a significant negative correlation between importance and the serial position of *I am* statements (r = -.091, p = .014) and *I will be* statements (r = -.191, p < .001), such that the most personally significant self statements were generated first. Similarly, there was a significant negative correlation between emotional valence and the serial position of *I am* statements (r = -.082, p = .027) and *I will be* statements (r = -.179, p <.001), such that statements generated first were also most positive.

5.3.3.2 Transitional Impact Scale

The Transitional Impact Scale (TIS; Svob et al., 2014) was administered to further assess the magnitude and properties of change predicted by prospective undergraduate students. Overall, participants predicted that university would bring about a relatively high level of change; the average global change score was 43.49 (SD = 7.71) out of 60. With regards to the subscales of change, participants predicted a slightly higher level of material change (mean = 22.73, SD = 3.95, total possible score/30) relative to psychological change (mean = 20.76, SD = 5.85, total possible score/30).

5.3.3.3 Summary of Part 1 Outcomes

Psychological statements are most salient to prospective undergraduate students, who also predict that self will become increasingly psychological in nature following a semester at university - statements used to describe the self in the future were significantly more psychological and less physical than statements used to describe the self in the present moment. Notably, *I will be* statements were rated more positively and were also predicted to be more personally significant than *I am* statements, suggesting that university was expected to have an important and positive impact on the self. Participants also predicted that university would bring about a high level of material and psychological change.

5.4 Part 2: End of Semester 1

5.4.1 Participants

The 73 participants who had completed Part 1 of this study were given questionnaire booklets to complete for Part 2. Booklets were handed out by seminar leaders in a compulsory Research Skills module during Week 10 of Semester 1. It was requested that booklets were returned to the department within 2 weeks to ensure that they were completed before students returned home for the Christmas break. As an incentive, participants received course credit for participation. 57 questionnaire booklets were

returned (78%) within the 2 weeks specified. Of the 57 students, 54 were females and 3 were male; ages ranged from 18 to 29 with a mean age of 18.58 (SD = 1.55)

5.4.2 Procedure and Materials

Students received two questionnaires in sealed envelopes, as well as an information sheet, consent form and instruction sheet. The questionnaire envelopes were labelled '1' and '2' and the instruction sheet gave directions for participants to work through all questions in Envelope 1 before opening Envelope 2. Tasks are described in the order in which they were completed by participants.

5.4.2.1 Envelope 1

The questions within Envelope 1 elicited memories from the time since participants took part in Part 1. Instructions were vague in order to avoid cueing recall of particular events. Specifically, they read:

In this first task, you are being asked to recall 10 incidents that have occurred since first taking part in this study. In particular, these should be 10 highly significant and important memories that you expect to think about in the future. In the boxes below, please give a short description (one sentence of text) of each memory.

One question followed that asked participants to rate the extent to which their memories related to how they saw themselves at the present moment or how they used to see themselves at the time of completing the first part of this research. Ratings were given on a scale of 1 to 5, with 1 being 'very much how I used to be' and 5 being 'very much how I see myself now'.

Next participants completed the *I Am Task* exactly as they had in Part 1; they were asked to generate 10 self statements reflecting stable and enduring aspects of their identity, each starting with the phrase *I am*.

The following question considered how participants' memories and *I am* statements might be linked. Specifically they were asked to consider whether any of the *I am* statements that they generated were related to the memories that they had previously described. To this end, the following instructions were given:

We would like you to consider whether any of the I am statements that you just gave relate to the memories that you described earlier. For instance, if you generated a memory for going to your first lecture and the statement 'I am a student' you might consider the two as being related. You will see that each I am statement that you gave on the previous page has a number assigned to it, in Column 1 of the table below, please write down the number(s) of any I am's that relate to the corresponding memory. Please note that for each memory you may write down as many numbers as you like.

Next, participants re-read each memory and estimated the date of occurrence in the format date/month. They also rated the significance of each memory on a scale of 1 to 10, with 10 being very important and 1 being not important at all.

The final question asked participants to return to their *I am* statements, to rate them in terms of importance and emotional valence and to retrospectively date each statement, just as they had done in Part 1 of this research.

5.4.2.2 Envelope 2

Participants were instructed to complete all questions in Envelope 1 before opening Envelope 2. This was because the first question in Envelope 2 re-presented participants with the 10 *I will be* statements that they had generated in Part 1 and it was important to avoid instances where the original *I will be* statements cued the generation of the *I am* statements given. In an attempt to determine how well participants had been able to predict their own self-concept following a semester at university, participants were asked to rate how important each *I will be* statement was in defining their current identity. Participants

gave ratings on a scale of 1 to 10, with 10 being 'very important' and 1 being 'not important at all'.

Next, items adapted from the TIS (Svob et al., 2014) were completed by participants to assess the impact of university on material circumstances and psychological perspectives. For instance, participants were asked to respond to statements such as, 'Being at University has changed the things I own'. As in Part 1, statements were responded to on a scale of 1 to 5, 1 being 'completely disagree' and 5 being 'completely agree'. In the final task participants completed the 30 identity items from the TSCS (Fitts, 1965), just as they had in Part 1.

5.4.3 Results

Part 2 of this research had three aims 1) to examine changes in self-concept following a transitional lifetime event 2) to determine the accuracy with which young adults can predict changes in identity and 3) to explore the role of autobiographical memory at a transitional lifetime point. In instances where comparisons between Part 1 and Part 2 are made, data from those who did not take part in Part 2 is excluded from the analysis and thus comparisons consider only data from those who took part in both parts of this study.

5.4.3.1 Changes to Self Statements

570 *I am* statements were collected, as all participant were able to generate 10 self statements. Again, statements were analysed in terms of the type of statement generated, that is, whether they were physical, social or psychological in nature. As in Part 1, statements were predominantly psychological - 86% of *I am* statements were psychological compared with 4% that were physical and 10% that were social.

Next, *I am* and *I will be* statements generated in Part 1 were compared with those generated in Part 2 to examine whether or not university had had an impact on the type of statement generated (see Figure 5.2).
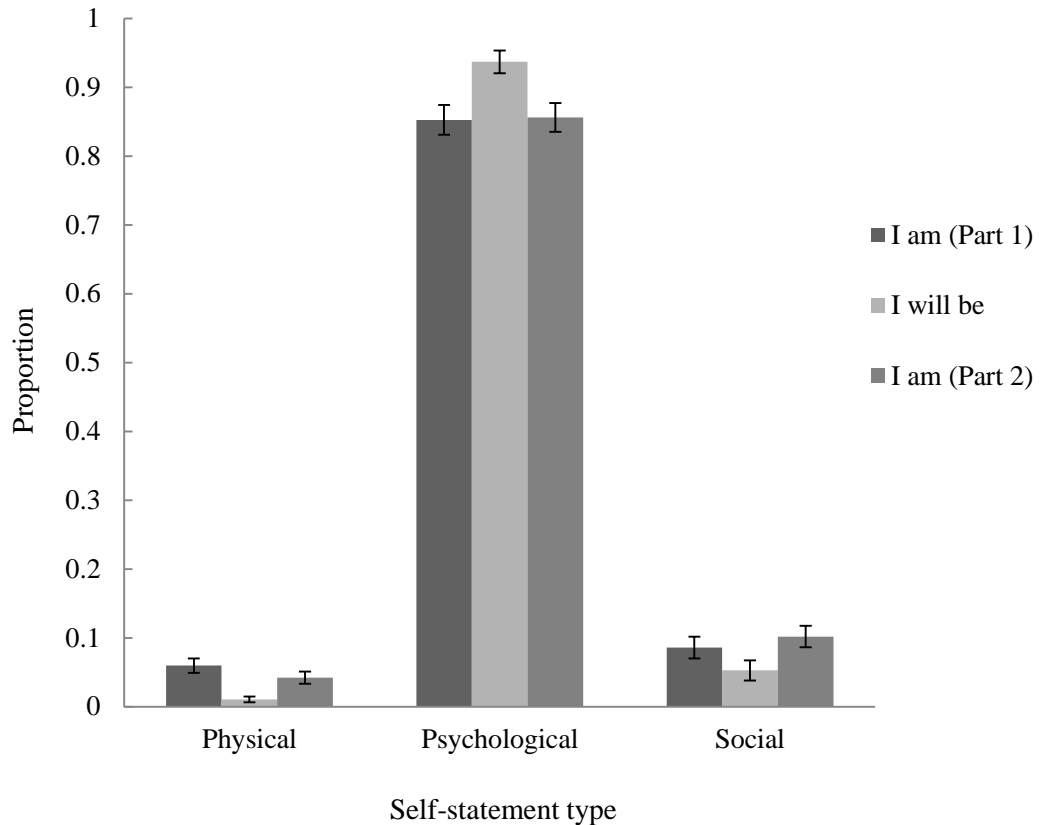
Figure 5.2. Proportion of *I am* and *I will be* statements classified as physical, social or psychological in nature. Error bars represent standard error of the mean.

A 3 (task - *I am* (Part 1), *I will be*, *I am* (Part 2)) x 3 (statement type – physical, social, psychological) repeated measures ANOVA allowed for the incidence of an interaction between task and statement type across Parts 1 and 2 to be explored. There was a main effect of statement type (F (2, 110) = 1075.76, $p < .001$), such that participants generated a higher proportion of psychological statements ($p < .001$ in each instance). A significant statement type x task interaction was also found (F (4, 220) = 7.80, $p <. 001$). To explore the interaction, data was split by statement type and a series of one way ANOVAs were carried out. Findings showed a main effect of task on the proportion of psychological statements (F (2, 112) = 9.39, $p < .001$). Specifically, *I will be* statements were significantly more psychological in nature than the *I am* statements generated in Part 1 and Part 2 ($p < .004$ in both cases). There was also a main effect of task on the proportion of

physical (F (2, 112) = 12.30, $p < .001$) and social (F (2, 112) = 3.83, $p = .03$) statements generated, with less generated in the *I Will Be Task*, which was to be expected from using proportional data.

There were also significant differences in the ratings assigned to *I am* statements. Importance ratings increased from 6.59 (SD = 1.07) to 7.34 (SD = 1.18), with those in Part 2 being rated as significantly more positive (t (54) = 5.04, $p < .001$). With regards to personal significance, this also increased across the two time intervals from 6.54 (SD = 1.15) to 6.99 (SD = 1.32), and this difference was also significant (t (54) = 2.70, $p = .009$). Notably, this is consistent with the predictions that were made by participants regarding the importance and valence of *I will be* statements. Part 2 also asked participants to look over the *I will be* statements generated in Part 1 and rate (on a scale of 1 to 10) how important each statement was in defining their identity in the present moment. The average rating given was 7.47 (SD = 2.06), further demonstrating that students were accurate at predicting how their identity would be defined following a semester at university.

5.4.3.2 Transitional Impact Scale

In Part 1, prospective students predicted that university would lead to a change in their material circumstances and psychological perspectives. In Part 2, participants completed the TIS for a second time, with the purpose of establishing actual change. Predicted (Part 1) and actual (Part 2) material and psychological change are presented in Table 5.2 alongside global change, which was calculated by summing material and psychological change.

Table 5.2. Mean (SD) predicted and actual change, as determined using the TIS.

	Material	Psychological	Global
Predicted	22.58 (4.27)	20.04 (4.14)	42.61 (7.03)
Actual	22.95 (3.38)	19.79 (4.40)	42.74 (6.08)

Mean ratings of predicted and actual change were very similar (paired samples t tests revealed no significant differences, in each case $p > .05$), suggesting that participants were able to accurately predict the impact of starting university on both their material and psychological status. However, it is possible that exploring the data in this way obscures individual differences between ratings, that is, by considering group means it is not possible to determine the difference between predicted and actual change for each participant. As such, correlational analysis was used to examine the consistency between the predicted and actual score generated by each participant. Interestingly, simple correlations showed a strong correlation between predicted and actual global change (r (55) = .84, $p < .001$) and psychological change (r (55) = .38, $p = .002$), but not material change (r (55) = .05, $p = .74$). Thus, participants were less accurate at predicting how university would affect their material circumstances. Results regarding psychological change are however consistent with what was observed when comparing predicted and actual change in *I am* and *I will be* statements. Students are expecting that university will help them to develop their psychological traits and the findings here suggest that it did, though not quite as much as anticipated when generating *I will be*'s.

5.4.3.3   Date of Occurrence

565 memories were collected from participants; all but 3 participants were able to generate 10 memories. Participants were asked to date each memory they recalled. Most memories (88%) were assigned a specific date, in the format day/month. Memories that were dated by

month only were assigned the date that fell at the midpoint of the month. Some memories were described using a time in the month i.e. early September, mid-October or late November. Dates described as early were assigned the 1st of the month, memories described as occurring 'mid' month were assigned the 15th of the month and those described as 'late' were assigned the first date of the last week of that month. Figure 5.3 highlights the distribution of remembered events across the 16 week period between participants taking part in Part 1 and at the end of Semester 1 (Part 2).
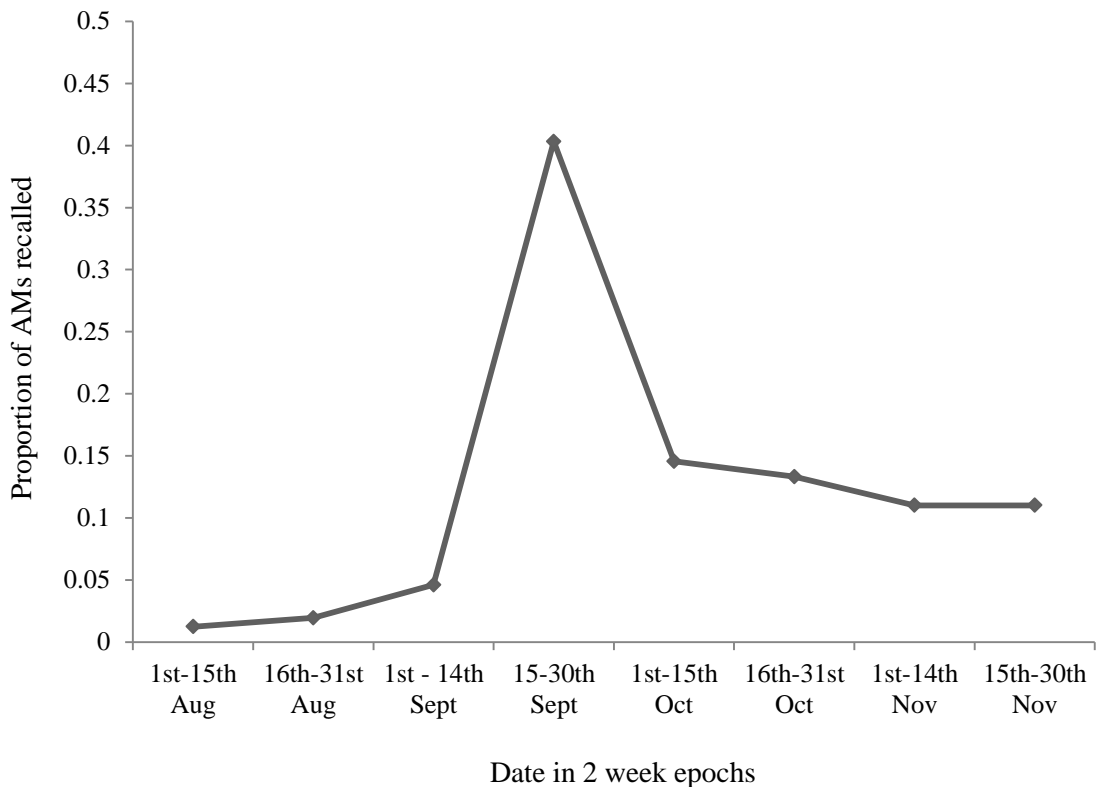
Figure 5.3. Temporal distribution of memories recalled at the end of Semester 1.

Note. The earliest memories recalled by participants were dated 1st August, 8 weeks prior to the start of the University of Leeds induction period. The induction period in this particular year (2013) began on the 16th September. Teaching in this year began on the 30th September, and thus the weeks contained in the final epoch represent weeks 8 and 9 of participants' first semester at university (there are 11 weeks per semester).

There is an obvious clustering of memories between 15th September and 30th September. Specifically, 40% of all memories from Semester 1 were recalled from this time period. For formal analysis data was split into 8 epochs: 1st-15th August, 16th-31st August, 1st-14th September, 15th-30th September, 1st-15th October, 16th-31st October, 1st-14th November, 15th-30th November, and was recoded as the proportion of memories that fell within each. A repeated measures ANOVA showed a significant effect of epoch (F (3.78, 211.46) = 70.05, $p <$. 001), suggesting that participants generated significantly more memories from some epochs than others. Pairwise comparisons revealed that participants generated significantly more memories from 15th-30th September than for any of the other 8 epochs ($p < .001$, corrected). Given that this is the fortnight during which students at the University of Leeds are inducted, move into student accommodation and experience Fresher's week, it is clear that memories cluster significantly around the time that they become students and presumably form a new 'student' identity.

Previous research has shown that life story memories are goal relevant, emotionally intense, important and frequently rehearsed (e.g., Thompsen et al., 2012). In this instance we were able to consider whether they also play a role in supporting the emergence of a new identity. Once participants had generated *I am* statements and autobiographical memories, they were asked to record the number of *I am* statements associated with each memory. The assumption here was that the more *I am*'s that were associated with a memory, the more self-relevant that memory was. As was predicted, the majority of memories were associated with current self statements. Specifically, only 14.33% of the memories generated were reported as being unrelated to self. Correlational analysis was then carried out to determine whether a relationship existed between the importance ratings assigned to a memory, and the number of *I am*'s associated with it. Results demonstrate a significant positive correlation (r (55) = .36, p = .006) between these two measures; the more important the memory, the more closely associated with the self that memory is.

5.4.3.4   Summary of Part 2 outcomes

Participants report material and psychological change following becoming an undergraduate student, and psychological change is something that they accurately anticipated prior to the onset of a new student identity. Despite large material and psychological change, there was no change in the type of statement used by participants to describe themselves. Young adults continued to demonstrate a bias for describing themselves in relation to their psychological traits. However, the perceived importance and valence of self statements did increase significantly, and again this is something that participants accurately predicted before the start of university. Finally, by asking participants to link autobiographical memories with their current self statements it was found that there is a significant positive correlation between the importance and the self-relevance of memories that emerge around a transitional lifetime period (see Section 5.4.3.3).

5.5   Part 3: End of Year 1

5.5.1   Participants

For the final part of this study, a link to an online questionnaire was mailed to the 57 students from Part 2 during Week 10 of Semester 2. The online questionnaire was completed by 31 students (54%) who received course credit for participation. The age range of the participants in this final part was 18 to 29, and the mean age was 19.13 years (SD = 1.89).

5.5.2   Procedure and Materials

Students received the link to an online questionnaire via email. The first section of the questionnaire was comprised of an information sheet and consent form that participants were required to complete before they were able to continue to answer all other questions. All other questions were adapted from those completed in previous parts of this study, in

particular, many questions were exact replications of those used in Part 2, with one exception being an emphasis on the relationship between self statements and autobiographical memories, and thus a more detailed examination of event memory characteristics was carried out and the TSCS and TIS were not included. Tasks are described in the order in which they were completed by participants.

As in Part 2, question 1 elicited memories from the time since participants took part in Part 1, and task instructions were identical to those described above. Again, the question that followed asked participants to rate the extent to which their memories related to how they saw themselves at the present moment or how they used to see themselves at the time of completing the first part of this research, and then participants completed the *I Am Task* exactly as they had in Part 1 and Part 2 of this study. Participants were then re-presented with their *I am* statements and each autobiographical memory that they had generated in question 1, and were asked to consider whether any of the *I am* statements that they generated were related to the memories that they had previously described (as in Part 2). Next, participants estimated the date of occurrence of each memory, in the format date/month, and then proceeded to rate each memory in terms of several characteristics (see Table 5.3). This was a deviation from the design of Part 2, and was implemented to gain a more detailed insight into the characteristics of the memories that make it into one's life story.

Table 5.3. Questions to assess the characteristics of autobiographical memories generated in Part 3.

How important is each memory to you? Rated on a 10 point scale, with 10 being very important and 1 being not important at all.

How would you describe your emotions at the time of the event? Rated on a 10 point scale, with 10 being extremely happy and 1 being extremely sad.

How vivid is each memory? That is, how clearly do you see the memory when you recall it? Rated on a 10 point scale, 10 being very clearly and 1 being not clearly at all.

How often have you thought about each memory since it happened? Rated on a 10 point scale, 10 being very often and 1 being not often at all

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Following the above questions, participants were asked to give remember/know judgements for each memory that they had recalled (Tulving, 1985; Gardiner, Ramponi & Richardson-Klavehn, 1998). Specifically, participants were asked to describe their subjective state of awareness during retrieval, that is, they were instructed to make a *remember* response for memories that summoned temporal and spatial information (i.e. when it happened, what time it happened and where it happened), thoughts, perceptions and emotions. Ultimately, participants were instructed to assign *remember* responses to memories that were virtually 'relived' at the point of retrieval. Alternatively, participants were instructed to assign a *know* response to memories that were readily available, but devoid of such contextual information or feelings of reliving. Finally, participants could give a *guess* response if they were unsure, or felt that the event was not their own memory, rather a memory derived from stories told by others.

For clarity, the following details were provided;

When we recall a memory we can often make judgements about whether it is 'remembered' or 'known'. For instance, you might know the name of the first street you grew up in, or know that Paris is capital of France, but you can't recall in what circumstances you learnt that information - the information is readily available but it is devoid of any context - this constitutes Knowing. This feels different to when, for example, we think back to the meal out with friends last Thursday, we can remember temporal and spatial information (i.e. when it happened, what time, where we sat, how big the restaurant was), our thoughts, perceptions, emotions - like what we ate or drank, or feeling lucky to have such good friends. Perhaps you virtually "hear" or "see" what was happening during the event and relive the experience. Whilst you know that each of your memories happened, this type of recollection is different to Knowing - this constitutes Remembering.

The final questions in Part 3 re-presented participants with their *I am* statements, and instructed them to rate each in terms of importance and emotional valence and to retrospectively date each statement, just as they had done in Part 1 and 2 of this study.

5.5.3   Results: Characteristics of Self-Relevant AMs

Part 3 was completed at the end of the academic year, to allow further examination of temporal clustering around the transitional lifetime point, as well as a more detailed look at the characteristics of memories that are encoded around the time of the emergence of a new self. In instances where Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, Greenhouse-Geisser corrections were applied to the degrees of freedom to ensure that a valid critical *F* value was obtained.With regards to identity, self statements remained predominately psychological (see Figure 5.4).
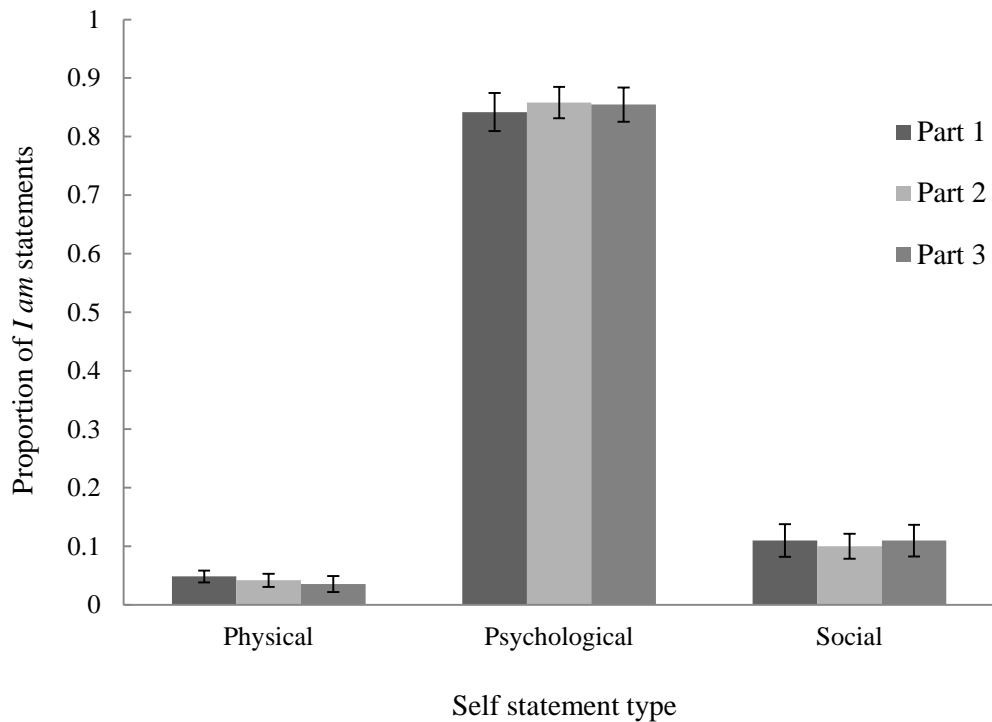
Figure 5.4. Proportion of *I am* statements types generated across the three parts of this study. Error bars represent standard error of the mean.

A 3 (study part – Part 1, Part 2, Part 3) x 3 (statement type – physical, social, psychological) repeated measures ANOVA allowed for the incidence of an interaction between study part and statement type to be explored. Analysis revealed a main effect of statement type (F (1.13, 34.03) = 361.22, p < .001), such that participants generated a higher proportion of psychological statements (p < .001 in each instance). Participants also generated significantly fewer physical statements relative to social statements (p = .006). However, no interaction emerged (p = .853), illustrating that the type of statement that students used to define their identity did not change throughout the course of a transitional lifetime period.

In Part 1, participants predicted that university would have a positive and self-affirming impact on their identity. Findings from Part 2 confirmed that these expectations were accurate, as *I am* statements generated in Part 2 were significantly more important and

positively valenced than those generated in Part 1. To explore the impact of another semester at university, importance and valence ratings given in Part 3 are considered next. Ratings are presented in Table 5.4.

Table 5.4. Mean (SD) importance and valence ratings assigned to *I am* statements across the three parts of this study.

	Importance	Valence
Part 1	6.68 (1.10)	6.71 (1.32)
Part 2	7.14 (1.23)	7.11 (1.41)
Part 3	8.01 (0.77)	7.93 (1.30)

Note. Ratings were given on a scale of 1 to 10, with 10 being very important/extremely positive and 1 being not important at all/extremely negative.

One way ANOVA was used to explore the significance of the findings presented in Table 5.4. Analysis showed there was a significant effect of the part of the study on importance ratings (F (2, 92) = 12.89, $p < .001$). More specifically, ratings generated in Part 3 were significantly higher than those generated in Part 1 ($p < .001$) and Part 2 ($p = .005$). There was also a significant effect of the part of the study on valence ratings (F (2, 92) = 6.53, $p = .002$), as the positivity assigned to *I am* statements was significantly greater in Part 3 than in Part 1 ($p = .002$). There was also a marginally significant increase from Part 2 to Part 3 ($p = .058$). Overall, these findings suggest that there is a positive relationship between time spent at university and the strength and positivity of one's identity.

With regards to AMs, 308 were generated by participants in Part 3 of this study, as all but one participant generated 10 memories. As in Part 2, all participants were asked to date each memory that they generated, and the temporal distribution of memories across the first year at university are shown in Figure 5.5.
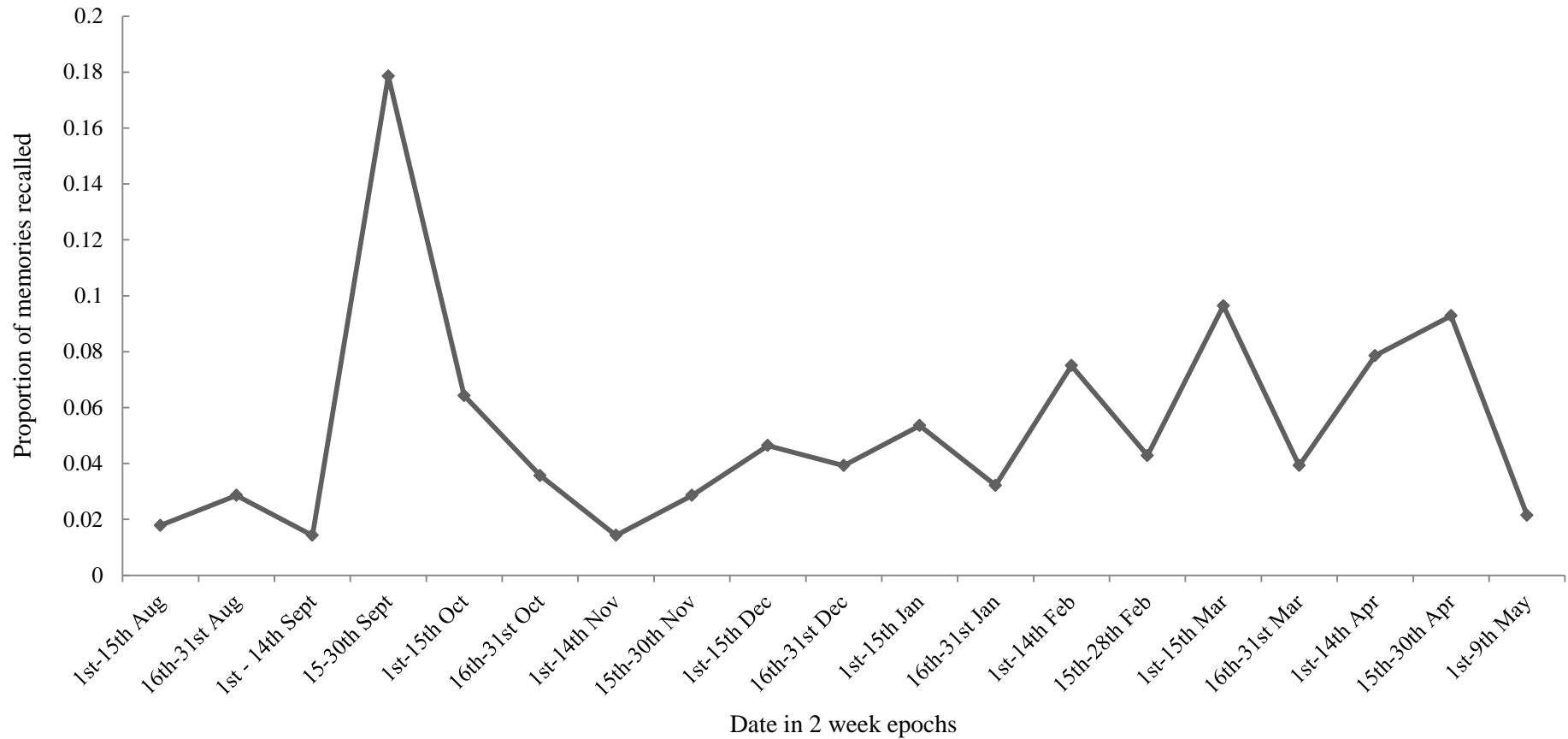
Figure 5.5. Temporal distribution of memories recalled at the end of Year 1.

Note. The university induction period in this particular academic year (2013/14) began on the 16th September. Semester 1 teaching began on the 30th September and ended on the 15th December. The Christmas break period ran from the 15th December to the 13th January, at which time a 2 week period of examinations took place. Semester 2 teaching began on the 27th January and ran for 9 weeks until the 31st March, at which time a 4 week Easter break began. Participants returned for the final 2 weeks of Semester 2 teaching on the 28th April. Year 1 teaching ended on the 9th May.

There is clear clustering of memories around the time that participants became university students, and this replicates findings from Part 2. As in Part 2, analysis involved splitting the data into fortnightly epochs, which generated the 19 epochs illustrated in Figure 5.5. For each participant, data was coded as the proportion of memories that fell within these epochs and a repeated measures ANOVA was carried out that compared the mean proportion within each of the 19 epochs. This analysis revealed a significant main effect of epoch (F (7.01, 210.33) = 6.54, p < .001), such that participants generated significantly more memories from some epochs than others. Pairwise comparisons revealed that participants recalled significantly more memories from 15th to 30th September than for most epochs, with the exception of those representing the 1st to 14th February, 1st to 15th March, 1st to 14th April and 15th to 30th April. It is likely that, as is found in the lifespan retrieval literature (e.g., Rubin et al., 1998), the later peaks reflect a recency effect, in which accessibility of memories is enhanced for recent episodes.

As in Part 2, Part 3 asked participants to state the number of *I am* statements that were associated with each AM that they generated. Again, participants reported that the majority of their memories were directly relevant to current self statements, this time only 9.42% of memories were completely unrelated to the self. To explore the characteristics of self-relevant memories in more detail simple correlations were carried out between importance, valence, vividness, rehearsal and the self relevance of a memory. Findings are presented in Table 5.5.

Table 5.5. Mean (SD) and simple correlations between the self-relevance of AM's and the importance, valence, vividness and rehearsal of AMs

		Importance	Valence	Vividness	Rehearsal
Mean rating		7.26 (2.28)	7.02 (2.72)	7.79 (1.96)	6.25 (2.42)
Self-relevance of AM	r	.261**	.139*	.158*	.135*
	df	305	306	306	304

Note. Ratings of importance, valence, vividness and rehearsal were given on a scale of 1-10, with a higher score representing a more important, positive, vivid and rehearsed AM; with regards to correlations, $**p < .001$, $*p < .02$, df = number of pairs - 2

Table 5.5 illustrates that the memories generated by participants were of moderately high importance, were emotionally positive, vivid and rehearsed relatively frequently. Crucially, the memories that were most closely related to current self statements are also more important, more positively valenced, more vividly remembered and more frequently rehearsed.

Previous research shows that memories from the period of the reminiscence bump are unique in their characteristics - they tend to be more vivid (Cohen & Falkner, 1988), personally significant (Fitzgerald, 1996), important (Rubin & Schulkind, 1997) and positive (Berntsen & Rubin, 2002) than memories from other lifetime periods. The present study presented the opportunity to explore a 'bump from within the bump' i.e. to explore the characteristics of memories that cluster within the period of the reminiscence bump. To this end, participants' data was divided into transitional memories (memories from the 2 week epoch in which participants started university) and non-transitional memories (memories from the remaining 18 epochs). The mean number of associated *I am*'s and ratings of importance, valence, vividness and rehearsal were then calculated and data is presented in Table 5.6.

Table 5.6. Mean (SD) ratings assigned to each memory recalled from the period of transition and those that fall outside of it.

	I am	Importance	Valence	Vividness	Rehearsal
Transition	2.17 (1.51)	7.14 (2.65)	6.03 (2.42)	7.67 (2.15)	5.71 (2.39)
Non-transition	1.96 (1.43)	7.27 (2.17)	7.24 (2.74)	7.82 (1.91)	6.36 (2.46)

Table 5.6 seems to show that there is little difference between ratings assigned to memories from the time of transition relative to memories that fall outside of this time. This is also the case for the number of associated *I am* statements. A 2 (transition, non-transition) x 5 (*I am*, importance, valence, vividness, rehearsal) repeated measures ANOVA confirmed that there was no main effect of bump period (F (1, 76) = 0.25, p = 0.624). Thus, memories from the point of transition did not differ in their characteristics. This is perhaps unsurprising given that participants were instructed to recall highly significant and important memories that they expected to think about in the future, and that all memories recalled in this study were from the broader period of the typical lifespan reminiscence bump.

5.6 Discussion

Consistent with predictions made at the outset of this chapter, it was found that when participants were asked to recall autobiographical memories from their first year at university, memories clustered at the beginning of that new lifetime period. With regards to the content of self-knowledge for this transitional phase, no differences were found before, during or after; selves were predominantly psychological and this was stable across the three time intervals. However, as predicted, changes did emerge in relation to the importance and emotional valence of self statements; university was regarded as a positive transition that resulted in the formation of a more positive and personally significant self,

notably this was following just one semester at university. Participants were also able to accurately predict the psychological impact that university would have on them. With regards to the role of AMs in supporting the formation of a new identity, participants reported that the majority of their most accessible AMs were directly related to current self statements. In addition, it was found that memories that were most closely related to current self were also more important, more positively valenced, more vividly remembered and more frequently rehearsed.

5.6.1   Memory "Clusters" and New Selves

According to the SMS, the self is grounded in memory (Conway & Pleydell-Pearce, 2000). If this is the case, and memory dictates what the self is and can be, then we would expect memories that support the self to remain highly accessible over time. The present study showed that undergraduate memories cluster at the start of the first academic year at the time when a new student identity emerges, and this is consistent with findings reported by other researchers (e.g., Pillemer et al., 1986, 1988). More generally, research shows that memories from the beginning of any transitional lifetime period remain highly accessible, whilst other memories decay over time (e.g., Thomsen et al., 2011). So why are memories that cluster around transitional lifetime periods especially accessible and long lasting? Conway (2005) claimed that maintaining a coherent and consistent self over time is crucial to maintaining psychological well-being. To this end, he proposed that ones most accessible memories function to 'maintain coherence between memories, conceptual knowledge, goals and the conceptual self' (Conway, 2005, p. 600). Indeed the need to maintain coherence is likely to be particularly pertinent at times of transition, when coherence relies on the ability to recall episodes that merge past selves with new selves.

Transitional periods also signal a change in goal status. In this instance, starting university is regarded as a particularly goal-relevant and self-defining experience, given that participants were embarking on an event that was likely to define their life trajectory and result in the formation of a more autonomous self. Conway and Homes (2004) highlighted

that highly accessible memories cluster around goal-relevant periods in order to 'ground the self in past goal configurations and so provide a personal, psychological, history of changes to the self' (p.462). They further demonstrated that the heightened accessibility of goal-relevant memories   persists even after the start of a new lifetime period, when previous goals have been achieved and new ones emerge. In relation to the present study, Pillemer et al. (1988) showed that memories from the start of college remain highly accessible up to 22 years after graduation.

The present study showed that ones most accessible memories are directly related to current self statements and that the more self-relevant these memories are, the more important, positive, vivid and rehearsed the event is. This could suggest that self-relevant life story memories undergo a privileged encoding process in order to remain highly accessible over time. Steiner et al. (2014) recently suggested that memories that are encoded near the boundaries of extended lifetime periods receive focused attention and heightened mental processing that enhances long-term memory. Indeed a memory that is important, vivid, emotionally salient and frequently rehearsed is unlikely to be forgotten.

When making assumptions based on the temporal distribution of autobiographical memories it is important to consider the accuracy with which participants date such events. Indeed autobiographical memory is largely considered to be a reconstructive process (e.g., Conway, 2005) and as such, it is likely that some degree of error emerged when participants attempted to provide exact dates for autobiographical events. However, as participants were not cued by a specific marker in time, there is no reason to expect that memory dating would have been biased in any particular direction. Encouragingly, research has also found that life story memories and self-relevant events are dated more accurately than autobiographical memories that are of little importance to the self or the life story (e.g., Skowronski ; Thomsen et al., 2012).

5.6.2   The Importance of Predicting Future Selves

Prospective students were accurate in predicting the psychological impact that university would have, particularly in relation to its impact on self-concept. Participants predicted that university would have a positive and personally significant impact on their identity, confirming that they were embarking on a positive new life story chapter at the time of testing. It is suggested that participants' ability to make accurate predictions further relates to the motivation to maintain a coherent and consistent sense of self over time. As highlighted in Chapter 4, a key feature of autobiographical memory is its capacity to allow for mental time travel (e.g., Tulving, 2002). Autobiographical memory allows us to imagine the future as well as relive the past, and the ability to project oneself into the future and imagine 'possible selves' (Markus & Nurius, 1986) functions to maintain a sense of personal continuity (e.g., D'Argembeau, Lardi & Van der Linden, 2012). The present study extends this notion by demonstrating that not only is it possible to imagine future selves, but in this instance, predictions were also accurate. The ability to make accurate predictions about the impact of transitional events on self might serve a self-protective function by ensuring that the transitions that we embark upon are goal-relevant and self-enhancing. It would be interesting for future work to explore this idea more detail, especially in relation to the impact of inaccurate predictions or having to adopt an unexpected self (e.g., I am a person with a brain injury or I am a failure), as was highlighted in Study 3. If continuity of self is essential to psychological well-being, and continuity incorporates the need to make accurate predictions about future self, such research is likely to have a number of important and clinically relevant implications (see Section 7.7 for a detailed consideration of clinical implications).

5.6.3   Psychological Selves and Transitional Times

Thus far this thesis has suggested that there might be a particular association between episodic autobiographical memory and the psychological content of self. In line with this, the present study showed that psychological selves dominate at a time when important life

story memories are encoded. Psychological selves were especially prominent in this study when participants were asked to predict how the self would be defined following a semester at university. This finding might relate to ideas raised in Chapter 2, as the task of constructing an independent self is likely to lead one to think more introspectively and thus increase access to psychological trait-like descriptions in particular. In relation to this, it was possible to explore the frequency with which participants predicted that university would lead to the development of an independent self (i.e. the frequency with which *I will be independent* or *I will be more independent* was generated). Indeed 58.33% of participants predicted that starting university would lead to the development of either an independent (40.28%) or at least more independent (18.06%) self. This is compared with only 12.5% of people who considered themselves to be independent before the start of Semester 1 (i.e. this percentage of participants generated the phrase *I am independent* at the start of Semester 1). Psychological selves also have the capacity to transcend context and thus may dominate in periods of uncertainty.

5.6.4   Conclusion

In sum, findings from Study 4 demonstrate that memories cluster around the start of transitional lifetime periods, most likely in order to maintain a coherent sense of self throughout a period of identity change. A sense of coherence might also be facilitated by the capacity to accurately predict what the self will become in the future. Indeed in this instance participants were aware that university would have a positive and personally significant impact on the self. In an attempt to determine the impact of adopting an unexpected self, Chapter 6 explores self in a sample of participants with acquired brain injury. Given that the onset of brain injury is most frequently dominated by a period of amnesia, it was of interest to explore how a paucity of memories for the start of a transitional lifetime period would affect self in a larger group of participants. This was considered to be especially pertinent in relation to the notion that brain injury results in a 'loss of self' (e.g., Nochi, 1998).

6. REDISCOVERING THE SELF FOLLOWING ACQUIRED BRAIN INJURY

"I can't go back to yesterday because I was a different person then."

Lewis Carroll (1865)

6.1   Introduction

The case study (SA) presented in Chapter 4 suggested that there is reduced access to some aspects of self-knowledge following an acquired brain injury (ABI) and subsequent memory loss. This suggests that the continuity of the self is disrupted by brain injury and in particular, it was found that psychological selves were difficult to access. In the present chapter, this neuropsychological evaluation of the self-memory relationship is extended to a larger and more heterogeneous sample of twenty eight people with ABI and varying degrees of autobiographical impairment. The aim was to test further the idea that episodic memory impairment has an impact on the ability to generate self-knowledge in the form of *I am* statements, and in particular to explore whether a deficit in generating up-to-date psychological selves might be related to memory loss.

6.1.1   Exploring the Self-Memory Relationship in ABI

Section 1. 4 described how recent neuropsychological research implies that self can be "known" in the absence of episodic AMs (e.g., Klein, Rozendal & Cosmides, 2002; Rosenbaum et al., 2005), and in response it assumes that self is largely a conceptual construct that is based on semantic memory (e.g., Rathbone et al., 2009). However, in taking a more nuanced approach to understanding the self-memory relationship, this thesis has demonstrated that there might be a particular association between episodic memory

and psychological trait-like descriptions of the self. For instance, Chapter 2 described how access to psychological selves is enhanced following autobiographical retrieval and Chapter 4 showed that the reverse pattern emerges in an woman with a particular episodic impairment – SA failed to generate a single psychological, trait-like description of her current identity on the *I Am Fluency Task*, whereas the majority of the *I am* statements generated by controls were psychological in nature. To further this work, the present chapter revisits the self-memory relationship in a more generalisable neuropsychological context, by considering the impact of ABI on the self in a group of twenty eight people whose injuries had had a varying degree of impact on their episodic memory. The sample also differed in relation to the length of time since injury, but all were living in a brain injury rehabilitation unit at the time of testing. Thus, there were two critical issues – the first, and most important, was whether degree of memory impairment was related to access to psychological selves. The second was that with a larger sample, it is also possible to take into account other factors such as the time since injury in the description of the self: perhaps SA was too close to the onset of her memory difficulties to have constructed an up-to-date view of her psychological self.

6.1.2   The Issue of the 'Lost Self'

Acquired brain injury has been described as an 'umbrella term' that includes, but is not limited to, traumatic brain injury (TBI), concussion, cerebral vascular accident (CVA) or stroke, aneurysm, brain tumor, vestibuar dysfunction, and postsurgical complications resulting in anoxia or hypoxia (Ciuffreda & Kapoor, 2012). Of the various functional changes that follow ABI, including physical, cognitive and behavioural changes (Nochi, 1997), memory disorders are one of the most common (Tate, 1997). Thus, in the context of this thesis, it is expected that some degree of change to the self will also emerge.

The exploration of the impact of ABI on the self has been a particular topic of interest in the brain injury literature, where it is widely accepted that people experience a disruption to the self following brain injury. In fact, Jackson and Manchester (2000) described this

disruption as being 'almost the sine qua non of brain injury' (p. 27). What is less clear cut is the extent of the impact that ABI has on the self. Traditionally, the literature presented TBI as a precursor to an overwhelming 'loss of self' (Cicerone, 1989; Frey, 1994; Grosswasser & Stern, 1998; Judd & Wilson, 1999; Medved & Brockmeier, 2008; O'Shanick & O'Shanick, 1994). Indeed Nochi (1998) identified this as a key theme in the narratives of ten people who had sustained a TBI between two and twelve years previously. But more recently, researchers have rejected the notion of a complete loss of self, favouring an approach that emphasises change. For instance, Gelech and Desjardins (2011) proposed that 'the postinjury self is "new" only in the sense that it differs from what existed before the injury, and not in the sense that something pre-existing has been totally lost or wholly replaced' (p.71). This conceptualisation is also is consistent with findings from Chapter 4, which demonstrated that the self remained accessible in a case of ABI, and yet it was changed in relation to its content and phenomenological continuity.

In an attempt to quantify changes in the self following brain injury, Tyerman and Humphrey (1984) developed the Head Injury Semantic Differential Scale (HISDS), which is comprised of twenty adjective pairs that are thought to be pertinent to those with brain injury (e.g., helpless–in control, dependent–independent, clumsy–skillful). In the original study, participants with ABI rated these traits for past (pre-injury), present and future self-descriptiveness and the authors found considerable discrepancies between pre-injury self and both present and future self. In particular, participants were most negative about present self, but anticipated a return to pre-injury self at some point in the future. This pattern of findings has also been replicated more recently in people who have had a stroke (Ellis-Hill & Horn, 2000) and has been cited as a possible explanation for high rates of emotional distress following brain injury (e.g., Cantor et al., 2005).

6.1.3 Self-Discrepancy and Emotional Distress

In 1987, Higgins suggested that discrepancies between actual self and ideal self are the key to understanding emotional distress following ABI (see Higgins (1987) for a detailed description of self-discrepancy theory). Subsequent research has provided empirical support for this theory (e.g., Higgins, Klein & Stauman, 1985; Higgins, Bond, Klein & Stauman, 1986; Strauman, Vookles, Berenstein, Chaiken & Higgins, 1991), as well as evidence for the need to extend it in order to incorporate discrepancies between pre and post-injury self, which have also been found to be positively correlated with emotional distress (Cantor et al., 2005). In an attempt to integrate findings from the literature on self-discrepancy and conceptualise the necessary change process that occurs in brain injury rehabilitation, Gracey, Evans and Malley (2009) proposed the "Y-shaped" process model (see Figure 6.1).
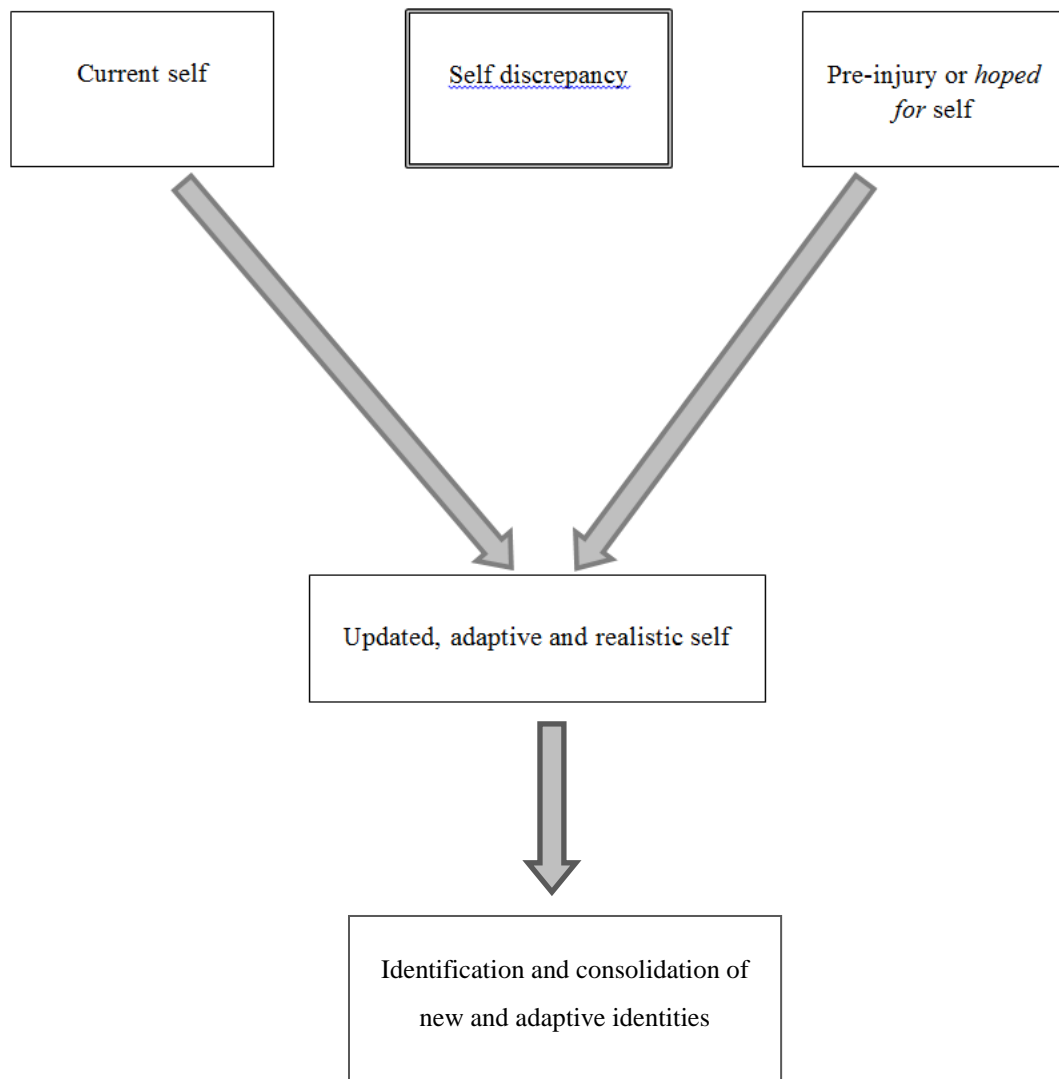
Figure 6.1. The "Y-shaped" process model (based on Gracey et al., 2009)

These authors cite discrepancies between current self, and both pre-injury self and *hoped for* self, as being crucial in relation to psychological wellbeing following ABI. They suggest that the focus of rehabilitation should be on reducing such discrepancies (illustrated by the converging lines of Figure 6.1) and that it is only when such discrepancies have been reduced that people can begin to identify and consolidate a new, adaptive identity (Gracey et al., 2009). It was in response to this model that the *I was* and *I hope to be* tasks were designed for the purposes of exploring self in a case of limbic encephalitis in Chapter 4. Taken together, the novel self-fluency tasks (*I am, I was* and *I*

hope to be) showed no deficit in SA's ability to access self statements. There were also no differences in the content of SA's pre-injury or *hoped for* self relative to controls, yet discrepancies emerged in the current self, for which she was unable to generate any psychological, trait-like descriptions. It was unclear from this case study whether or not her lack of access to psychological selves was a consequence of her memory impairment, or rather a response to her illness. Thus the present study re-introduces these tasks in a group of ABI participants who have sustained a range of injuries (e.g., TBI, stroke, anoxic injury) who also varied in their location of neurological damage, degree of memory impairment, length of time since injury, length of time spent in rehabilitation, and pre-injury educational, employment and socio-economic status.

Meta-analyses by Henry and Crawford (2004) showed that participants with ABI are often impaired on tasks of phonemic and semantic fluency relative to control participants. However, the studies reported within this thesis have demonstrated that often general fluency performance is statistically unrelated to self-fluency (see Chapter 2 for an example). Thus it was anticipated that the self fluency tasks would be valuable in exploring self-discrepancy in ABI, regardless of whether or not participants presented with general fluency deficits. The ability to measure access to self statements based on freely generated descriptions is critical, since past approaches have been criticised for ignoring the subjective and idiosyncratic nature of the self (e.g., Gelech and Desjardins, 2011). Given that the findings from Chapter 4 were consistent with the notion of the self being changed, as opposed to lost following ABI, it was anticipated that those with ABI would be able to access self statements, yet there might be a negative relationship between episodic memory impairment and the generation of psychological selves, replicating what was found with SA.

6.1.4 Disrupting the Continuity of the Self

ABI frequently results in an inability to recall the causal traumatic, neurological event (Bryant, 2001), which means that (presumably) a new lifetime period begins in the absence

of a cluster of autobiographical memories that enable the self to be grounded and continuous in spite of change. In the context of this thesis, it is suggested that self-discrepancies might emerge as a result of a disruption to the continuity of self, and that this disruption could be related to an absence of memories for the beginning of a new lifestory period (see Chapter 5 for a discussion of the importance of memories for transitional lifetime periods). Indeed the idea that ABI results in a 'sudden break in the continuity of who the person is' (Moldover, Goldberg & Prout, 2004, p. 151) is not new and is something that was also highlighted in SA (see Chapter 4). If discrepancies in the self do relate to a failure to update the self with relevant autobiographical memories, then it was predicted that past self would be more grounded in memory than current self in participants with ABI. To explore this in the present study, participants were asked to recall the first ten autobiographical memories that came to mind, following which they were re-presented with their *I am* statements and were asked to highlight those statements that were associated with each memory (e.g., 'I remember dancing with my family at Keith's 50th birthday party' and the statement 'I am happy'). This was also repeated for *I was* statements in order to explore the association between past self and accessible AMs.

In sum, the aims of this chapter were based on attempts to generalise findings from Chapter 4 to a larger and more heterogeneous sample of people with ABI. Specifically, this study examined the accessibility and content of past (pre-injury), present and *hoped for* self, as well as the accessibility and characteristics of autobiographical memory, and the presence of an association between the two cognitive constructs.

6.2   Method

6.2.1   Participants

Twenty eight people with ABI (mean age = 41.93, SD = 14.81, range = 17-70) took part in this study. Participants were nineteen males and nine females who were living in either a short term (n = 23) or long term (n = 5) rehabilitation facility in West Yorkshire, UK. All

but one participant had been free from pre-injury psychiatric or neurological disorders; one male participant had been diagnosed with Parkinson's disease eight months prior to injury. Three participants had a history of alcohol abuse and three had a history of drug abuse. Time since neurological event ranged from two months to twenty nine years (mean months = 29.85, SD = 65.55) and all participants were able to provide informed consent to take part (see Appendix 3 for an example of the Information Sheet provided). Participants with comprehension and language deficits were excluded from taking part. Table 6.1 presents a summary of further demographic information and information regarding circumstances of ABI. Prior to testing, this study was approved by the ethics committee at the School of Psychology, University of Leeds (ref number: 14-0005) and the Disabilities Trust (UK).

Table 6.1. Descriptive data regarding the circumstances of ABI ($n = 28$)

Variable		ABI participants (%)
Employment status	Employed	60.71
	Unemployed	17.86
	Full time education	14.29
	Retired	7.14
Marital status	Single	46.43
	Married	39.29
	Divorced	14.29
Circumstance of injury	Traffic related	28.57
	Stroke	28.57
	Fall	17.86
	Tumour	10.71
	Encephalitis	7.14
	Hypoglycaemic attack	3.57
	Anoxic injury secondary to cardiac arrest	3.57

In order to explore the impact of ABI on the self and autobiographical memory, each participant was paired with an age and gender matched control subject who was recruited from a volunteer panel at the School of Psychology, University of Leeds (mean age = 41.82 years, SD = 15.89). None of the control participants had suffered from any

psychiatric or neurological disorder, and none had a history of drug abuse, alcohol abuse or memory problems.

6.2.2   Materials and Procedure

All participants were tested individually. Participants with ABI were tested on site at one of the two Brain Injury Rehabilitation Units, and all control participants were tested at the School of Psychology. In order to avoid testing being too demanding for participants with ABI, data was collected across two sessions that were always completed on separate days (this was also the case for control participants). Given that a number of participants with ABI had physical impairments affecting their dominant hand, all participants responded verbally to tasks and the experimenter recorded responses in a task booklet. Tasks are described in the order in which they were completed by participants.

6.2.2.1   *I Am, I Was, I Hope to Be*

To measure self-concept the *I Am Fluency Task* was administered. For the purpose of simplification, task instructions were adapted slightly and the experimenter read aloud the following instructions 'I want you to tell me all about yourself. I want each thing you tell me about yourself to start with the words *I am*'. In an attempt to increase the likelihood of those with ABI being able to complete the task, an example from each of the three self-concept categories ('*I am* hardworking', '*I am* slim', '*I am* a student') was given on a cue card that was placed in front of the participant (the order in which these statements was presented was also counterbalanced in order to prevent the priming of any particular category first). Participants were told that they had one minute to produce as many of these statements as possible.

After the fluency part of the task, participants were asked to rate each of their self statements on two dimensions. Firstly, they rated how important and central each *I am* statement was to defining their identity, using a cue card that presented a scale of 1 to 7 (with 7 being very important and 1 being not important at all). The second set of ratings

was designed to assess emotional valence i.e. how positive or negative they felt about each *I am* statement, again using a cue card, participants rated each on a scale of 1 to 7 (with 7 being "like very much about myself" and 1 being "don't like very much about myself"). [12]

Finally, participants were asked to retrospectively date each of their *I am* statements, whereby they gave an age at which they became a person who would define themselves using that statement. Participants assigned '0' to statements that had been self-defining for as long as they could remember.

The second set of tasks was similar to the first, except that they examined past self, and thus the instructions for the *I Am Fluency Task* were adapted and participants with ABI were asked to generate statements than began with the phrase *Before my injury I was*. This task was matched for control participants by asking them to think of a life event that had happened around the same time as the causal neurological event that had happened to the person with ABI who they were matched with. Controls then generated statements that described them before this event (e.g., *Before the life event I was*; see Table 6.2 for a list of the life events generated by controls). Again participants were provided with a cue card with an example statement from each of the three self-concept categories ('Before my injury/life event *I was* hardworking', ' Before my injury/life event *I was* slim', 'Before my injury/life event *I was* a student') and were told that they had one minute to produce as many statements as possible. As in the previous task, once participants had generated their past self statements, they were asked to rate each in terms of importance and valence and then retrospectively date each by giving an age at which they became a person who would define themselves using that statement.

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[12] It is important to note that this scale differs from those used in previous chapters when assessing the importance and emotional valence of self statements. This was changed for the purposes of consistency and clarity, given that the Head Injury Semantic Differential Scale (Tyerman & Humphrey, 1984; see Section 6.2.2.2) uses a scale of 1 to 7. This was considered to be important in relation to the participant group of interest here (ABI).

Table 6.2. Life events generated by control participants

Participant	Life event	Months since event
1	Enlisted into military service	18
2	Father died	9
3	Sons graduation	5
4	Reunion with old friends	6
5	Relative passed away	9
6	Writing my university personal statement	11
7	Getting married	11
8	Diagnosed with supraventricular tachycardia	9
9	Voluntary redundancy	53
10	Getting a-level results	9
11	Turning 30	61
12	Learning to play the guitar	21
13	Mother died	45
14	Diagnosed with cancer	26
15	Starting secondary school	348
16	Birth of daughter	96
17	Illness	3
18	Bridesmaid in South Korea	2
19	Visiting camp in Tazmania	6
20	Art exhibition, Royal College of Art	8
21	Went back to university in America	36
22	Starting university	22
23	Getting PhD	3
24	Father died	5
25	Finding out friend had cancer	6
26	Left my job and started PhD	17
27	Got a horse	38
28	Travelled to America	19

The final task that was similar in nature was designed to examine *hoped for* self and asked participants to generate statements that began with the phrase *In the future I hope to be*. A cue card was provided with the examples above (In the future *I hope to be* hardworking', 'In the future *I hope to be* slim', 'In the future *I hope to be* a student') and participants had one minute to generate as many statements as possible, following which they rated each statement and dated it in relation to the age at which they predicted that it would become a defining part of their identity. Participants were asked to state 'ongoing' for statements that were already defining parts of their identity.

6.2.2.2   Head Injury Semantic Differential Scale

Next, the Head Injury Semantic Differential Scale (HISDS; Tyerman & Humphrey, 1984) was completed by participants, to assess particular aspects of identity that are thought to be pertinent to those with acquired brain injury.

6.2.2.3   Autobiographical Memory Generation

The next task asked participants to generate ten autobiographical memories. The instructions for this task were necessarily short and simple, but were also relatively vague as to avoid cuing particular memories. Participants were asked to tell the experimenter about the first ten memories that came to mind when they thought back upon their life. To reduce task demands, participants were told that no great detail was required, just a sentence to summarise each autobiographical event.

Next, participants were re-presented with their *I am* statements (as in Chapter 5), and were asked to consider whether any of the statements were related to the memories that they had described. For instance, the memory 'going to watch Barnsley FC at Millennium Stadium' and the statement '*I am* a Barnsley fan' might be considered to be related. The experimenter read each autobiographical memory aloud and the participant responded by naming any *I am* statements that they considered to be related. To explore the relationship between past self and one's most accessible AM's this task was then repeated for *Before my injury/life event I was* statements.

In the final tasks of this initial testing session, participants were required to rate their autobiographical memories on several dimensions (see Table 6.3), and this was done in an attempt to determine the characteristics of memories that persist in the lifestory when many are lost as a result of ABI. To reduce the demands of the task, cue sheets were provided to depict each of the rating scales.

Table 6.3. Questions to assess the characteristics of autobiographical memories.

1.	How important is each memory to you? Rated on a 7 point scale, with 7 being very important and 1 being not important at all.
2.	How happy or sad does each memory make you feel? Rated on a 7 point scale, with 7 being extremely happy and 1 being extremely sad.
3.	How vivid is each memory? That is, how clearly do you see the memory when you think about it? Rated on a 7 point scale, 7 being very clearly and 1 being not clearly at all.
4.	How often have you thought about each memory since it happened? Rated on a 7 point scale, 7 being very often and 1 being not often at all.

Following the above questions, participants were asked to give remember/know judgements for each memory that they had recalled (Tulving, 1985). Specifically, participants were asked to describe their subjective state of awareness during retrieval, that is, they were instructed to make a Remember response for memories that summoned temporal and spatial information (i.e. when it happened, what time it happened and where it happened), thoughts, perceptions and emotions. Participants were instructed to assign Remember responses to memories that were virtually 'relived' at the point of retrieval. Alternatively, participants were instructed to assign a Know response to memories that were readily available, but devoid of such contextual information or feelings of reliving.

Finally, participants could select a Guess response if they were unsure, or felt that the event was not their own memory, rather a memory derived from stories told by others.

The Point of View paradigm (Nigro & Neisser, 1983) is an alternative approach to assessing perspective experienced during autobiographical retrieval and was also completed by participants. Participants were asked to describe their point of view at the time of recalling a memory, that is, they were asked 'when you think about the memory do you see the event happening through your own eyes, or do you see yourself in the memory, as if through someone else's eyes?'. Recalling a memory as if through ones own eyes is classified as a 'field' perspective memory and those recalled as if through someone else's eyes are classified as 'observer' perspective. Images of a person running and riding a bike from third and first person perspective were also shown to the participants in order to aid understanding (see Appendix 4).

The final question of the initial testing session asked participants to describe the intactness of their memory for the event that caused their brain injury; responses were given on a scale of 1 to 7, with 7 being intact memory and 1 being no memories at all.

6.2.2.4   Autobiographical Memory Interview

Participants completed the Autobiographical Memory Interview (AMI; Kopelman, Wilson & Baddeley, 1989; see Appendix 5) in a separate testing session that lasted approximately 40 minutes. The AMI is a measure of remote autobiographical memory that is frequently used in the autobiographical memory literature. Specifically, it allows for the assessment of both personal semantic memory and memory for autobiographical events. The Personal Semantic Schedule requires participants to recall facts from their lives relating to 3 distinct lifetime periods – childhood (e.g., names of teachers), early adulthood (e.g., name of first child) and recent life (i.e. in the past year e.g., location of a holiday). The Autobiographical Incident Schedule requires participants to recall 3 incidents from each of the lifetime periods highlighted above (childhood, early adulthood, and recent life); again specific prompts are provided e.g., an incident from secondary school, an incident from own or

another's wedding, an incident from a recent holiday. Responses are scored in relation to the amount of information recalled and scores are then translated to one of four discrete categories – normal, borderline, probably abnormal, definitely abnormal (for more information see Kopelman, Wilson & Baddeley, 1989).

6.2.2.5 Control Fluency Tasks

Finally, as the task of primary interest involved generating statements under time pressure, a series of fluency tasks were included to examine general fluency speed. Category fluency was assessed by asking participants to generate as many animals as they could in one minute. Letter fluency was assessed using the FAS Controlled Oral Word Association Test (Benton, 1968) that asked participants to generate as many words as they could beginning with the letters 'F', 'A' and 'S'. Participants were given one minute for each letter, with a fluency score derived by averaging the number of words generated for each letter.

6.3   Results

The analysis strategy combined ANOVAs and correlational analysis (specifically Pearson's *r* correlation coefficient). In instances were post-hoc analysis was necessary Bonferroni corrected t tests were used and Mauchly's Test of Sphericity was used to test assumptions regarding the homogeneity of variance, where necessary. In instances where this assumption was violated Greenhouse-Geisser corrected degrees of freedom are reported. For clarity and conciseness, only significant pairwise comparisons are reported, for those that are not reported p > .05. Given the results from the Autobiographical Memory Interview (Kopelman et al., 1989; see Figure 6.2) the ABI participants in this study can be considered to be a memory impaired group; however, the extent of impairment varied between participants and as such, correlational analyses is used in a number of places throughout this results section, for instance to explore the relationship between degree of memory impairment and the generation of psychological selves. For the ANOVAs, note that in instances where proportional data has been used in an analysis of

variance the main effect of group is not reported, this is due to the fact that the group difference will always sum to 1.0 and as such, no group differences emerge.

6.3.1 Autobiographical Memory Interview

In order to determine the extent of autobiographical memory impairment participants with ABI completed the Autobiographical Memory Interview (AMI; Kopelman et al., 1989) and findings are presented in Figure 6.2. One participant with ABI was unable to complete this task for personal reasons and as such, data from the remaining 27 participants is displayed below. Just one participant with ABI (participant 6) scored (marginally) within the normal range on both subtests, and thus the ABI group was considered to be a memory impaired group from this point onwards. The AMI was also completed by control participants, all of whom scored within the normal range on both episodic and semantic components of the task (for conciseness, these data have not been presented).
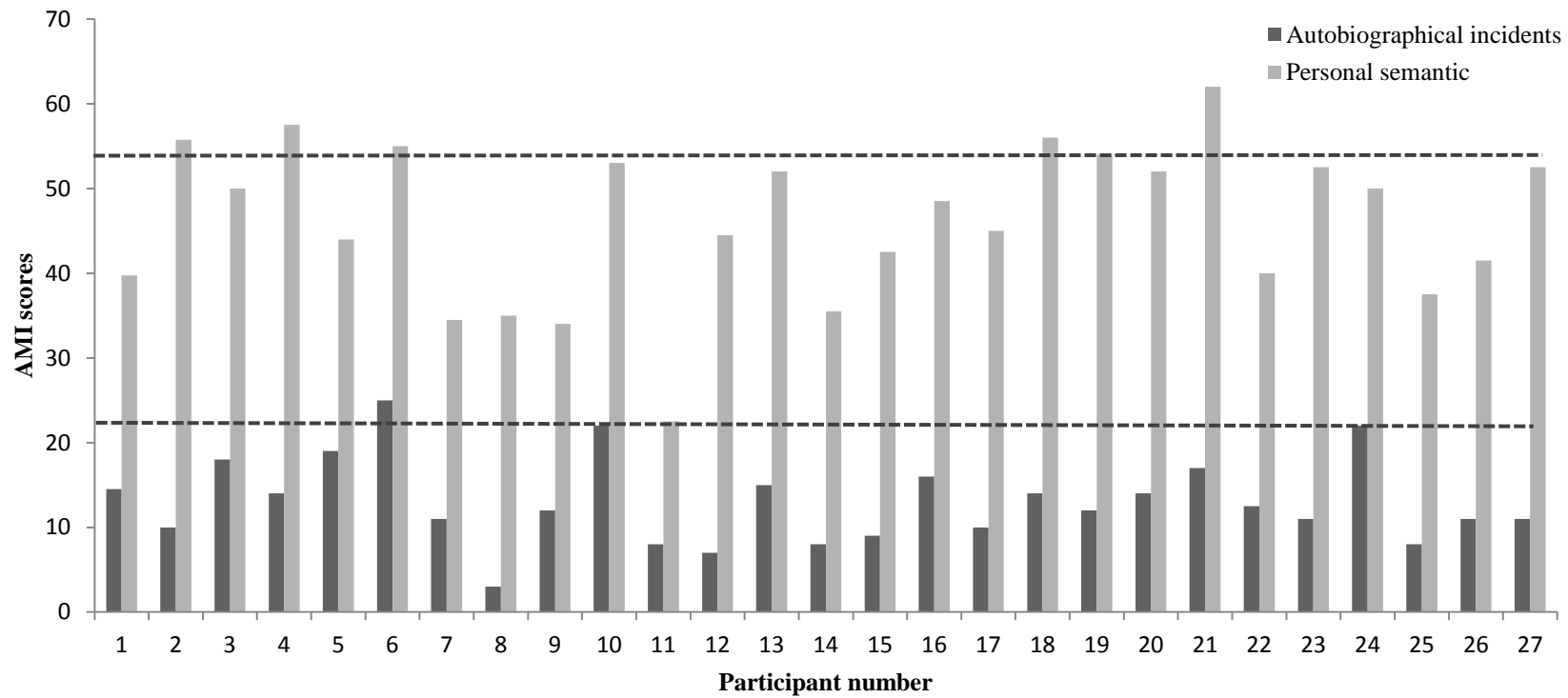
Figure 6.2. ABI participants' scores on the episodic (autobiographical incidents) and semantic components of the Autobiographical Memory Interview (Kopelman et al., 1989).

Note. Dashed lines represent cut off scores for the acceptable range according to the AMI scoring manual, all scores below the dashed line represent borderline, probably abnormal and definitely abnormal scores. The Autobiographical incidents schedule is scored on a scale of 0-27; the Personal semantic schedule is scored on a scale of 0-63.

6.3.2 General Fluency Speed

To explore group differences in general fluency speed, participants completed letter fluency and category fluency tasks. These tasks were completed with 25 of the 28 participants. For category fluency, participants with ABI generated an average of 12.36 (SD = 3.49) items in one minute, compared with controls who generated 24.60 (5.75). An independent samples t test revealed that this difference was significant (t (48) = 9.10, p < .001). A similar discrepancy was also shown on the letter fluency tasks, in which those with ABI generated 7.68 (SD = 2.98) words in one minute, whereas controls generated 15.44 (SD = 3.30). Again, this difference was significant (t (48) = 8.74, p < .001). Thus, consistent with the meta-analyses described in Section 6.1.3, it was confirmed that participants with ABI demonstrated fluency deficits, relative to control participants.

6.3.3 Self-Related Fluency

The accessibility of self-concept was examined using *I Am*, *I Was* and *I Hope To Be Fluency Tasks*. The average number of statements generated by participants in each of these tasks was calculated and is presented in Figure 6.3.
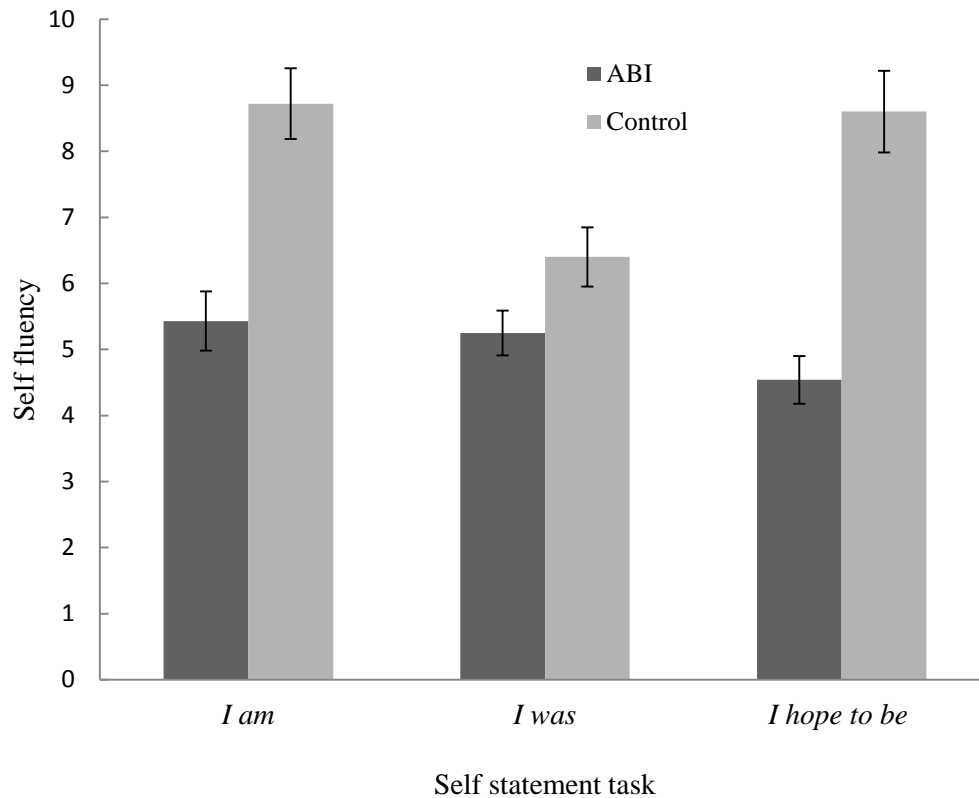
Figure 6.3. Mean number of self statements generated (in one minute) by participants in each group. Error bars represent standard error of the mean.

A 2 x 3 mixed ANOVA was carried out comparing the two groups (controls; ABI) with the three levels of self statement task (*I am, I was*, *I hope to be*). Results revealed a significant main effect of group (F (1, 54) = 36.11, p < .001), as controls were significantly more fluent than participants with ABI (p < .001). There was also a main effect of task (F (2, 108) = 5.20, p = .007), such that participants produced significantly more *I am* statements than *I was* statements (p = .008). Finally, a significant group x task interaction was found (F (2, 108) = 7.36, p = .001). Pairwise comparisons revealed that controls were significantly more fluent on all three tasks (in each case, p < .032), yet the effect of group was considerably smaller on the *I was* task (d = -0.59) than the effect of group on either the *I am* (d = -1.26) or *I hope to be* (d = -1.62) tasks. This suggests that ABI has the greatest impact on the accessibility of current and hoped for self and has the smallest impact on past self. To explore this further, pairwise comparisons also assessed fluency differences within the two groups. Analysis showed no main effect of task type in those with ABI (F (2, 48) = 2.26, p = .115), but there was a main effect of task type

in controls (F (2, 48) = 8.41, p = .001), such that control participants generated significantly fewer I was statements relative to both I am (p = .003) and I hope to be (p = .001) statements. In sum, for controls, present and hoped for selves are more accessible than past selves; however, ABI patients don't show this pattern, as access to their current and hoped for selves is *relatively more* impaired. Thus, past, present and hoped for selves can be considered to be equally (in)accessible.

It is possible that these differences were attributable to the fluency deficits highlighted in Section 6.3.2. To explore this, simple correlations were carried out between participants' scores on the control fluency tasks (animal and letter) and the self fluency tasks (*I am*, *I was*, *I hope to be*) and analysis showed that there was a strong positive correlation between *I am* fluency and both category (r = .576, p < .001) and letter fluency (r = .566, p < .001), this was also the case for *I hope to be* fluency (letter: r = .594, p < .001; category: r = .497, p = < .001), but there were no correlations between *I was* fluency and the control fluency tasks (p > . 078 in both cases). In order to control for group differences in general fluency speed, letter fluency and category fluency scores were entered into an analysis of covariance (ANCOVA). Critically, when the effects of both category and letter fluency were removed, the effect of group remained significant (p = .038) demonstrating that participants with ABI had reduced access to self-concept relative to controls even after taking their general fluency deficits into consideration. In support of this, simple correlations between self fluency and control fluency tasks in the ABI group alone were unrelated (p > .201 in all cases).

In order to explore the relationship between self fluency and autobiographical memory, fluency scores on each of the three identity fluency tasks were correlated with scores on both the episodic and semantic components of the AMI and findings are presented in Table 6.4.

Table 6.4 Simple correlations between ABI participants' AMI scores and self-related fluency scores ($n = 27$)

Self fluency task		Childhood		Early adulthood		Recent times	
		Episodic	Semantic	Episodic	Semantic	Episodic	Semantic
I am	r	.330	.168	.400*	.060	.314	.193
I was	r	.122	.142	.367	.291	.568**	.258
I hope to be	r	-.127	.146	.139	.314	-.074	.136

Note. *$p = .039$, ** $p = .002$

Simple correlations showed that there was a particular relationship between the intactness of episodic memory for early adulthood and the ability to access current self statements. This finding is in keeping with those throughout this thesis that demonstrate the importance of early adulthood and episodic memory in the formation of the self. There was also a relationship between episodic memory for recent times and *I was* fluency, which might be interpreted as the ability to use episodic memory for recent events to construct a new identity: people who had a better memory for recent events were also able to generate more characteristics or self-descriptions of how they used to be before the event. However, it is important to note that the values presented above are not corrected for multiple comparisons and if the Bonferroni corrected value of .003 was to be accepted, these findings would no longer be significant.

6.3.4 Type of Statement

It was of interest to determine whether the type of statement generated varied according to group, to this end, the proportion of physical, social and psychological statements was calculated and statements used to describe current self are considered first (see Figure 6.4).

Figure 6.4. Mean proportion of physical, social and psychological *I am* statements generated by participants in each group. Error bars represent standard error of the mean.

The type of *I am* statement generated by participants in each condition was examined using a 2 (group) x 3 (statement type) mixed design ANOVA. There was a main effect of statement type (F (1.40, 75.50) = 20.15, p < .001), as participants generated a higher proportion of psychological statements, relative to social (p = .023) or physical (p < .001) statements. Participants also generated significantly more social than physical statements (p = .002). The interaction between statement type x group was approaching significance (F (1.40, 75.50) = 3.10, p = .068) and pairwise comparisons revealed that participants with ABI generated marginally fewer psychological *I am* statements (t (54) = 1.86, p = .068) and marginally more social *I am* statements (t (47.98) = 1.88, p = .066) than did controls. Additional analysis was used to explore within group differences. First of all, One-way ANOVA revealed a significant main effect of statement type in the ABI group (F (1.46, 39.45) = 5.24, p = .017), such that those with ABI generated significantly fewer physical statements relative to psychological (p = .004) and social statements (p = .018), but there was no difference between the proportion of social and psychological statements generated (p = 1.00). This analysis was repeated to explore

statement type generated by controls and also revealed a main effect of statements type (F (1.26, 34.10) = 23.95, p < .001). Unlike those with brain injury, control participants showed a significant bias for generating psychological statements relative to physical (p = < .001) and social (p = .002) statements and there was no difference between the proportion of social and physical statements generated (p = .134). This finding is somewhat consistent with those in Chapter 4, as SA generated significantly fewer psychological selves to describe her current self than did controls. In this instance, the between groups difference is marginal, yet within groups comparisons show that the bias for describing current self in relation to psychological traits is absent in those with ABI.

Next, type of statement used to describe past self was considered and findings are presented in Figure 6.5.
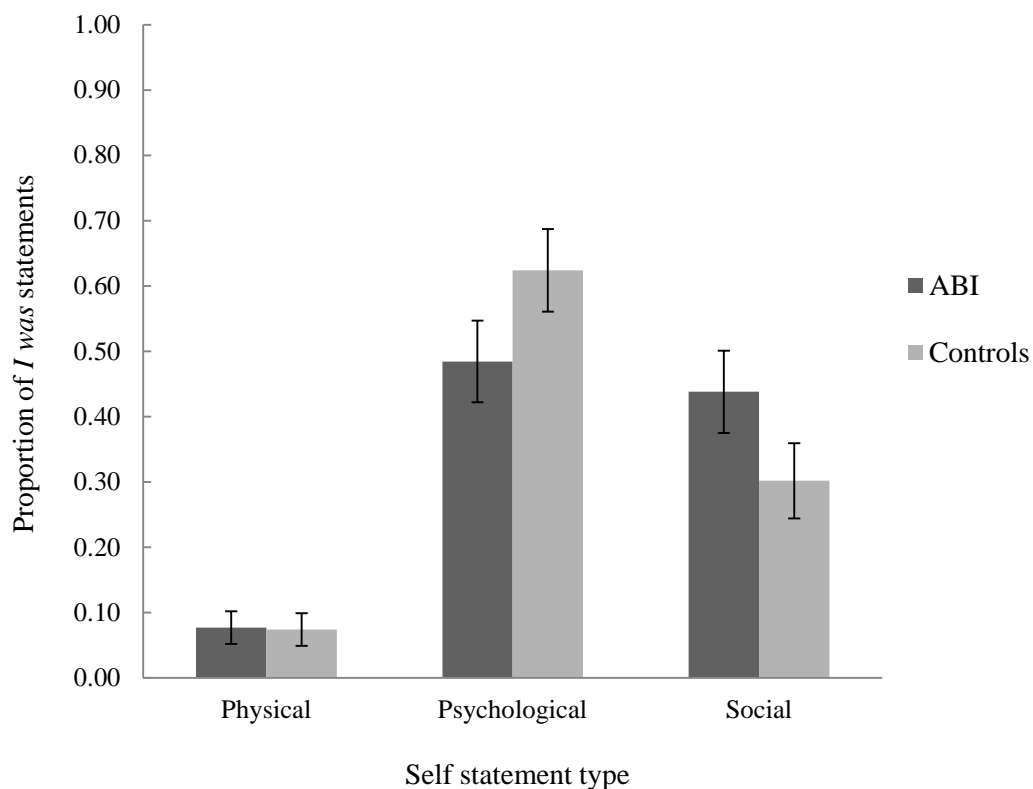
Figure 6.5. Mean proportion of physical, social and psychological *I was* statements generated by participants in each group. Error bars represent standard error of the mean.

Much like Figure 6.4, Figure 6.5 illustrates that both groups of participants had a preference for generating psychological descriptors of the self, yet participants with ABI generated fewer and

were more likely to generate social self statements than controls. A 2 (group) x 3 (statement type) mixed ANOVA was used to explore findings presented in Figure 6.5. There was a main effect of statement type (F (1.24, 66.69) = 25.70, p < .001). To explore the main effect, descriptive statistics were collapsed across groups; psychological (mean = .38, SE = .04) physical (mean = .12, SE = .02), social (mean = .49, SE = .04). The difference between physical statements and social statements was significant (p < .001), as was the difference between physical and psychological statements (p <.001), but there was no difference between the proportion of social and psychological statements generated (p = .49) and no interaction (F (1.24, 66.69) = 1.88, p = .174). Thus when describing past self, statement type did not vary according to group i.e. those with ABI describe past self in much the same way as controls.

Finally, type of statement used to describe *hoped for* self was considered and findings are presented in Figure 6.6.
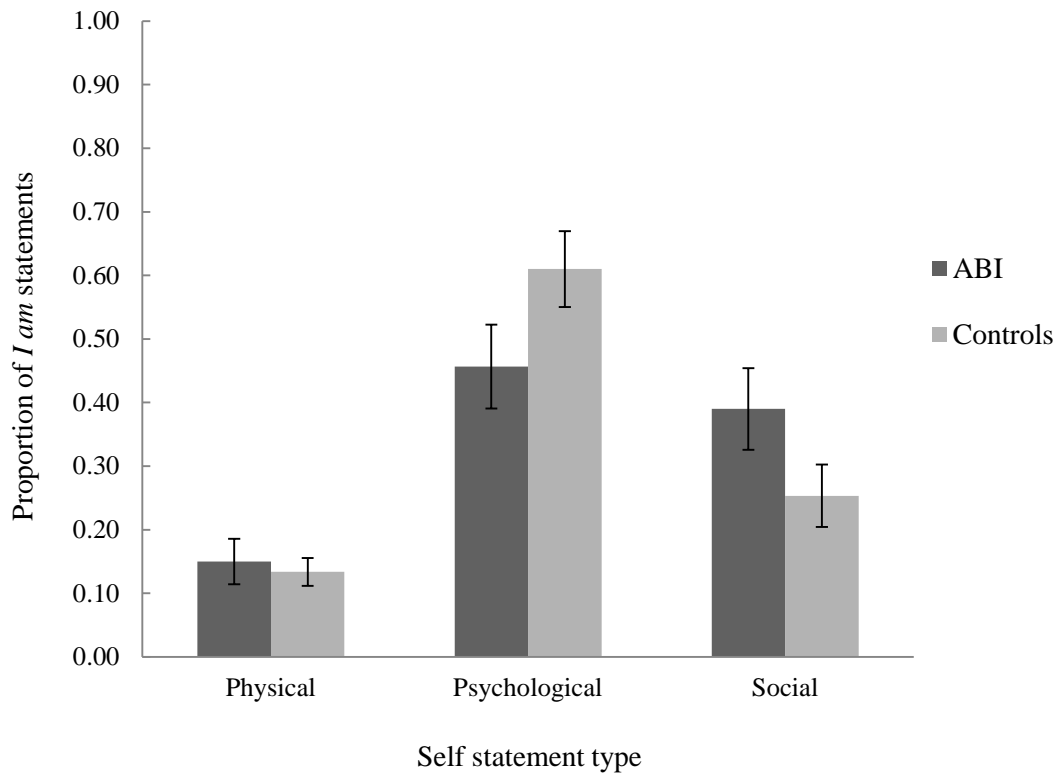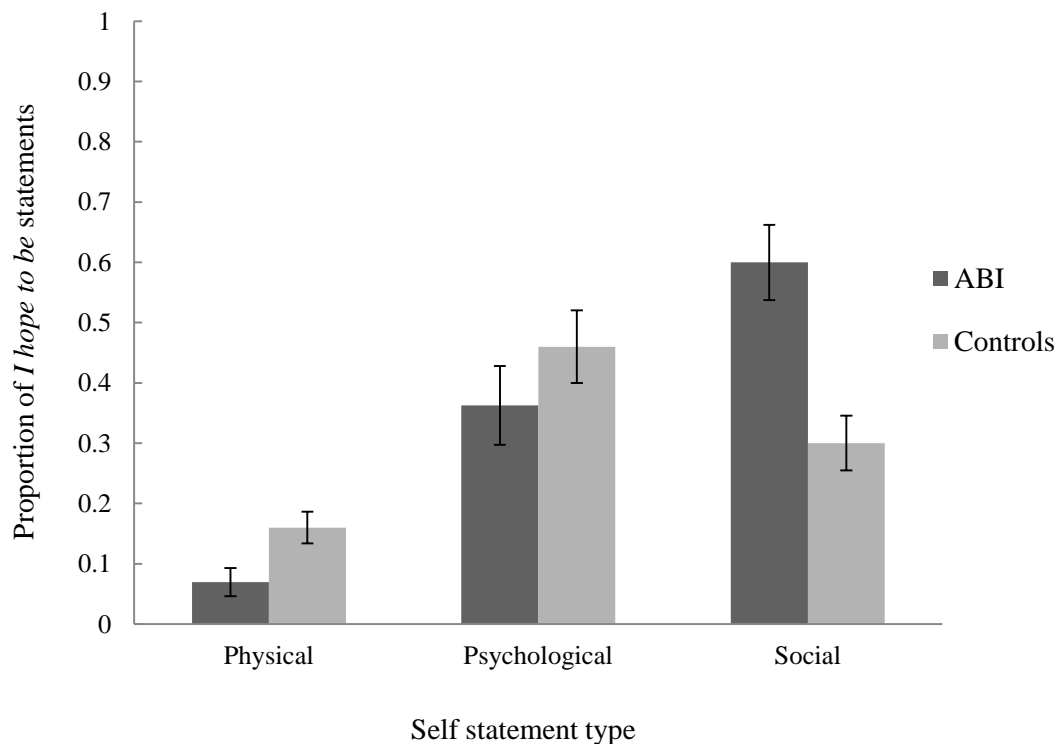

Figure 6.6. Mean proportion of physical, social and psychological *I hope to be* statements generated by participants in each group. Error bars represent standard error of the mean.

The distribution of type of statement was explored using 2 (group) x 3 (statement type) mixed ANOVA, which showed a main effect of statement type (F (1.34, 72.52) = 20.36, $p < .001$), such that participants generated significantly fewer physical statements than social ($p < .001$) or psychological statements ($p < .001$). There was also a significant group x task interaction (F (1.34, 72.52) = 4.85, $p = .021$) and pairwise comparisons revealed that participants with ABI generated significantly more social statements to describe their *hoped for* self than did control participants (t (54) = 2.68, $p = .01$). As above, analysis was also used to explore within group differences. First of all, One-way ANOVA revealed a significant main effect of statement type in the ABI group (F (1.30, 35.18) = 16.41, p , .001), such that those with ABI generated significantly fewer physical statements relative to psychological ($p = .006$) and social statements ($p < .001$), there was also a trend towards participants generating significantly more social statements relative to psychological statements ($p = .060$). This analysis was repeated to explore statement type generated by controls and again revealed a main effect of statement type (F (1.27, 34.30) = 7.91, $p = .005$). As in those with brain injury, control participants generated significantly fewer physical statements relative to social (p < .001) and psychological ($p = .002$) statements, however there was no difference between the proportion of social and psychological statements used to describe hoped for self ($p = 1.00$). Thus in contrast to *I am* and *I was* statements, findings here illustrate a trend towards those with ABI generating *I hope to be* statements that are predominantly social, whilst controls show no such preference.

6.3.5 Importance and Emotional Valence

To further explore the content of self, participants rated each self statement in relation to emotional valence and personal significance. First of all, personal significance was considered by averaging the ratings generated by each person and findings are presented in Table 6.5.

Table 6.5. Mean (SD) personal significance ratings assigned by participants to *I am*, *I was* and *I hope to be* statements.

	ABI	Controls
I am	5.73 (1.11)	5.27 (0.87)
I was	6.14 (0.86)	5.35 (0.92)
I hope to be	6.48 (0.51)	6.02 (0.59)

A 2 (group) x 3 (task) mixed ANOVA was used to explore the significance of these findings. Analysis revealed a main effect of group (F (1, 54) = 13.00, p = .001), as personal significance was highest for those with ABI (p = .001). There was also a main effect of task (F (2, 108) = 15.88, p < .001), such that *I hope to be* statements were rated as more personally significant than *I am* (p < .001) or *I was* (p = .001) statements, but no significant interaction was found (F (2, 108) = 0.93, p = .398).

In order to explore whether personal significance had changed following brain injury, a one way ANOVA was carried out to compare the ratings of past, present and *hoped for* self generated by participants with ABI. Analysis showed a main effect of self fluency task (F (2, 54) = 6.29, p = .003), such that, *I am* statements were rated as being less personally significant than *I hope to be* statements (p = .006), but no other differences emerged (p > .214, in each case). Thus, participants reported no difference in the personal significance of the self following ABI. With regards to control participants, analysis again showed a main effect of fluency task (F (2, 54) = 11.60, p < .001) . Pairwise comparisons demonstrated that *I hope to be* statements were predicted to be more personally significant than both *I am* (p < .001) and *I was* (p = .001) statements. Overall, participants predicted that the statements that they were yet to become would be the most personally significant. The biggest group difference emerged for *I was* statements, as participants with ABI rated these as being more identity defining. It is possible that this is the result of people with brain injury being able to reflect upon how important certain aspects of their self were once they had been lost. For instance, *I was* statements that were

generated by those with ABI and were rated highly for personal significance frequently related to employment, physical activity and a sense of normality (e.g. "working hard", "driving", "dancing", "feeling normal (I took this for granted)", "capable of so many things", "free").

Next, the emotional valence that both groups assigned to statements was considered and findings are presented in Table 6.6.

Table 6.6. Mean (SD) emotional valence ratings assigned by participants to *I am, I was* and *I hope to be* statements.

	ABI	Controls
I am	4.87 (1.78)	5.32 (0.92)
I was	6.06 (0.86)	4.42 (1.41)
I hope to be	6.54 (0.59)	6.33 (0.58)

Note: Ratings were given on a scale of 1 to 7, with 7 being extremely positive and 1 being extremely negative.

A 2 (group) x 3 (task) ANOVA was used to explore findings presented in Table 6.6 and revealed a main effect of group (F (1, 54) = 7.03, p = .01), as overall, participants with ABI rated self-statements as being more positive than did controls (p = .01). There was also main effect of task (F (1.70, 91.62) = 25.34, p < .001), such that *I hope to be* statements were rated as being significantly more positive than *I am* (p < .001) or *I was* (p < .001) statements. Finally, there was a significant group x task interaction (F (1.70, 91.62) = 13.26, p < .001), whereby participants with ABI rated *I was* statements as being significantly more positive than did control participants (t (44.61) = 5.26, p < .001), but no other differences emerged. It is proposed that this drove the overall main effect of group and relates to the fact that participants with ABI can reflect on how positive aspects of their pre-injury self were given that many of those aspects are now changed. For instance, examples of the most positively valenced I *was* statements include "loving socialising", "able to walk", "going out", "enjoying work" and "living on my own".

In order to explore whether positivity of the self changed following brain injury, a one way ANOVA was carried out to compare the valence ratings assigned to past, present and *hoped for* self. Analysis showed a main effect of self fluency task (F (1.41, 38.12) = 14.40, $p < .001$), such that, *I am* statements were rated as being significantly more negative than *I was* ($p = .009$) or *I hope to be* statements ($p < .001$). *I hope to be* statements were also rated as being significantly more positive than *I was* statements ($p = .051$). Thus the emotional valence attached to self statements had changed for participants with ABI - following their brain injury they felt more negative about their current self - yet they were hopeful about the self being positive in the future. With regards to control participants, analysis again showed a main effect of fluency task (F (1.44, 38.86) = 26.77, $p < .001$). As in participants with ABI, controls were significantly more positive about *I hope to be* statements relative to *I am* ($p < .001$) or *I was* ($p < .001$) statements. However, controls participants rated *I am* statements as being significantly more positive than *I was* ($p = .027$) statements. Thus across groups, participants were most positive about who they hoped to become and yet whilst control participants were least positive about past self, participants with ABI were least positive about their current self.

6.3.6   Age of Emergence: Predicting New Selves

Chapter 4 demonstrated a marked difference between the temporal characteristics of *I hope to be* statements in a person with a recently acquired ABI, relative to neurologically intact control participants. In particular, the majority of controls *I hope to be* statements were already established as defining features of their identity suggesting that, in general, they hoped to maintain their current identity into the future. In contrast, the majority of SA's *I hope to be* statements were not existing components of her identity, rather they were things that she hoped to become in the future. Similarly, the present study found that 47% of controls *I hope to be* statements were classified as 'ongoing', whereas only 2.36% of the *I hope to be* statements generated by those with ABI were defined as being an existing part of their identity.

SA hoped that any statement that was not an existing part of her identity would emerge within one year, whereas controls generated *I hope to be* statements that extended considerably further into the future. To explore this in this larger sample of people, all participants in the present

study were asked to assign an age to *I hope to be* statement, that is, an age at which they felt that each statement was likely to become a defining part of their identity. Next, statements that had been assigned a specific age were recoded as number of years into the future and an average number of years was calculated for each participant (only data from those who had assigned specific ages to *I hope to be* statements were included here). On average, participants with ABI predicted that all *hoped for* selves would become a part of their identity within 2.33 years (SD = 2.36), whereas controls expected that *hoped for* selves would be established within 4.82 years (SD = 4.52). An independent samples *t* test demonstrated that this difference was significant (t (38.28) = 2.47, p = 0.18). Thus, as in Chapter 4, goals for the self were significantly more immediate in those with ABI than in control participants.

6.3.7 Head Injury Semantic Differential Scale

To explore whether or not discrepancies existed between traits that are considered to be pertinent to brain injury, participants completed the HISDS (Tyerman & Humphrey, 1984). Findings are presented in Table 6.7.

Table 6.7. Mean (SD) ratings generated by participants with ABI and controls on the HISDS (Tyerman & Humphrey, 1984).

	Past	Present	Future
ABI	112.00 (21.89)	94.79 (25.28)	107.79 (27.62)
Controls	96.89 (19.18)	100. 86 (17.94)	109.18 (14.29)

Note. The higher the score on the HISDS (max score = 140) the more positive the identity

To explore the significance of findings, a 2 (group) x 3 (task) mixed ANOVA was carried out. Analysis revealed no main effect of group (F (1, 54) = 0.28, p = .602); however, there was a main effect of task (F (2, 108) = 8.14, p = .001), such that present self was generally considered as being more negative than either past self (p = .029) or future self ($p < .001$). There was also a significant interaction between group and task (F (2, 108) = 8.70, $p < .001$), whereby

participants with ABI rated past self as being significantly more positive that did controls (*t* (54) = 2.75, *p* = .008), but no other group differences emerged (in each case, p > .05).

Previous research with the HISDS (e.g., Ellis-Hill & Horn, 2000; Tyerman & Humphrey, 1984) has shown that considerable discrepancies exist between pre-injury self and both present and future self in participants with ABI. In particular, those with ABI tend to be most negative about present self, yet rate past and future self very similarly, suggesting that they predict a return to past self at some point in the future. To explore whether or not the same pattern of findings emerged in the present sample, a one way ANOVA was carried out on the data from those with ABI. This analysis did show a main effect of task (*F* (2, 54) = 7.95, *p* = .001), such that present self was rated as being significantly more negative than both past (*p* = .001) or future self (*p* = .016) and, as in previous research, there were no discrepancies between ratings of past self and future self (*p* = 1.00). In control participants, one-way ANOVA also showed a main effect of task (*F* (2, 54) = 9.59, *p* < .001). In contrast to those with ABI, pairwise comparisons revealed no difference between ratings assigned to past self and those assigned to present self (*p* = .361); however, future self was rated as being significantly more positive than past (*p* = .013) and present self (*p* = .003). Overall, findings indicate that controls were most positive about future self, whereas people with ABI were as positive about their past self as they were about self in the future. Importantly, these findings (generated using a widely used measure of self concept in ABI) are consistent with those generated using the self fluency tasks.

Given that the HISDS provides an objective measure of how positive or negative a person feels about past and present self it was anticipated that, if self fluency tasks are reliable measures of self, scores on these tasks should correlate with the emotional valence ratings that were assigned by participants to *I am* and *I was* statements. To this end, data were collapsed across participants (n = 56) and simple correlations demonstrated that valence ratings assigned to *I am* statements were positively correlated with positivity of present self on the HISDS (*r* = .473, *p* < .001). Similarly, valence ratings assigned to *I was* statements were positively correlated with positivity of past self on the HISDS (*r* = .442, *p* = .001). Thus findings provide support for the validity of the self fluency tasks as measures of self-discrepancy in ABI. It is important to note that there

was no relationship between the valence of *I hope to be* selves and future self as determined by the HISDS ($r = .114$, $p = .401$), which suggests that participants perceive a difference between the future self that they hope for and the future self that they actually predict.

6.3.8 Autobiographical Memory

The literature reports that, following brain injury, people frequently experience a 'loss of self' (e.g., Nochi, 1985). Given that Chapter 2 and Chapter 5 proposed that memories cluster around transitional points in order to maintain a consistent sense of self across lifetime periods, the present study attempted to explore the idea that a transition that occurs in the absence of memory might lead to this 'loss of self'. To measure this objectively, participants were asked to rate the intactness of their memory for the neurological event (or life event, in the case of controls). Ratings were given on a scale of 1 to 7, with 7 being intact memory and 1 being no memories at all. The average rating given by participants with ABI was 2.71 (SD = 2.31), relative to controls who gave an average rating on 5.89 (SD = 1.37). An independent samples *t* test revealed that this difference was significant (t (54) = 6.27, $p < .001$), thus those with ABI reported significantly worse memory for their life story event than did controls.

Given that participants with ABI had significantly worse memory for their life event, it was anticipated that their memories would be most closely associated with past self relative to current self. To test this hypothesis, participants were asked to recall the first ten memories that came to mind when reflecting on their life so far, following which they were re-presented with their *I am* statements and were asked to highlight those statements that were associated with each memory. This was also repeated for *I was* statements to explore the association between past self and accessible AMs. Of the 28 participants with ABI, only 14 were able to generate ten memories (3 participants generated 9, 5 participants generated 6, 4 generated 5, 1 generated 4 and 1 generated only 3 memories) and this is consistent with findings from the AMI, which demonstrated autobiographical memory deficits in this group. In contrast, all control participants were able to generate ten autobiographical memories. The prediction here was that if loss of self relates to a failure to update self, then memories would be most closely associated with past self in participants with ABI, yet most closely associated with current self in controls.

To explore this, the number of memories associated with each *I am* and *I was* statement was calculated. Consistent with predictions, the *I am* statements generated by controls were supported by 607 memories, whereas *I am* statements generated by participants with ABI were supported by only 248 memories. In contrast, *I was* statements generated by participants with ABI were supported by 337 memories and 425 memories in controls. To analyse data statistically, data was converted into the average number of memories that supported each participant's statements and the averages are presented in Table 6.8.

Table 6.8. Mean (SD) number of memories that supported each participant's *I am* and *I was* statements

	ABI	Controls
I am statements	1.61 (1.27)	2.75 (1.46)
I was statements	2.13 (1.99)	2.31 (1.38)

A 2 (group) x 2 (self statement task) mixed design ANOVA was used to explore the significance of these findings. Analysis showed that the effect of group approached significance (F (1, 54) = 3.52, p = .066), as marginally fewer memories supported self-statements in participants with ABI, but there was no main effect of task (F (1, 54) = .031, p = .861). There was however, a significant group x self-statement task interaction (F (1,54) = 4.83, p = .032), such that significantly fewer memories supported present self in those with ABI (t (54) = 3.12, p = .003), yet there was no significant difference between the number of memories that supported past self (t (47.95) = 0.38, p = .708).

The final part of this study aimed to determine qualitative differences in the nature of the memories generated by participants with brain injury and those generated by controls. To this end, participants rated the memories that they had generated in relation to importance, valence, vividness and rehearsal. Findings are presented in Table 6.9.

Table 6.9. Mean (SD) autobiographical memory rating generated by participants with ABI and controls.

	ABI	Controls
Importance	5.72 (0.99)	5.33 (0.85)
Valence	5.36 (0.99)	5.13 (0.74)
Vividness	5.62 (0.78)	5.07 (0.92)
Rehearsal	4.48 (1.20)	4.00 (0.81)

Note. All ratings were given on a scale of 1 to 7, with the magnitude of each characteristic increasing along this scale.

To explore the significance of the findings presented in Table 6.9, a series of one way ANOVAs was used. Analysis showed that those with ABI reported that their AMs were significantly more vivid than did controls (F (1, 54) = 5.57, p = .002), but no other differences emerged (p > .09 in each case).

Finally, in order to assess participants subjective state of consciousness during retrieval they completed the Remember/know and the Point of view paradigms. Table 6.10 lists the overall proportions of responses participants with ABI and controls gave for Remember/Know judgments and Field/Observer judgments.

Table 6.10. Proportion of responses associated with AMs of participants with ABI and controls.

		ABI	Controls
Remember/know judgement	Remember	.66 (.29)	.68 (.16)
	Know	.28 (.24)	.30 (.16)
	Guess	.06 (.14)	.02 (.05)
Point of view	Field (F)	.68 (.22)	.65 (.23)
	Observer (O)	.29 (.20)	.31 (.21)
	F/O	.03 (.10)	.04 (.14)

To explore responses on the Remember/know paradigm a 2 (group) x 3 (subjective experience judgement) mixed design ANOVA was carried out. There was no main effect of group (F (1,54) = .000, p = 1.00), given that proportional data was used. There was a main effect of subjective experience judgement (F (1.32, 71.45) = 103.14, p < .001), such that participants generated significantly more Remember responses (p < .001 in each case), but there was no significant group x subjective experience judgement interaction (F (1.32, 71.45) = .35, p = .616). Similarly, a 2 (group) x 3 (subjective experience judgement) mixed ANOVA was used to explore the data from the Point of view paradigm and showed a main effect of subjective experience judgement (F (1.49, 79.05) = 101.61, p < .001), such that participants generated significantly more Field responses (p < .001 in each case), but there was no significant group x subjective experience response interaction (F (1,54) = .000, p = 1.00). Thus, findings from both tasks support the idea that there was no difference between the subjective experiences associated with one's most accessible AMs in participants with ABI or controls.

6.4   Discussion

The primary aim of Study 5 was to replicate and extend findings from the single case that was presented in Chapter 4, specifically in a larger and more heterogeneous group of people with ABI. First of all, the Autobiographical Memory Interview (Kopelman et al., 1989) revealed that the participants with brain injury were impaired on tasks of both episodic and semantic autobiographical memory[13]. In fact, 50% of the sample were unable to recall ten life story memories when prompted to do so. The brain injured group were also impaired on general fluency tasks, relative to age and gender matched control participants, and in this regard, it was evident that this sample differed from SA (who had no fluency deficits) from the outset. In terms of the central hypothesis that episodic memories are related to the self, a key finding in support of this idea is shown in Table 6.4; there is a reliable correlation (r = .40) between episodic memory (from the AMI) and the number of *I am* statements generated; supporting the findings from the experimental study in Chapter 2.

The participants with brain injury had reduced access to self statements and this was unrelated to their general fluency deficit, suggesting that something special exists about how the self is stored and accessed, in that the fluency of generating self statements is not related to the speed with which other categorical information can be generated. With regards to the type of statement generated to describe the self, no differences emerged in relation to how those with ABI described past self relative to controls, but some differences were found in relation to descriptions of current self, as participants with ABI did not demonstrate the bias for generating psychological selves that was demonstrated in controls. Differences also emerged for *hoped for* selves, as participants with ABI generated significantly more social selves (relating specifically to roles and relationships) than controls.

In sum, findings from this larger group of people with ABI differed in a number of ways from those found with SA; in particular, this group demonstrated deficits in their ability to access the

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[13] Findings demonstrated that the participants with ABI had both episodic and semantic deficits. Episodic and semantic AM are presumed to be interrelated constructs and thus it is possible that the findings reflect a general deficit in autobiographical memory. Nonetheless, the AMI has been shown to be effective in distinguishing between the two constructs in older adults (Levine et al., 2002).

self in general and yet showed less marked impairment in their ability to access psychological trait-like descriptions. Possible explanations for these discrepancies are discussed in detail below.

6.4.1 AM and the Accessibility of Self Statements

On each of the *I am, I was* and *I hope to be* tasks, participants with ABI generated significantly fewer self statements than did control participants. Critically, this reduced access to the self was unrelated to the general fluency impairment that was found in the ABI group. These findings are consistent with the experimental work presented in Chapter 2, which showed that AMs increase access to the self, and yet are in contrast with findings from Chapter 4, which illustrated that the accessibility of self statements was unimpaired following ABI and subsequent AM impairment. It is suggested that differences in post-injury circumstances might explain the disparate findings, as the circumstances in which SA and the ABI group were rediscovering the self following ABI varied considerably. Following her illness, SA was largely independent. She lived at home with her family and maintained her relationships with friends; as such, it is presumed that her daily life presented opportunities in which she could form new memories that both supported her new selves and allowed her to rediscover old selves. In contrast, it is possible that it is more difficult for someone to rediscover the self in the context of a rehabilitation setting, given that the environment is unfamiliar and that the contents of each day are largely determined by others. Presumably, these circumstances make it more challenging for someone to create new memories that ground their unique self. Indeed despite SA's autobiographical impairment, she was able to form episodic memories for recent times, suggesting that she would have been able to ground herself in memories whenever opportunities to form self-relevant memories arose. Future research might explore the clinical usefulness of providing opportunities for those with ABI who are living in rehabilitation settings to ground their selves in memories – this is considered in more detail in Chapter 7.

In addition, SA was unimpaired in her ability to access memories from childhood and early adult years. Chapter 4 suggested that the persistence of these memories might have been crucial in explaining the persistence of her self-knowledge given that AMs from this time are critical in

the maintenance of identity. In contrast, 64.29% of ABI participants in the present study presented with at least borderline impairments in their ability to access memories from childhood and 89.29% were impaired in their ability to generate memories from early adulthood. Thus it is possible that this too contributed to deficits in accessing the self. In support of this, the present study found that *I am* fluency was positively correlated with the intactness of episodic AM (and not semantic AM) for early adulthood.

Despite their notable memory impairments, the characteristics of the memories that persisted in brain injury were not reported to be any different from those generated by controls. That is, all participants' most accessible memories were characterised as being important, positively valenced and vivid. They were also most frequently reported as being autonoetic in nature and recalled from the first person perspective, which is consistent with previous literature that has demonstrated that episodes that support the self are not reported to be subjectively different in patients with memory impairment (e.g., Illman et al., 2011; Rathbone et al., 2009). However, it is important to highlight that participants were not required to justify their phenomenological ratings in this instance, thus it is possible that whilst reports of subjective experience did not differ, subjective experience itself did.

6.4.2   The Content of Current Self-Knowledge

At the outset, it was predicted that people with episodic memory impairment would also show deficits in their ability to generate psychological selves given that this is a relationship that has emerged several times throughout this thesis. For instance, Chapters 3 and 5 indicated that an overwhelming bias for generating psychological selves appears during the period of early adulthood (i.e. at the peak of the reminiscence bump), recalling an autobiographical incident also subsequently increased access to psychological selves in Chapter 2, and psychological selves were found to be less accessible in a case of episodic amnesia in Chapter 4. The key question in this study thus related to whether or not there was an episodic nature to the self-deficit that presented in participants with ABI.

In support of a particular relationship between episodic AM and psychological selves, findings showed that the aforementioned bias for describing self in relation to psychological traits is

absent in those with ABI, but significant in controls. There were also some cases within the ABI sample that were similar to SA, as five of the twenty eight participants with ABI failed to generate any psychological descriptors of current self, whereas at least 14% of the *I am* statements generated by controls were psychological in nature. Indeed of all 195 participants who have completed the *I Am Fluency Task* as part of the work presented in this thesis, just 15 have failed to generate any psychological selves, nine of whom were older adults (who are most likely to generate selves that are social in nature) and one of whom being SA. Therefore it is proposed that psychological selves are being impacted on somehow in the present sample (as in Study 3, Chapter 4) and another possibility that was considered in Chapter 4 was that difficulty in accessing psychological selves might be a reaction to illness. Indeed SA was tested in the very acute stages of her illness and thus it is possible that she had not yet had time to react to what had happened to her and thus re-establish her psychological self. To explore this in the present sample, the number of psychological selves generated by each participant was correlated with the number of months since injury, but these two variables were found to be unrelated.

However, it is important to note that participants with ABI showed no deficit in their capacity to access psychological selves relative to controls. There was a numerical trend towards those with ABI generating fewer psychological statements to describe their current self than controls, but this difference was not significant. Thus conclusions regarding the relationship between episodic memory and psychological selves is much less clear than when it emerged in SA. It is possible that this specific self-related deficit does not emerge in this instance because of a more general deficit in accessing the self. Compared with participants with ABI, controls were found to be more fluent overall on the *I am, I was* and *I hope to be* task. It is possible that once people with ABI had re-established social selves in the context of returning home, and had adjusted to their new physical selves post injury, a selective deficit in psychological selves would become more apparent. It would be fruitful for future research to employ longitudinal designs in order to explore how different types of self-knowledge are rediscovered or re-acquired post brain injury.

6.4.3 Grounding the Self in Memory

In response to the findings in Chapter 5, which showed that memories cluster around the start of transitional lifetime periods, it was proposed that a lack of memories for such a time might explain feelings of discontinuity in the self that are frequently reported in the ABI literature (e.g., Moldover, Goldberg & Prout, 2004). Indeed maintaining a coherent and consistent self over time is considered to be crucial to maintaining psychological well-being (Conway, 2005) and the need to maintain coherence is likely to be particularly pertinent at times of transition, when coherence relies on the ability to recall episodes that merge past selves with new selves. In line with the predictions, the present study showed that the majority of participants (53.57%) had no memories for the traumatic event that caused their brain injury. Control participants, unsurprisingly, had significantly better memory for the life events that they reported. If feelings of discontinuity do relate to a failure to update the self with relevant autobiographical memories, it was predicted that current self would be less grounded in memory in ABI participants than in controls. This was found to be the case, as participants with brain injury reported that significantly fewer memories were associated with current self than did controls. There was also no difference in the number of memories that were associated with past selves. It is possible that having fewer memories to support selves explains the deficits in the accessibility of self statements that were found across all self fluency tasks.

Evidence of discontinuity and self-related change were also found when considering *hoped for* selves, as 47% of the *I hope to be* statements generated by controls were classified as being 'ongoing', whereas only 2.36% of *I hope to be* statements generated by those with ABI were defined as being an existing part of their identity. Importantly, this replicates what was found in Chapter 4, as the majority of SA's *I hope to be* statements were concepts that she was yet to become. Specifically, SA hoped that a variety of new self defining concepts would emerge within one year and similarly, participants with ABI predicted that all *hoped for* selves would become a part of their identity within approximately two years. Both findings suggest that goals for the self become much more immediate following ABI. The *hoped for* selves generated by participants with ABI also differed in that they were significantly more social in nature than

those generated by controls. In particular, they frequently related to the themes of employment and family roles. For instance, participant eight hoped that in the future she would be "a mother", "a wife", "living at home", "close to her family" and "employed".

Change was also evident in relation to the emotional valence that was attached to the self in instances of ABI. Consistent with literature that has used the HISDS (e.g., Tyerman & Humphrey, 1984; Ellis-Hill & Horn, 2000), present self was rated as being significantly more negative than past self in participants with ABI, implying that positive aspects of the self had been lost post-injury. Participants with ABI were also significantly more positive about past self than were controls. ABI did not change how personally significant selves were, and all participants predicted that *hoped for* selves would be more personally significant than either past or present selves.

6.4.4   Clinical Implications

First of all, this study demonstrated that *I am, I was* and *I hope to be* tasks can be used to obtain a multitude of self-relevant information from individuals with ABI. These tasks provided quantitative data on the accessibility of self statements, as well as qualitative data relating to the content of self-knowledge. Importantly, this was also the case in instances where individuals had deficits in general fluency. For example, participant two was a forty-six year old male who presented with deficits in both semantic and phonemic fluency – he generated six items on the semantic task, five items (on average) on the phonemic fluency task and eight *I am* statements. In contrast, the age and gender matched control participant, who was also neurologically intact, generated fifteen semantic items, twelve phonemic items and just seven *I am* statements. Support for the use of the self fluency tasks was also found when considering the relationship between ratings of emotional valence and scores on the HISDS, as scores on these two tasks were highly correlated. In sum, it is proposed that the self fluency tasks will be useful in rehabilitation settings, particularly in identifying aspects of the self that people currently feel connected to, as well as those that they wish to develop. From a rehabilitation perspective, it is interesting to note that in this instance, participants with ABI showed an overwhelming bias for generating *hoped for* selves that described roles and relationships.

6.4.5   Conclusion

In sum, findings suggest that the self is not wholly lost following ABI, rather there are new selves that emerge and old selves that need to be rediscovered, and key to this is the idea that both might need to be grounded in autobiographical memory. This study also provides support for the use of the self fluency tasks in clinical populations. This is considered to be crucial given that the capacity to address self-discrepancy is now regarded as being a fundamental component of successful rehabilitation following ABI (Gracey, Evans and Malley, 2008). Along with our experimental manipulation which increases access to self statements (Chapter 2), this work does suggest that one way of meaningfully 'measuring' the self is to ask people to generate self statements and measure how accessible these are.

7. GENERAL DISCUSSION

"It's a poor sort of memory that only works backwards"

Lewis Carroll (1865)

7.1 Overview

This thesis aimed to further our understanding of the relationship between autobiographical memory and the accessibility and organisation of self statements. The novel *I Am Fluency Task* was central to this aim, as it provided a unique means of quantitatively exploring the accessibility of self statements, whilst qualitatively examining the content of self-knowledge. In doing so, this approach allowed for a more nuanced understanding of the ways in which self statements are tied with autobiographical memory.

A novel finding was that autobiographical retrieval increases access to the self, as measured by a fluency task. It was also found that access to self statements was reduced in AM impairment. This was especially the case for psychological selves, possibly suggesting a particular relationship between episodic memory and trait-like descriptions of current self-concept. The accessibility of self statements also changed across the lifespan, and changes corresponded with key AM milestones, such as, the end of the period of childhood amnesia and during the period of the reminiscence bump. Periods of self-related change were also associated with a temporal clustering of autobiographical memories and the coherence of the self over time was disrupted when times of change were dominated by the onset of amnesia. In sum, the studies within this thesis demonstrate a robust relationship between the accessibility of the self and that of autobiographical memory, and suggest that one way of meaningfully 'measuring' the self is to ask people to generate self statements and to subsequently measure how accessible these are.

It is important to acknowledge that there were both strengths and weaknesses of employing mixed methods approaches to explore the self memory relationship in this thesis. With regards

to the advantages, the use of experimental research was theoretically useful in allowing for a more fine-grained understanding of how the accessibility of these two constructs is related. Of course, this has important clinical implications with regards to self in memory impairment and neuropsychological chapters demonstrated the feasibility and potential usefulness of using the *I Am Fluency Task* to explore this in people with acquired brain injury. Nonetheless, employing mixed methods in the context of a PhD thesis meant that neither approach could be explored fully and thus a number of unanswered questions remain. In particular, the relationship between memory impairment and access to psychological selves in unclear and is an important area for future research. These issues are considered individually and in more detail throughout this discussion.

7.2   Summary of Findings

A summary of the main findings presented within this thesis is presented in Table 7.1. Each empirical chapter is then reviewed below in turn.

Table 7.1. Summary of the main findings

Study	Title	Main findings	For discussion
1a	Autobiographical retrieval and I am fluency	Recalling an episodic AM increases access to self-statements and psychological selves in particular.	Why does AM retrieval increase access to self and psychological self in particular?
1b	Autobiographical retrieval and psychological selves	Replicated a key finding from Study 1a showing that retrieval of an episodic AM increases access to psychological selves.	
2	The accessibility of self and its relation to autobiographical memory across the lifespan	Self-statements are most accessible to young adults, who also show a bias for psychological statements. This bias disappears in older adults who prefer to describe self in relation to social roles. The emergence of I am's clustered around key AM milestones.	Why does the accessibility and content of self knowledge change across the lifespan?
3	Psychological selves and amnesia	The strength of SA's identity was unimpaired relative to controls, yet she was unable to generate a single psychological description of her current identity. Age of emergence data also suggested that SA was experiencing a period of identity change and a disruption to the continuity of her sense of self.	Why are psychological selves unavailable in amnesia? How does AM impairment cause a disruption in the continuity of self?
4	Self-concept, autobiographical memory and transitional lifetime periods	Self-concept was dominated by psychological traits before, during and after a transitional lifetime period. Prospective students were accurate at predicting the impact of starting University on their sense of self. AMs clustered around the period of transition and were directly related to statements that described current self.	What is the importance of making accurate predictions about future selves? Why do AMs cluster around times of self change?
5	Rediscovering the self following ABI	Access to the self was reduced following ABI and subsequent memory impairment, but there was mixed evidence for a particular deficit in accessing psychological selves. AMs were more closely associated with past self than current self.	Why was access to self reduced in this group and not in SA? What is the nature of the impairment in access to psychological selves? What is the impact of AMs that ground one's past self but not current self?

7.2.1   Chapter 2

Chapter 2 presented the novel *I Am Fluency Task* and reported on the impact of autobiographical retrieval on the accessibility and content of stored self knowledge. Study 1a showed a complex pattern of how autobiographical retrieval impacts access to the self. Non-proportional data showed a main effect, whereby participants who recalled an autobiographical memory were more likely to generate self statements (independent of type), whereas proportional data showed a particular effect on psychological and social selves. Study 1b further explored this effect of statement type and showed that participants were able to generate significantly more psychological self statements following recall of an episodic AM. This demonstrated for the first time that it is possible to use memory to 'boost' the self. In doing so, support was provided for Conway's (2005) notion of a bidirectional relationship between the self and memory, given that previous research shows that it is possible to use the self to enhance memory (i.e. the Self Reference Effect; Rogers et al., 1977). The type of self that is most accessible also changed following recall of an autobiographical memory. This manipulation increased access to psychological selves in particular (Study 1a and 1b), and thus pointed to a particular relationship between psychological selves and episodic memory. Across both studies, the self statements that participants used to describe their identity were personally significant, overwhelmingly positive and in Study 1b they clustered during late adolescence and early adulthood. Notably, the clustering of selves during this period is consistent with an identity-based account of the reminiscence bump (e.g., Rathbone et al., 2009), whereby there is heightened access to memories at times of identity formation, presumably because AM supports the generation of self concepts which can be, encoded, stored and accessed later, just like memories.

The findings from this first Chapter launched the rest of this thesis, and indeed exploring the relationship between psychological selves and episodic memory became a key theme. The results also had important implications for those with memory impairment (as previously described by Addis and Tippett, 2004) and the implications of these findings for clinical groups are discussed in Section 7.8.

7.2.2   Chapter 3

To build on initial findings, Chapter 3 described an exploration of what happens to the self as the accessibility of autobiographical memory changes across the lifespan. Self was shown to be most accessible to young adults, who were able to generate more self statements in one minute, than adolescents or older adults. Critically, this advantage remained even after taking general fluency performance into consideration. Young adulthood was also defined by a preference for describing the self in relation to psychological, trait like statements, and yet this effect disappeared in older adults who were most likely to describe themselves in relation to their social roles. Older adults also rated their self statements as being more positive and personally significant than all other age groups. To our knowledge, this is the first study of its type to show that self-concept is most positive in older adults, and it is in line with the positivity bias in ageing, which describes how older people show a preference for positive information (e.g., Carstensen, Fung & Charles, 2003; Carstensen, Isaacowitz & Charles, 1999). Also, given the strong relationship between episodic memory and psychological selves in Chapter 2, it is perhaps interesting that older adults, who tend to have poorer episodic memory performance than young controls (e.g., Craik, 1994), generated fewer psychological selves.

Overall, results support the notion of self as a dynamic construct, insofar as the content, valence and personal significance of one's most salient self statements varies according to age. Building on the theory that there is a particular relationship between psychological selves and episodic AM, a significant positive correlation was found between episodic autobiographical fluency for early adulthood and the proportion of psychological statements generated. In response, it was proposed that psychological selves are most accessible during young adulthood, as this is also the time when one's most enduring and accessible autobiographical memories are formed.

Finally, by exploring the temporal distribution of *I am* statements it was possible to plot lifetime periods that were key to identity formation. The emergence of *I am*'s clustered around periods that could be considered to be key AM milestones, such as the end of the period of childhood amnesia and during the period of the reminiscence bump. Consistent with Conway's

(2005) SMS, which maintains that both memory and the working self are driven by goals, I am's also clustered around times that could signal a change in goal status, namely the end of secondary school; however, this interpretation is offered with caution given that participants were not asked about the goal-relevance of this period.

7.2.3 Chapter 4

Chapter 4 adopted a case study approach to examine the impact of amnesia on the accessibility and content of the self. In an extension of the previous Chapters that used the *I Am Fluency Task*, this Chapter explored temporally extended aspects of the self by asking SA and neurologically intact controls to generate *I was, I am* and *I hope to be* statements. Results showed that SA had unimpaired access to *past, present* and *hoped for* self statements and this was despite ongoing episodic deficits and profound retrograde amnesia for the twelve months prior to the onset of her illness. Consistent with previous research (e.g., Klein, Loftus & Kihlstrom, 1993; Klein, Rozendahl et al., 2002; Klein et al., 2003; Rathbone et al., 2009; Rosenbaum et al., 2005) this suggested that episodic memory is not necessary in order to maintain access to the self. However, differences emerged when examining the type of self-knowledge that SA generated to describe her current identity, as she failed to generate a single psychological, trait-like description. Notably, the majority of statements generated by controls were psychological in nature. SA was also able to generate trait-like descriptions of both her past and *hoped for* self, suggesting that decrements were constrained to her current self, and that memory might play a particular role in updating psychological aspects of the conceptual self.

SA reported that significantly more of her current self statements emerged in recent years relative to controls. Similarly, she predicted that more *hoped for* selves would emerge within the next year. These results suggested that SA was experiencing changes to her identity and a disruption in the continuity of her sense of self. Research shows that the capacity to imagine future selves allows for a sense of personal continuity over time (e.g., D'Argembeau, Lardi & Van der Linden, 2012). In response, it is considered that this lack of coherence might be

explained as a response to the emergence of an identity that was never within her repertoire of possible selves (i.e. that of someone with acquired brain injury). The critical issue here is whether SA's self-related changes are associated with the fact that she has a profound episodic memory deficit – at least for a certain period – or, they are just a normal reaction to a major illness event.

7.2.4   Chapter 5

Whilst the central aims of this Chapter remained the same as those previous to it, the approach that was taken was somewhat different. This Chapter described an investigation into the relationship between the self and memory at the beginning of a lifetime period, when a new and independent self emerges - in this case, that of becoming a university student. Consistent with previous Chapters, findings showed an overwhelming bias for generating psychological selves in young adults. The prospective students also predicted that university would bring about a considerable degree of self-related change, as the *I will be* statements that they produced were more psychological, positively valenced and personally significant than their current *I am*'s. Consistent with predictions made by the SMS, participants' most personally significant identity statements (both *I am*'s and *I will be*'s) were also generated first. In other words, one's most important current and future identity statements are also the most accessible.

The second part of this study showed that the students' predictions were accurate - there was a positive linear relationship between time spent at university and the positivity and personal significance of self statements. Thus it is evident that this particular period of identity change was expected by participants, which is in stark contrast to those who experienced ABI, as an example. That is, for many life events and identity changes, there is an anticipation and expectation which possibly drives the formation of memories around key moments. In comparison, SA's sudden memory problems and inability to work was not incorporated in the same way into a 'lifescript' (see Berntsen & Rubin, 2004).

Consistent with previous research (e.g., Pillemer et al., 1986, 1988), there was an obvious clustering of memories around the beginning of this transitional lifetime period and it is argued

that this plays a crucial role in maintaining a coherent sense of self over time. To extend previous findings, this study also explored the extent to which memories from a transitional period are related to current self statements. Results showed that the vast majority of these AMs were directly related to one's current self (85.67% of those generated in Part 2 and 90.58% of those generated in Part 3). This is consistent with the SMS assumption that selves are supported by a set of relevant and accessible AMs (Conway, 2005). Memories that were most closely related to current self were also more important, more positively valenced, more vividly remembered and more frequently rehearsed.

7.2.5   Chapter 6

This final study described a continuation of the neuropsychological case study that was presented in Study 3. In particular, the approach described in Study 3 was extended to a larger and more heterogeneous sample of twenty eight people with ABI and varying degrees of autobiographical impairment. The aim was to see whether the same pattern of results from the case study would be borne out in a group study of people including those with severe memory impairment. Also, given that Study 4 demonstrated that memories cluster around periods that involve self-related change (possibly to maintain a coherent sense of self in spite of changes to one's self-concept) a central objective in Study 5 was to determine how the self might be accessed and conceptualised when memories for the point of transition are unavailable. Findings were compared with twenty eight age and gender-matched control participants who were neurologically unimpaired.

With regards to the key measure of self related fluency, those with ABI showed impairment across all temporalities; they had reduced access to past, present and *hoped for* self. Importantly, this deficit remained after taking the sample's general fluency deficit into consideration and thus suggests that ABI involves reduced access to the self (see also Azouvi & Piolino, 2015). A key question in this study was whether or not there was an episodic aspect to this self-deficit. Overall, there was little support for this prediction. Participants with ABI did generate proportionately fewer psychological statements to describe their current identity, but

this was not significant (albeit a preference for describing current self in relation to psychological selves emerged in controls, but was absent in participants with ABI). Thus results did not support findings from Study 3, whereby a deficit in episodic memory was thought to be responsible for the lack of psychological selves generated by SA. However, it is important to note that within this sample of twenty eight people with brain injury, 17.86% failed to generate any psychological statements, this is compared with 2.56% of all neurologically intact adults who have completed the *I Am Fluency Task* as part of the work presented across all experiments within this thesis. Thus it might be assumed that psychological selves are being impacted on somehow, and possible explanations are considered in Section 6.4.2.

Results also showed that those with ABI conceptualised *hoped for* self differently to controls. Controls maintained a bias for psychological descriptors, whilst the majority of *hoped for* selves generated by those with ABI related to social roles (e.g., *I hope to be* working, *I hope to be* looking after my family, *I hope to be* driving again). The temporal characteristics of *hoped for* selves was also different in ABI, as controls tended to report that hoped for selves were an existing part of their identity, whereas those with ABI did not. Of note, this finding is consistent with those from SA. In contrast, no differences were found in the way in which both groups defined their past self.

Somewhat surprisingly, ABI had no impact on the personal significance of self statements. However, there was evidence that participants felt that their sense of self had been changed following brain injury, as those with ABI judged their past self more positively than did controls. There was also evidence that those with ABI were hopeful about the self being positive again in the future. This is consistent with findings from previous research showing discrepancies between past self and current self, alongside the anticipation that past self will be re-established at some point in the future (e.g., Tyerman & Humphrey, 1984). In contrast, whilst participants with ABI were least positive about their current self, control participants were least positive about past self. It is possible that this discrepancy was an artifact of using a

negative critical incident in participants with ABI. Indeed whilst emotional valence ratings for critical incidents were not generated, controls' were presumably more positive (e.g. getting married, birth of daughter, getting PhD). To explore this future research might specify a significant negative life event in controls, examples from this sample included bereavement, illness and redundancy.

As highlighted in Chapter 5, the need to maintain coherence is likely to be particularly pertinent at times of transition, when coherence relies on the ability to recall episodes that merge past selves with new selves. However, the majority of participants (53.57%) had no memories for the traumatic event that caused their brain injury. If feelings of discontinuity do relate to a failure to update the self with relevant autobiographical memories, it was predicted that current self would be less grounded in memory in ABI participants than in controls. Indeed this was the case - participants with brain injury reported that significantly fewer memories were associated with current self than did controls. Notably, there was no group difference in the number of memories that were associated with past selves.

Finally, there was a positive relationship between *I am* fluency and episodic AM for early adulthood, such that, the more intact episodic AM was for this time period, the more accessible the current self was. This result is consistent with theories that emphasise the importance of early adulthood and episodic memory in the formation of the self (e.g., Conway, 1997; Conway & Rubin, 1993; Conway & Haque, 1999).

In sum, findings suggested that contrary to what has been reported in the literature (e.g., Cicerone, 1989; Frey, 1994; Grosswasser & Stern, 1998; Judd & Wilson, 1999; Medved & Brockmeier, 2008; Nocchi, 1998; O'Shanick & O'Shanick, 1994) self is not wholly lost following ABI, rather there are new selves that emerge and old selves that need to be rediscovered - key to this is the idea that both might need to be grounded in autobiographical memory. This study also provides support for the use of the self fluency tasks in clinical populations. Correlational analysis showed that self fluency and control fluency tasks in the ABI group were unrelated ($p > .201$ in all cases), and yet self fluency did correlate with

performance on a popular and widely used measure of the self in ABI (i.e. the Head Injury Semantic Differential Scale; Tyerman & Humphrey, 1984).

7.3 The Accessibility of Self Statements

Broadly speaking, this thesis adopted three approaches to exploring the accessibility of self statements. The first was an experimental approach that asked what happens to the accessibility of the self following autobiographical retrieval? (Studies 1a and 1b). The second approach was more naturalistic in its design, as it explored the accessibility of the self during times of developmental (Study 2) and transitional (Study 4) change. Finally, by utilising a neuropsychological approach it was possible to determine the impact of autobiographical memory impairment on the accessibility of the self (Studies 3 and 5). Taken together, it was evident that there is a robust relationship between the accessibility of these two constructs.

Study 1a showed that retrieval of a memory offers an immediate benefit in terms of access to self statements in neurologically intact individuals. This is consistent with the idea that there exists a bidirectional relationship between the self and memory, as previous research shows that the self functions to 'boost' memory (i.e. the self-reference effect; Rogers, Kuiper & Kirker, 1977), and Study 1a highlights that the reverse is also true. Participants can retrieve more information about themselves following retrieval of an autobiographical memory, thus it seems possible to use memory to 'boost' the self. This finding also implies that a chronic inability to think about oneself in the past may limit the number of self statements generated. However, the findings presented within this thesis were mixed when it came to exploring the impact of AM impairment on the accessibility of the self. Study 3 showed that AM impairment had no impact on the accessibility of self statements in general (but see Section 7.4 for consideration of the impact on the accessibility of psychological selves in particular), whereas Study 5 showed that access to the self was reduced in a larger and more heterogenous sample of people with ABI. This latter finding is also consistent with those of Azouvi and Piolino (2015).

So what might have led to these disparate findings? This thesis assumes that self statements are derived from AM, thus it is proposed that the accessibility of one's current self is reduced in the most acute phases of ABI, when the participant is likely to have reduced memory for recent times and the event that initiated changes in the self (Bryant, 2001). However, it is possible for memory performance to improve following ABI, i.e. to have intact anterograde memory alongside retrograde impairments. Indeed SA showed intact AM for recent times. Thus one explanation for the differences is that SA found it easier to rebuild the knowledge that she possessed about her current self. This could be due to a less severe AM impairment alongside (or independent from) opportunities to create memories that ground her post-ABI self. In contrast, participants from the larger ABI group were living in rehabilitation settings at the time of testing, and presumably had fewer opportunities to create memories that exemplified their unique (pre-morbid) self. Of course, this is somewhat of a tentative suggestion and explorations of the way in which the self is re-built following ABI is an avenue for future, clinically-motivated research.

This thesis showed that self statements are most accessible to adults and least accessible to those with severe ABI. Table 7.2 highlights performance on the *I Am Fluency Task* across the studies in this thesis.

Table 7.2. Table to compare the mean (SD) *I am* fluency, category fluency and age of participant groups from across the studies presented in this thesis.

Study	Participant group	Mean Age (SD)	*I am* fluency	Category fluency
1a	AM retrieval	19.13 (1.23)	9.38 (2.02)	19.79 (3.01)
1a	Control group	18.92 (0.93)	7.92 (1.91)	19.75 (3.72)
2	Y7 adolescents	11.42 (0.50)	7.00 (2.54)	14.21 (2.86)
2	Y11 adolescents	15.74 (0.56)	6.31 (1.45)	17.05 (3.41)
2	Young adults	19.65 (0.99)	10.45 (2.21)	20/70 (3.60)
2	Older adults	68.4 (5.79)	6.10 (2.04)	12.60 (3.38)
3	SA	53	15	31
3	Control participants	53.30 (1.89)	14.20 (4.13)	27.60 (7.26)
5	ABI	41.93 (14.81)	5.43 (2.39)	12.36 (3.49)
5	Control participants	41.82 (15.89)	8.72 (2.69)	24.60 (5.75)

In keeping with the theme of this thesis, one explanation for the differences in *I am* fluency that are highlighted in Table 7.2 relates to the role of AM in determining access to self statements. For instance, AM is most salient in the period of adulthood (see Conway, 1990; Conway & Rubin, 1993, for reviews) and tends to be impaired in ABI (Piolino et al., 2007). If the accessibility of self statements is dependent on AM, then *I am* fluency should be significantly related to AM fluency. In neurologically intact participants, the accessibility of self statements was related to both episodic and semantic AM fluency across all lifetime periods i.e. childhood, early adulthood and recent times (Study 2). This supports the idea that both episodic and semantic AM are drawn upon to maintain the self in healthy groups (e.g., Grilli et al., 2015). However, in the case of memory impairment, the ability to access self statements was related only to the accessibility of episodic memory from early adulthood (Study 5). This is consistent

with research that suggests that AMs from early adulthood are particularly important and self defining (e.g., Conway, 1997; Conway & Rubin, 1993; Conway & Haque, 1999) and thus are perhaps especially resilient to cognitive degradation. However, this raises questions about whether or not the *I am*'s generated by participants with memory impairment are accurate reflections of current self, as opposed to their *early adult self.* Indeed pervious research has shown that AM impairment can lead to a failure to update ones current self concept (e.g., Klein et al., 2003; McCarthy and Hodges, 1995). The accuracy of *I am* statements was not assessed in this thesis, and this is a possible limitation. However, it is proposed that assessing the statements that people currently feel connected to is meaningful regardless of whether or not they are accurate, particularly in clinical groups, for whom such information can provide a focus in rehabilitation. Future research might explore the accuracy of self statements by asking relatives to rate the *I am* statements generated by participants, but arguably, the individual is always the expert when it comes to describing a concept as personal and idiosyncratic as the self.

Whilst the accessibility of self statements was related to AM, several of the studies presented within this thesis (Studies 1a, 3 and 5) showed that self fluency was not correlated with general fluency. Moreover, across studies, it was found that participants could generate more semantic items in a minute in the control task than they can generate self-relevant information. This suggests that there might be something special about the way in which the self is stored and accessed. One question is, are self statements reconstructed at the time of retrieval or stored as a predefined set of constructs? Whilst providing a definitive answer to this question is beyond the scope of this thesis, it is possible to offer some speculation, based on what is known about fluency tasks more generally.

Typically, standard fluency tasks assess semantic fluency (asking participants to generate exemplars from categories e.g., animals, furniture, fruits) or phonemic fluency (asking participants to generate words in response to an initial letter e.g., 'F'). Performance on these tasks reliably differs, as fluency speed is superior on semantic tasks relative to phonemic tasks

(e.g., Bokat & Goldberg, 2003; Kremin & Dellotas, 1996; Riva, Nichelli, & Devoti, 2000; Spreen & Strauss, 1998). Ad hoc fluency tasks are also of relevance here, that is 'a novel category constructed spontaneously to achieve a goal relevant in the current situation' (Barsalou, 2010, p. 86). For example, *things to take on a picnic* or *things to pack for my trip to Paris*. Performance on a particular ad hoc fluency task improves over time, as the association between items is strengthened with each subsequent usage i.e. deciding what to pack for your first trip to Paris will be more effortful than deciding what to pack for your second trip, and so on (Barsalou, 2010). Similarly, access to self statements might have been superior in young adults relative to adolescents (Study 2) because adolescence is a period of identity 'crisis' and uncertainty that culminates in the emergence a stable self in young adulthood (e.g., Erikson, 1950) i.e. the associations between self statements are strengthened once a person is more certain about who they are, and repeatedly asking yourself 'who am I?' should lead to strengthening of the associations between aspects of the self, just as for other ad-hoc categories.

Given that self statements are semantically related constructs it is unlikely that the *I Am Fluency Task* initiates a search process to the extent that letter fluency tasks do (e.g., Ho, Sahakian, Robbins, Barker, Rosser & Hodges, 2002). Indeed, the generation of phonemically related words is a unique task that tends to be absent in everyday speech production (Shao, Janse, Vissser & Meyer, 2014). As such, completion requires participants to adopt novel search and retrieval strategies, whilst simultaneously suppressing the activation of words that are semantically related (e.g.,, Luo et al., 2010; Katzev et al., 2013,). Several studies in this thesis showed that participants are slower to generate self statements than items in category fluency tasks (Study 1a, 3, 6), suggesting that they are less concrete (in keeping with the differences in fluency between verbal, category and ad-hoc fluency tasks). One possibility is that we store clusters of selves (e.g., current selves, past selves, possible selves) and yet retrieval demands some degree of online processing given that the self is a dynamic construct. Indeed Conway (2005) describes the working self as changing constantly according to the constraints of autobiographical memory. Consistent with this, Studies 1a and 1b showed that there is an impact of retrieving an autobiographical memory on the accessibility and type of self statement

that is generated at any given time. The idea that the storage of the self is distinct from other types of schematic knowledge is consistent with neuroimaging investigations of the self reference effect that have shown that the self is special in that it recruits a unique neural network relative to all other-referenced memories (e.g., Kelley et al., 2002). It would be worthwhile for future research to adapt the *I Am Fluency Task* to explore whether or not the storage of self statements is unique from that of other-referenced statements. For instance, by asking participants to complete he is/she is fluency tasks in relation to significant others (e.g., a personally significant example might be *one's mother* and a publicly significant example might be *the Queen*).

Notwithstanding the possible differences between verbal fluency tasks that use letters or categories and the self fluency tasks, there are possibly a number of empirical findings from the fluency literature that may bring to bear on the discussion of the findings from this thesis. Indeed it is likely that both tasks require executive functioning in order to search for and retrieve information from an information hierarchy (Rathbone & Moulin, 2014). The relationship between AM and executive function has been illustrated well in neuropsychological groups. For instance, AM impairment in AD has been linked with executive dysfunction and in response, Greene et al. (1995) proposed that 'executive impairment may lead to a poorer search and recollection process, and hence impaired retrieval of autobiographical memories' (p. 1666). It is possible that a general executive deficit impairs the capacity to search for and retrieve self statements in participants with ABI. Consistent with this explanation, SA scored within the normal range on tests of executive function and showed no decrement in her ability to access self statements. Section 7.7 considers how executive function might be incorporated into the SMS, and Section 7.8 considers the implications of this for clinical groups.

Verbal fluency tasks involve the processes of clustering (i.e. the search and retrieval of statements from the same subcategory) and switching (i.e. the search and retrieval of different subcategories). Whilst no formal analysis was carried out in relation to these strategies, there was a tendency for clustering and switching to be observed when participants were generating

self statements. Such that, the generation of a statement tended to be followed by others from that category before participants switched to retrieving statements from another category. By way of example, a participant from Study 1a generated the following *I am*'s in the following order: sporty, chatty, confident, loud, a student, a friend, a girlfriend, a daughter, a sister, homely. The capacity for switching has been shown to correspond with performance on tasks of semantic fluency. In addition, the temporal gradient of semantic fluency (but not phonemic fluency) maps onto that found in self fluency, in that it improves from adolescence to young adulthood (e.g., Riva et al., 2000) and declines in old age (e.g., Troyer, Moscovitch & Winocur, 1997). The capacity for switching could therefore provide an alternative explanation for the differences in self fluency observed across the adolescent, young adult and older adult groups. Again, this resonates with the theory of the self being a dynamic construct – to some extent, fluent performance on the *I am* task used here requires that the participant can shift between different clusters of self statements.

In sum, the experiments in this thesis have shown that it is possible to measure aspects of the self by using fluency tasks, and the results found seem to agree with theories about the retrieval of self from AM. The extent to which these self fluency tasks recruit the same neuronal regions as for generating information about other people or other categories, is an interesting question for future research. Likewise, the similarities and differences between clustering and switching across *I am* fluency tasks and other tasks would be of interest for future research.

7.4   The Content of Self Knowledge

One of the key findings in this thesis is that the self is a dynamic construct, insofar as the content of the self changes following retrieval from autobiographical memory (Study 1a and 1b), across the lifespan (Study 2), during transitional periods (Study 4) and in response to neurological impairment (Study 3 and 5). An important question thus relates to the role that AM plays in maintaining the self despite such changes. Traditionally, it was assumed that episodic AM plays a key role in maintaining the self, but more recently, research has

highlighted that episodic memory might not be necessary, and instead that semantic memory plays a more crucial role in supporting self statements. This has now been demonstrated in both neurologically intact (Grilli et al., 2015) and neurologically impaired groups (e.g., Klein, 2010; Klein & Gangi, 2010; Klein & Lax, 2010; Rathbone et al., 2009). However, in the context of conceptualising the self as a multifaceted structure, this thesis proposed that it might be necessary to adopt a more nuanced approach to exploring the role of AM in maintaining access to self statements. Indeed in reviewing the neuropsychological case studies that claim that the self is maintained in episodic impairment it seemed that more often than not, something had changed about the self compared to neurologically intact controls. For instance, in the case of PJM, the authors conclude that she has 'a coherent, continuous sense of self, despite having lost episodic memories for an 18-month period' (Rathbone et al., 2009, p. 405). Of course, PJM looks to have maintained a sense of self in that her *I am* statements cluster around important moments, but really is her self as complex, as accessible, or as strong as a controls? It could be argued not - she could only produce 12 self statements in the Twenty Statements Test (,TST Kuhn and McPartland, 1954), for instance. More specifically, PJM experienced retrograde episodic memory loss following a TBI sustained in a bicycling accident. The authors describe how she was able to generate some self statements when tested 4-14 months post-injury and how she was able to generate semantic autobiographical memories to support these. PJM's failure to generate 20 statements on the TST could be interpreted as reflecting an impoverished sense of self in the context of episodic memory loss. Indeed previous research has offered this interpretation when demonstrating that people with memory impairment in the context of Alzheimer's disease generate fewer statements than do controls (Addis & Tippett, 2004).

To explore the possibility that AM impairment led to a more subtle self-deficit, the associations between memory and distinct types of self (physical, social and psychological) were considered. In adopting this approach, Studies 1-4 highlighted a particular relationship between episodic memory and psychological, trait-like descriptions of the self (e.g., *I am* hardworking, *I am* kind, *I am* generous). Chapter 2 described experimental manipulations (Study 1a and 1b), in which retrieval from AM increased access to psychological selves (but not physical

characteristics or social roles). Following this, a neuropsychological case study showed that the reverse relationship might also exist, as psychological *I am*'s were inaccessible in a case of memory impairment that was primarily episodic in nature (Study 3). Psychological selves also dominated descriptions of the self in young adulthood (Study 1a, 2 and 4), during the period when ones most accessible and enduring AMs are formed (i.e. the reminiscence bump period, see Conway, 1990; Conway & Rubin, 1993, for reviews), and yet this was not the case in adolescence or old age (Study 2). A recent study by Grilli et al. (2015) also implied that episodic and semantic AM may play differential roles in supporting self knowledge. These authors found that trait-like descriptions were less salient in people with memory impairment, and were supported by fewer semantic AMs than statements that described social roles.

On an intuitive level, it seems plausible to assume that psychological selves are most closely associated with episodic exemplars. Perhaps even to consider that (as in AM) there exists an episodic self and a semantic self that are distinct from one another. We might imagine the episodic self to be subjective in nature and more closely associated with autonoetic consciousness i.e. the experience of *me in the past*, whereas a semantic self might be conceived of selves that are objectively verifiable (e.g., social roles and physical characteristics), and extracted from episodic exemplars. It may be the case that, as has been shown with knowledge, semantic self statements are encoded initially as a response to a particular event or occurrence, but that over time, the trait, quality or disposition becomes a more enduring and context-free aspect of personality. In this case, it would presumably be more difficult for people to generate episodic memories to support social or physical selves than psychological selves, and more difficult to generate semantic knowledge to support psychological selves than social or physical selves.

The idea that self statements are extracted from episodic memory and stored within a semantic system is not new (see Section 1.4.4), but the idea that not all self statements undergo this process is. To explore this, future research might ask people to generate self statements for each of the three categories and then memories that exemplify those selves. By examining the content of such memories it would be possible to determine whether they were episodic or

semantic in nature. An alternative approach would be to adopt a memory model, such as the Remember/Know Paradigm (Tulving, 1985), to determine the phenomenology associated with different statement types. In other words, by asking people to provide remember/know judgements for each of their self statements it would be possible to determine the nature of the memories that ground the self. In this instance, an R response would be given for selves that conjure up memories with associated temporal and spatial information (i.e. when it happened, what time it happened and where it happened), thoughts, perceptions and emotions. Whereas K judgements would be assigned to selves that are not associated with the retrieval of such contextual information. By way of example, consider the statement *I am a sister*. It is possible for me to recall countless memories of happy times spent with my sister, and yet I wouldn't say that it is on the basis of this information that I possess the knowledge of myself as a sister, rather the knowledge of myself as a sister feels factual in its origins, in which case a K response would be appropriate here. In exploring phenomenology a little more, it would be possible to look at the idea of 'privileged access' whereby only the individual has access to certain self-related information. Kuhn and McPartland's original coding scheme for the *I am* statements (outlined briefly in Chapter 1) split the statements into consensual and non-consensual. Non consensual statements, such as *I am generous*, may be based on an individuals unique access to their own emotions, feelings and memories which might be more akin to how we really see ourselves (analogous to R in memory retrieval terms).   On the other hand, consensual information might be more conceptually based, and with interpersonally shared representations, such as *I am female*.   This is presumably not something that requires much internal representation of the self, and a description that the person themselves, or another person could equally generate.

Despite the findings reported in Chapters 2-5, Chapter 6 sparked some doubt with regards to the relationship between psychological selves and episodic AM, as there was no difference between the proportion of psychological selves generated by participants with ABI vs. controls (although there was a numerical trend towards participants with ABI generating fewer psychological *I am* statements than controls). Thus it might have been premature to suggest a

particular association between the two, especially since SA also presented with some semantic deficits for the time of her illness (but not recent times). However, the sample of people with ABI were heterogeneous, in terms of length of time since injury, severity of injury, severity of subsequent impairments, age and region of neurological impairment. Whilst this was beneficial in terms of determining the usefulness of the *I Am Fluency Task* in exploring the self in ABI in general, it makes the interpretation of findings somewhat difficult. Thus it is proposed that there is a need to explore the accessibility of psychological selves in a more homogenous group of people with AM impairment. To shed light on the relative contribution of episodic and semantic AM it would also be of interest to explore what happens to the accessibility of self statements in a purely semantic case.

7.5   Memory and the Maintenance of a Coherent Self

The capacity to maintain a coherent sense of self over time is considered to be crucial in terms of psychological well-being (Conway, 2005). It is also (presumably) a fairly difficult task, given that a person changes considerably during the course of a lifetime. This capacity to maintain coherence in spite of change has been suggested to be one of the fundamental roles of AM, and this thesis provided a number of lines of support for this assumption.

First of all, Study 4 replicated previous studies by showing that memories cluster around the beginning of transitional lifetime periods (e.g., McAdams, 1993; Pillemer, Goldsmith, Panter & White, 1988; Steiner, Pillemer, Thomsen & Minigan, 2014; Thomsen & Berntsen, 2008; Thomsen, Pillemer & Ivcevic, 2011). In response, it was argued that the need to maintain coherence is likely to be particularly pertinent during times of change, when the memories that are encoded ground both ongoing selves and new selves, and synthesise the two. In support of this, Study 4 and 5 used a novel approach to show that one's most accessible memories are closely associated with current self statements in neurologically intact adults. To take a different approach, Study 5 examined the impact of a transitional period that is frequently accompanied by the onset of amnesia, that is, ABI. This study showed that current self is less grounded in memory in ABI than in controls, and it is proposed that this might go some way in

explaining the idea that the self is 'lost' following brain injury (e.g., Cicerone, 1989; Frey, 1994; Grosswasser & Stern, 1998; Judd & Wilson, 1999; Medved & Brockmeier, 2008; O'Shanick & O'Shanick, 1994).

The role of AM in maintaining a coherent sense of self over time is now well established (e.g., Blagov & Singer, 2004; Lardi, D'Argembeau, Chanal, Ghisletta, & Van der Linden, 2010; Singer & Moffitt, 1991, 1992; Sutin & Robins, 2005; Thorne, McLean, & Lawrence, 2004). More recently, research has also paid attention to the importance of episodic future thinking, that is 'a projection of the self into the future to pre-experience an event' (Atance & O'Neill, 2001, p. 533). Such research has shown that both re-experiencing and pre-experiencing recruit a similar neural network (Addis, Wong, & Schacter, 2007; Okuda et al., 2003; Szpunar, Watson, & McDermott, 2007), that people perceive future events to be more fundamental to maintaining identity than recalling the past (Bernsten & Bohn, 2010) and that 'self defining future projections give rise to a strong sense of personal continuity' (D'Argembeau et al., 2012, p. 110). Study 4 of this thesis supported the idea that the capacity to envisage possible selves might be important in maintaining coherence. In particular, prospective students were accurate at predicting the impact that university would have on their identity, as they anticipated that university would lead to an increase in both the emotional valence and personal significance of self statements. In contrast, Studies 3 and 5 showed that coherence was interrupted in the context of an unexpected transition (i.e. ABI), and it was proposed that this might be a response to a person forming an identity that was never stored as a 'possible self'. Of course, it could be the case that the accuracy of prospective students' predictions was an artefact of this being a positive life transition. Indeed it has been suggested that people generally anticipate a positive future self in order to remain positive about self in the present moment (e.g., D'Argembeau et al., 2012; Sedikides & Gregg, 2008; Taylor & Brown, 1988). Macleod and Conway (2007) demonstrated that the capacity to think about the self in the future has a positive impact on well-being. They also showed that this capacity was reduced in people who are parasuicidal relative to non-suicidal controls. Similarly, Quoidbach, Hansenne and Mottet (2008) showed that negative future projections are associated with higher levels of neuroticism. Thus the

avoidance of imagining negatively valenced future selves (e.g., *I will be* a person with ABI) is likely to serve a self-protective function, but possibly at a cost to personal continuity in instances where negative and unexpected life transitions take place. Taken together, findings suggest that it would be useful for future research to compare the impact of expected and unexpected selves on the experience of self-coherence over time.

7.6   The Self Memory System

The idea that memory functions to maintain the coherence of self over time is a key aspect of the SMS. Conway (2005) describes how 'coherence is a strong force in human memory that acts at encoding, post-encoding remembering, and re-encoding, to shape both the accessibility of memories and the accessibility of their content' (p. 595). The idea that the accessibility of memory varies according to the salience of the self was supported by Study 4, which showed that memories cluster around the time a new identity is formed. This is also consistent with an identity-based account of the reminiscence bump i.e. memories from late adolescence and early adulthood are most accessible because this time is key in terms of identity formation (e.g., Erikson, 1950; Conway & Haque, 1999). Research also shows that it is possible for reminiscence bumps to emerge outside of this period, in instances where other time periods are particularly identity defining. For example, Conway and Haque (1999) found a reminiscence bump between the ages of 35 and 55 in a sample of Bangladeshi people – this bump corresponded to a time of national conflict in Bangladesh and as such a period that was cluttered with highly self-relevant experiences. Study 2 explored the emergence of selves across the lifespan and hypothesised that - if the self account of the reminiscence bump is accurate - the temporal distribution of selves should replicate the pattern of the lifespan retrieval curve. Indeed selves emerged following the period of childhood amnesia and clustered between the ages of 10 and 30. Notably, a second bump was also visible in the older adult sample, who reported numerous selves emerging between the ages of 56 and 60. This finding suggests that smaller reminiscence bumps that emerge around this time might be explained by

the formation of new selves that correspond with the themes of retirement, ageing and becoming a grandparent.

Prior to the body of work presented in this thesis, research had demonstrated that the most salient aspects of the self are supported by a set of relevant autobiographical memories which are preferentially active (Rathbone & Moulin, 2015). In support of Conway's (2005) ideas about the bidirectionality of the relationship between the self and memory, Study 1a showed that the reverse of this relationship is also true - participants can retrieve more information about themselves following retrieval of an autobiographical memory. Thus in a similar way, it is suggested that the retrieval of an autobiographical memory activates a set of relevant self concepts, to which that memory is intimately linked. To explore this in more detail, it would be valuable for future research to examine whether or not there is an overlap in the content of self statements and the content of the autobiographical memory that was retrieved.

Section 7.3 described how self statements are likely to be retrieved as part of an online process. In particular, such a process might involve information about the self in the present moment being compared with autobiographical information about the self in the past. Thus there might be a role for executive function in controlling what participants report in response to the *I Am Fluency Task*. Indeed Baumeister (1998) claims that executive function is one of three fundamental origins of selfhood (the others being reflexive consciousness and interpersonal aspects of the self). Figure 7.1. highlights how executive function might be incorporated within the SMS.
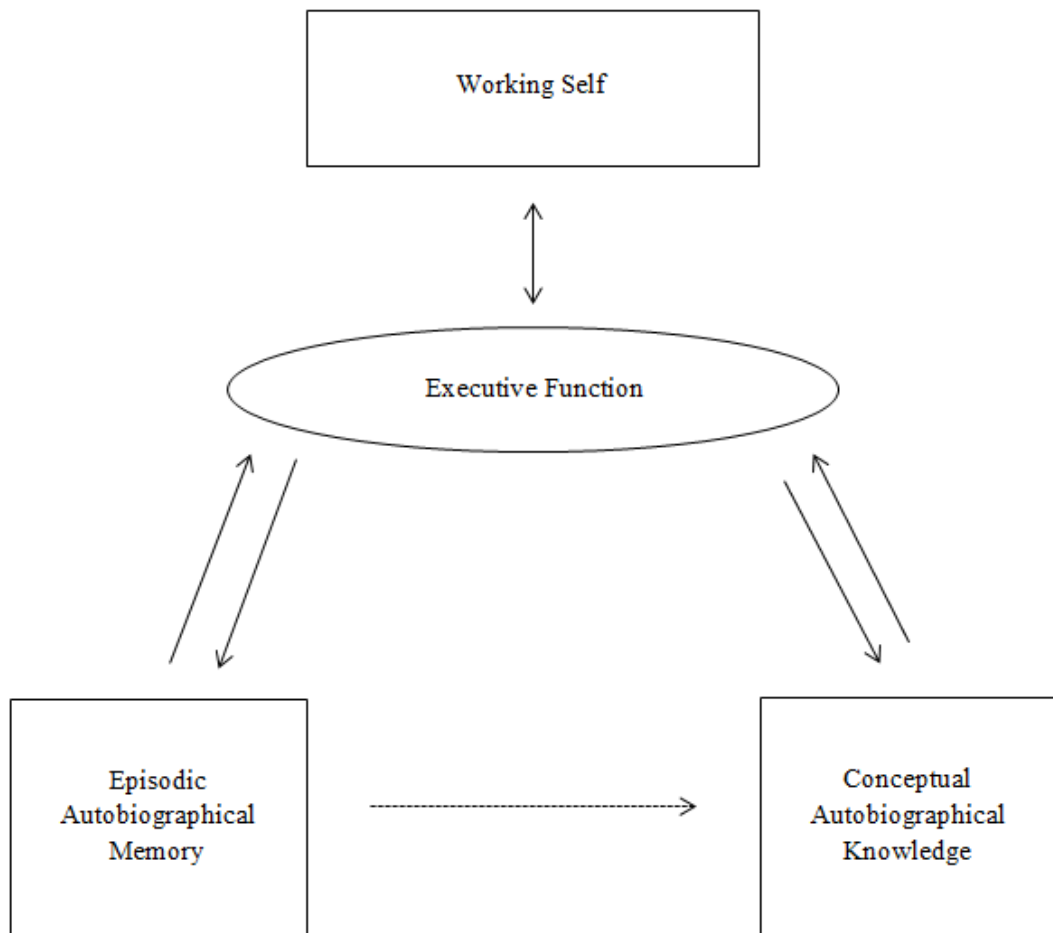
Figure 7.1. A simplified and updated diagram of the SMS, adapted from Rathbone et al. (2009)

Essentially, executive functioning could be responsible for the dynamic nature of the self, in such a way that it determines the *I am*'s that are generated at any given time (see Section 7.7 for a consideration of the clinical implications of this suggestion). Indeed previous research shows how a female in a room filled with males is substantially more likely to reference gender in self-description tasks (McGuire & Padawer-Singer, 1976), and future research might explore how priming different aspects of the self e.g., the physical self affects the self statements generated.

7.7 Clinical Implications

"A disease is never a mere loss or excess …there is always a reaction, on the part of the affected organism or individual, to restore, to replace or to compensate for and to preserve its identity, however strange the means may be"

Oliver Sacks (1985)

One of the key aims of this thesis was to explore the usefulness of the *I Am Fluency Task* as a measure of the accessibility and organisation of self statements - key to this was the idea that it might prove to be useful in exploring the self in clinical groups. This final section considers the clinical implications that emerged from the studies that used the *I Am Fluency Task*.

Study 1a showed that the retrieval of a memory offers an immediate benefit in terms of access to the self in neurologically intact individuals, thus implying that a chronic inability to think about oneself in the past may limit the number of self statements generated. The studies that followed sought to examine this issue, but findings were mixed. Study 5 supported the prediction, as self statements were less accessible in a sample of people with AM impairment. However, this was not the case in Study 3, which showed that self-related fluency was unimpaired in a person with profound retrograde amnesia for a 12-month period. These disparate findings are reflective of the wider literature that looks at the self in autobiographical impairment. For instance, access to self statements has been shown to be reduced in ABI (Azouvi & Piolino, 2015) and Alzheimer's disease, (Addis & Tippett, 2004), and yet there is a growing body of literature to suggest that sense of self is maintained in spite of considerable memory deficits (e.g., Klein, 2010; Klein & Gangi, 2010; Klein & Lax, 2010; Rathbone, Moulin & Conway, 2009; Rosenbaum, 2003). One way of unifying such disparate findings is to conclude that the self is not wholly lost following AM impairment, but neither is it unaffected. Study 3 (and to some extent Study 5) suggested that it might be necessary to adopt a more nuanced approach to examining the self deficit, as reduced access to psychological selves was found to accompany AM impairment. Indeed it is possible that psychological selves are most vulnerable in cases of memory impairment. Perhaps it is this aspect of the self that is 'lost'

following ABI (e.g., Nochi, 1998), and thus this aspect of the self that should be the focus of re-discovery in rehabilitation. By providing people with opportunities to engage in meaningful and personally relevant activities it might be possible to strengthen psychological aspects of self of self. For instance going clothes shopping, having access to library books and spending time around animals are activities that would reinforce beliefs about myself as someone who is inquisitive, hardworking, self-critical and caring.

AM impairment also tends to signal a time of change and as such there are new selves that emerge and old selves to be rediscovered. Key to this is the idea that both need to be grounded in autobiographical memory in order to maintain coherence and subsequent well-being (Conway, 2005). It is this process that is perhaps most likely to be impaired in cases of AM deficits. Indeed Studies 4 and 5 showed that current self concept is closely associated with AM in neurologically intact adults, but Study 5 also showed that this was not the case in AM impairment - current self was less grounded in memory than past self following ABI. Related to this is the idea that memory impairment may lead to failures to update the self. For example, Klein et al. (2003) described a patient with advanced AD who was unable to update her trait self-knowledge in the face of profound anterograde and retrograde memory deficits. Similarly, McCarthy and Hodges (1995) described the case of PS, who was perpetually stuck in the past following a bilateral thalamic stroke that left him densely amnesic. Indeed it is possible that the participants with ABI who were described in Study 5 were generating selves that were outdated, and perhaps this explains why they were able to access psychological selves despite episodic AM impairment. In support of the idea that the self was rooted in the past in these participants, results showed that *I am* fluency was correlated with the intactness of episodic memory for early adult times.

Within the body of work that was carried out as part of this thesis, the usefulness of the *I Am Fluency Task* in exploring the self in dementia was considered. However, findings have not been reported, as these participants most often presented with severe dementia, thus impairments in language and comprehension made research with the *I Am Fluency Task* difficult. Nonetheless, an interesting pattern of findings emerged from the handful of data (*n* =

13) that was collected. Consistent with the ideas described above, preliminary results with this population suggest that a sense of self may be maintained in dementia, but that this self might be outdated, given that it is based on memories that have remained salient despite loss of AM for recent times - namely the period of young adulthood. In this study, two tasks were used to gather information on self statements - the *I Am Fluency Task* and the *Me/Not Me Task*. The *Me/Not Me Task* is a novel task that presents participants with 30 self statements (e.g., retired, a grandparent, loving, active; see Appendix 6 and 7 for example task sheets). Participants are required to respond by stating '*Me*' if the statement describes them, and '*Not Me*' if it does not. It was evident that knowledge of self statements had not been updated in some of the most severe cases of dementia. For example, some participants reported that they were not retired (yet all were living in residential settings), others stated that they were not a grandparent, yet they knew themselves to be a parent. A similar pattern emerged on the *I Am Fluency Task*, as despite the fact that self statements were not checked for accuracy, it was evident that some were outdated (e.g., *I am a nurse*, *I am a housewife*, *I am looking for a place to retire*). Notably, participants with dementia were also able to generate psychological, trait-like descriptions of the self. In line with Figure 7.2, it is suggested that deficits in executive function might disrupt the capacity to compare current selves with past selves and thus produce an up to date conceptualisation of the working self.

In sum, there are a number of important clinical implications that materialised from the findings reported in this thesis. Namely that memory impairment does impact on the self in important ways and that the *I Am Fluency Task* provides one meaningful way of measuring this. Indeed a primary aim of this thesis was to determine whether or not the accessibility of the self could be measured with a fluency task. The fact that *I am* fluency correlates with measures of the self that are frequently used in clinical groups (i.e. the Head Injury Semantic Differential Scale), and yet does not correlate with fluency more generally, suggests that this novel task is appropriate for use in clinical groups, and even those who present with fluency deficits. Notably, the self fluency tasks have the additional benefits of being less time consuming than the HISDS, and yet are able to capture the subjective and idiosyncratic nature of self

statements. Indeed it is argued that this is crucial in ensuring that approaches to therapy and rehabilitation are unique to each individual.

7.8   Conclusion

This thesis presents a series of studies that were designed to examine the accessibility and organisation of self statements in autobiographical memory. Key to the exploration of this relationship was the novel The *I Am Fluency Task*, which reliably demonstrated that the accessibility of the self is tied with AM. The idea that memory impairment leads to difficulties in accessing self statements is a contentious issue, but in this thesis it is argued that AM plays a key role in providing access to self statements that are coherent, up-to-date and psychological in nature. Otherwise, as with previous studies it has been demonstrated that even in the face of serious episodic and autobiographical memory difficulties, some access to self statements persist. This suggests that the self is a complex dynamic structure which draws upon both autobiographical memory and personal semantics, and may be updated and maintained by a complex co-ordination of information from multiple memory systems. For future research one might continue to use parallel research methods from memory research to investigate the availability and accessibility of self statements as viewed from episodic and semantic viewpoints, or indeed as perhaps an executive-like structure, as implied in Conway's concept of the 'working self'.

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APPENDICES

APPENDIX 1: AN ADAPTED VERSION OF THE TRANSITIONAL IMPACT SCALE (SVOB ET AL., 2014) - STUDY 2

This task asks you about the impact that you think going to university will have on **YOU**. Please respond by circling how much you agree with each of the statements below: **1 = completely disagree and 5 = completely agree.**

Going to university will change the places where I hang out

        1   2   3   4   5

Going to university will change the things I own

        1   2   3   4   5

Going to university will change my material circumstances.

        1   2   3   4   5

Going to university will change the activities I engage in

        1   2   3   4   5

Going to university will change the people I spend time with

        1   2   3   4   5

Going to university will change where I live

        1   2   3   4   5

Going to university will change my attitudes

        1   2   3   4   5

Going to university will change the way I think about things

        1   2   3   4   5

Going to university will impact my emotional responses

          1   2   3   4   5

Going to university will change my sense of self

          1   2   3   4   5

Going to university will impact me psychologically

          1   2   3   4   5

Going to university will influence my understanding of right and wrong

          1   2   3   4   5

APPENDIX 2: IDENTITY ITEMS FROM THE TENNESSEE SELF CONCEPT SCALE (FITTS, 1965) - STUDY 2

This task asks you to rate 30 statements for self-descriptiveness, that is, how well each statement describes **YOU**. Please do this by circling the appropriate number below each statement: 1 = always false, 2 = mostly false, 3 = partly false and partly true, 4 = mostly true, 5 = always true.

I have a healthy body

| | 1 | 2 | 3 | 4 | 5 |

I like to appear neat and attractive

| | 1 | 2 | 3 | 4 | 5 |

I am an attractive person

| | 1 | 2 | 3 | 4 | 5 |

I am full of pain and suffering

| | 1 | 2 | 3 | 4 | 5 |

I am an untidy person

| | 1 | 2 | 3 | 4 | 5 |

I am not a healthy person

| | 1 | 2 | 3 | 4 | 5 |

I am a well-mannered person

| | 1 | 2 | 3 | 4 | 5 |

I am a pious person

   1   2   3   4   5

I am an honest person

   1   2   3   4   5

I don't have a good moral

   1   2   3   4   5

I am a bad person

   1   2   3   4   5

I am a weak-willed person

   1   2   3   4   5

I am a cheerful person

   1   2   3   4   5

I have a high self-control

   1   2   3   4   5

I am a calm person and easy to befriend

   1   2   3   4   5

I am hated

   1   2   3   4   5

I am not important

   1   2   3   4   5

I can no longer think straight

       1   2   3   4   5

I have a family that are always ready to help when I am in trouble

       1   2   3   4   5

I am important to my family and my friends

       1   2   3   4   5

I am from a happy family

       1   2   3   4   5

I am not loved by my family

       1   2   3   4   5

My friends are not confident in me

       1   2   3   4   5

I think my family do not put their trust in me

       1   2   3   4   5

I am a friendly person

       1   2   3   4   5

I am more popular among females

       1   2   3   4   5

I am more popular among males

       1   2   3   4   5

I feel angry towards everybody

        1   2   3   4   5

I am not interested in what others are doing

        1   2   3   4   5

I find it difficult to develop closeness with others

        1   2   3   4   5

END

APPENDIX 3: INFORMATION SHEET – STUDY 5

Identity and Memory in Acquired Brain Injury

TAKING PART IN RESEARCH

You are being invited to take part in some research about identity and memory. Please read this if you are interested in taking part.

What is the research about?

We would like to understand more about how brain injury might affect a person's identity and/or memory. We know that for some people identity is changed a lot by brain injury and we would like to know why this happens and how we might help to make this better.

What will happen if I take part?

If you take part Lara will ask you some questions. These questions will help us to learn more about your identity and your memory. Some of the tasks will ask you to give short statements about yourself. Other tasks will ask you to think of some memories from your past. All of the answers that you give will be anonymous and will be kept confidential. We will not tell anyone that you have taken part and we will not use your name in any reports we write.

Deciding whether to take part

You do not have to take part in this research. But if you decide that you would like to, Lara will talk you through each part of the study and will be with you to answer any questions you have. If you do decide to take part you can stop at any time and you don't have to give a reason for this. If you change your mind halfway through and would like your answers to be deleted this will be done. Taking part in this research will have no impact on the clinical treatment you receive.

How will the research be used?

We hope that the results of this study will be useful in helping people with brain injury in the future and so our findings might be shared at conferences or in journals.

What happens next?

If you would like to take part, you will be asked to sign a consent form.

Thank you for taking the time to read this information sheet

This research is being conducted by the School of Psychology, University of Leeds. It has been approved by the University of Leeds Ethics Committee (ref number: **14-0005)** and the Disabilities Trust Ethics Committee. For more information please contact Lara Charlesworth on 0113 343 2275 **ps08l2c@leeds.ac.uk**

APPENDIX 4: CUE SHEET – STUDY 5

I see the memory through my own eyes	I see myself in the memory
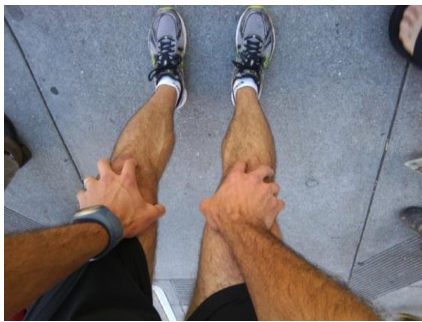
APPENDIX 5: THE AUTOBIOGRAPHICAL MEMORY INTERVIEW

Personal semantics		
Time period	Item	Example questions
Childhood	Before school	Home address, names of friends
	First school	Name, where, age at starting, own address, names of teachers, friends?
	Secondary school	Name, where, level of exams passed, own address, names of teachers, friends?
Early adulthood	First job or college/university	Name of firm/college, qualifications, own address, names of boss/colleagues?
	Wedding (own or others)	Whose? Where? When? Address before/after, names of best man, bridesmaids?
	Children (own/nieces and nephews/close friends)	Names of two children, when and where born?
Recent information	Hospital or place of work (controls)	Current - name and place, when first came, names of staff/clients/patients, current address? When and where last in hospital, where living then?
	Christmas and visits	Where last Christmas spent? Who with? Names of other visitors or relatives seen in last year?
	Holiday or other journey	Where? When? Who with?

Autobiographical incidents		
Time period	Item	Example questions
Childhood	Before school	First memory? Involving brother or sister?
	First school	Involving teacher? Involving friend?
	Secondary school	Involving teacher? Involving friend?
Early adulthood	First job or college/university	First day at job/college? Episode with friend?
	Wedding (own or others)	The guests? At reception?
	Meeting someone during 20s	E.g., in an interview? On holiday or at work?
Recent event	Relative or visitor in the last year	Visit by or to a relative? News about relative?
	Event in the hospital or at work (controls)	Involving staff/colleagues?
	Holiday or other journey	Places visited? Person met?

APPENDIX 6: ME/NOT ME TASK SHEETS (FEMALE VERSION)

Tall	Me	Not me	Sometimes me
Grandmother	Me	Not me	Sometimes me
Happy	Me	Not me	Sometimes me
Unfit	Me	Not me	Sometimes me
Loving	Me	Not me	Sometimes me
Short-sighted	Me	Not me	Sometimes me
Aunt	Me	Not me	Sometimes me
Married	Me	Not me	Sometimes me
Clever	Me	Not me	Sometimes me
Kind	Me	Not me	Sometimes me
Woman	Me	Not me	Sometimes me
Athletic	Me	Not me	Sometimes me
Short-haired	Me	Not me	Sometimes me
Good-listener	Me	Not me	Sometimes me
Overweight	Me	Not me	Sometimes me

Carer	Me	Not me	Sometimes me
Friend	Me	Not me	Sometimes me
Quiet	Me	Not me	Sometimes me
Strong	Me	Not me	Sometimes me
Driver	Me	Not me	Sometimes me
Hard-working	Me	Not me	Sometimes me
Sister	Me	Not me	Sometimes me
Grey-haired	Me	Not me	Sometimes me
Creative	Me	Not me	Sometimes me
Mother	Me	Not me	Sometimes me
Loyal	Me	Not me	Sometimes me
Reader	Me	Not me	Sometimes me
Short	Me	Not me	Sometimes me
Honest	Me	Not me	Sometimes me
Retired	Me	Not me	Sometimes me

APPENDIX 7: ME/NOT ME TASK SHEETS (MALE VERSION)

Tall	Me	Not me	Sometimes me
Grandfather	Me	Not me	Sometimes me
Happy	Me	Not me	Sometimes me
Unfit	Me	Not me	Sometimes me
Loving	Me	Not me	Sometimes me
Short-sighted	Me	Not me	Sometimes me
Uncle	Me	Not me	Sometimes me
Married	Me	Not me	Sometimes me
Clever	Me	Not me	Sometimes me
Kind	Me	Not me	Sometimes me
Man	Me	Not me	Sometimes me
Athletic	Me	Not me	Sometimes me
Short-haired	Me	Not me	Sometimes me
Good-listener	Me	Not me	Sometimes me
Overweight	Me	Not me	Sometimes me

Carer	Me	Not me	Sometimes me
Friend	Me	Not me	Sometimes me
Quiet	Me	Not me	Sometimes me
Strong	Me	Not me	Sometimes me
Driver	Me	Not me	Sometimes me
Hard-working	Me	Not me	Sometimes me
Brother	Me	Not me	Sometimes me
Grey-haired	Me	Not me	Sometimes me
Creative	Me	Not me	Sometimes me
Father	Me	Not me	Sometimes me
Loyal	Me	Not me	Sometimes me
Reader	Me	Not me	Sometimes me
Short	Me	Not me	Sometimes me
Honest	Me	Not me	Sometimes me
Retired	Me	Not me	Sometimes me