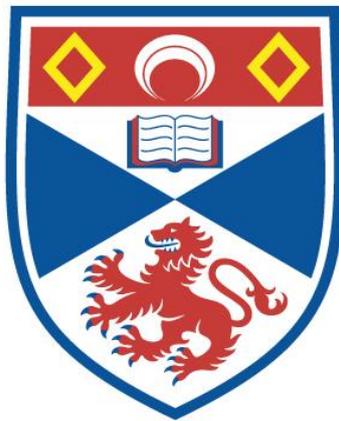


**WE ARE WHAT WE REMEMBER: AN EXAMINATION OF
AUTOBIOGRAPHICAL MEMORY ACROSS THE LIFESPAN
AND THE IMPACT OF ALZHEIMER'S DISEASE**

Celeste Shin-Ru Lonson

**A Thesis Submitted for the Degree of PhD
at the
University of St Andrews**



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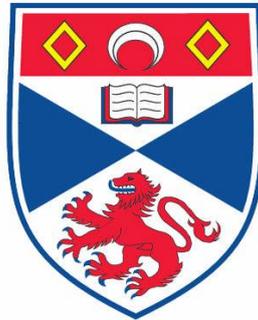
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We are what we remember:

An examination of autobiographical memory across the lifespan and the impact of
Alzheimer's Disease

Celeste Shin-Ru Lonson



This thesis is submitted in partial fulfilment for the degree of PhD
at the
University of St Andrews

22 March, 2014

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Abstract

“If you could somehow reprogram a person’s brain and change a significant memory in someone’s life, would that individual become someone else entirely?” According to McAdams (1985), a loss of autobiographical memory (AM) can be seen as a loss of identity, as identity is based on our personal experiences. As it is not currently possible to target and then alter specific memories within an individual brain, the AM of a healthy older group were compared to a group with Alzheimer’s disease (AD). The main question of this thesis was, “does a loss in AM result in a loss of identity?” This thesis explores AM across the life course through a series of four experiments with young and older adults, including a group with AD. Results support the critical role of the working-self in determining the self-relevance of AM across the lifespan.

Chapter 1. Introduction

This thesis explores memorability across the life course through a series of experiments with young and older adults, including a group with Alzheimer's disease. The overarching question is "does a loss in autobiographical memory (AM) result in a loss of identity?"

Chapters 2-4 provide a general background of current research in autobiographical remembering among the healthy older population. Chapter 2 contains an examination of the main theoretical accounts proposed to explain the encoding of autobiographical memories and the factors that lead to some events being more memorable than others. It begins with describing the emergence and development of self then distinguishes between the constructs of self and identity. This is followed with a description of the cultural life script, functions and various categories of AM, and the reminiscence bump (Rubin, Rahhal, & Poon, 1989). Finally, chapter two concludes with a discussion of various methods used in assessment of AM.

Chapter three examines the role of goals in determining the accessibility of AM. Key theories covered in this chapter are: lifespan development theory (Erickson, Paul, Heider, & Gardner, 1959), socioemotional selectivity theory (Carstensen, 1993; Carstensen, Isaacowitz, & Charles, 1999), and the self-memory system (Conway & Pleydell-Pearce, 2000). Chapter four discusses one of the products of goal processing in AM, self-defining memories. Chapter five defines Alzheimer's disease and examines the current evidence regarding the effects of this illness of retrieving AM.

Chapters six and seven outline the experimental design and participants used within the four studies of this thesis.

Chapters 8-10 cover four experiments. The first three establish healthy remembering in older adults. This includes a detailed look at the reminiscence bump (Rubin, et al, 1989), self-defining memories, and the role of goals in determining self-relevance and accessibility to AM. The final study compares healthy AM from older adults to a group of older adults with Alzheimer's disease in order to answer the question, "Does the loss of AM result in a loss of identity?"

Chapter 2. Autobiographical Memory

Memory is not a unitary function of the mind, but rather is a set of distinct and integrated systems (Squire, 2004). The general distinctions of these individual systems and how they function are reasonably well agreed upon; however, some details continue to be debated. At the broadest level, memory can be separated into two major systems, *nondeclarative* and *declarative* memory (Squire, 2004).

Nondeclarative memory includes several systems that help us operate with little to no conscious awareness. This encompasses knowledge of skills and actions that are well-practiced, known as procedural knowledge, as well as knowledge acquired through classical conditioning (Squire, 2004). Examples of nondeclarative memory include the ability to play a well-practiced piece on the piano or type documents on the keyboard with little to no conscious effort.

In contrast, *declarative memory* is explicit and conscious; it includes representations of experienced events (Squire, 2004; Tulving, 1972). In 1972, Tulving separated declarative memory into two systems, *semantic* and *episodic* (Tulving, 1972). Information not related to personal experiences was labelled *semantic*. For example, most people are aware that the Great Wall is in China and the Sphinx in Egypt, even though the exact time and place when this information was acquired is unknown. All memories that are personally experienced were categorized as *episodic* memories. Remembering that you ate pizza while watching a movie on television last night is an example of an episodic memory.

All animals share this ability to remember the what, when, and where of

specific events. Like humans, animals can use specific occurrences in the past to guide current and future behaviour (Clayton, Bussey, & Dickenson, 2003; Hampton, 2009). What separates humans from other animals is two-fold. First, humans are able to move from “that happened” to “that happened to *me*” (Fivush, 2011; Tulving, 1985) We humans have a subjective sense of ourselves experiencing an event. Second, humans are able to use mental time travel to link thoughts and feelings about an event in the past to current thoughts and feelings about that same event (Habermas & Bluck, 2000; Tulving, 1985). This unique ability to understand oneself as an experiencer of events and to link personal experiences of events across time in a meaningful sequence is *autonoetic consciousness*, and it is the root of *autobiographical memory* (AM; Fivush, 2011; Tulving, 1985).

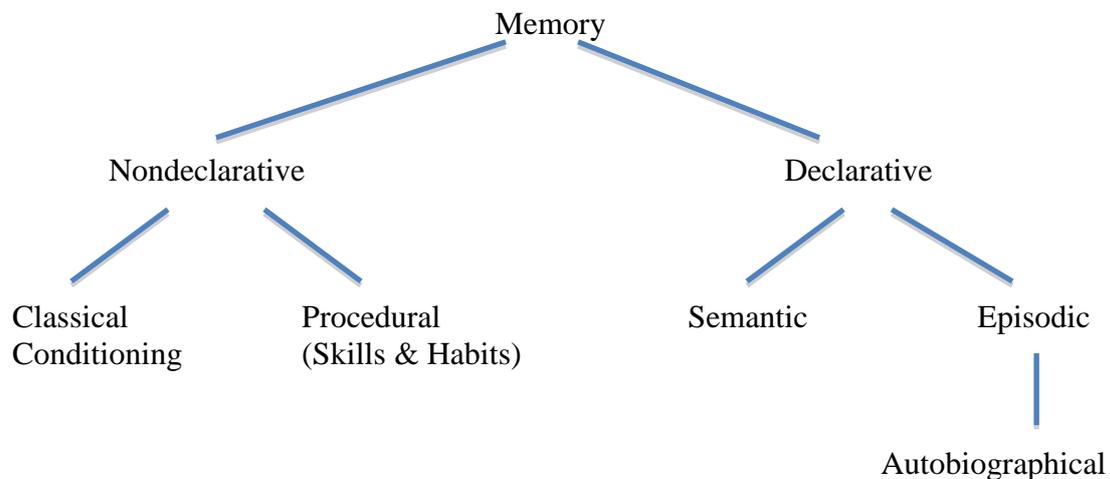


Figure 2.1. A taxonomy of memory systems.

2.1. Emergence and Development of Self

Human memory begins in utero; newborn infants are able to distinguish between familiar sounds (e.g. mother’s voice) and unfamiliar sounds (De Casper &

Spence, 1986). During the first year of life, memory (mostly recognition memory) becomes more consistent and resilient (Bauer, 2007). By 12 to 18 months of age, most healthy infants possess complex memories of past events and are able to demonstrate recall of those events over substantial delays (Fivush, 2011). At approximately three years, children are able to verbally communicate past experiences. It is at this point that the influences of maternal reminiscing style become apparent (Fivush, 2011).

It has been shown that a mother's way of reminiscing varies on a continuum, from highly elaborative with long and detailed conversations about past events to less elaborative, talking less frequently and in less detail about the shared past (Fivush & Fromhoff, 1988; Fivush, et al., 2006; Hudson, 1990). Elaborative mothers are characterized as asking many open-ended questions that provide some information and encourage the child to recall additional details (e.g. "What did we see at the zoo today?"). In addition, elaborative mothers also integrate their children's responses to an ongoing narrative, piecing together the 'who,' 'what,' 'where,' and 'when' of shared experiences (e.g. "That's right, we saw some elephants! Who came with us?") as well as evaluation of those experiences (e.g. "Was the zoo fun?"). When the child is unable to recall, the mother fills in the blanks using details already provided while continuing to encourage the child to participate (e.g. "Do you remember the monkeys? Do you remember how they were swinging in the trees?"; Fivush, et al., 2006). In contrast, mothers with a less elaborative reminiscing style focus only single aspects of experiences, often in the form of yes or no questions (e.g. "Did you go to the zoo today?"). Less elaborative mothers may prompt the child, but do not provide any additional information towards creating a story (e.g. "Do you remember?"; Fivush, et al., 2006).

Maternal reminiscing style does not simply amount to talkativeness (Haden & Fivush, 1996). A mother's elaborateness in conversation has been found to be consistent over time and also consistent across children. That is, a mother who is highly elaborative when conversing with one child will also be highly elaborative when conversing with her other children (Haden, 1998; Haden, & Fivush, 1996; Reese, 2002). Children in their preschool years with highly elaborative mothers are able to share past experiences in greater detail and organization than those with less elaborative mothers (Fivush, et al., 2006; Reese, 2002). Encouragement of more elaborative conversing early in development has also shown to develop memory skills that persist through childhood and into adolescence (Fivush, et al., 2006). Adolescents whose mothers used a more elaborative reminiscing style during preschool years have an earlier age of first memory (Fivush, 2011; Jack, MacDonald, Reese, & Hayne, 2009). Overall, it appears that autobiographical memory begins to emerge in toddlerhood; however, it may not be fully consolidated until adolescence or early adulthood (Fivush, 2011; Habermas & Bluck, 2000).

While toddlers may have a subjective sense of self in experiencing events, true AM requires the ability to mentally time travel, linking past and present self (Damasio, 1999; James, 1890; Tulving, 1985). This skill is believed to emerge around age five (Povinelli, 2001; Povinelli, Landau, & Perilloux, 1996; Povinelli, Landry, Theall, Clarke, & Castille, 1999). The utilization of mental time travel to link past experiences chronologically leads to construction of a personal time line and personal narratives (McAdams, 1985; Povinelli, 2001).

2.2. Self and Identity

The ideas of *self* and *identity* are closely related but are different constructs. The ability to understand oneself as an experiencer with linked personal events across time (i.e. auto-noetic consciousness) is the *self* (Fivush, 2011; Tulving, 1985). McAdams (1985) theorized that human identities exist in the form of personal narratives (i.e. life story; Habermas & Bluck, 2000).

Defining oneself in terms of past experiences allows the self to be integrated in a more individualized and flexible way; it allows for multiple and malleable identifications (Fischer-Rosenthal, 1995; McAdams, 1996). For example, a day in an adolescent's life may entail: eat breakfast with family (I am a son and brother), go to school (I am a student), go to football practice (I am an athlete), and work part-time job in restaurant (I am a waiter). While a single person may take on different social roles at times, that person maintains the same continuous self across all roles. It is an internalized and evolving life story that integrates different, and sometimes conflicting, roles and relationships into parts of a whole identity, thus contextualizing the self within past events (Habermas & de Silveira, 2008; McAdams, 2001; Singer & Blagov, 2004). Engaging in narrative practices, such as reminiscing with others, is an important way in which personal identities are developed (Habermas & Bluck, 2000; McLean, Pasupathi, & Pals, 2007; Thorne, 2000).

The creation and maintenance of a narrative identity is dependent upon the ability to construct a coherent personal story through linking past and current self-experiences (Damasio, 1999; James, 1890; Habermas & Bluck, 2000; McAdams,

1985). Four types of coherence are required in order to create this personal life story: *causal*, *temporal*, *cultural concept of biography*, and *thematic* (Habermas & Bluck, 2000).

Causal coherence is necessary to link episodes within a person's life and to explain changes in the individual's values or aspirations. It is established by linking external (e.g. "There's no milk in the refrigerator because the store was closed today") or internal causes (e.g. "There's no milk in the refrigerator because I forgot to stop at the store") to life's events (Habermas & Bluck, 2000). Linking experienced events across time in temporal order is referred to as *temporal coherence*. This requires either the ability to specifically date events (which is usually only possible for a few highly significant events) or reconstructing temporal order based on contextual information (Habermas & Bluck, 2000). This contextual information may include cultural norms of events that typically happen in a person's life, a *cultural concept of biography*. In modern Western cultures, this usually includes: transition from school to work, marriage, birth of children, and retirement. *Thematic coherence* refers to connecting past events that are similar in subject matter in order to derive a general quality, characteristic, or concern that summarizes those events (Habermas & Bluck, 2000). For example, a person who has faced many obstacles might say, "life is difficult" or "I have been fortunate." This is generally the last form of coherence to develop, as it requires the aforementioned abilities (causal, temporal, cultural concept of biography) in order to create a narrative from which to extract a theme (Habermas & Bluck, 2000).

In an investigation of when these abilities emerge, Habermas and de Silveira

(2008) asked individuals aged 8-20 to write seven life events on seven cards and place those cards on a time line. Then each participant was instructed to tell a story of their entire lives, incorporating those seven life events in their story. Inspection of the life stories provided revealed that temporal coherence increased the most between ages 8-12, causal coherence between ages 12-16, and thematic coherence between 16-20. This evidence points to childhood as the time period in which life narratives emerge, as well as the order in which cognitive skills are developed over adolescence.

2.3. The Cultural Life Script

As children grow and develop cognitively, personal narratives develop more complexity and coherence through adolescence and into young adulthood (Habermas & Bluck, 2000, Habermas & de Silveira, 2008). As previously discussed (Section 2.2), a fully articulated life story requires four types of coherence: causal (life events are linked in an explanatory way to other events or to an individual's personal characteristics or pursuits), temporal (stories need to be told in an order that makes sense), cultural concept of biography (cultural norms dictate that certain events, such as marriage, should be included in life stories), and thematic (life events may be understood by creating overarching themes that provide meaning; Habermas & Bluck, 2000). Life scripts are a way to encompass all four types of coherence (Thomsen, 2009).

Life scripts organize memories from our lives and for the life events of others (Berntsen & Rubin, 2004; Thomsen, 2009; even fictional characters, Copeland, Radvansky, & Goodwin, 2009). They act as a general 'plot' of when events are

expected to happen in a person's life and are defined by cultural expectations of when particular events are expected to occur within a life period (Berntsen & Rubin, 2004). Acting as a framework on which the life story is built, the life script and serves to organize life stories into *chapters* (Thomsen & Berntsen, 2008). Chapters are constructed both prospectively (the event 'childbirth' may mark the future chapter of 'parenthood') and retrospectively when reminiscing back on past life periods (Thomsen, Pillemer, & Ivcevic, 2011). Life chapters often mark periods of transition, beginning with important life script events, which are overwhelmingly positive and specific (Thomsen & Berntsen, 2008; Thomsen, et al., 2011). Chapters correspond to Conway and Pleydell-Pearce's (2000) description of *lifetime periods*, which will be discussed in detail in Section 3.2.

Berntsen & Rubin (2004) explored life scripts by asking undergraduates first to imagine a healthy prototypical infant, then list the seven most important events expected to occur in that infant's imaginary life. Participants then indicated at which age each event was most likely to occur and rated each event on importance and valence. The majority of events reported were highly positive, concentrated in young adulthood, and represented an idealized life. Examples of such events include: graduation, marriage, birth of children, and retirement. Janssen and Rubin (2011, p. 291) characterised life scripts according to ten qualities:

1. Life scripts are semantic knowledge about expectations about life events in a given culture and not personal memories of those life events.
2. Life scripts are a series of temporally ordered life events.
3. Life scripts form a hierarchical arrangement with transitional events forming a higher order 'scene', in which a series of subordinate actions or episodes

are nested (Section 3.2.2; Conway, 2009).

4. Life scripts can be described in terms of time slots and their requirements.
5. The time slots are culturally important transitional events and their requirements are the culturally sanctioned timing of these events.
6. Life scripts are used to process life stories.
7. Life scripts do not represent an average life, but represent an idealized life from which many common and some important events are left out.
8. Because life scripts represent a normative life course, life scripts are not extracted from personal actions in recurrent contexts, but are transmitted by tradition. Young people, who have lived through a smaller part of their life, still know the entire life script of their culture.
9. Life scripts are distorted from actual lives to favour positive events.
10. Life scripts are distorted from actual life stories to favour events expected to occur in the early adulthood.

The inclusion of semantic knowledge of the lifespan within a culture separates the life script from earlier organizational models of AM, such as the life story schema (Bluck & Habermas, 2000). For example, the life story schema is formed “as a residue of repeated speaking, thinking, and reasoning about the events of one’s past through which events are related to one another and to the self” (Habermas & Bluck, 2000, p. 127). The life story schema conceives of the cultural concept of biography as another type of coherence on the same level as the other three types of linguistic coherence (Bohn, 2011; Habermas & Bluck, 2000). In contrast, the life script theory conceptualizes the cultural concept of biography as facilitating a connection between the self and the culture beyond the individual (Berntsen & Rubin, 2004; Bohn, 2011).

While examination of life stories has shown tremendous overlap between cultural life scripts and personal life stories (Thomsen & Berntsen, 2008; Rubin, Berntsen & Hutson, 2009), cultures have slightly different norms and expectations for the timing of and type of life events (Erdoğan, Baran, Avlar, Taş, & Tekcan, 2008; Haque, & Hasking, 2010). In a study comparing life scripts between Turkish and Danish university students, some of the events listed were culture-specific and were not included in the other country's script at all (Erdoğan, et al., 2008). For example, Turkish students listed circumcision (part of Muslim religion) and military service (required of all men over age 18), both socially significant in an average Turkish man's life; Danish students listed confirmation and baptism, both significant events in an average Christian person's life (Erdoğan, et al., 2008). Similarly, "leaving home" was frequently included in the life script of Danish students as a positive event; in the Turkish students' life script it was listed less frequently and as a negative event. In Denmark, leaving home is generally seen as a step toward adulthood and independence; in Turkey, there is a more collectivist family environment where most young adults live at home with their parents until they are married (Bastuğ, 2002; Erdoğan, et al., 2008).

2.4. Functions of Autobiographical Memory

The defining factor of AM that distinguishes humans from animals is auto-noetic consciousness, an awareness of self that is continuous across time (Fivush, 2011; Tulving, 1985). AM developed from auto-noetic consciousness among humans for three interrelated purposes: *self-definition*, *self-relation* and *self-regulation*

(Fivush, Berlin, Sales, Mennuti-Washburn, & Cassidy, 2003).

Autobiographical memories provide a sense of continuity and coherence that *define the self* (Fivush, et al., 2003). Individual self-definition is variable person-to-person as well as culturally (Fivush & Bucker, 2003; Wang, 2001; 2003). For example, males and females have gendered self-concepts that are linked to differences in reminiscing. Females include more emotional and relational content and also report sharing their memories more than males (Fivush & Bucker, 2003). Culturally, mothers in Western cultures tend to elaborate more when reminiscing with their children than mothers in Eastern cultures, and these differences in elaboration are linked to differences in self-concept between cultures (Wang, 2001, 2003). In particular, children in Western cultures develop a more autonomous sense of self than children in Eastern cultures (Wang, 2001; 2003). These differences are also seen within cultures; children of mothers that are highly elaborative when reminiscing develop a more segregated and comprehensive sense of self (Bird & Reese, 2006). Therefore, a more elaborative maternal reminiscing style is interrelated, by both gender and culture, to a more differentiated self-concept (Bird & Reese, 2006; Fivush & Bucker, 2003; Wang, 2001; 2003).

Autobiographical memories also serve to *relate the self*, creating and maintaining social relationships (Fivush, et al., 2003). Relationships with others exist as specific memories of interactions and shared experiences through time (Cassidy & Shaver, 1999). These memories provide a framework for defining and interpreting current relationships, which is a frequent and important purpose of recalling past experiences (Fivush, 2011, Fivush, et al., 2003). For example, a woman's memories

of past interactions and shared experiences with her father may later influence her choices in romantic relationships (Bagget, Shaffer, & Muetzelfeld, 2013). Relating self to others is most often achieved by telling others about personal experiences. In conversation, past experiences are referenced approximately every five minutes (Bohanek, Fivush, Zaman, Lepore, Merchant, & Duke, 2009; Miller, 1994) and roughly 90% of emotional experiences are shared within a few hours or days of occurrence (Rime, Finkenaur, Luminet, Zech, & Pilippot, 1998). This human need to share personal experiences helps to create and strengthen social relationships through time (Fivush, et al., 2003). For example, adolescents who know more of these stories and share them in more detailed and elaborate ways show greater emotional well-being (Fivush, Bohanek, & Marin, 2010). In families, personal narratives from parents and grandparents create a sense of connection to family as well as a sense of self in relation to other family members (Fivush, et al., 2010).

Relating to others through reminiscing is linked to *self-regulation* in both physical and emotional health. Individuals who are able to resolve emotional experiences by incorporating them into explanatory personal narratives display better physical health as evidenced by immune system functioning and higher levels of contribution in work and school (Frattaroli, 2006; Pennebaker & Chung, 2007). Psychological benefits are seen in the way AM is remembered and shared. As previously discussed, mothers who are highly elaborative when reminiscing have children who show greater levels of emotional understanding and regulation (Section 2.1; Fivush, Haden, & Reese, 2010). Specifically, mothers who provide more explanations and resolutions when recalling highly stressful shared events with their children have children who show greater coping skills and less depression and anxiety

(Fivush & Sales, 2006; Sales & Fivush, 2005). Psychological benefits are also seen in individuals who share positive events from their day and subsequently display higher levels of emotional well-being (Frederickson, 2001). While the exact mechanisms linking reminiscence to well-being have yet to be discovered, it is clear that our personal memories and health are intimately related.

2.5. Classification of Autobiographical Memories

A variety of coding and categorizing models have been proposed to explain the nature and contents of AM. In one of the earliest attempts to categorize AM, Brewer (1986) defined AM as all “information related to self” (p. 26). He then classified AM into three aspects: *generic personal memory*, *personal memory* and *autobiographical fact*. *Generic personal memory* is an imaginal memory that is acquired through repeated instances with different variations. An example would be my former morning commutes from home to university. My image is not of a specific day or time, but just a generic view of the landmarks I drove past on my way to lectures. *Personal memory* also includes visual mental images, but are limited to a particular episode in one’s life. For example, I can recall quite vividly an afternoon when I was 12 years old my parents brought home a yellow Labrador puppy. A nonimaginal memory of an instance in one’s life is an *autobiographical fact*. For example, I know that in my third year of high school I read *The Great Gatsby* in my literature class.

While Brewer’s (1986) categories were based heavily on the presence of mental imagery, Dritschel (1991) devised a temporal based taxonomy of AM. In this taxonomy, AM are first broken down into *idea units*, defined as “a clause consisting

of a finite verb plus all its modifiers” (Dritschel, 1991, p. 320). These idea units were then classified as either *non-autobiographical* (e.g. semantic memories) or *autobiographical*.

Autobiographical memories were classified into four types: *specific*, *general categoric*, *general extended*, and *personal semantic* (Table 2.2; Dritschel, 1991). A *specific* AM is a single event, lasting less than one day (Conway & Pleydell-Pearce, 2000, Singer & Blagov, 2002; Williams, 1992). For example, “I got a tattoo when I turned 29.” A specific event that lasts for more than one day is considered a *general extended* AM (Barsalou, 1988; Williams & Dritschel, 1992). For example, “When I had chicken pox in kindergarten I got to miss a whole week of school.” A *general categoric* AM is an event that is repeated in several instances, as in “We had some great days snowboarding that winter” (Conway, 1996; Williams, 1996). Autobiographical facts about the participants’ past and present are *personal semantic* AM, such as, “I have a younger brother” (Dritschel, 1991; Kopelman, Wilson, & Baddeley, 1989).

| Type of AM | Definition | Example |
|-------------------|---|--|
| Specific | A unique event that occurred at a particular time and place | I got a tattoo when I turned 29. |
| General Categoric | Similar events that are repeated over time on several different occasions | I played softball in high school. |
| General Extended | An event that extends over a long period of time | I went on a two-week holiday to China a few years ago. |
| Personal Semantic | A personal fact | I lived in Chattanooga, Tennessee. |

Table 2.1. Four categories of AM (Williams and Dritschel, 1992).

As depicted in the table above, the first three types of AM (specific, general categoric, and general extended) represent episodic self-knowledge; they are memories of personally experienced events. The remaining category in the table, personal semantic, comprises facts and details about oneself in the absence of the personal experiences from which they were derived. All personal semantic memories are episodic in origin (e.g. I ran a 10k race, I run five days a week, yesterday I saw a moose while running), however, over time personal facts are extracted from those episodes and can then be recalled without retrieval of the original experiences (e.g. I am a runner, I enjoy running; Haslam, Jetten, Haslam, Pugliese, & Tonks, 2011, Sakaki, 2007).

Studies have shown that amnesic patients, despite having lost the ability to retrieve personally experienced events, could still access personal semantic information, suggesting that personal episodes and personal facts are independently represented in different memory systems (Klein, Cosmides, Costabile, & Mei, 2002; Tulving, 1993; Viskontas, McAndrews, & Moscovitch, 2000). These findings also suggest that identity can be maintained in the absence of memory for personal experiences, provided there is some preservation of personal semantic memory. This has led some researchers to question whether or not memory for personally experienced events is critical to the preservation of identity, as some semblance of self must be contained in personal semantic memory (Haslam, et al., 2011). Haslam and colleagues (2011) propose that identity is supported by the accumulation of personal experiences and personal semantic knowledge is extracted from those experiences. Therefore, as memory for personal experiences supports personal semantic memory, personal semantic memories also add to a person's sense of identity.

2.6. The Reminiscence Bump

When adults over 40 years of age share AM from across the lifespan (i.e. reminisce) in either cued or free recall, and these AM are plotted according to age at encoding of the experiences, the resulting retrieval curve appears much like Figure 5.1 (Rubin, Rahhal, & Poon, 1998). Termed the lifespan retrieval curve, it is characterized by three parts: (1) childhood amnesia, as the cognitive skills required to create AM have not yet developed, (2) a reminiscence bump from ages 10-30, and (3) a recency period from the present declining back to the bump in which more recent events are better remembered because they have had less time to fade; Rubin, et al., 1986; Rubin, Wetzler, & Nebes, 1998). From the current standpoint, the reminiscence bump is of the most interest as it coincides with the period in which individuals pass from adolescence into adulthood and, in doing so, create a personal identity (Erikson, et al., 1959; 1963).

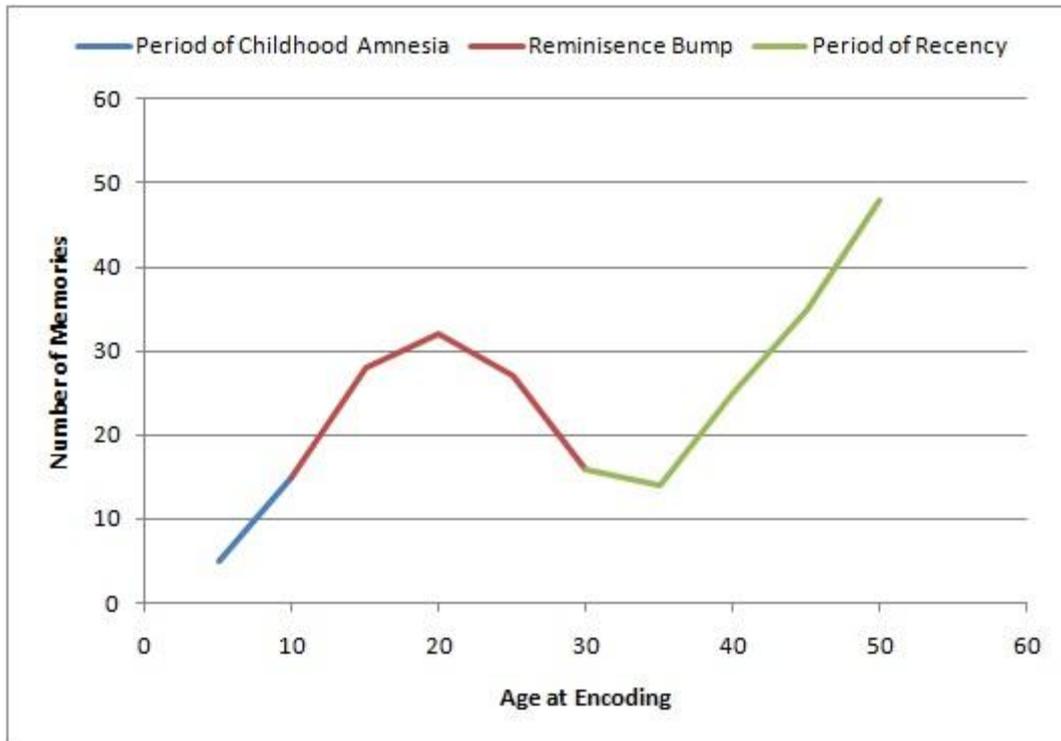


Figure 5.1. An idealized lifespan retrieval curve, characterized by childhood amnesia, reminiscence bump, and recency period. Adapted from Rubin, et al. (1998).

Bump memories have been described as “more novel, more distinctive, more important for identity development, and more likely to reflect life transitions than memories from other life phases” (Demiray, et al., 2009, p. 721). Several accounts for those characteristics of the bump have been proposed: *maturational development*, *cognitive*, *narrative-self/identity*, and *life script*. According to the *maturational development* account, human cognitive skills reach their peak between the ages of 10-30; faster processing and better or more frequent encoding during that age period may lead to more frequent retrieval of those memories (Serauf & Rubin, 1998).

A *cognitive account* suggests that events from ages 10-30 are more often recalled because this age period involves a high frequency of novel (i.e. new or first

time) and distinctive (i.e. unique or one time) experiences (Rubin, et al., 1998). A novel event is different from the events that preceded it, thus it is more distinctive and the individual pays more attention to it. Accordingly, it has been found that distinctive events make up 84% of all AM within the bump period (Demiray, Gülgöz, & Bluck, 2009). The distinctiveness of these events may lead to them being encoded more deeply in memory, perhaps to serve as prototypes for future events (Kristo, Janssen, & Murre, 2009). Thus as the individual encounters new situations, these events may be retrieved and rehearsed more for retrospective comparison (Kristo, et al., 2009).

According to the *self-narrative/identity account*, adult identities are formed during late adolescence and early adulthood through the creation of a coherent self-narrative (Habermas & Bluck, 2000). This account is also parallels the self-memory system model of AM, discussed extensively in Chapter 3, which states that it is during this era individuals establish unique goal hierarchies that constitute central components of identity (Section 3.2; Conway & Pleydell-Pearce, 2000). As people age and goals change, groups of highly goal-relevant AM relating to identity are left behind (Conway, 2005; Conway & Pleydell-Pearce, 2000). Since adolescence and young adulthood are the period in which identity is created, it would be expected that more goal-related AM from that age period would be better remembered and therefore incorporated into the life story (Conway, 2005; Conway & Pleydell-Pearce, 2000; Erickson, 1959; Habermas & Bluck, 2000). In this view, events from this period are deemed more important or vivid because they form the base, or core of self-identity. Thus, they are also more likely to be recalled by the current self, as they have been influential on who one has become today (Glück & Bluck, 2007).

The life script account proposes that cultural expectations of a typical life course affect the accessibility of AM (Section 2.2; Fitzgerald, 1988; Thomsen & Berntsen, 2008). For example, in American culture, people are generally expected to move out of their parents' home, get married, have their own children, establish a career, retire, and have grandchildren. Most cultures list marriage, having children, and starting a career as significant parts of the life script; however, it should be noted that different cultures have slightly different norms and expectations for the timing of and type of life events (Berntsen & Rubin, 2004; Erdoğan, et al., 2008; Haque & Hasking, 2010). These events are reflected in content of older adults' AM from the bump period; the most common theme found was "relationships" followed by "work/education" (Blagov & Singer, 2004; Cohen & Faulkner, 1988; Elnick, et al., 1999; Holmes & Conway, 1999; Lardi, D'Argembeau, Chanal, Ghisletta, & Van der Linden, 2010; Schroots & Assink, 2005; Singer, Rexhaj, & Baddeley, 2007). The most important and positive events generally occur in life scripts between ages 15-30 (Berntsen & Rubin, 2002). These events also tend to mark important transition periods and milestones. Indeed, studies have found most AM from the bump period are positive; that is, isolation of the positive events from one's life shows a reminiscence bump while negative and neutral events are distributed across the lifespan, most likely reflecting the unpredictable occurrence of events such as accidents or bereavements in one's life (Bohn, 2010; Glück & Bluck, 2007; Rubin, et al., 2009).

Each of these aforementioned accounts has received some empirical support. This suggests that all four accounts previously discussed (maturational development, cognitive, narrative-self/identity, and life script) may work simultaneously to create a

reminiscence bump. In other words, people remember more from the age 10-30 because that life period is a time of biological maturation, new and unique experiences, adult identity formation, and important events in life scripts. The life story account integrates these different accounts by combining two key theories: life story theory (Baltes, 1987) and lifespan developmental theory (McAdams, 1985).

According to the life story theory, the cognitive tools required to form coherent personal narratives does not develop until adolescence and early adulthood (Habermas & Bluck, 2000; McAdams, 1985). As previously discussed (Section 2.1), a fully verbalized life story requires four types of coherence: temporal (told in an order that makes sense), cultural concept of biography (cultural norms dictate that certain events included in life stories), causal (life events are linked in an explanatory), and thematic (overarching themes that provide insight; Habermas & Bluck, 2000). Thus, according to this theory, an individual's life story is not simply a collection of significant individual events- it is a string of related events connected to one another and to the self.

The life story account also draws on lifespan developmental theory in order to integrate key components of previous accounts for the bump (maturation development, cognitive, self-narrative/identity, and life script; Baltes, 1987). According to lifespan developmental theory, adolescence and young adulthood are periods of continuing growth accompanied by higher levels of functioning and adaptive capacity (Baltes, 1997; Ebner, Freund, & Baltes, 2006). This encompasses the maturational account of the bump, that the bump is the result of better memory capacity during that period of growth. During this time of growth, many novel and

distinctive (i.e. first time and one time) events are encountered (Rubin et al., 1998). In line with the cognitive account of the bump, lifespan developmental theory posits that AM from the bump period are more easily recalled because of their uniqueness (Brewer, 1988; Jansari & Parkin, 1996). Lifespan developmental theory also names adolescence and early adulthood as the time that adult identity is formed (Erickson, 1982; Habermas & Bluck, 2000). As with the self-narrative/identity account, bump events are more frequently recalled because they are central to the creation of one's self-narrative (Fitzgerald, 1988). Another important aspect of the lifespan developmental theory is the influence of cultural expectations of the life course, the life script (Berntsen & Rubin, 2004; Thomsen, 2009). Most cultures anticipate the most positive and important events, which also tend to be transitional, to occur between ages 15-30 (Berntsen & Rubin, 2002). Therefore, in conjunction with life the life script account, AM from this age period are better remembered due to their significance in fulfilling cultural expectations (Berntsen & Rubin, 2004; Thomsen, 2009).

In sum, the life story account integrates life story theory and lifespan developmental theory thereby unifying constructs from previous accounts into a more holistic view of the reminiscence bump. (Demiray, et al., 2009). It is important to note, however, that while the life story theory describes bump memories as important and vivid, empirically, there has been mixed evidence regarding the importance and vividness of bump AM relative to AM from outside the bump (Jansari & Parkin, 1996; Fitzgerald, 1988; Rubin & Schulkind, 1997b; Rubin, Schulkind, & Rahhal, 1999). Some studies have found bump memories to be significantly more important and vivid than other AM (Fitzgerald, 1988; Rubin & Schulkind, 1997b). Other studies

have found no difference (Jansari & Parkin, 1996; Rubin & Schulkind, 1997a; Rubin, et al., 1999); concluding that importance and vividness are characteristics of all memories included in the life story, and they alone are not sufficient enough to distinguish bump AM from other memories (Demiray, et al., 2009).

2.7. Methods of Assessment

Early studies of AM favoured the learning of word lists, which participants were then asked to recall at a later time (Craik & Lockhart, 1972; Craik & Tulving, 1975; Shulman, 1971, 1974) While, the retrieval of words seen can be argued to contain an element of self-experience (e.g. seeing, reading and learning the words), a generic list of words is not self-relevant (Fivush, 2011). Knowing that “blue” was the first in a list of words to memorize in an experiment (i.e. “that happened”) is different from knowing “my cat threw up on my bed yesterday” (i.e. “that happened to me”) in self-related context. Consequently, the self-relevance of personal experiences serves as the main distinction between episodic (self-experience) and autobiographical (self-relevant).

Popular tests of AM in the past few decades have focused a great deal on specificity, the ability to recall an AM that happened at a particular time and place (Williams, 1992; Williams & Dritschel, 1992). These experiments have included prompting participants with different cues such as words or pictures (Hudson & Fivush, 1991; Williams & Broadbent, 1986; Van den Hoven & Eggen, 2009) or directly asking the participants for AM from particular lifetime periods (Kopelman, et al., 1989; Levine, Svoboda, Hay, Winocur, & Moscovitch, 2002).

One of the most frequently used tests of AM, the *autobiographical memory test* (AMT; Robinson, 1976; Williams & Broadbent, 1986), presents the participant with a series cue words, then asks the participant to respond with a specific AM to each cue word within a specified time limit (e.g. 30-60 seconds). The AMT has proven to be a reliable assessment of AM specificity, particularly in individuals with emotional disorders such as depression (Griffith, et al., 2009). This test is based on earlier paradigms that presented participants with cue words (positive, negative, and/or neutral) and asked them to retrieve specific AM relating to the word (Crovitz & Schiffman, 1974; Galton, 1879; Robinson, 1976). The variation of cue words continues to be a drawback to the AMT. Most researchers use 10-20 different words, however, the exact words and whether the words are emotional or neutral vary (Fitzgerald and Lawrence, 1984; Maki, Janssen, Uemiya, & Naka, 2013; Robinson, 1976; Rubin, et al., 1986; Rubin & Schulkind, 1997). For example, neutral cue words (e.g. table, sock) have been found to elicit an earlier bump ranging from 10-20 years old (Rubin, et al., 1986; Rubin & Schulkind, 1997) with increased recall of recent events (Maki, et al., 2013; Rubin & Schulkind, 1997); whereas AM cued with emotional words (e.g. happy, sad) have been shown to produce a bump centered between ages 20-30 (Rubin, et al., 1986) with an even greater amount of recent events than neutral words (Fitzgerald and Lawrence, 1984; Robinson, 1976). Therefore, it becomes difficult to compare AMT studies with differing results, as it is unclear to what extent the differing words influence the responses given (Heron, Crane, Gunnell, Lewis, Evans, & Williams, 2012).

A less frequently used method, cueing AM with photos, has shown mixed

results. Hudson and Fivush (1991) interviewed a group of 15 kindergarteners regarding a trip to the Jewish Museum (a museum of archaeology) on four occasions: immediately after the trip, 6 weeks after the trip, one year later, and six years later. The children had no trouble recalling the trip immediately after. On the subsequent three interviews (6 weeks; 6 months; and six years later) the children were asked, "Can you tell me what happened when we went to the Jewish Museum?" After the children stated all they could remember, they were shown 6 different pictures showing activities they had participated in on that day. Interestingly, after one year, only one of the fifteen children was able to answer the open-ended question. With the photo cues, however, the event was remembered by 87% of the children- even after 6 years.

In a similar experiment using adult participants, Van den Hoven and Eggen (2009) interviewed participants regarding a guided tour of Archeon, a history-themed park in the Netherlands one month after their visit. Each participant was asked to write down as much as they could remember about one of the activities from the tour in the presence of one of five different cues: artefact, picture, odour, sound, or video. Second, the participants wrote down as much as they could remember about a second activity from the tour without any additional cues. Van den Hoven and Eggen (2009) discovered that AM specificity was not enhanced by any of the five cues; the number of specific details were equal across the different prompts. The participants provided more specific details when they were not given any cue at all. It was concluded that the additional cues hampered the production of specific AM.

Two prevalent methods that do not use photo or word cues are the *autobiographical memory interview* (Kopelman, et al., 1989), and the *autobiographical interview* (Levine, et al., 2002). These two methods test participants' ability to produce specific AM as well as personal semantic AM, memory for personal facts (Kopelman, et al, 1989). The autobiographical memory interview tests specific AM by asking the participant to recall specific events from different life periods; while personal semantic memory is examined by requesting the names, dates, and locations of the previously elicited specific AM. This test has a few limitations. First, it does not distinguish between vivid and detailed specific AM and specific AM that only meets the minimum requirement to be considered specific. Furthermore, the autobiographical memory interview splits the collection and assessment of specific AM and personal semantic AM in an artificial manner; when people speak naturally, the two components of AM blend together (Dritschel, Williams, Baddeley, & Nimmo-Smith, 1992). In response to these limitations, Levine, et al. (2002) created the autobiographical interview which asks the participant to narrate one personal event for several consecutive lifetime periods. AM specificity and personal semantic AM are then assessed within each narrative.

In addition to the aforementioned qualitative analyses (using cue words and photos to assess specificity or directly interviewing the participant to assess specific versus personal semantic AM), other investigations of AM have employed quantitative analyses. One such test examines the rate at which people can recall AM, the *autobiographical fluency test* (Dritschel, et al., 1992). This test assesses AM across several lifetime periods; however, it uniquely emphasises in its instructions that no detail is required. Participants are encouraged to give very brief

responses in order to maximise the number of AM retrieved during the 90-second time limit. Within each time period, participants are first asked for as many events as they can remember, then as many names of people (e.g. friends or teachers) as they can remember. Therefore, this test includes both an episodic and personal semantic component and has proven useful in distinguishing between these two components of AM (Kopelman, et al., 1989).

Autobiographical memories form the core of personal identity (McAdams, 1985). These memories can be very specific or vague; they can be records of personal experiences or personal facts derived from those experiences (Conway & Pleydell-Pearce, 2000). The determinates of which AM are retained and which AM are forgotten will be the focus of the next chapter (Chapter 3).

Chapter 3. Goals

The creation of autobiographical memories (AM) is contingent upon auto-noetic consciousness, the ability to coherently link past and present experiences as events that happened to “me” (Tulving, 1985; Fivush, 2011). As people move through life and personal experiences are retained, accessibility to those AM are modulated by a person’s motives or goals (Conway & Pleydell-Pearce, 2000; Woike, Mcleod, & Goggin, 2003).

Basic cognitive processes, such as the creation and re-telling of personal narratives, rely upon a hierarchical organization of motives or goals (Conway & Pleydell-Pearce, 2000; Woike, 2003). Perhaps the most well known theory of motivation, Maslow’s hierarchy of needs (1954) illustrates the hierarchal organization of motives from a humanistic standpoint. Presented as a pyramid (Figure 3.1), the lowest levels of need include basic requirements for survival, such as food, shelter, and safety. The next higher levels include emotional needs, such as love, acceptance, achievement, and respect. Throughout life, people move up and down the pyramid. For example, a person who has worked up the pyramid and accomplished many achievements, earning a great deal of respect, may suddenly lose his/her job and home. This would require a focus of attention from achievement and respect down the pyramid to food and shelter. The top of the pyramid represents the need for self-actualization, a complete understanding of self and realization of a person’s highest potential. According to Maslow, this is the highest level of motivation; however, it has not and will never been achieved, as it would be impossible for a person to understand, learn, and experience everything.

| Category of Need | Specific Examples | Mount Maslow |
|---------------------------|--|--------------|
| Self-Actualization | <ul style="list-style-type: none"> • Self-expression • Personal growth • Autonomy • Spontaneity • Veridical self-assessment | |
| Esteem | <ul style="list-style-type: none"> • Self-esteem • Self-respect • Sense of mastery • Prestige • Respect from others | |
| Belonging and Love | <ul style="list-style-type: none"> • Love others • Be loved by others • Trust others • Sexual intimacy • Belong to a group | |
| Safety | <ul style="list-style-type: none"> • Economic safety • Control • Predictability • Psychological safety • Physical safety | |
| Physiological | <ul style="list-style-type: none"> • Hunger • Thirst • Warmth • Sleep • Respiration | |

Figure 3.1. Maslow's hierarchy of needs, including his five categories and specific examples (Finkel, Hui, Carswell, & Larson, 2014; Maslow, 1943).

A developmental theory of motivation pairs different goals with different developmental stages of life (Erikson, Paul, Heider, & Gardner, 1959). In Erikson's *psychosocial theory of development*, different existential problems confront the individual at specific stages of life. The exact temporal occurrence of these stages may vary from individual to individual, however, the chronological sequence remains the same (Table 3.1). In infancy and childhood, the major existential goals include establishing trust, autonomy, initiative and industry. Adolescence is of chief importance, as it marks the time when personal identity is to be achieved. A sense of intimacy is the desired outcome for early adulthood. Middle and old age are characterized by generativity and integrity.

| <i>Age</i> | <i>Conflict</i> | <i>Resolution or "Virtue"</i> | <i>Culmination in old age</i> |
|-------------------------------|-----------------------------|-------------------------------|---|
| Infancy (0-1 year) | Basic trust vs. mistrust | Hope | Appreciation of interdependence and relatedness |
| Early childhood (1-3 years) | Autonomy vs. shame | Will | Acceptance of the cycle of life, from integration to disintegration |
| Play age (3-6 years) | Initiative vs. guilt | Purpose | Humor; empathy; resilience |
| School age (6-12 years) | Industry vs. Inferiority | Competence | Humility; acceptance of the course of one's life and unfulfilled hopes |
| Adolescence (12-19 years) | Identity vs. Confusion | Fidelity | Sense of complexity of life; merging of sensory, logical and aesthetic perception |
| Early adulthood (20-25 years) | Intimacy vs. Isolation | Love | Sense of the complexity of relationships; value of tenderness and loving freely |
| Adulthood (26-64 years) | Generativity vs. stagnation | Care | Caritas, caring for others, and agape, empathy and concern |
| Old age (65-death) | Integrity vs. Despair | Wisdom | Existential identity; a sense of integrity strong enough to withstand physical disintegration |

Table 3.1. Erikson's psychosocial stages of development (Erikson, 1997; Erikson, et al., 1959).

The two stages of most concern to the experiments forthcoming are the fifth (identity vs. confusion) and seventh (generativity vs. stagnation). The fifth stage occurs during adolescence and focuses on answering the question "Who am I?" (Erikson, 1997). This age period captures the transition from childhood to adulthood. Adolescents may feel confused or insecure regarding who they are and how they as individuals fit into society. It is common during this period for adolescents to experiment with different identities (e.g. changing the way they look and/or behave; Erikson, 1997). According to Erikson (1963, 1968), this experimentation is critical to the process of forming a strong identity and trajectory in life. Adolescents who receive proper encouragement and reinforcement through self-exploration will transition into adulthood with a strong sense of self and feelings of control and independence. Those who fail to achieve a sense of personal identity will continue into adulthood insecure and confused about themselves and the future (Erikson,

1997).

The seventh stage, generativity versus stagnation, occurs approximately between the ages of 40-65 (Erikson, et al., 1959). During this time, adults attempt to contribute to or nurture things that will outlast them. This is often achieved through rearing children, caring for others, and/or creating and accomplishing things that benefit others as a whole (Erikson, 1997). Those who achieve generativity during this period will feel that they have positively contributed to the world around them. Stagnation refers to people who fail to contribute to society and therefore feel unproductive and uninvolved in the world (Erikson, 1997; Erikson, et al., 1959).

3.1. Socioemotional Selectivity Theory

Whether conscious or subconscious, awareness of constraints on time also influences goal prioritization (Carstensen, 1993; Carstensen, Isaacowitz, & Charles, 1999). *Socioemotional selectivity theory* (SST) maintains that as people age and time horizons shrink, personal motivations change as a result (Carstensen, 1993; Carstensen, et al., 1999). Young and healthy individuals perceive their time remaining to live as expansive and therefore prioritize goals that focus on future possibilities, such as developing a role in society (e.g. social acceptance) or developing career interests (e.g. becoming financially independent). As people age (or if serious health problems are encountered, Carstensen & Fredrickson, 1998) and time remaining is constrained, personal goals increasingly emphasize emotion and meaning (Carstensen, 1993). This may include goals such as leaving a legacy or taking responsibility for future generations (i.e. *generativity*) or self-regulatory goals such as seeking

emotional experiences or seeking to be in control of one's emotions (i.e. *emotion regulation*; Carstensen, 1993; Lang & Carstensen, 2002).

Generativity is expressed through teaching, nurturing, and leading in an effort to benefit society and promote continuity from one generation to the next (Erickson, 1950; 1959). According to Erickson (1963), generativity is of chief importance from approximately 26-64 years of age, then decreases in importance in old age.

McAdams, de St. Aubin, and Logan (1993) identified seven defining features of generativity:

1. Expectation from society that as individuals move through middle age, more time and energy should be spent toward the advancement of the next generation
2. Inner desire for symbolic immortality
3. Conscious concern for the next generation
4. Belief in the goodness or worthwhileness of humanity for the future
5. Commitment to the welfare of the future generation
6. Behaviours that involve creating or nurturing

The complex interactions of the previously mentioned six features result in the seventh characteristic of generativity, the *generativity script* (McAdams, 1985, 1990).

The generativity script is an inner awareness of where generative efforts fit into one's own personal history and the broader social world; it is a significant part of the larger life story (McAdams, 1985, 1990).

Studies have shown that emotional well-being improves with age (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Carstensen, Turan, Scheibe, Ram, Ersner-

Hershfield, Samanez-Larkin, Brooks, & Nesselroade, 2011). Individuals can *regulate emotion* by focusing less on negative aspects of a situation. In support of this, Mather & Carstensen (2003) found that older adults pay less attention to negative pictures, and thus are less likely to recall those images. As a result, they concluded that a similar process may occur in older adults in everyday life; older adults may be less likely to remember unpleasant events because they pay less attention to those events as they occur. Likewise, regulating emotion could also affect the appraisal of past events. Relative to younger adults, older adults have been found to appraise negative memories more positively (Comblain, D'Argembeau, & Van der Linden, 2005), recall less negative emotion when remembering a negative interaction with a family member or friend (Birditt & Fingerman, 2005), and are less likely to label a past experience as stressful or difficult (Aldwin, Sutton, Chiara, & Spiro, 1996).

Interestingly, when younger people imagine their time as limited, or when older adults imagine their lives as unlimited, differences in goal changes disappear. Specifically, younger adults who imagine their future time as limited prefer familiar social partners (Fredrickson & Carstensen, 1990) and older adults who imagined an unlimited future no longer showed a bias toward emotion regulation or generativity goals (Fung, Carstensen, & Lutz, 1999). Emotionally meaningful goals, therefore, appear to be prioritized by people approaching the end of their lives, regardless of age.

Lang and Carstensen (2002) examined how *future time perspective* (FTP) influences goal priorities in a group of 480 German participants aged 20-80. Using questionnaires to assess personal networks and social satisfaction and card sorting

tasks to assess goal priorities, it was found that older participants perceived their time as limited and prioritized goals relating to generativity and emotion regulation.

Younger participants perceived their time as expansive and were more concerned with goals relating to autonomy and social acceptance.

These results have recently been replicated using data from the European Social Survey, which included 43,000 individuals from 23 countries (Coudin & Lima, 2011). FTP and goals (generativity, emotion regulation, autonomy, and social acceptance) were assessed using a questionnaire on which questions were answered using a 7-point scale. FTP was found to significantly and negatively correlate with age; as people get older, their FTP shrinks. FTP was also investigated in ill versus healthy participants. People who viewed themselves as healthy had a more expansive FTP. When the relationship between FTP and goals was examined, FTP was found to positively correlate with ‘social acceptance’ and ‘autonomy;’ and negatively correlate with ‘generativity’ and ‘emotion regulation.’ This confirms the previous study and supports the SST; people who perceive their time as limited pursue more emotional meaningful goals (Carstensen, 1993; Lang & Carstensen, 2002).

3.2. Self-Memory System

Once AM have been created and retained, a person’s motives or goals heavily influence accessibility to those AM (Conway & Pleydell-Pearce, 2000; Woike, et al., 2003). The *self-memory system* (SMS) is a dynamic model in which goals are viewed as processes and AM represent information about goal attainment. It describes autobiographical remembering as collaboration between two constructs, the *working*

self and the *autobiographical knowledge base* (Conway & Pleydell-Pearce, 2000).

3.2.1. Working Self

The *working self* operates as a *goal structure* and as *conceptual self-knowledge*. Goals are represented at different levels of specificity within complex hierarchies interconnected through positive and negative feedback loops (Carver & Scheier, 1982, 1998). The *working self-goal structure* refers to the currently active goal-hierarchy, viewed as part of the working memory system (Baddeley, 1986). Hierarchical organization of goals is necessary in order to reduce discrepancies between the current state and desired goal state, thus regulating behaviour. The currently active goal-hierarchy (i.e. the working self) is in a permanent state of activation, however some subset of the structure may at any time operate at a higher level of activation and operate in guiding and regulating cognition, emotion, and behaviour (Carver & Scheier, 1998; Conway, 2005).

Working alongside the working self-goal structure is the *working self-conceptual knowledge* (Conway & Pleydell-Pearce, 2000). This consists of abstracted knowledge structures that are independent from specific temporally defined events, but serve to activate those specific instances that exemplify, contextualize, or ground underlying themes or ideas (Conway, Meares, & Standart, 2004). Such abstracted knowledge structures include attitudes, values, beliefs and socially constructed categories that define the self, other people, and the surrounding world (Conway, et al., 2004; Pasupathi, 2001). As a whole, the working self acts as a set of control processes, regulating new knowledge entering long-term memory, what pre-existing

knowledge is accessed, and how memories are re-constructed (Conway, 2005).

From an evolutionary standpoint, a memory system that does not accurately keep record of an individual's goals and outcomes would be unlikely to survive (Conway, 2005). AM should then correspond to experience; however, keeping an accurate record of every minute detail of every experience is also impractical due to the vast volume of information that would have to be stored and sifted through each time an AM is recalled. Therefore, our memory system is faced with two conflicting objectives, to keep an accurate record of experiences and to do so in a cognitively efficient manner. The working self strives to achieve a balance between these two objectives by coordinating and organizing personal goals into interconnected hierarchies according to two rules: *adaptive correspondence* and *self-coherence* (Conway, 2005; Conway, Singer & Tagini, 2004).

Adaptive correspondence allows the working self to keep track of where it is currently in goal attainment (Conway, 2005). In order to live an orderly life, individuals need to keep track of smaller tasks, whether they are simply small tasks (i.e. washing hands after using the toilet) or smaller tasks that comprise a larger goal (i.e. studying for an exam, to pass a class, to obtain a degree, to begin a career, etc.). For example, a person leaving home locks the front door. If that person is unable to remember whether or not the door was locked, he/she would continuously return to the door to lock it (Conway & Pleydell-Pearce, 2000).

Self-coherence refers to AM and the central aspects of self combining to form a coherent system in which AM is consistent with current goals, self-images and self-

beliefs (Conway, 2005; Conway, et al., 2004). This process requires the working self to raise the accessibility of goal-related AM and lower the accessibility to AM that challenge the current goal structure (Baddeley, 1986; Conway, et al., 2004).

Reconstructing past memories to conform with their current self-view creates a coherent overarching understanding of how different life periods link together, allowing for a consistent self that exists across time (Conway & Ross, 1984; McAdams, 2001; Ross & Wilson, 2002; Wilson & Ross, 2001).

For example, a mother who loves her son and believes he can do no wrong recalls events from a physical confrontation between her son and other boys at school. She adamantly states that her son was not at fault, he was a victim, confirming her belief that her son is an angel, despite seeing the camera footage showing her son pushing other boys and initiating the fight. Such biases in memory that favour core beliefs or central aspects of self are common signs of coherence (Conway, 2005; Conway & Pleydell-Pearce, 2000). The converse, when AM contradicts or undermines important parts of the self, is typically only found in individuals with serious psychological illnesses or brain damage (Baddeley, Thornton, Chua, and McKenna, 1996). For instance, a young man who believed himself to be a rock star even though he couldn't play guitar, or another young man who believed himself to be a Russian chess master, even though he couldn't speak Russian and was constantly beat in chess matches (Baddeley, et al., 1996).

The working self serves to maintain consistency in self-identity and self-perception; however, this is not always possible as people grow and develop (Erikson, et al., 1959; Conway, 2005). As goals of the self change over time, and as this process

repeats over an individual's lifetime, groups of highly accessible and highly goal-relevant are left behind (Conway, 2005). While these groups of AM may no longer be currently self-relevant, they still define the self in the past (Conway, 2005; Conway & Pleydell-Pearce, 2000). For example, a teenager's current goals are to hang out with friends, go to concerts, and get that awesome purple hair dye for her Mohawk. As this girl grows into a young adult, purple hair dye and concerts become much less prioritized. Now her current goals include studying for midterms, registering for next semester's university courses, and getting a part-time job. Her current identity is "I am a university student." With this identity, AM closely related to studying and working part-time will be the most readily available. However, when this person reminisces on her days as an adolescent, she still thinks, "I was a punk rocker in high school." The current identity does not cancel the previous or future identities. The goals of going to concerts and hanging out with friends defined this girl in adolescence. Therefore, AM closely related to those past goals will always be more readily accessible when she reminisces about that time period. Later in life, the (now) woman gives birth, resulting in a new goal hierarchy that prioritizes her new baby and identifies herself as "a mother." When she reminisces on her adolescent days as a "punk rocker" the most easily recalled experiences are those of concerts, friends, and hair dye. Similarly, when she retells stories from her time as a university student, the most readily available stories will be of studying and working. While these clusters of goal-related AM may no longer be currently self-relevant, they continue to define past identities (Section 3.2.2; Conway, 2005). When these clusters of highly goal relevant AM are viewed across a lifetime, they form a coherent story of the individual's life (Conway, 2005).

The pattern of raising the accessibility of AM due to their self-relevant properties, can be seen across the lifespan. Conway and Holmes (2004), asked adults over 70 years of age to freely recall AM from each decade of life. The content of these memories were then analysed according to Erikson's psychosocial stages of the lifespan (Erikson, et al., 1959). The distribution by age at encoding of the AM was found to correlate strongly with content associated with each psychosocial stage. In Figure 3.2.1, below, it can be seen that AM closely related to a particular psychosocial stage are concentrated around the age period in which that stage is theorised to occur. The first four stages of childhood are grouped together as 'child' and AM relating to these stages are most prevalent during the first decade of life (ages 0-9). Identity themed AM are concentrated around adolescence (ages 10-19). AM concerning intimacy are most frequent from the third decade of life (ages 20-29), and generativity themed AM appear to dominate thereafter. Past events that have been of great significance to life goals are strongly associated with the self (Conway & Pleydell-Pearce, 2000). Memories of these once highly self-relevant experiences remain highly accessible, even after the associated goal period has passed, and are the first that come to mind when that age period is freely sampled (Conway, 2005; Conway & Pleydell-Pearce, 2000). This study further demonstrates the influence of the working self, as the most readily available memories from each age period reflect the issues that were of chief concern.

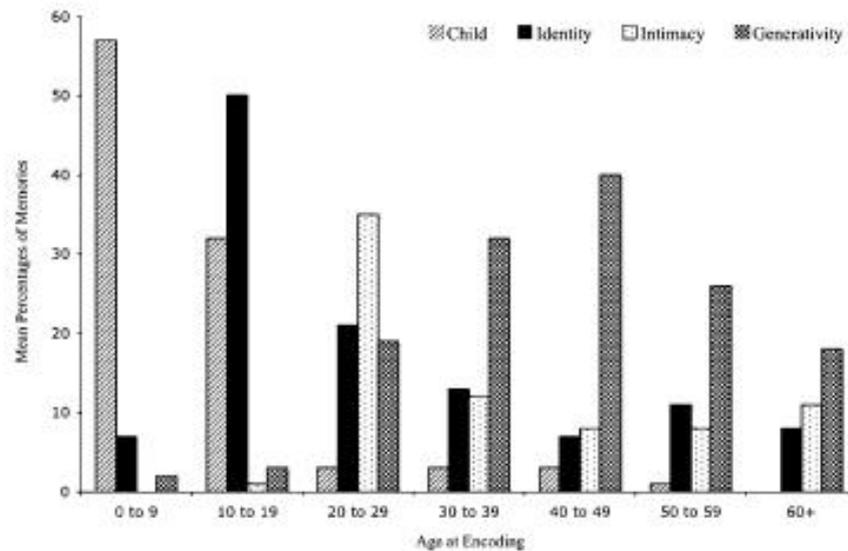


Figure 3.2.1. Distributions of AM across the lifespan according to age at encoding and associated psychosocial theme (Conway & Holmes, 2004).

3.2.2. Autobiographical Knowledge Base

According to the SMS model, the *autobiographical knowledge base* in long-term memory is comprised of two parts: *autobiographical knowledge* and *episodic memories*. It is the merging of these two parts that create a specific AM (Conway, 2005, 2009). Autobiographical knowledge structures contain knowledge of personal experiences at different levels of specificity, organised from highly abstract to event-specific and terminate in episodic memories (Conway, 2005, 2009).

The most abstract level is the *life story* (Bluck & Habermas, 2000; Pillemer, 1998). This is thought of as part of the *conceptual self*, as depicted in Figure 3.2.2 (Conway, 2005; Conway, et al., 2004). The life story is built upon the life script and contains factual and evaluative knowledge about the self (Section 2.2; Bluck &

Habermas, 2000). It may also comprise self-images that separate the individual into different selves (e.g. self at work versus self at home). These divisions are supported by cues contained in self-images, which differentially access other information in the autobiographical knowledge base (Conway, 2005). For example, a person who accesses a particular lifetime period will have cues activated by that period which in turn access particular sets of general events which contain cues to specific episodic memories (Conway, 2005).

The content within *lifetime periods* represent thematic knowledge common to that period (Conway & Pleydell-Pearce, 2000). Within any time frame, there may exist any number of lifetime periods. For example, ‘when I worked at a ski resort’ may overlap with ‘when I was dating Brian’ and ‘when I was still living with my mother.’ However, each of these lifetime periods corresponds thematically to different parts of the autobiographical knowledge base. These individual lifetime periods may also be linked in order to form broader, higher level themes such as work or relationships (Conway & Pleydell-Pearce, 2000). General events represent sets of associated events linked by a theme (Robinson, 1992; Conway & Pleydell-Pearce, 2000). These events encompass both extended (e.g., my trip to China; Barsalou, 1988; Williams & Dritschel, 1992) and repeated or categoric events (e.g., ballet lessons; Conway, 1996, Williams, 1996). Brown and Schopflocher (1998) demonstrated that when one AM is used to cue recall of a second, noticeable event clusters emerge, suggesting a temporal organization of general events. To illustrate these ideas, consider Figure 3.2.2, which depicts a man who is an academic by profession. This self-knowledge is part of his life story and accesses the lifetime period “Working at University X” representing personal conceptual knowledge related to work. The

lifetime period could then access the general event of working on a particular project, “Grant Z.” This general event contains knowledge that can access episodic memories (e.g. writing proposal, submitting application), which bring to mind images of those specific experiences (Conway, 2005).

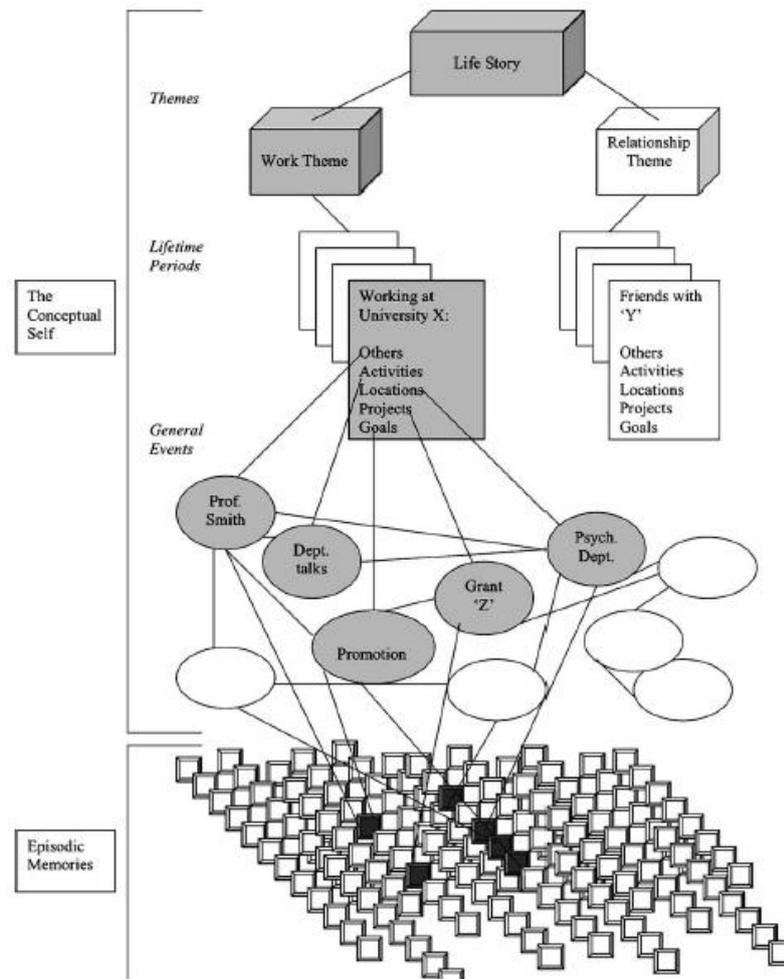


Figure 3.2.2. The relationship between autobiographical knowledge (labelled as “the conceptual self”) and episodic memories within the autobiographical knowledge base (Conway, 2005).

In order to further illustrate these structures, consider the following AM, recalled when “Taiwan” was brought to mind:

When I was four years old, my mother and I went back to Taiwan to visit with my grandparents (her parents) for several months. She was on maternity leave, as she was pregnant with my younger brother. During this time, I attended a nearby preschool. The one event that sticks out in my mind from that period was from a particular afternoon at that preschool. A boy sitting next to me wanted to use a marker that I happened to be colouring with. I kept telling him that I was using it first and he can use it when I'm done, in an increasingly annoyed and loud fashion as any four-year-old would. Apparently this boy *really* wanted that marker since he clawed his fingernails down my face and snatched the marker from my hand. I in turn tackled him to the floor and blackened his eye with my fist. This resulted in my first time getting in trouble in school, and a phone call from my teacher to my mother. Perhaps the most vivid part of this memory is getting off the school bus at the end of the day in front of my grandparents house. My face was burning from being scratched and I felt fearful of my mother's reaction to my fighting at school.

In this example, a theme (Taiwan) activated a lifetime period (when I was four years old), which in turn linked general events (visiting grandparents in Taiwan, attending preschool) with associated episodic memory details (the fight and aftermath).

Cognitive activation through these levels of specificity creates a complete and unique autobiographical memory within the autobiographical knowledge base (Conway, 2005).

At times, a current lifetime period may cue several general events and

associated episodic memories. The themes shown previously in Figure 3.2.2 are each associated with several other general events and lifetime periods. Burt, Kemp, & Conway (2003) demonstrated that general events characteristically activate groups of episodic memories that ground the general event to particular moments in time, as depicted in Figure 3.2.3 below. When new goals, themes and lifetime periods become central to the working self, events that were important to the now expired working self are recorded in the form of general events and associated colonies of episodic memories (Burt, et al., 2003; Conway, 2005).

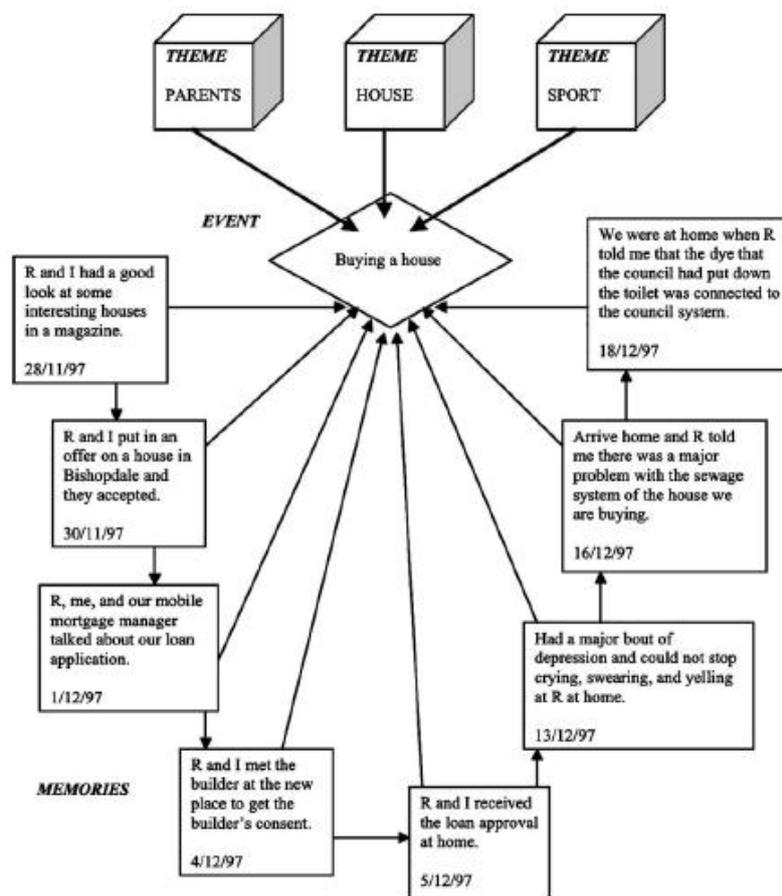


Figure 3.2.3. Episodic memories and a general event (Burt, et al., 2003).

Autooetic consciousness is central to the experience of remembering (Tulving, 1985; Wheeler, Stuss, & Tulving, 1997). Within the SMS model autooetic

consciousness is conceptualized as occurring when episodic memories enter consciousness during autobiographical remembering (Conway, 2005; Tulving, 1985). Episodic memories are “summary records of sensory-perceptual-conceptual-affective processing derived from working memory” (Conway, 2005, p. 612.). These memories operate separately from autobiographical knowledge. Conway (1996) proposed that at the level of general events, knowledge is optimised in terms of its usefulness and ease of access and thus is the preferred level of access to AM. The separation of episodic memories also offers an explanation as to why specific AM are not always formed under normal circumstances. Conway (2009, p. 2306) identified nine characteristics of episodic memories:

1. Contain summary record of sensory-perceptual-conceptual-affective processing.
2. Retain patterns of activation/inhibition over long periods.
3. Are often represented in the form of (visual) images.
4. Always have a perspective (field or observer).
5. Represent short time slices of experience.
6. Are represented roughly in their order of occurrence on a temporal dimension.
7. Are subject to rapid forgetting.
8. Make autobiographical remembering specific.
9. Are recollectively experienced when accessed.

The first characteristic proposes that episodic memories are experience-near, but they are summary records of the experience, not literal. This corresponds to the idea of adaptive correspondence (Section 3.2.1; Conway & Pleydell-Pearce, 2000).

Property two concerns the fact that once an episodic memory is formed, the details within that particular memory are determined by patterns of activation/inhibition guided by goal hierarchies. This allows for property one, remembering in a relevant way, rather than literally as well as self-coherence (Section 3.2.1; Conway & Pleydell-Pearce, 2000). Properties 3, 4, and 5 describe the nature of episodic memories. It has been well established that episodic memories are represented in the form of visual imagery (Brewer, 1988; Galton, 1883). These visual episodic memories always have a perspective. That is, a visual episodic memory with a field perspective is said to preserve an approximation of the person's original perspective. In contrast, in an observer perspective, the person remembering sees him/herself within the visual image (Robinson & Swanson, 1993).

Episodic memories represent short slices of time, preserving information that is highly relevant to goal processing, generation, outcomes & evaluations (Conway, 2009). It is proposed that the boundaries of episodic memories are marked in the beginning by information about goal-related actions and endings are marked with details about the outcomes of those actions or with the start of a new action (Williams, Conway & Baddeley, 2008). Goal junctures can occur at many different levels, the SMS model theorises that episodic memories begin and end with action sequences that dictate a major change in the currently relevant goal. For example, in knitting a scarf, each stitch does not result in its own episodic memory. Putting the knitting down and beginning a different activity such as taking the dog out for a walk or going to the post office should, according to the SMS, be points at which episodic memories are created (Conway, Williams, & Baddeley, 2005).

Finally, consider the last four properties of episodic memory proposed by Conway (2009). Temporal coherence is a key cognitive ability that forms the foundation for logical planning and pursuit of goals (Habermas & Bluck, 2000; Conway & Pleydell-Pearce, 2000). The temporal dimension of episodic memory extends both forward and backward in time. Within approximately 24 hours, most newly created episodic memories are lost (Conway, 2009). Only those associated with current goals and integrated with knowledge structures in the autobiographical knowledge base are retained (Conway, 2005). Therefore, these episodic memories need to be specific enough to provide relevant information in order to create and maintain an adaptive record of recent goal processing so that current progress can be readily accessed.

3.2.3. Organization of episodic memories

Episodic memories are records of short-term goal processing and are formed at goal junctures (Conway, 2005, 2009). Conway (2009) proposed that after episodic memories are integrated with existing knowledge structures, they are represented at three levels of specificity: *episodic elements*, *simple episodic memories*, and *complex episodic memories*. *Episodic elements* (EE) are the most detailed, or experience-near, representations of events in long-term memory. These details are usually in the form of visual images and represent summaries of moments of conscious experience (Moscovitch, 1995; Stern, 2004). EE are usually grouped within a conceptual frame. Frames are contextual knowledge that organize a single EE, or more often a set of EE. EE correspond to experience, whereas the frame locates the EE within a particular memory structure. In this manner, conceptual frames are more involved with

coherence than correspondence (Section 3.2.1; Conway, 2009). Frames are conceived of as an interpretation of EE that gives them personal meaning. According to the present account, a *simple episodic memory* (SEM) is comprised of EE plus a frame (Figure 3.2.4, below). SEM vary in the number of associated EE depending upon the nature of the experience and its self-relevance. Following this view of organization there are two ways to access a SEM, through a cue that is linked in some way to the content of EE, or through a cue that corresponds to the frame. It is proposed that intentional access of SEM occurs most often through the frame and incidental access most often through EE, although given an effective cue access through both in parallel is deemed possible (Conway, 2009).

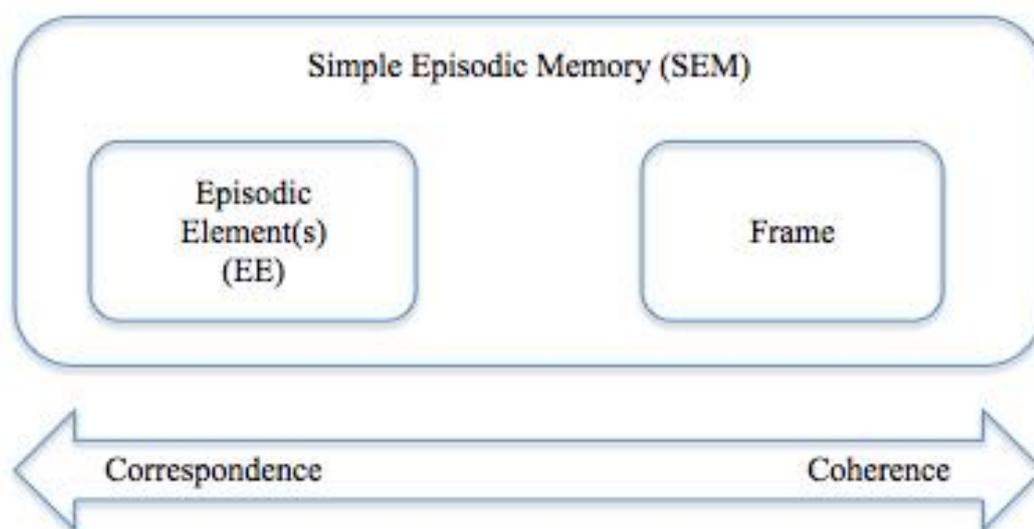


Figure 3.2.4. A simple episodic memory, comprised of a frame and episodic element(s) and relationship to correspondence and coherence. (adapted from Conway, 2009).

SEM themselves may be organized into *complex episodic memories* (CEM; Conway, 2009). CEM consist of SEM linked to a common higher order conceptual

frame (Figure 3.2.5). For example, an everyday event such as “day at school” may be represented by several SEM (e.g. class, lunch, recess).

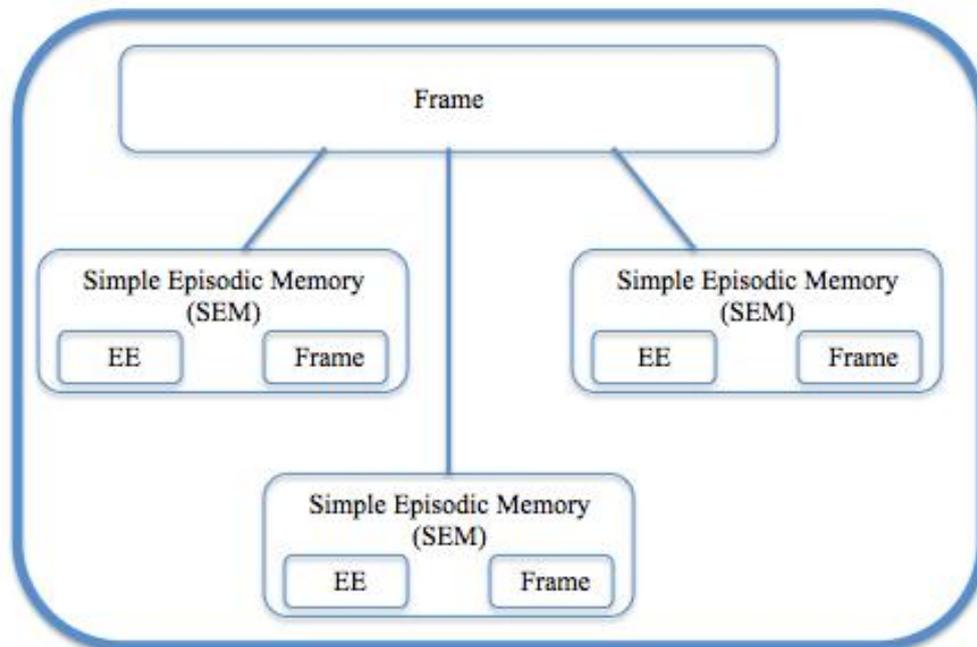


Figure 3.2.5. A complex episodic memory. (adapted from Conway, 2009).

Figure 3.2.6 depicts the incorporation of SEM and CEM within the relationship between the working self and the autobiographical knowledge base (labelled as ‘autobiographical memory,’ below). In this diagram, the working self provides the conceptual context for autobiographical knowledge (Conway & Pleydell-Pearce, 2000). In turn, autobiographical knowledge forms the conceptual context for episodic memories (Conway, 2005, 2009). In other words, a SEM is part of a CEM, which is part of a general event, which is part of a lifetime period, which is part of the conceptual self. As such, AM as a whole can be conceived of as a record of the goal system and basis for future goal generation (Conway & Pleydell-Pearce, 2000).

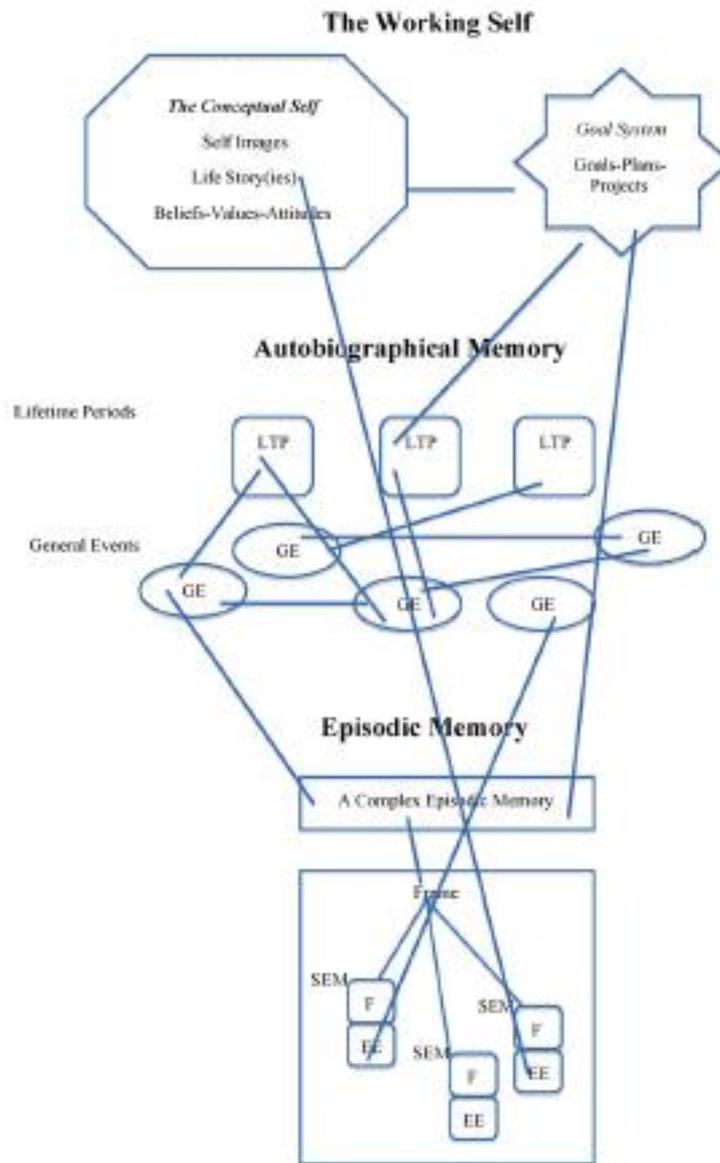


Figure 3.2.6. The embedding of episodic memories within the self-memory system, (Conway, 2009).

Encoding and the environment in which it takes place are critical to the formation of episodic memories (Conway, 2009). It should be noted however, that retrieval also influences episodic memories. It is theorized that accessing SEM and CEM raises their accessibility (Conway & Pleydell-Pearce, 2000). Similarly, accessing associated EE results in some details becoming more available than others (Conway & Pleydell-Pearce, 2000; Conway, 2009). Over time, these patterns of activation/inhibition become fixed and difficult to change (Racsmay & Conway,

2006). In this way, retrieval (particularly repeated retrieval, i.e. rehearsal) shapes episodic memory and autobiographical knowledge.

The following diagram (Figure 3.2.7) illustrates the SMS within human memory as a whole. As discussed in the previous chapter, memory can initially be considered *nondeclarative* (i.e. implicit, without conscious awareness) or *declarative* (i.e. explicit and conscious; Squire, 2004; Tulving, 1972). Nondeclarative memory mostly operates with little to no conscious awareness and includes responses trained through classical conditioning, well-practiced skills, and habits (Squire, 2004). Declarative memory is explicit and conscious and includes both semantic and episodic memories (Tulving, 1972). All factual information not relating to personal experiences are considered semantic. Tulving (1972) conceptualized episodic memories as including all personal experiences. However, as discussed in Section 2.5, not all personally experienced events relate to the self (e.g. remembering a word list; Craik & Lockhart, 1972; Craik & Tulving, 1975; Nadel & Hardt, 2011, Steinvorth, Corkin, & Halgren, 2006). This distinction is reflected in the model as declarative memory separated into *semantic*, *episodic* (unrelated to self), and *autobiographical* (episodic memory relating to self; Figure 3.2.7).

This third category of declarative memory, autobiographical, is completely dedicated to self-awareness and identity (Tulving, 1985; Fivush, 2011). This is where the SMS fits. As previously discussed, AM is the result of a collaboration between the *working self* and the *autobiographical knowledge base* (Sections 3.2.1 & 3.2.2; Conway & Pleydell-Pearce, 2000). The working self uses sets of goal hierarchies and

conceptual knowledge to keep track of goal processing and maintain a cohesive and consistent self.

The autobiographical knowledge base organizes information from personal experiences at varying levels of specificity (Conway & Pleydell-Pearce, 2000). Generally, when a specific AM is brought to mind, the working self provides the context for the AM to the autobiographical knowledge base (Conway, 2005; Conway & Pleydell-Pearce, 2000). Upon receipt of this information, the autobiographical knowledge base, through the *conceptual self*, forms the conceptual context for episodic memories (Conway, 2009). The conceptual knowledge found in both the working self and the autobiographical knowledge base correspond to *personal semantic memory* as both refer to abstract knowledge about the self (Section 2.4; Dritschel, 1991; Kopelman, Wilson, & Baddeley, 1989). However, these constructs differ in their ties to temporally defined events (Brewer, 1986; Conway & Pleydell-Pearce, 2000; Dritschel, 1991; Kopelman, et al., 1989).

CEM correspond to generic personal memory (non-imaginal memory for events; Brewer, 1986), general extended (lasting more than one day; Barsalou, 1988; Williams & Dritschel, 1992), and general categoric AM (repeated similar events; Section 2.4; Conway, 1996; Williams, 1996). SEM parallel personal memory (visual mental images of a particular event; Brewer, 1986) and specific AM (specific event lasting less than one day; Conway & Pleydell-Pearce, 2000, Singer & Blagov, 2002; Williams, 1992). As CEM are made up of SEM, the more general representations of AM (generic personal, general extended, general categorical) can also be thought of

as encompassing the more specific representations (personal memory, Brewer, 1986; specific AM, Williams, 1992).

Past events that have had great implications on life goals are strongly associated with the self (Conway, 2005). As the self progresses through time and goals change, events that were important in the past are recorded in the form of general events and associated colonies of episodic memories (Conway 2005, 2009). These clusters of AM define the past self, remain highly accessible, and are the first that come to mind when that age period is freely sampled Conway & Pleydell-Pearce, 2000). Within these clusters are particularly important AM that highlight key points in an individual's life (Conway, 2005). These self-defining memories are the focus of the next chapter.

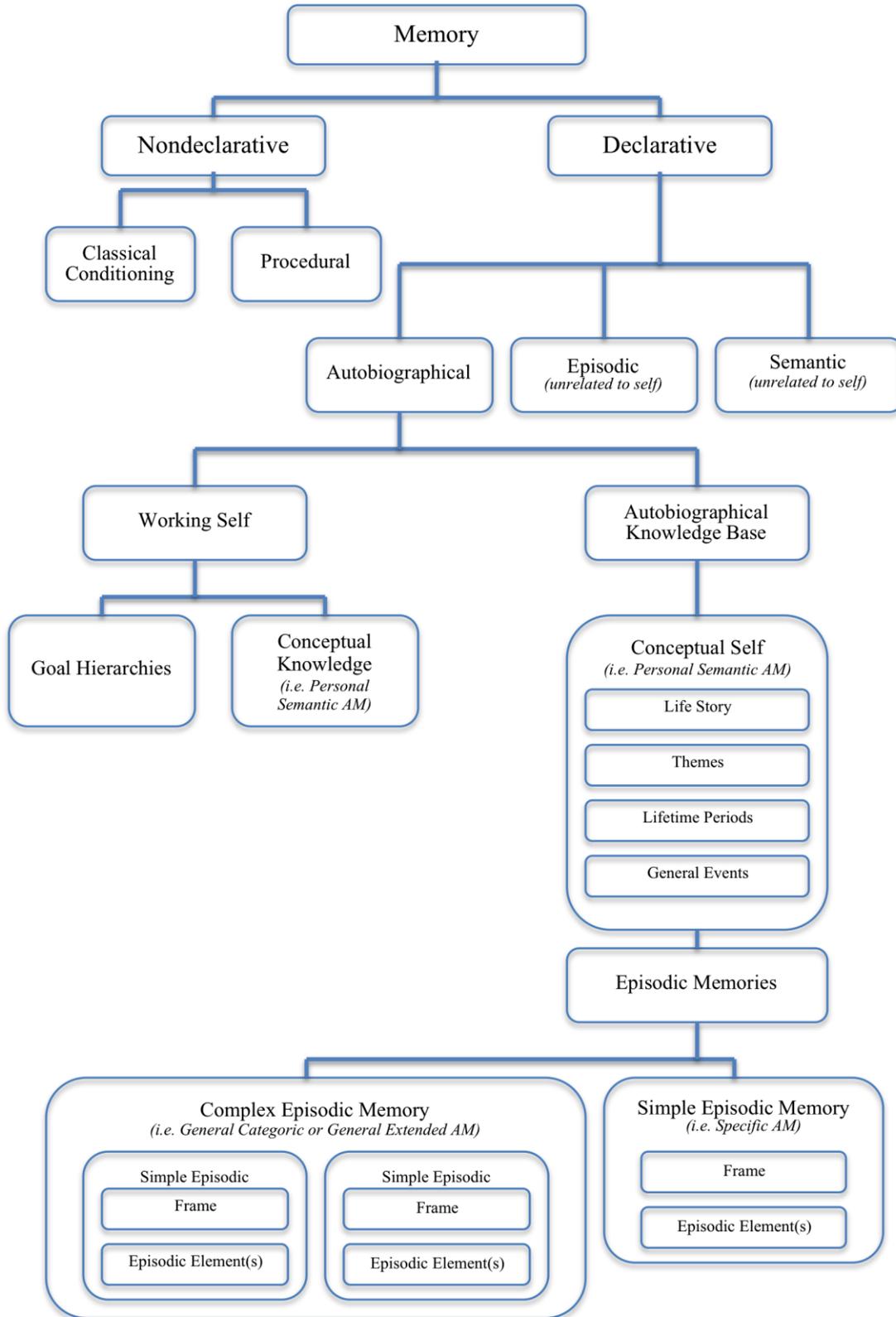


Figure 3.2.7. The self-memory system embedded in human memory.

Chapter 4. Self-Defining Memories

The working self is a key component in the formation of autobiographical memories (AM; Conway & Pleydell-Pearce, 2000). It is strongly influenced by patterns of goal processing and strives to keep a balance between adaptive correspondence (i.e. keeping track of goal progress) and self-coherence (i.e. keeping AM consistent with central aspects of the self; Conway & Pleydell-Pearce, 2000). As an individual moves through time, sets of AM relating to (past) critical goals are left behind. Due to their goal-relevance, these AM are closely linked to past identity and are therefore more easily accessible than other more mundane AM (Conway, 2005). When considered across the lifespan, these sets of AM create an over arching narrative that provides unity & purpose over the lifetime, known as a life story (Conway, 2005; Habermas & Bluck, 2000).

The ability to summarize specific events and see linkage at the general level is necessary for the creation of a life story, and is also crucial to meaning-making and self-understanding (Habermas & Bluck, 2000). The process of meaning-making includes attributing meaning to AM by relating them to abstract knowledge about the self, such as lessons about the self, important relationships, or life in general (Blagov & Singer, 2004). Linking AM to abstract self-knowledge through meaning-making allows AM to affect the self and, as a result, form *self-defining memories* (SDM; Blagov & Singer, 2004; Conway, 2005; Singer, Blagov, Berry, & Oost, 2013). A specific sub-category of life story memories, SDM are described as vivid, emotionally intense, frequently recalled, linked to other similar AM, and focused on an enduring concern or unresolved conflict (i.e. personal goals; Singer & Blagov, 2004; Singer & Salovey, 1993).

4.1. Self-Defining Memories in the Self-Memory System

Self-defining memories can be distinguished from other types of vivid memories. For example, flashbulb memories are a particularly vivid and emotionally charged type of memory, often about important public events (Brown & Kulik, 1977). Witnessing a horrific car accident is, perhaps, an important, vivid, and emotionally intense memory that is often revisited; however, to the passer-by, it is not central to the enduring themes or goals that comprise identity. Therefore, the two main characteristics of SDM that separate them from other vivid and affective AM are: (1) linkage to other similarly themed AM and (2) relevance to an individual's motivations and goal pursuits (Conway, Singer, & Tagini, 2004).

According to the self-memory system (SMS), goal-driven episodic memories are continually being formed and forgotten in response to changes in goal processing (Conway & Pleydell-Pearce, 2000). Few of these memories, however, become integrated with long-term knowledge structures and of those few, even less become self-defining. SDM are only formed when an AM or set of AM contain knowledge of high value to chief goals (particularly those relating to development) in the goal hierarchy of the working self (Conway, et al., 2004). SDM build on existing AM by linking them to other similarly themed significant memories across the lifetime (Demorest & Alexander, 1992; Singer, Blagov, Berry, & Oost, 2013; Thorne, Cutting, & Skaw, 1998). These themes originate from the central goals of the working self and it is through these goals that s are originally encoded and later reconstructed (Conway, et al., 2004). As such, SDM are heavily influenced by changes in these goals as well

as the intense emotions related to those goal changes (Conway, et al., 2004; Erikson, Paul, Heider, & Gardner, 1959).

Self-defining memories have been conceived of as an integration of episodic memory with self-concept (Singer, et al., 2013). In daily life, individuals recall AM that fit with their current self-concept in order to maintain self-coherence (Section 3.2.1; Conway, 2005; Conway, Meares, & Standart, 2004). For example, a woman who sees herself as a ‘good mother (identity)’ will tend to recall AM rich in ‘good-mothering (central goal)’ in order to confirm and enhance her self-concept as a good mother. Clusters of AM that provide evidence of ‘good mothering’ may include: natural childbirth, breast-feeding, enrolling children in extra-curricular activities, or even the child’s achievements. Conversely, AM that disputes ‘good mothering’ (e.g. instances of favouring one child over another or forgetting to pick up child after football practice) will be made less easily accessible. Of the clusters of ‘good mothering’ AM, only a few highlights become integrated into the personal narrative as life story memories (Habermas & Bluck, 2000; Mclean, 2008, Singer & Blagov, 2004). For example, some highlights may include: attending childbirth classes, attempting to discretely pump breast milk while at work, taking child to first ballet lesson, or child winning a ribbon for excellence in playing piano. It is from this smaller group of life story AM that the most important experiences relating to self are determined (i.e. SDM; Singer & Blagov, 2004).

4.2. Dimensions of Self-Defining Memories

Self-defining memories have been found to vary across four dimensions:

meaning, specificity, content, and affect (Blagov & Singer, 2004). AM may be narrated as a story internally or to others, but whether or not personal significance or meaning is attached to that AM is a separate cognitive process (Blagov & Singer, 2004). Singer and Blagov (2004) developed the concept of *integrative memories*, narratives that have been ascribed personal meaning such as lessons about the self, important relationships, or life in general. It is through this meaning-making process that AM affects the self and allows for the creation of (Blagov & Singer, 2004; Singer & Blagov, 2004). Linking AM to abstract self-knowledge through meaning-making gives the AM more cognitive, emotional, and motivational value while also powerfully reinforcing relevant goals (Blagov & Singer, 2004). Creating personal meaning from past struggles and sharing the insight has been found to predict higher self-esteem in college students (Debats, Drost, & Hansen, 1995), shorter grieving periods in bereaved spouses (Bauer & Bonanno, 2001), and greater well-being and sense of growth in parents of disabled children (King, Scollon, Ramsey, & May, 2000). Studies of SDM in college students have found that only 23% to 28% contain integrative (i.e. meaning-making) statements (Blagov & Singer, 2004; Thorne, McLean & Lawrence, 2004). Whereas older adults have been found, compared to younger adults, to report more integrative SDM and engage in more reminiscence that involved the sharing of life lessons (Webster & McCall, 1999).

Autobiographical memories are organized hierarchically according to level of specificity; therefore, retrieval of SDM may lead to the reconstruction of a specific memory containing many sensory details or to more general or summarized memories (Section 3.3; Blagov & Singer, 2004; Conway & Pleydell-Pearce, 2000). Studies of younger adults have found that approximately 70% to 85% of the SDM reported were

specific (Blagov & Singer, 2004; Singer & Moffitt, 1992; Wood & Conway, 2006). Older adults, conversely, have been found to report mostly generalized SDM; this difference between age groups has been attributed to the processes of meaning-making (Blagov & Singer, 2004; Singer et al, 2007). Some studies have reported a negative correlation between meaning-making and SDM specificity (Blagov & Singer, 2004; Singer et al, 2007). In other words, more meaning is attributed to more generalized SDM. Blagov & Singer (2004) suggested that more generalized AM facilitates the ability to link thematically similar experiences and therefore meaning-making and self-understanding. These ideas are consistent with findings that older adults retrieve more generalized SDM that contain more meaning-making statements (when compared to college students) and are also more likely than younger adults to engage in self-reflection and life review (Erikson, 1997; Singer et al 2007; Webster & McCall, 1999).

Meaning-making is also referred to as *autobiographical reasoning* (Habermas & Bluck, 2000). Both terms refer to thinking and talking about the past and forming links between the self and past events in an effort to achieve self-understanding and create a life story (Habermas & Bluck, 2000; McLean, Pasupathi, & Pals, 2007). Creating a connection between the experience and the self is one of the most basic functions of AM (Pasupathi & Mansour, 2006; Pasupathi, Mansour & Brubaker, 2007). This connection, a *self-event connection*, can vary in whether the individual describes it in terms of change in self or in terms of self-stability. Stability or self-explanatory connections are more prevalent among older adults and may serve to bolster self-concept (Brown, Asher, Cialdini, 2005; McLean, 2008a; Pasupathi, et al., 2007). The need for a coherent and consistent narrative about the self increases with

age (Cohler, 1993). Specifically, older adults, even while experiencing change, narrate the past in terms of self-explanatory connections, in order to preserve self-continuity, stability, and resolution (Sneed & Whitbourne, 2001; Troll & Skaff, 1997). Younger adults, in contrast, narrate the self in terms of change (McLean, 2008b). As young adulthood is generally a period of transition (e.g. child to adult, school to work), integrating different changes in the past may provide a more fluid sense of self, one that is open to opportunity and new possibilities for development (McLean, 2008b).

When early adolescents first begin to express themselves in a narrative fashion, processing and creating self-event connections is the first manifestation of autobiographical reasoning (Habermas & Bluck, 2000). The next stage of life story development involves making *event-event connections*, drawing links between past events, rather than between self and event (McLean, 2008a). This stage corresponds to the emergence of narrative identity (Habermas & Bluck, 2000). As such, it is not expected to begin until young adulthood (Habermas & Bluck, 2000; McAdams, 1993). Event-event connections are similar in concept to thematic coherence (Habermas & Bluck, 2000) in that both require the ability to understand a larger story beyond isolated events. Thematic coherence can be conceived of as a broader level of event-event connections. For example, a woman that has experienced repeated relationships in which the partner was unfaithful (event-event connections) may conclude that “men are untrustworthy” (theme).

Memory content refers to the main subject matter emphasised in a narrative and reflects one of the individual’s chief concerns (Singer, Rexhaj, & Baddeley,

2007). When young adults' SDM are examined for content, the vast majority are relationship-themed (44%, Lardi, D'Argembeau, Chanal, Ghisletta, & Van der Linden, 2010; 31%, Blagov & Singer, 2004; 45%, Thorne, et al., 2004); within those relationship-themed SDM, approximately half contain an explicit reference to discomfort, unease, or disagreement, termed *tension* (Lardi, et al. 2010; Thorne, et al., 2004). Memories that contain tension can either concern bad events that turn good, *redemption sequence*, or a good event that turns bad, *contamination sequence* (McAdams, Reynolds, Lewis, Patten, & Bowman, 2001). Reflecting on stressful events is adaptive; it tends to lessen the tension associated with AM retrieval and promotes efforts to avoid such situations in the future (Taylor, 1991; Thorne et al., 2004). Accordingly, SDM with more autobiographical reasoning and tension also tend to include more redemption sequences (Lardi, et al. 2010). These relationship-themed SDM appear to last into old age, as older adults' SDM have also been found to be mostly relationship-themed (Singer, et al., 2007).

The affect, or emotion, assigned to a particular SDM may vary in the type (e.g. positive or negative) as well as the intensity. In an evaluation of the connection between SDM and long-term goals, Moffitt and Singer (1994) asked 117 undergraduates to provide 10 SDM and rate each memory for 10 different emotions. On a separate occasion, the same undergraduates provided 15 personal strivings and rated each striving according to 10 dimensions. Finally, participants rated each SDM for its relevance to attaining or not attaining each personal striving. Young adults' feelings toward personal strivings were linked to their feelings toward their SDM. Those who reported more positive SDM rated personal strivings as more important and felt more optimistic about goal attainment. Participants who reported more

negative SDM rated personal strivings as more difficult and had higher avoidance striving, confirming that how people feel towards their goals is also how they feel about their SDM (Moffitt & Singer, 1994). Research on SDM in college students has shown that negative emotion is somewhat more prevalent than positive emotion (Blagov & Singer, 2004; Singer & Moffitt, 1992; Wood & Conway, 2006). Singer & Moffitt (1992) found that over half (55%) of college students' SDM were negative. Similarly, Blagov & Singer (2004) found negatively charged SDM to be dominant (about 58%) among undergraduates. In contrast, older adults' SDM appear to be predominately positive in emotional tone, showing a *positivity effect*, such that positive events are highlighted and negative ones are re-framed (Singer, et al., 2007). This coincides with studies showing that the prioritization of emotion regulation, and therefore emotional well-being, improves with age (Carstensen, 1993; Lang & Carstensen, 2000; Ritchie, Skrowronski, Cardogan, & Constantine Sedikides, 2013).

Thus far, it appears that SDM retrieved at different ages in the life course, both look and function differently (McLean, 2008; Singer, et al., 2007). When compared with younger adults, older adults' SDM are more vivid, positive, and general, and contain more integrative meaning-making statements that emphasize stability and continuity (Singer, et al., 2007). Singer and colleagues (2007) proposed that these results could indicate that younger adults simply do not have the perspective that older adults do when they examine their life events. Older adults have had more time to distance themselves from certain events and generalize and relate them to other similar instances (Habermas & Bluck, 2000; McLean, 2008). Therefore, older adults are able to create a coherent story and elaborate on how these events relate to themselves to create meaning (McLean, 2008). This meaning-making process appears

to be difficult for younger adults since they have not had the time to create perspective. Thus, they do not have the same freedom as older adults to frequently recall specific episodes and compare them to related experiences. Without this widened perspective, younger adults lack the capability to create deeper meaning from their SDM (Thorne, et al., 2004).

Chapter 5. Alzheimer's Disease

The central question to this thesis is, “does a loss of AM result in a loss of identity?” The construction of a healthy personal identity is a life-long process that requires continually incorporating new experiences into the life story (McAdams, 1985). Basic cognitive processes, such as the construction and telling of personal narratives, rely upon a hierarchal organization of personal goals (Chapter 3; Conway & Pleydell-Pearce, 2000). In older adults, highly prioritized goals include: generativity, an inner desire to nurture and benefit future generations, and emotion regulation, motivation to maintain a positive well-being (Section 3.1; Conway & Holmes, 2004; Erikson, 1997; Lang & Carstensen, 2000). Highly goal-relevant AM are also closely linked to personal identity, both past and present and form an overall life story when viewed across the life time (Conway, 2005; Conway & Pleydell-Pearce, 2000).

Maintaining a healthy narrative identity requires a cooperative effort from both episodic memory and meaning-making in order to achieve insight and well-being (Chapter 4; Erikson, 1968; McLean, 2008). Meaning-making allows AM to affect the self through linking AM to abstract self-knowledge, thereby creating self-defining memories (Section 4.1; Conway, 2005; Blagov & Singer, 2004; Singer, Blagov, Berry, & Oost, 2013). SDM are only formed when an AM or cluster of AM contain knowledge of high value to central goal hierarchies in the working self (Conway, Singer, & Tagini, 2004). Older adults' SDM are characterised as more general, positive, vivid, and containing more meaning-making statements than SDM from younger adults (Section 4.2; Singer, Rexhaj, & Baddeley, 2007).

Older adults are also more likely than younger adults to engage in self-reflection and life review, as well as in more reminiscence involving the sharing of life lessons (Erikson, 1997; Singer, et al., 2007; Webster & McCall, 1999). It has been found that when older adults freely reminisce (or when AM are cued), the majority of stories shared are from adolescence and young adulthood (Rubin, Wetzler, & Nebes, 1986; Rubin, Rahhal, & Poon, 1998). Reasons for sharing past AM through reminiscence with others change as people age. As individuals grow older, the need for a coherent and consistent narrative about the self increases (Cohler, 1993). In older adults, personal narratives provide a means for preserving self-continuity through stability and resolution (McLean, 2008b).

According to McAdams (1985), a loss of AM can be seen as a loss of identity, as identity is based on our personal experiences. In order to explore this idea, older adults with Alzheimer's were included as AD is characterised by a loss of autobiographical memory (Piolino, Desgranges, Clarys, Guillery-Girard, Taconnat, Isingrini, & Eustache, 2006).

5.1. A Neurological Account

Groups of neurons, as well as the patterns and frequency of firing among those neurons represent information in the brain (Conway, Pleydell-Pearce, Whitecross, & Sharpe, 2002). The areas of the brain that are primarily affected by Alzheimer's disease are the frontal (judgement and behaviour), temporal (memory), and occipital lobes (language), depicted below in Figure 5.1 (Westmacott, Black, Freedman, &

Moscovitch, 2003). The area of most relevance to the purposes of this thesis is the temporal lobe. The hippocampus, located within the temporal lobe, is chiefly responsible for storing and retrieving information (Conway, et al., 2002; Westmacott, et al., 2003)

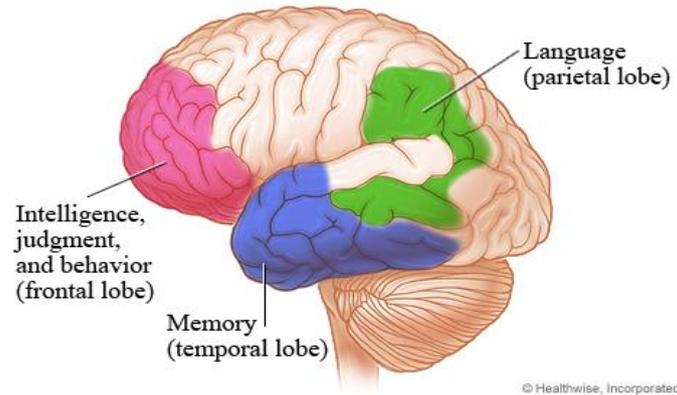


Figure 5.1. Areas of the brain affected by Alzheimer's Disease (WebMD Medical Reference from Healthwise, 2012).

As the disease progresses, plaques develop within brain cells and tangles develop among the neural connections (Figure 5.2; Small & Mayeux, 2010). As this neurodegeneration continues, gaps between neurons begin grow causing the brain as a whole to shrink (Figure 5.3; Small & Mayeux, 2010).

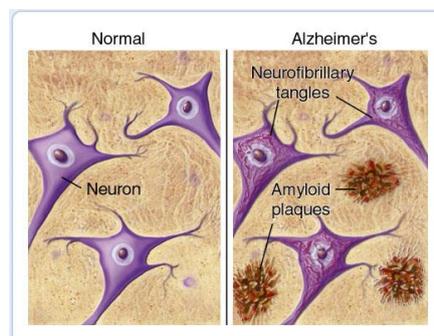


Figure 5.2. Alzheimer's brain cells. (WebMD Medical Reference from Healthwise, 2001).

In a review of imaging studies of AM and matched list-learning episodic studies, Gilboa (2004) found differences in neural activations of autobiographical versus episodic memories within the frontal lobe of the brain. However, it appears that many studies that examine the neurological representations of AM continue to adhere to the original separation of declarative memory into episodic and semantic; equating AM with general episodic memory that may or may not be self-relevant (Tulving, 1987). Two main theories prevail regarding the neural organization of semantic and episodic memories, the *multiple systems view* and the *unitary system view*.

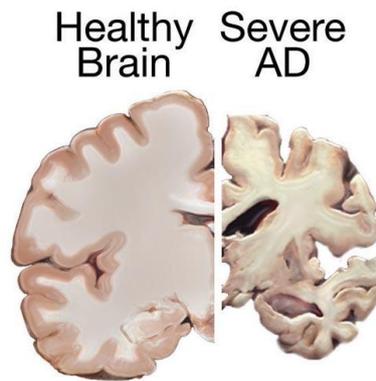


Figure 5.3. A healthy brain compared to a brain suffering from Alzheimer's Disease (National Institutes of Health, 2011).

The composition of declarative memory as a single memory system with semantic and autobiographical memory at opposite ends of the continuum is known as the *unitary system view* (Baddeley, 1984; Rahjah & McIntosh, 2005). Semantic and autobiographical memory are theorized to overlap; even vivid autobiographical memory at the far end of the spectrum is seen to contain some semantic information (Gilboa, 2004). Similarly, semantic memories usually contain some context from which they were acquired, though that context may be degraded and lacking in detail

(Gilboa, 2004). Evidence for a unitary system is provided in functional imaging studies where participants were given episodic and semantic retrieval tasks, and no significant differences in regional brain activation were found (Burianova, McIntosh, Grady, 2009; Rahjah & McIntosh, 2005).

Researchers have found through functional imaging that regardless of the age of the AM, similar parts of the hippocampus are activated during encoding and retrieval (Nadel, Samsonovich, Ryan, & Moscovitch, 2000; Gilboa, Winocur, Grady, Hevenor, & Moscovitch, 2004; Ryan et al., 2001). Likewise, Danker and Anderson (2010) analysed a broad range of experiments and found that in the majority of those studies, the same neural circuits in the hippocampus and neocortex are activated during both encoding and retrieval of episodic memories. Yet other researchers have found, when comparing brain activity during retrieval of recent or remote AM, hippocampal activity during retrieval is unaffected by the remoteness of the AM (Maguire, Henson, Mummery, & Frith, 2001; Ryan, Nadel, Keil, Putnam, Schnyer, Trouard, & Moscovitch, 2001).

The *multiple systems view* posits that there are separate neural networks for episodic and semantic memory (Tulving, 1987). Evidence for this view comes from studies that show functional dissociations between these two memory representations. Episodic memory has been found to correlate with the front temporal lobe; patients with damage to this area are characterized by semantic memory loss, however, their episodic memories are spared (Graham, Lee, Brett, & Patterson, 2003; McKinnon, Black, Miller, Moscovitch, & Levine, 2006; Snowden, Griffiths, & Neary, 1994). Patients with lesions to the medial temporal lobe are typically impaired on AM tasks,

but are able to retrieve semantic memories freely, suggesting that the medial temporal lobe is exclusively responsible for AM retrieval (Gadian, Aicardi, Watkins, Porter, Mishkin, & Vargha-Khadem, 2000; Hirano & Noguchi, 1998; Tulving, Hayman, & Macdonald, 1991; Tulving & Markowitsch, 1998).

5.2. Impact on Autobiographical Memory

A loss of autobiographical memory can be seen as a loss of self, as our self-identity is based on our personal experiences (McAdams, 1985). Addis & Tippett (2004) compared the AM and self-identity of a group of healthy older adults to a group of older adults with AD. AM was assessed using the autobiographical memory interview. Identity was assessed using the Twenty Statements Test, which requires participants to answer the question “Who am I?” with 20 “I am...” statements about themselves (Kuhn & McPartland, 1954) as well as the identity component of the Tennessee Self-Concept Scale, which consists of 82 statements that are rated on a 5-point scale from ‘always true’ to ‘always false’ with regard to the person individually. (Fitts & Warren, 1996). It was found that older adults with AD have a weaker sense of personal identity, and a more abstract sense of self than the healthy older adults. Only a weak correlation was found between AM and identity. A similar relationship was found between AM and identity by Naylor & Clare (2008) who also used the same measures with healthy older adults and older adults with dementia.

Eustache, Piolino, Giffard, Viader, Sayette, Baron, et al. (2004) asked older adults with AD to produce specific detailed personal event memories for three different time periods: childhood/ adolescence, middle age, and the previous five

years excluding the past twelve months. It was found that the older adults with AD retrieved less specific memories than healthy controls across the three time periods and showed a temporal gradient with the most remote period being best preserved. This temporal gradient is often referred to as *Ribot's Gradient*, for Ribot's law of retrograde amnesia (Ribot, 1992). That is, for patients with retrograde amnesia, memories will be progressively lost starting from the most recent to the most distant.

Evidence for this gradient in older adults with AD is mixed. Some studies have found that older adults with AD retrieve virtually no recent memories, unlike healthy older adults (Leyhe, Müller, Milian, Eschweiler, & Saur, 2009; Addis & Tippett, 2004; Irish, Lawlor, O'Mara, & Coen, 2011). Other studies found that older adults with AD generally retrieve significantly fewer memories than healthy older adults, and these memories mirror the bump of the healthy group on a lesser level (Fromholt & Larsen, 1991; Meeter, Eijsackers, & Mulder, 2006). These latter findings may be due to the inclusion of older adults with mild AD. A significant temporal difference may have emerged if the healthy older adults had been solely compared with older adults with more severe AD.

Several theories account for the preservation of earlier AM. The *multiple trace theory* (MTT) proposed by Nadel & Moscovitch (1997), states that memories are represented with multiple pathways or "traces." Each time a memory is reconstructed during recollection, a memory trace is created. Thus, according to MTT, earlier memories are better remembered because they have had more opportunities to be remembered (i.e. rehearsed) and therefore are represented by more traces within the hippocampus and neocortex; the hippocampus remains an active player in

remembering.

A second neurological model for AM processes is the *consolidation theory* (Squire & Alvarez, 1995). According to this theory, AM are first acquired through the hippocampus, then stored within the temporal lobe in the neocortex, the outermost layer of the brain (Baylis, Rolls, & Leonard, 1987). The hippocampus acts as an “index,” referencing which cortical nodes are involved with particular memories (Squire & Alvarez, 1995). The hippocampus continues this role until the memory connections within the neocortex are strong enough that the hippocampus is no longer needed in the process of retrieval (Squire, 1992; Squire & Alvarez, 1995). This “consolidation” of AM is counter to MTT, which proposes that both the hippocampus and the neocortex are necessary in the encoding and reconstruction of memories and the hippocampus remains an active player in remembering (Nadel & Moscovitch, 1997).

Researchers have proposed that AM consolidation occurs during slow-wave sleep, since that is when transmission in the hippocampus tends to be the most efficient (Squire & Alvarez, 1995). Many studies have shown that hippocampal activity patterns during the day are reactivated again during slow-wave sleep (Nádasdy, Hirase, Czurkó Csicsvari, & Buzsáki, 1999; Pavlides & Winson, 1989; Sutherland & McNaughton, 2000; Wilson & McNaughton, 1994). Qin, McNaughton, Skaggs, and Barnes (1997) found that the replay of hippocampal activity patterns in slow-wave sleep was also mirrored in the parietal lobe of the neocortex. Thus hippocampal and neocortical patterns that were active together during the day were also active together during slow-wave sleep.

A third explanation proposes that frequent retrieval of some personal memories may result in them becoming *semanticized* (Gilboa, 2004; Haslam, Jetten, Haslam, Pugliese, & Tonks, 2011). That is, although a memory is initially encoded as episodic, frequent retrieval of the same memory over time may cause it to become semantic. This idea is also in conjunction with the remember/know paradigm, which distinguishes between *remembering* an event and *knowing* it happened (Tulving, 2001). For example, a high school student wore a pink dress with frills to her first dance. In the first few years immediately following the event, she may *remember* that specific memory of wearing the pink dress to the dance along with the sights, sounds and smells of the event. However, many years later the memory may just become an autobiographical fact, or semantic memory, unaccompanied by any of the previous sensory details (Haslam, et al., 2011; Martinelli, et al., 2013).

The semantization of AM, may explain why older adults with Alzheimer's patients have many detailed memories from their early lives (Leyhe, et al, 2009; Addis & Tippett, 2004; Irish, et al., 2011); older memories have more opportunities to become preserved through retrieval and rehearsal over time. In accordance with consolidation theory, when personal episodic memories have built up enough pathways that they can be directly retrieved from the neocortex and no longer require the aid of the hippocampal system, they lose spatial and temporal context- and become personal semantic memories (Schooler, Shiffrin, & Raajmakers, 2001; Rosenbaum, Winocur, & Moscovitch, 2001; Meeter & Murre, 2004). In support of this explanation, Kinsbourne & Wood (1975) found that amnesic patients with hippocampal damage were able to recall AM in a way that resembled general factual

knowledge rather than vivid and detailed specific episodes. Overall semantization of AM suggests that identity can be preserved in absence of detailed specific AM, provided that personal semantic information has been extracted from those experiences.

Chapter 6. Experimental Design

This thesis examines autobiographical memory (AM) across the life course through a series of four experiments with young and older adults, including a group with Alzheimer's disease (AD). The overarching question is “does the loss of AM result in a loss of identity?”

Experiment 1

The purpose of the first experiment was to establish what healthy AM is like in healthy older adults. Older adults were used as the primary group of participants because, due to their age, they have a lifetime of AM to examine. Healthy older adults have a tendency to recall personal experiences from adolescence and young adulthood more often than any other time of life, resulting in a distribution of AM called the reminiscence bump (Rubin, et al., 1986; Rubin, Rahaal, & Poon, 1998). The life story account unifies past theories (maturational development, cognitive, narrative-self/identity, and life script) into a holistic explanation for this distribution in remembering. According to the life story account, AM from the bump are better remembered because these memories are more novel/distinctive, vivid, positive, important for identity development and also tend to mark periods of transition (Demiray, Gülgöz, & Bluck, 2009).

The majority of AM contained within the reminiscence bump period have been found to relate to relationships, echoing anticipated events such as marriage and arrival of children (Singer, Rexhaj, & Baddley, 2007; Cohen & Faulkner, 1988;

Holmes & Conway, 1999). Work/education related AM make up the second most common theme in the bump (Schroots & Assink, 2005; Lardi, et al., 2010; Elnick, et al., 1999; Blagov & Singer, 2004). The exact subject matter conveyed within bump AM was of chief interest in this study. Therefore, the first two objectives of Experiment One were (1) to determine whether the life story account for the bump provides a comprehensive explanation and (2) to explore the subject matter of AM that are incorporated into identity across the life time.

Five positive and five negative cue words were chosen as emotions that are universally experienced. Participants were asked to recall a specific AM in response to each word, then rate the qualities of each reported AM (importance, rehearsal, vividness and pleasantness) on a five-point scale (Rubin & Schulkind, 1997). A younger sample was included in order to gain a more detailed look at the commonalities and differences between the two age groups' AM from the bump period of life.

If the life story account is indeed a comprehensive explanation for the bump, then it would be expected that AM from the bump period would be more novel/distinctive, vivid, positive, important for identity development and also tend to mark periods of transition (Demiray, Gülgöz, & Bluck, 2009). It was also predicted that the content of AM from younger adults would mirror the content in older adult's AM from the bump, giving insight into the details of AM that are incorporated into identity.

The third objective of this study was to further explore the positivity bias in older adults' specific AM, in particular, to determine if positive bias in older adults is the result of the rehearsal or reconstruction of past experiences (Carstensen, 1993; Carstensen, Isaacowitz, & Charles, 1999). Studies have shown that emotional well-being increases with age (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Carstensen, Turan, Scheibe, Ram, Ersner-Hershfield, Samanez-Larkin, Brooks, Nesselroade, 2011). According to socioemotional selectivity theory (SST), this is because older adults see their future time as limited and therefore focus on more positive emotional experiences (Carstensen, 1993; Carstensen, et al., 1999). One implication of this perspective is that the emotional benefit of rehearsal might encourage more frequent retrieval and thus amplify the resilience and availability of those positive AM (Gallo, Korthauer, McDonough, Teshale, & Johnson, 2011). Other studies, however, have found that older adults do not always reminisce more often about positive experience than younger adults (Alea, 2010; Comblan, et al., 2005). Gallo and colleagues (2011) have suggested that both positive and negative event details are equally accessible; positivity is the result of older adults focusing more on the positive details when reconstructing past experiences.

Based on the positivity found in older adults, it was predicted that only positive AM would result in a bump, negative events would not (Carstensen, 1993; Glück & Bluck, 2007; Rubin, Berntsen, & Hutson, 2009). Also according to SST and recent literature, no age difference was expected in the number of specific AM retrieved in response to positive versus negative cue words or in the rehearsal of those AM; a difference was expected, however, in the appraisal of past negative events,

with older adults rating negative experiences more positively (Comblain, et al., 2005; Gallo, et al., 2011).

Experiment 2

The second experiment was designed in an effort to further explore the role of relationships with others and personal goals in identity, particularly in the creation of self-defining memories (SDM). Personal identities are defined by past experiences (McAdams, 1996). Which past experiences are readily available depends largely on the current goals of the self (Conway & Pleydell-Pearce, 2000). As people age and begin to perceive their time remaining as limited, goal priorities shift toward the more emotionally meaningful and positive, such as generativity and emotional regulation (SST; Carstensen, 1993; Carstensen, et al., 1999). These changes in goal hierarchies over time result in groups of highly goal-relevant AM that are left behind (Conway & Pleydell-Pearce, 2000). These AM, while not currently goal-relevant, continue to define the person's past identity. When these clusters of readily available AM are considered across the lifespan, they form a life story (Thomsen & Berntsen, 2008; Conway, 2005).

Life story memories exist in the form of lasting life narratives and are crucial to personal identity (McAdams, 1985). The process of meaning-making transforms life story memories into self-defining memories (SDM; Blagov & Singer, 2004). Meaning is attributed to life story memories by relating those AM to abstract knowledge about the self (e.g. attitudes/beliefs, personal semantic AM; Blagov & Singer, 2004). Therefore, SDM can be conceived of as a particular type of life story

memory characterised as vivid, emotionally intense, linked to other AM, frequently retrieved, and focused on a central goal-hierarchy (Singer & Blagov, 2004; Singer & Salovey, 1993). The majority of SDM reported from older adults have been found to be relationship-themed (Singer, et al., 2007; Holmes & Conway, 1999). It is unclear, however, whether the focus in these experiences is on the other person in the relationship or on the individuals themselves. The first purpose of this experiment is to explore the role of goals in SDM.

Participants were asked to provide five memories that they feel define themselves. They were allowed as much time as necessary and reminded that the event could be of anything from anytime in their lives, as long as the memory was one that was important and has a strong relation to the person they are currently. Goals were assessed using a sorting task in which participants organized goal priorities into ranked tiers, reflecting the hierarchical nature of goal processing (Conway & Pleydell Pearce, 2000). Based on SMS, if goals define our identities, and identities are developed in adolescence, then older adults' SDM from between ages 10-30 should reflect those from the younger adults (Conway, 2005; Erikson, 1959).

Among older adults, the majority of AM retrieved from the reminiscence bump period are specific (occurring at a particular time and place; Singer & Blagov, 2002; Williams, 1992). This trend is also mirrored in younger adults still in the midst of the bump era (Singer & Blagov, 2002). The life story account explains that the specific nature of these AM are a result biological maturation, new and unique experiences, adult identity formation, and important events in life scripts (Baltes, 1996; Berntsen & Rubin, 2004; Jansari & Parkin, 1997; Piolino et. al., 2006;

Thomsen, Pillemer, & Ivcevic, 2011); however, studies have found that when SDM are isolated from other life story memories, older adults' SDM are more general than those from younger adults (Blagov & Singer, 2004; Singer, et al., 2007). This generalization of SDM in the older group illustrates the creation of SDM from life story memories through the process of meaning-making (Section 4.2; Blagov & Singer, 2004; Singer & Blagov, 2004).

The ability to link life events at a more global level allows the person to compare and contrast experiences across the lifespan and extract meaning and life lessons from important events and time periods (Blagov & Singer, 2004). This has been debated in a recent study, which did not find any significant difference in specificity between older and younger adults' SDM (Martinelli, Anssens, Sperduti, & Piolino, 2013). Therefore, the second aim of this study was to determine if SDM from older adults are indeed more general as a result of the processes of meaning-making. Based on the majority of previous findings, it was expected that older adults' SDM would be more general; younger adults' would be more specific and emphasize periods of transition (Blagov & Singer, McLean, 2008, Singer, et al., 2007).

Experiment 3

In order to create meaning, life story AM are generalized and linked to abstract self-knowledge in order make comparisons between experiences across time (Blagov & Singer, 2004). Past studies have found SDM from older adults to be less specific than younger adults (Blagov & Singer, 2004; Singer, et al., 2007). The purpose of this experiment was to compare AM deemed *self-defining* in the previous

experiment to those deemed significant. Older and younger adults were shown photos of annual events and asked, “what was your most significant (event)?” Significance is equated with self-relevance according to self-narrative/identity formation theories (Conway, 2005; Habermas & Bluck, 2000). In order to ascertain if self-relevance is determined by a person’s individual experience (e.g. personal accomplishment) or through others (e.g. working together or achievements of own children) the self versus others-focus in AM deemed significant was examined. Based on identity formation and socioemotional selectivity theory (SST), it was hypothesized that significant AM from within the bump period would be more self focused due to the imperative to form a personal identity; significant AM from after the bump will be more others focused due to the influence of generativity resulting from a decrease in future time perspective (Carstensen, 1993; Carstensen, Isaacowitz, & Charles, 1999; Conway & Pleydell-Pearce, 2000; Erikson, 1968).

Experiment 4

The purpose of the final experiment was to determine if a loss of AM results in a loss of self. Based on the qualities of healthy older adults’ AM gathered from the previous three experiments, a picture of healthy AM will be determined and compared with a group of older adults with Alzheimer’s disease (AD). This disease is characterised by a loss of AM; in contrast to the mostly positive and detailed experiences retrieved by healthy older adults from the bump era, when asked for their personal experiences, older adults with AD mostly share events from childhood (Eustache, Piolino, Giffard, Viader, Sayette, Baron, et al., 2004; Piolino, Desgranges, Clarys, Guillery-Girard, Tacconnat, Isingrini, & Eustache, 2006; Ribot, 1882). Both

healthy older adults and older adults with AD were shown photos of annual events and asked for AM relating to the photos. In order to determine the link between AM and identity, the role of goal-hierarchies, personal narratives, relationships, and personal semantic AM in determining personal identity in healthy older adults were considered and compared to the group with AD.

Chapter 7. Participants

7.1. Background data

A total of 116 participants were recruited. This included 51 young adults (9 men) aged 18-23 ($M = 19.63$, $SD = 1.30$), 65 healthy older adults (29 men) aged 59-98 ($M = 75.32$, $SD = 9.99$), and 21 older adults (7 men) diagnosed with Alzheimer's Disease (AD) aged 57-98 ($M = 82.24$, $SD = 11.16$). All young adults were undergraduate students at the University of St Andrews. All healthy older adults were living independently and were recruited from the St Andrews and Dundee areas. Participants were either paid £4 or given academic credit if they were university students. Not all participants partook in all measures. One older woman was excluded from the healthy older adult group because her HADS score fell outside the healthy range.

| | <i>n</i> | Age | | Years of Education | |
|-------------|----------|----------|-----------|--------------------|-----------|
| | | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young | 51 | 19.63 | 1.30 | 13.33 | .95 |
| Old | 65 | 75.32 | 9.99 | 12.10 | 3.29 |
| Alzheimer's | 21 | 82.24 | 11.16 | 10.81 | 3.83 |

Table 7.1. Descriptive information for age and years of education of all participants recruited.

7.2. MMSE (Folstein, Folstein, & McHugh, 1975)

The *Mini-Mental State Examination* (MMSE; Appendix 6) was used as a

broad measure of cognitive function for the older adults. It is a brief 30-point test designed to identify signs of cognitive impairment in older adults. The MMSE was used to ensure that the healthy older adult participants did not have cognitive impairment. Scores between 27-30 are considered to be in the normal range (Folstein et al., 1975). All of the men and women in the healthy older adult group ($M = 28.82$; $SD = .80$) scored within the healthy range. All of the participants with AD scored below the healthy range ($M = 14.76$; $SD = 5.24$; Table 4.3). The means between these two groups were statistically different, $t(26.64) = -9.98$, $p < .01$, two-tailed, equal variances not assumed. The MMSE was not administered to the young adult group as it was designed and validated for older adults as a screen for cognitive decline. Healthy young adults would not be expected to have any difficulties with this simple test.

7.3. HADS (Zigmond & Snaith, 1983)

The *Hospital Anxiety and Depression Scale* (HADS; Appendix 7) was used as a broad measure of emotional wellbeing for both the older and younger participants. The HADS comprises 14 statements, 7 about anxiety and 7 for depression, that participants endorse on a scale in terms of the frequency with which they have these feelings. An example of an anxiety statement is “worrying things go through my mind”: 3 – ‘a great deal of the time’; 2 – ‘a lot of the time’; 1 – ‘from time to time’; 0 – ‘Only occasionally.’ A depression statement is “I look forward with enjoyment to things”: 0 – ‘as much as I ever did’; 1 - rather less than I used to’; 2 – ‘definitely less than I used to’; 3 – ‘hardly at all.’ Through a metaanalysis of studies, a cut-off point of 8 out of 21 was identified for anxiety or depression, therefore a healthy score for

either anxiety or depression would be 7 or below (Bjelland, Dahl, Haug, & Neckelmann, 2002). Both the healthy older group (anxiety $M = 4.22$, $SD = 2.08$; depression $M = 3.48$, $SD = 1.88$) and younger group (anxiety $M = 5.43$; $SD = 1.98$; depression $M = 2.79$; $SD = 2.22$) scored within this healthy range (Table 7.2).

| Group | <i>n</i> | HADS Anxiety | | HADS Depression | | MMSE | |
|-------------|----------|--------------|-----------|-----------------|-----------|----------|-----------|
| | | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young | 51 | 5.43 | 1.98 | 2.79 | 2.22 | - | - |
| Old | 65 | 4.22 | 2.08 | 3.48 | 1.88 | 28.82 | .80 |
| Alzheimer's | 21 | - | - | - | - | 14.76 | 5.24 |

Table 7.2. Descriptive information for HADS and MMSE scores of all participants recruited (Folstein, et al., 1975; Zigmond & Snaith, 1983).

Chapter 8. Experiment 1

Older adults tend to recall more events from adolescence and young adulthood (approximately ages 10-30) more often than any other period in their lives; this enhanced accessibility of autobiographical memories (AM) is known as the reminiscence bump, or simply the ‘bump’ (Rubin, Rahhal, & Poon, 1998; Rubin, Wetzler, & Nebes, 1986). Bump memories have been described as “more novel, more distinctive, more important for identity development, and more likely to reflect life transitions than memories from other life phases” (Demiray, Gülgoz, & Bluck, 2009, p. 271). In an effort to consolidate past theoretical accounts for the bump, Demiray and colleagues (2009) put forward the *life story account*. This view draws on two major theories: *life story theory* and *lifespan developmental theory*.

According to the *life story theory*, the cognitive tools required to communicate coherent personal narratives do not develop until adolescence and early adulthood (McAdams, 1985; Habermas & Bluck, 2000). The creation and maintenance of a narrative identity is dependent upon the ability to construct a coherent personal story through linking past and current self-experiences (Damasio, 1999; James, 1890; Habermas & Bluck, 2000; McAdams, 1985). A complete life story requires four types of coherence: temporal (told in logical order), cultural concept of biography (cultural norms included in life stories), causal (events are linked in an explanatory way), and thematic (overarching themes that provide meaning; Habermas & Bluck, 2000). Therefore, the life story theory proposes that an individual’s life story is not just a group of significant isolated events- it is a series of interrelated events linked to one another and to the self (Demiray, et al., 2009).

Lifespan developmental theory incorporates other previous accounts for the bump (*maturational development, cognitive, self-narrative/identity, and life script*; Baltes, 1997; Demiray, et al., 2009). As with the *maturational development* account, the lifespan developmental theory states that cognitive functioning peaks between the ages of 10-30 (Baltes, 1997). Therefore, the bump is the result of better processing and encoding of memory during that period of growth (Baltes, 1997; Ebner, Freund, & Baltes, 2006, Scrauf & Rubin, 1998). Also during this age period, a high frequency of novel and distinctive (i.e. first time or one time) events are encountered (Rubin et al., 1998). In accordance with the *cognitive* account, lifespan developmental theory posits that most first or unique experiences stand out as being new or different from other day to day events. As a result, most individuals pay more attention and thus, these memories are encoded more deeply (Kristo, Janssen, & Murre, 2009). As individuals mature over time and encounter new situations, these past events may be retrieved and rehearsed more for retrospective comparison (Kristo, et al., 2009).

The lifespan developmental theory also incorporates the *self-narrative/identity* account in recognizing that adolescence and early adulthood is the age period in which the adult identity is formed (Erickson, 1982; Habermas & Bluck, 2000). As such, bump events are more frequently recalled because they are central to the creation of one's self-narrative (Fitzgerald, 1988). This idea is supported by the self-memory system (SMS) model of AM; the bump period is an era in which individuals establish unique goal hierarchies that constitute central components of identity (Conway & Pleydell-Pearce, 2000). As people move through the lifespan and goals change, groups of highly goal-relevant AM that are central to identity are left behind

(Conway, 2005; Conway & Pleydell-Pearce, 2000). Since adolescence and young adulthood are the period in which identity is created, goal-related AM from that age are therefore better remembered (Conway, 2005; Conway & Pleydell-Pearce, 2000; Erickson, 1968). In this view, bump AM are more likely to be recalled by the current self, as they have been influential on who one has become today (Conway, 2005; Glück & Bluck, 2007). While this view describes bump memories as important and vivid, empirically (Habermas & Bluck, 2000), there has been mixed evidence regarding the importance and vividness of bump AM relative to AM from outside the bump (Jansari & Parkin, 1996; Fitzgerald, 1988; Rubin & Schulkind, 1997b; Rubin, Schulkind, & Rahhal, 1999). Some studies have found AM from the bump period to be significantly more important and vivid than other AM (Fitzgerald, 1988; Rubin & Schulkind, 1997b). Other studies have concluded all life story memories are important and vivid, and those qualities alone are not sufficient enough to distinguish bump AM from other memories (Demiray, et al., 2009).

Finally, the lifespan developmental theory draws upon the *life script* account for the bump in proposing that bump events are retained due to the influence of cultural expectations on life trajectory. Most cultures anticipate the most positive and important events to occur between ages 15-30 (Berntsen & Rubin, 2002). These events also mark transitional choices and milestones (Berntsen & Rubin, 2002). Therefore, AM from this age period are better remembered due to their significance in fulfilling cultural expectations (Berntsen & Rubin, 2004; Thomsen, 2009).

In Western cultures, the life script includes events such as graduation, marriage, birth of children, beginning of career, and retirement (Berntsen & Rubin,

2004; Erdoğan, Baran, Avlar, Taş, & Tekcan, 2008). These idealised life events are concentrated between the ages of 10-30 and are characterised as being positive, important, and as marking important transition periods and milestones (Berntsen & Rubin, 2002; 2004; Rubin & Berntsen, 2003). As such, when only positive events are isolated from a person's life those events will display a reminiscence bump; negative and neutral events are distributed across the lifespan, most likely reflecting the unpredictable nature of events such as bereavements in one's life (Bohn, 2010; Glück & Bluck, 2007; Rubin, Berntsen & Hutson, 2009).

Important and transitional script events are reflected in the content of bump AM. Studies have found relationships to be the most common theme overall, echoing anticipated events such as marriage and arrival of children (Cohen & Faulkner, 1988; Holmes & Conway, 1999; Singer, Rexhaj, & Baddley, 2007). Other script events such as graduation and career launch are mirrored in work/education-themed AM, which form the second most common theme in the bump (Blagov & Singer, 2004; Elnick, et al., 1999; Lardi, D'Argembeau, Chanal, Ghisletta, & Van der Linden, 2010; Schroots & Assink, 2005).

Each of these aforementioned past accounts has received some empirical evidence, suggesting that each plays a part in creating a reminiscence bump. The life story account provides a holistic view of the reminiscence bump by integrating life story theory with lifespan developmental theory (which incorporates maturational development, cognitive, narrative-self/identity, and life script accounts) into a unified construct (Demiray, et al., 2009).

Although aging has been associated with more positive AM, the effect that positivity has on specific AM remains unclear (Lang & Carstensen, 2002; Mather & Carstensen, 2005). Are more AM from the bump specific because they have been recalled more often (i.e. better rehearsed)? Or do older adults focus on the positive when reconstructing past AM from the bump era? If older adults are more likely to reminisce about experiences from young adulthood, then the continued rehearsal of those AM could strengthen the links to details associated with those events (Gallo, Korthauer, McDonough, Teshale, & Johnson, 2011). Exploration of rehearsal in younger adults have found that positive events are more likely than negative events to be rehearsed (Walker, Skowronski, Gibbons, Vogl, & Ritchie, 2009) or socially reminisced (Rasmussen & Berntsen, 2009) and that rehearsal of AM leads to more reported details (Ritchie, Skowronski, Walker, & Wood, 2006).

In older adults, reminiscence of positive events has been found to be associated with positive emotions (Pasupathi & Carstensen, 2003). According to socioemotional selectivity theory (SST), older adults see their future time as limited and therefore focus on more positive emotional experiences (Carstensen, 1993; Carstensen, Isaacowitz, & Charles, 1999). One possible implication of this perspective is that the emotional benefit of rehearsal might lead to more frequent retrieval and therefore amplify the resilience and availability of those positive AM (Walker, et al., 2009). Other studies, however, have found that older adults do not always reminisce more often about positive experience than younger adults (Alea, 2010). Comblan, D'Argembeau, and Van der Linden (2005) asked older and younger adults to generate AM and rate each event among several dimensions, including vividness and amount of detail. No age differences were found in vividness or detail

between positive or negative AM; however, older adults rated negative events more positively than younger adults. This suggests that both positive and negative event details are equally accessible; older adults focus more on the positive when reconstructing past AM (Gallo, et al., 2011).

The purposes of this study were threefold: (1) to determine whether the life story account for the bump provides a comprehensive explanation, (2) to gain insight into the subject matter of AM incorporated into identity across the lifespan, and (3) to determine if the positivity of specific AM in older adults is the result of rehearsal or a bias in reconstruction (Carstensen, 1993; Carstensen, et al., 1999).

In order to gain a more detailed look at the qualities of AM from the bump era, five positive and five negative cue words were chosen as universally experienced emotions. Participants were asked to retrieve a specific AM in response to each word, then rate the qualities of each reported AM (importance, rehearsal, vividness and pleasantness) on a five-point scale (Rubin & Schulkind, 1997). A young adult sample was included for comparison.

Past studies using cue words to prompt AM have found the distribution of recalled events may vary depending on the nature of the cue words used (Rubin, et al., 1998; Maki, Janssen, Uemiya, & Naka, 2013). For example, neutral cue words (e.g. table, sock) have been found to elicit an earlier bump ranging from 10-20 years old (Rubin, et al., 1986; Rubin & Schulkind, 1997) with increased recall of recent events (Maki, et al., 2013; Rubin & Schulkind, 1997); whereas AM cued with emotional words (e.g. happy, sad) have been shown to produce a bump centered between ages

20-30 (Rubin, et al., 1986) with an even greater amount of recent events than neutral words (Fitzgerald and Lawrence, 1984; Robinson, 1976). When participants are directly asked for important or vivid AM, the bump emerges between 20-30 years and very recent events are reported (Fitzgerald, 1998; Rubin & Schulkind, 1997b). Based on these findings, it is expected that the emotional cue words used in this study will result in a distribution of AM centred between ages 20-30 and include many recent events (Demiray, et al., 2009; Fitzgerald & Lawrence, 1984; Robinson, 1976).

According to the life story account, it was hypothesised that (1) AM from the bump period would be more novel/distinctive, vivid, positive, important for identity development and also tend to mark periods of transition, (2) the content of AM from younger adults would mirror the content in older adult's AM from the bump. Based on SST, it was anticipated that: (3) only positive AM would result in a bump, negative events would not (Carstensen, 1993; Glück & Bluck, 2007; Rubin, et al., 2009), (4) no age difference was expected in the number of specific AM retrieved in response to positive versus negative cue words (5) or in the rehearsal of those AM (Comblain, et al., 2005; Gallo, et al., 2011). However, (6) a difference was expected in the appraisal of past negative events with older adults rating negative experiences more positively (Comblain, et al., 2005; Gallo, et al., 2011).

Method

Participants

Fifty-seven participants were recruited, 29 young adults (5 men; age $M =$

19.34, $SD = 1.34$; education $M = 13.07$, $SD = .84$) and 28 healthy older adults (14 men; age $M = 71.21$, $SD = 6.76$; education $M = 14.00$, $SD = 3.02$), from Fife and Dundee, Scotland.

| | Age | | Years of Education | | MMSE | | HADS – Anxiety | | HADS - Depression | |
|-----------------|----------|-----------|--------------------|-----------|----------|-----------|----------------|-----------|-------------------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young n = 29 | 19.34 | 1.34 | 13.07 | .84 | - | - | 5.05 | 2.17 | 2.65 | 2.48 |
| Old n = 28 | 71.21 | 6.76 | 14.00 | 3.02 | 29.16 | .71 | 4.07 | 2.19 | 2.95 | 1.84 |

Table 1. Descriptive information for all participants who took part.

Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975). The Mini-Mental State Examination was given to all participants in the older group as a screening measure to confirm their mental well-being. All of the participants in the healthy older adult group ($M = 29.16$, $SD = .71$) scored within the healthy range, 27-30.

Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The Hospital Anxiety and Depressions scale was administered to both groups to ensure participants' emotional well-being. Both the younger adults (anxiety $M = 5.05$, $SD = 2.17$; depression $M = 2.65$, $SD = 2.48$) as well as the older adults (anxiety $M = 4.07$, $SD = 2.19$; depression $M = 2.95$, $SD = 1.84$) scored within the healthy range, 7 or below; however, the difference between groups in anxiety was found to be significant, $t(55) = -2.21$, $p = .03$. This may be due to typical university student worries: exams, papers, living away from family, etc.

An analysis of covariance (ANCOVA) was strongly considered to control for the difference between groups in the HADS anxiety scores. However, a violation in linearity was found. The covariate did not adjust the group means, suggesting that the HADS anxiety scores are not significantly affecting the data. For these reasons, and also because all HADS scores were within the healthy range, it was decided that the one-way analysis of variance (ANOVA) should be used. The following assumptions were checked and met: independence of observations, normal distribution of the dependent variable, and homogeneity of variances.

Materials

Autobiographical Memory Test (Williams & Broadbent, 1986). A modified AMT was administered with five positive (*happy, interested, surprised, safe, successful*) and five negative words (*sorry, angry, clumsy, lonely, hurt*). Participants were instructed to retrieve, in less than 60 seconds, a memory of an event that involved them personally and occurred at a specific time and place. No emphasis was placed on the importance of the memory at the point of retrieval.

The AMT was altered so that after retrieving each memory in response to the cue word, the participants were then asked for their age at the time of the event and to rate each recalled experience for *pleasantness* (“How pleasant do you consider your memory to be?”), *rehearsal* (“How often have you thought and/or talked about the memory before?”), *importance* (“How personally important is the recalled experience to you?”), and *vividness* (“How detailed/clear is your memory?”), all on 5-point scales

(Rubin & Schulkind, 1997).

Scoring. Two researchers independently coded responses to each cue word for specificity with 100% reliability. Specific AM were then labelled as novel/distinctive and/or transitional with 90% and 97% agreement respectively. The same specific AM were then further categorized according to five major themes: Relationships, School, Work, Hobbies, and Other. These categories were assigned to specific AM with 97% interrater agreement.

Results

Twenty-nine younger adults were shown 10 words each, 290 word-cues in total. From these 290 words, 267 specific AM were retrieved (92%). Twenty-eight older adults were also shown 10 words each, totalling 280 word-cues. From these 280 words, 198 specific AM were reported (71%). The 82 failed attempts to retrieve a specific AM consisted of 30 instances of time running out and 52 instances of recalling a general AM. Only specific AM were used in the following analyses.

A mixed ANOVA was conducted in order to assess age differences in the number of specific AM retrieved in response to positive or negative words. A main effect was found for age group; younger adults ($M = 9.24$, $SD = .87$) recalled significantly more AM than the older group overall ($M = 7.07$, $SD = 1.72$), $F(55) = 30.85$, $p < .00$. This trend continued when the emotional words were taken into account; younger adults ($M = 4.62$, $SD = .68$) retrieved more AM in response to negative words than older adults ($M = 3.32$, $SD = 1.09$), $F(55) = 4.31$, $p < .05$. No

difference was found within the age groups in the number of specific AM retrieved in response to positive or negative words, $F(55) = 3.27, p = .08$.

| | Specific AM | | | | | |
|-------|---------------|-----------|----------------|-----------|----------------|-----------|
| | Total Overall | | Positive Words | | Negative Words | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young | 9.24 | .87 | 4.59 | .50 | 4.62 | .68 |
| Old | 7.07 | 1.72 | 3.82 | 1.02 | 3.32 | 1.09 |

Table 2. Frequencies of young ($n = 29$) and old ($n = 28$) specific AM retrieved in response to positive or negative cue words.

| | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p</i> |
|------------------------------|-----------|-----------|----------|----------|
| Emotional Cue | 55 | 1.54 | 3.27 | .08 |
| Age Group | 55 | 30.34 | 30.85 | .00** |
| Emotional Cue * Age Group | 55 | 2.04 | 4.31 | .04* |

Table 3. Main effects and interactions for age and emotional word cue on AM specificity (* $p < .05$, ** $p < .01$).

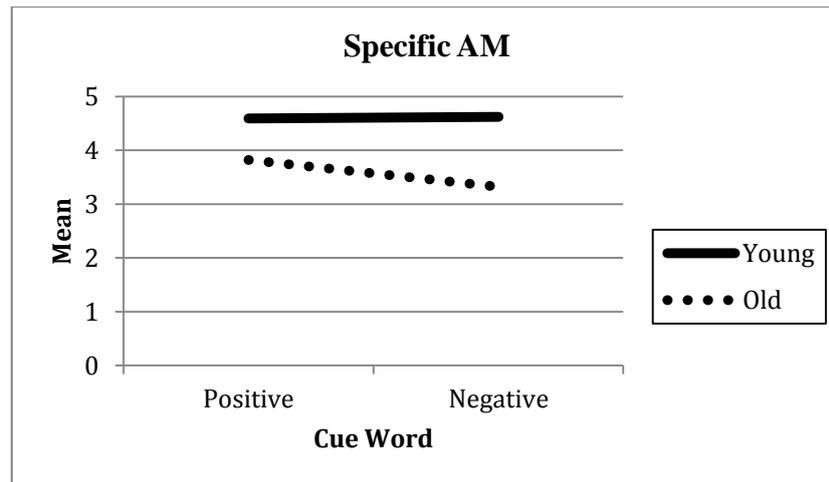


Figure 8.1. Participants' specific AM in response to positive or negative cue words.

Four mixed ANOVAs were conducted to assess whether there were group differences in the ratings of AM (pleasantness, rehearsal, importance, vividness) retrieved from positive versus negative cue words. The following assumptions were checked and met: independence of observations, normal distribution of the dependent variable, and homogeneity of variances.

Pleasantness. Both groups of adults rated AM from positive cue words as more pleasant (young $M = 4.22$, $SD = .51$; old $M = 4.01$, $SD = .64$) and AM from negative cue words as less pleasant (young $M = 1.73$, $SD = .44$; old $M = 2.05$, $SD = .84$). This main effect for the emotion of cue word was found to be significant $F(1,55) = 293.16$, $p < .00$, indicating that our emotional cue words were successful in indexing positive and negative AM from both groups. No main effect was found for age group, $F(1,55) = .32$, $p = .57$. However, the cue words' main effect was qualified by a significant interaction between emotion of cue word and age group, $F(1,55) = 4.17$, $p < .05$. This indicates that older adults rated AM cued from negative words as less pleasant overall, however these AM were still rated as more pleasant than

younger adults.

| Ratings for Pleasantness | | | | |
|---------------------------------|----------------------|-----------|----------------------|-----------|
| | Positive Word | | Negative Word | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young | 4.22 | .51 | 1.73 | .44 |
| Old | 4.01 | .64 | 2.05 | .84 |

Table 8.4. Younger ($n = 29$) and older ($n = 28$) adults' ratings of pleasantness of specific AM in response to positive or negative cue words.

| | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p</i> |
|------------------------------|-----------|-----------|----------|----------|
| Emotional Cue | 1 | 140.96 | 293.16 | .00** |
| Age Group | 1 | .10 | .32 | .57 |
| Emotional Cue * Age Group | 1 | 2.01 | 4.17 | .04* |

Table 8.5. Main effects and interactions for group membership and ratings of specific AM for pleasantness (* $p < .05$, ** $p < .01$).

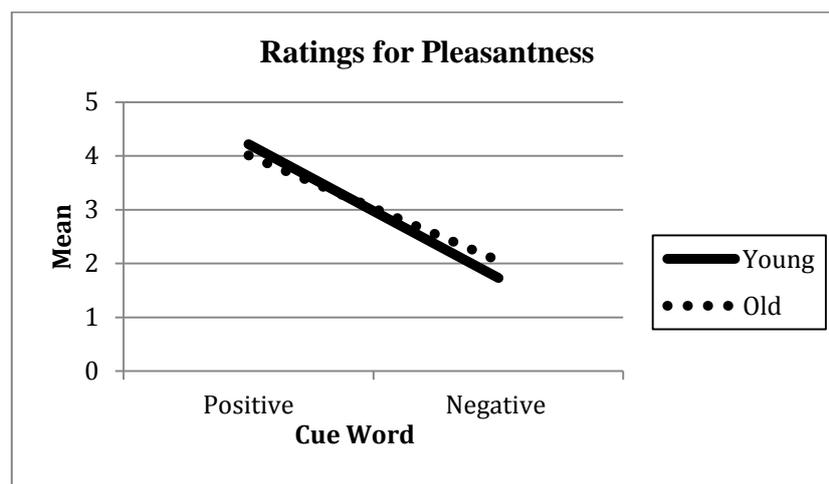


Figure 8.2. Younger ($n = 29$) and older ($n = 28$) ratings of pleasantness in response to positive or negative cue words.

Rehearsal. No significant main effect was found for the emotion of the word cues, $F(1,55) = 1.77, p = .19$, or for age group, $F(1,55) = .14, p = .85$; no interaction was found between these two variables, $F(1,55) = .14, p = .71$. Younger and older adults did not differ in how often they revisited the AM provided in response to the emotional word cues. In an effort to determine the relationship between positivity and rehearsal, a within group analysis was conducted within the older sample. No difference was found in the rehearsal of positive or negative AM in older adults, $t(27) = .78, p = .78$, two-tailed.

| Ratings for Rehearsal | | | | |
|------------------------------|----------------------|-----------|----------------------|-----------|
| | Positive Word | | Negative Word | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young | 3.02 | .77 | 2.81 | .74 |
| Old | 3.00 | .77 | 2.88 | .81 |

Table 8.6. Younger ($n = 29$) and older ($n = 28$) adults' ratings of rehearsal of specific AM in response to positive or negative cue words.

Importance. No main effect was found for word cue, $F(1,55) = .24, p = .62$; however a significant main effect was found for age group, $F(1,55) = 4.23, p < .05$, indicating older adults rated their AM as more important than younger adults regardless of the emotion of the cue word. No interaction was found between word cue and age group, $F(1,55) = .01, p = .96$.

| Ratings for Importance | | | | |
|-------------------------------|----------------------|-----------|----------------------|-----------|
| | Positive Word | | Negative Word | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young | 3.34 | .86 | 3.05 | .78 |
| Old | 4.29 | 3.92 | 4.05 | 3.62 |

Table 8.7. Younger ($n = 29$) and older ($n = 28$) adults' ratings of importance of specific AM in response to positive or negative cue words.

| | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p</i> |
|------------------------------|-----------|-----------|----------|----------|
| Emotional Cue | 1 | 2.00 | .24 | .62 |
| Age Group | 1 | 27.37 | 4.23 | .04* |
| Emotional Cue * Age Group | 1 | .02 | .01 | .96 |

Table 8.8. Main effects and interactions for group membership and ratings of specific AM for 'importance,' (* $p < .05$).

Vividness. A significant main effect was found for age group, $F(1,55) = 3.25$, $p < .05$, but not for the emotion of cue words, $F(1,55) = .05$, $p = .83$, and. Thus, older adults rated their AM from all word cues as more vivid than younger adults. A significant interaction was also discovered between the two variables, $F(1,55) = 4.95$, $p < .05$, indicating that younger adults rated AM from positive cue words as more vivid, while older adults rated AM from negative cue words as more vivid.

| Ratings for Vividness | | | | |
|-----------------------|----------|-----------|----------|-----------|
| | Positive | | Negative | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young | 4.15 | .49 | 3.98 | .54 |
| Old | 4.30 | .51 | 4.51 | .51 |

Table 8.9. Younger ($n = 29$) and older ($n = 28$) adults' ratings of and vividness of specific AM in response to positive or negative cue words.

| | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p</i> |
|------------------------------|-----------|-----------|----------|----------|
| Emotional Cue | 1 | .01 | .05 | .83 |
| Age Group | 1 | 3.25 | 10.42 | .03* |
| Emotional Cue * Age Group | 1 | 1.04 | 4.95 | .03* |

Table 8.10. Main effects and interactions for group membership and ratings of specific AM for vividness (* $p < .05$).

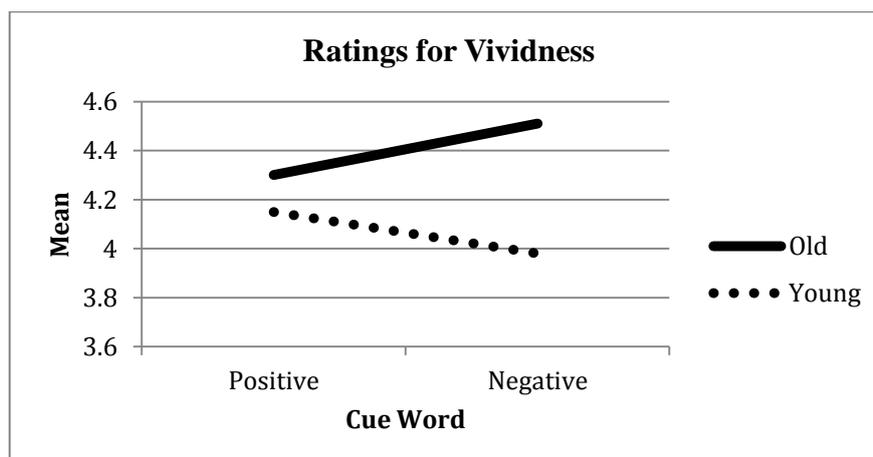


Figure 8.3. Younger ($n = 29$) and older ($n = 28$) adults' ratings of vividness of specific AM in response to positive or negative cue words.

Reminiscence Bump. Recent memories were defined as occurring within the last three years (Janssen, Chessa, & Murre, 2005). According to this specification, 64 out of 198 AM (32%) retrieved by older adults were recent compared to 122 out of 267 (45%) from the younger group. Using a one-way ANOVA, The number of recent AM retrieved by old ($M = 2.29$, $SD = 2.05$) and young ($M = 4.21$, $SD = 2.62$) participants was found to be significant, $F(1,55) = 9.44$, $p < .01$.

When older adults' specific AM were plotted according to their age at the time of memory, 58 specific AM were reported from between the ages of 10-30. Two different bumps emerged for AM elicited from positive versus negative cue words (Figures 3 & 4). Both bumps peaked around the 20-29 year decade, and both displayed a strong recency effect. The positive bump showed a more prominent peak (positive $M = .54$, $SD = .75$; negative $M = .46$, $SD = .74$), and the negative bump showed a much stronger recency effect (positive $M = .89$, $SD = 1.23$; negative $M = 1.07$, $SD = 1.25$).

| | Age at Time of Event | | | | | | | | | | | | | |
|----------------|----------------------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|
| | 0-9 | | 10-19 | | 20-29 | | 30-39 | | 40-49 | | 50-59 | | 60-69 | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Positive Words | 0 | 0 | .25 | .52 | .54 | .75 | .32 | .46 | .43 | .69 | .36 | .62 | .89 | 1.23 |
| Negative Words | .11 | .31 | .36 | .56 | .46 | .74 | .32 | .72 | .39 | .57 | .36 | .56 | 1.07 | 1.25 |

Table 8.11. Means and standard deviations for the frequency of specific AM from healthy older adults ($n = 28$) retrieved in response to positive and negative cue words.

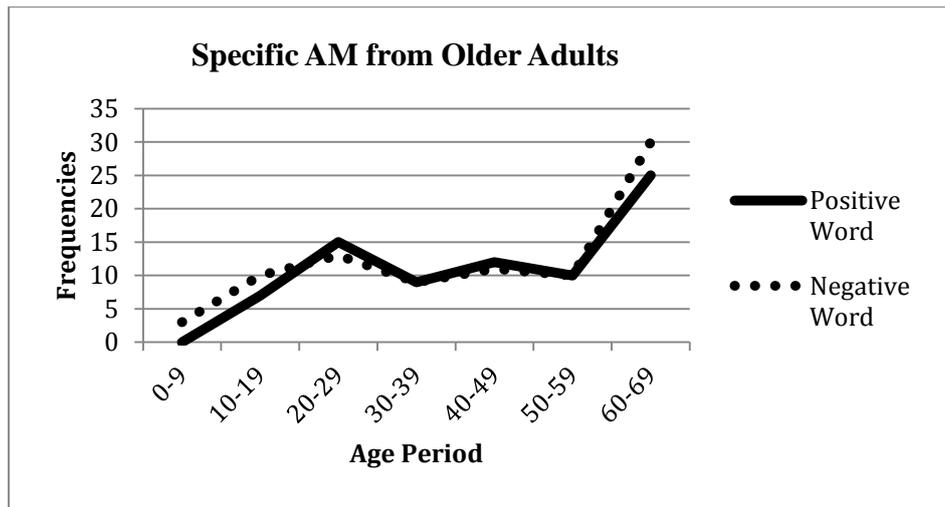


Figure 8.4. Frequencies of older adults' ($n = 28$) specific AM retrieved in response to positive and negative cue words, plotted according to age at the time of the AM.

When older adult's most important and most vivid AM (AM that were rated as a 4 or 5 out of 5) were plotted according to age at the time of the event, both bumps peaked in the 20-29 age period (important $M = .64$, $SD = .87$; vivid $M = .82$, $SD = 1.16$), and both displayed strong recency effects (important $M = .82$, $SD = 1.06$; vivid $M = .1.75$, $SD = 1.86$). It should be noted that the most vivid AM showed a more prominent bump and much larger recency effect than the most important AM.

| | Age at Time of Event | | | | | | | | | | | | | |
|----------------|----------------------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|
| | 0-9 | | 10-19 | | 20-29 | | 30-39 | | 40-49 | | 50-59 | | 60-69 | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Most Important | .07 | .26 | .29 | .53 | .64 | .87 | .50 | .88 | .39 | .69 | .32 | .67 | .82 | 1.06 |
| Most Vivid | .07 | .26 | .50 | .75 | .82 | 1.16 | .54 | .74 | .68 | .90 | .61 | .83 | 1.75 | 1.86 |

Table 8.12. Means and standard deviations for older adults' ($n = 28$) most important and most vivid AM retrieved in response to all 10 cue words.

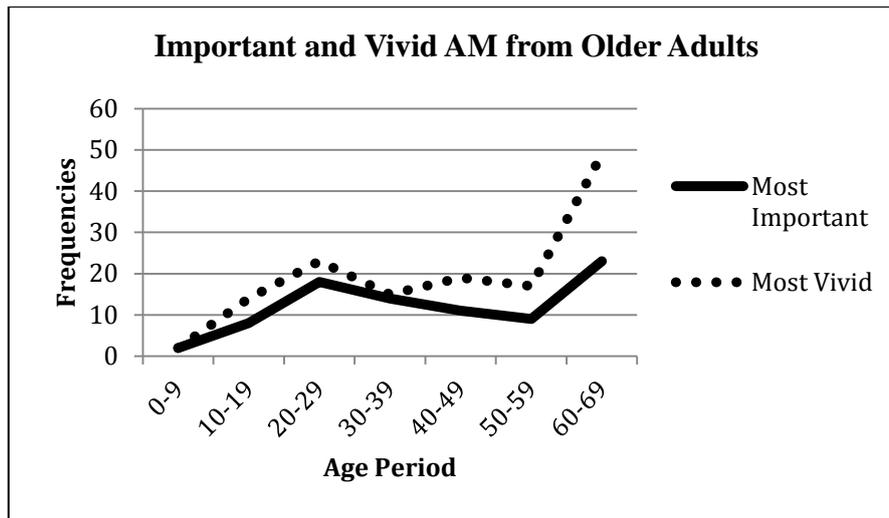


Figure 8.5. Frequency of older adults' ($n = 28$) most important and vivid specific AM retrieved in response to both positive and negative cue words, plotted according to age at the time of the AM.

In order to ascertain the differences within the older group (between the 58 specific AM retrieved from within the reminiscence bump and the 140 from other ages) in pleasantness, rehearsal, importance and vividness, four mixed ANOVAs were conducted.

| | Outside | | Inside | |
|--------------|----------|-----------|----------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Pleasantness | 2.53 | 1.80 | 2.94 | .57 |
| Rehearsal | 2.34 | 1.61 | 2.94 | .77 |
| Importance | 2.69 | 1.88 | 3.42 | .77 |
| Vividness | 3.26 | 1.99 | 2.94 | .57 |

Table 8.13. Mean and standard deviations of older adults' ($n = 28$) ratings for pleasantness, rehearsal, importance and vividness within and outside the reminiscence bump.

AM from within the bump were no more or less positive or rehearsed than AM from outside the bump. AM rated as important by older adults were concentrated in the bump period, $F(1,27) = 5.00, p < .05$. More AM rated as vivid were found outside the bump, $F(1,27) = 9.89, p < .01$.

| | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p</i> |
|--------------|-----------|-----------|----------|----------|
| Pleasantness | 1 | 2.44 | 1.28 | .27 |
| Rehearsal | 1 | 5.08 | 3.29 | .08 |
| Importance | 1 | 7.48 | 5.00 | .03* |
| Vividness | 1 | 9.89 | 9.89 | .00** |

Table 8.14. Differences in older adults' ratings of specific AM within and outside the reminiscence bump, (* $p < .05$, ** $p < .01$).

Novel/distinctive or Transitional. Events from both groups were initially considered for novel/distinctive or transitional aspects. Some events possessed either or neither of these qualities; some reported events were doubly labelled as both. Some examples of AM that were considered both novel/distinctive and transitional: receiving a university admittance letter, getting married, and birth of first child. These AM have been included twice, once in each category. Both groups reported more novel/distinctive than transitional events overall. Over half of the AM from the older group were novel/distinctive (60%), compared to 30% of AM from younger adults. Using a mixed ANOVA, this difference was found to be significant, $F(1,55) = 22.80, p < .00$; transitional events were not prevalent in either group, $F(1,55) = .40, p = .53$.

| | Young | | Old | |
|--------------------|----------|-----------|----------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Novel/ Distinctive | 2.79 | 1.74 | 5.21 | 2.08 |
| Transitional | 1.03 | 1.18 | 1.25 | 1.38 |

Table 8.15. Mean and standard deviations of novel/distinctive and transitional AM from both younger ($n = 29$) and older ($n = 28$) adults.

Older adults' novel/distinctive and transitional AM were compared from within and outside of the reminiscence bump. AM that were both novel/distinctive and transitional in nature were doubly labelled and included twice, once in each category respectively. Two repeated measures ANOVAs were used to assess any differences. More novel/distinctive AM were found outside the bump than within, $F(1,27) = 7.92, p < .01$; no difference was found in the distribution of transitional AM, $F(1,27) = .33, p = .57$.

Theme and content. Specific AM from both groups were labelled as pertaining to relationships, school, work, hobbies, or other. Some AM were included in more than one category. For example in response to the word "angry" a young participant stated, "My flatmate made me late to class." This statement included both a relationship (flatmate) and school (class) component. Once an AM was assigned to one or more of these five major categories, the content of the AM was examined and sorted into the minor categories specified in Table 17 (below). Memories from before age 10 were subtracted from the younger adult sample in order to only include specific AM from between 10-30. This left the young adult group with a total of 244 specific AM compared to the older adults' 58 from that age period.

Statistical comparisons were not conducted for the AM in these categories due to the large number of AM that were included in more than one category as well as the small amount of data included in the bump from the older group. With only 58 bump AM from the older group (compared to 140 from the younger group), continued breakdown of AM into smaller categories would result in the loss of statistical power and increase the chance of a type I error, an incorrect significant result (i.e. false positive; Huck, 1999).

Both older and younger adults reported relationship-themed AM most often, both overall and within the bump period. Within the bump, 87% of older adults' AM and 45% of younger adults' AM included relationships. Both groups mentioned large family gatherings and special/unique moments with other family members. Young adults' relationship-themed AM included: getting into trouble with friends, conflicts with flatmates, travelling abroad with family and friends, and romantic relationships. Older adults' relationship-themed AM from within the bump included: birth of children, unique experiences with parents and siblings, and marriage.

| Relationship Theme | Young | | Old | |
|------------------------------------|----------------------|--------------------|---------------------|-------------------|
| | <i>Total age 10+</i> | <i>Within Bump</i> | <i>Outside Bump</i> | <i>Total Bump</i> |
| | 101 | 43 | 50 | 93 |
| Nuclear Family (Parents, Siblings) | 41 | 6 | 5 | 11 |
| Boy/Girlfriend | 10 | 3 | 0 | 3 |
| Spouse | 0 | 7 | 9 | 16 |
| Children | 0 | 10 | 8 | 18 |
| Grandchildren | 0 | 0 | 6 | 6 |
| Friends/ Peers | 59 | 5 | 8 | 13 |

| | | | | |
|-----------------------------------|---|---|---|----|
| Birth | 0 | 8 | 2 | 10 |
| Death | 1 | 2 | 5 | 7 |
| Other (in-laws, niece, nephew) | 0 | 2 | 7 | 9 |

Table 8.17. Frequencies of relationship-themed AM from younger (n = 29) older adults (n = 28).

Following relationships, the next largest category of AM for young adults was school. Both groups included novel/distinct experiences from primary and secondary school. For young adults, many of the AM reported were very recent and not particularly novel/distinctive or important (e.g. “I was late to a lecture yesterday,” “I did well on an assignment”), although some important, novel/distinct (e.g. “When I got my A-Levels,” “When I got accepted to university”) and transitional AM (e.g. “My first day at university”) were mentioned as well. The older group’s school-themed AM largely reflects these latter AM from the younger adults (e.g. “starting university,” “graduation”).

| | Young | | Old | |
|----------------------------------|----------------------|--------------------|---------------------|-------------------|
| | <i>Total age 10+</i> | <i>Within Bump</i> | <i>Outside Bump</i> | <i>Total Bump</i> |
| School Theme | 54 | 15 | 1 | 16 |
| Success | 13 | 9 | 0 | 9 |
| Failure/Strife | 12 | 0 | 0 | 0 |
| Other (student life, classes) | 29 | 6 | 1 | 7 |

Table 8.18. Frequencies of school-themed specific AM from young (n = 29) and older adults (n = 28).

| | Young | | Old | |
|---------------------------------------|----------------------|--------------------|---------------------|-------------------|
| | <i>Total age 10+</i> | <i>Within Bump</i> | <i>Outside Bump</i> | <i>Total Bump</i> |
| Total Work | 14 | 20 | 9 | 29 |
| Success | 4 | 3 | 2 | 5 |
| Failure/Strife | 10 | 11 | 6 | 17 |
| Other (training, work related travel) | 0 | 6 | 1 | 7 |

Table 8.19. Frequencies of work-themed specific AM from young (n = 29) and older adults (n = 28).

Young adults' work related AM mostly consisted of negative experiences: conflict with boss, mistakes made, and experiences of strife. Older adults' work related AM from within the bump period included: job promotions, changing jobs, training, and conflicts with co-workers.

| | Young | | Old | |
|----------------------|----------------------|--------------------|---------------------|-------------------|
| | <i>Total age 10+</i> | <i>Within Bump</i> | <i>Outside Bump</i> | <i>Total Bump</i> |
| Total Hobbies | 9 | 8 | 7 | 15 |
| <i>Achievements</i> | 3 | 8 | 7 | 15 |
| <i>Other</i> | 6 | 0 | 0 | 0 |
| Total Misc. | 16 | 13 | 13 | 26 |

Table 8.20. Frequencies of hobby and other-themed specific AM from older adults young (n = 29) and older adults (n = 28).

Both groups mentioned leisure activities such as sports, music, and choir. These experiences were grouped as 'hobbies.' Young adults mostly mentioned achievements such as winning a football match, or getting the highest ranking in

piano playing. Older adults reported unique experiences (e.g. singing with a choir in a famous chapel) as well as more routine events (e.g. hiking or painting a project). Finally, a ‘miscellaneous’ category was created to include random mundane events such as: “I saw a flyer a few days ago at the grocery store for a ceilidh,” “I stubbed my toe this morning,” or “I spilled flour all over the kitchen floor.”

Discussion

The emotional cue words selected were successful in indexing positive and negative AM from both groups. That is, positive words elicited positive AM and negative words elicited negative AM. Older adults’ AM displayed a reminiscence bump with a peak between 20-29 years of age as well as a recency period, following previous studies using emotional word cues (Demiray, et al., 2009; Fitzgerald and Lawrence, 1984; Robinson, 1976).

In line with our expectations based on the life story account (particularly self-narrative/identity account), older adults rated their AM as more important and vivid than younger adults regardless of the emotion of the cue word. This is in accordance with previous findings where older adults rated their specific AM as more important and vivid (Comblain, et al., 2005; Janssen & Murre, 2008). Interestingly, an interaction was found within the two groups ratings for vividness: younger adults rated AM from positive cue words as more vivid, while older adults rated AM from negative cue words as more vivid. When the older adults’ most important and most vivid AM were plotted according to age at the time of the event, both bumps peaked in the 20-29 age period and both curves displayed strong recency effects, contradicting previous studies where no recency effect was found (Fitzgerald, 1988;

1996; Rubin & Schulkind, 1997). More specifically, vivid AM showed a more prominent bump and much larger recency effect than important AM. The vividness of negative AM and the recency effect could be the result of a smaller sample size of older adults as well as some older adults reporting recent traumatic and life changing AM such as serious accidents and disabilities.

When events from both groups were considered for novel/distinctive or transitional aspects, it was discovered that both included a large number of novel/distinctive AM. In particular, older adults retrieved significantly more novel/distinctive AM than the younger adults, providing support for the cognitive dimension of the life story account (Rubin, et al., 1998). Few transitional events were reported and no difference was found between groups in the number of transitional AM. These results contradict the life script account for the bump as well as studies that have found transitional AM are specific, important, and positive (Fitzgerald, 1988; Berntsen & Rubin, 2004). Cohen-Mansfield and colleagues (2010) found transitional AM in older adults to be largely neutral in tone. They also found these memories are often fragmented and don't develop an orderly structure. If transitional AM are indeed neutral in tone, not finding a bump for transitional AM may relate to previous studies that have found neutral cue words to be insufficient in creating a reminiscence bump (Rubin, 1986; Rubin, et al., 2009).

Comparisons were made between AM from within and outside the reminiscence bump period. First, AM from within the bump were no more or less positive or rehearsed than AM from outside the bump. This overall positivity supports SST, which suggests that older adults focus on the positive (Berntsen & Rubin, 2002;

Carstensen, et al., 1999; Lang & Carstensen, 2002). Bump AM were also rated as more important by older adults, supporting the mediation of life scripts (Fitzgerald, 1988) and the incorporation of bump AM into identity (Erikson, et al., 1959; Conway, 2005). The more even distribution of vivid AM runs counter to the self-narrative/identity account for the bump, however (Demiray, et al., 2009; Habermas & Bluck, 2000). This may coincide with older adults rating AM from negative cue words as more vivid. Again, this may be due to older adults reporting more serious/traumatic memories from after the bump period such as serious accidents/injuries and deaths. Evidence of this is seen in the large portion of AM rated as vivid found outside the bump, also reflecting the large recency effect.

When older adults' novel/distinctive and transitional AM were compared from within and outside of the reminiscence bump, more novel/distinctive AM were found outside the bump than within, and no difference was found in the distribution of transitional AM. This contradicts the cognitive account, which states that bump AM are more novel and distinctive and therefore encoded more strongly, retrieved more frequently, and get stronger with age (Demiray, et al., 2009; Janssen, et al., 2005). Older adults included many novel and distinctive events from after the bump period such as: graduation and marriage of children, birth of grandchildren, retirement, death of spouse/parents, significant illness/disability, and milestone birthdays (turning 50, 60, 70). It appears based on these findings, that novel/distinctive AM may not be restricted to the bump era. This data is also contrary to the life script account; the reminiscence bump should include more transitional memories than other age periods due to the mediation of life scripts (Fitzgerald, 1988; Glück & Bluck, 2007). Again, this could be due to the more neutral aspect of transitional memories (Cohen-

Mansfield, et al., 2010; Rubin, 1986; Rubin, et al., 2009) or it could be the result of a smaller sample size.

Finally, older adults' bump AM and younger adults' AM from after age 10 were compared for content. Previous studies have found bump AM tend to focus on: relationships, work, and education. (Elnick, et al., 1999; Holmes & Conway, 1999). Cohen-Mansfield (2010) interviewed older adults and found most AM from young adulthood focus on family and interpersonal relationships. In particular, novel/distinctive AM typically involve interpersonal relationships and sense of belonging/identity, while transitional AM typically describe the fulfilment of normative roles (e.g. marriage). Both older and younger adults' AM from the bump were heavily relationship-themed and mentioned novel/distinctive experiences with the nuclear family (e.g. holidays abroad, large family gatherings). Older adults mentioned relationship-themed transitional events such as marriage and birth of children; younger adults were likely not old enough to have had these experiences. As AM from this period form the core of personal identity, and the majority of AM appear to be relationship-themed, it appears that relationships with others form a large part of personal identity across time (Habermas & Bluck, 2000; Conway, 2005).

Older and younger adults' school-themed AM from the bump era were very similar in content; work related AM did not share many similarities. Differences in work related AM are likely due to older adults' prioritization of past work related goals, whereas, younger adults are still in the midst of education and are not yet fully active in the workforce. Both groups included novel/distinct experiences from primary and secondary school as well as from starting university. Younger adults

included events leading up to the transition of beginning university (“getting A-Levels,” “receiving acceptance letter”) as well as many routine/mundane events related to being a university student. Perhaps this is a result of goal-processing; that is, if the younger group was prioritizing goals relating to being a successful student, then it would be expected that AM relating to this goal would be more accessible (Conway & Pleydell-Pearce, 2000). This would be in accordance with the SMS; goal-relevant AM are more readily available due to their importance in maintaining personal identity (Conway, 2005). This is also seen in older adults’ school-themed AM. Older adults would have had similar past identities as students and as such, past goal hierarchies appear to have left behind clusters of highly accessible AM relating to being a student.

Both groups mentioned pastime activities, labelled as ‘hobbies.’ Younger adults focused on achievements (e.g. winning a trophy in sport), whereas older adults reported more novel/distinctive (e.g. singing in a televised event) as well as more mundane events (e.g. making progress on an art project). This is an almost opposite result from the school theme where older adults focused on achievements (e.g. starting university and graduating) and younger adults recalled novel/distinctive events leading up to “starting university” and included many mundane events related to being a university student. Again, these results reflect the changing of goal hierarchies and therefore identity across the lifespan (Conway, 2005). More data is needed in order to reach this conclusion statistically.

Based on SST, it was anticipated that only positive AM would result in a bump, negative events would not (Carstensen, 1993; Glück & Bluck, 2007; Rubin, et

al., 2009). Contrary to our hypothesis, this bump was found in AM retrieved from positive as well as negative cue words. Previous studies have found only positive AM to create a reminiscence bump (Berntsen & Rubin, 2002). Although, it has also been found that emotional words overall are more likely than neutral words to create a bump (Rubin, et al. 2009), and affect word bumps tend to peak in the 20-30 age range (Rubin, 1986). Finding a bump for negative AM also contradicts the life script account which suggests that negative events are unexpected and thus do not activate the life script during AM retrieval (Thomsen, Pillemer, & Ivcevic, 2011). Some support for the positivity effect was found in the positive cue bump displaying a more prominent peak and the negative cue bump showing a much stronger recency effect. Fitzgerald & Lawrence (1984) found that affect words elicited more recent memories than activity or object words. The results of this study could be due to the older group having more recent negative experiences and needing more time/perspective for healing.

The role of rehearsal or reconstruction in the positivity effect among older adults was also investigated by comparing the two age groups in the number of specific AM retrieved from positive versus negative cue words. Contrary to previous studies (Comblain, et al., 2005; Gallo, et al., 2009), a difference was found between ages in the number of specific AM recalled in response to the emotional words. In particular, older adults retrieved fewer specific AM in response to negative words than younger adults; no difference was found between ages in the number of specific AM reported from positive words. Within the older adult group, more specific AM were retrieved in response to positive words than negative words; however, this difference was not found to be significant. While this can be seen as a positivity bias

in older adults, it is still unclear as to whether this positivity is due to rehearsal or reconstruction.

Further evidence for emotion regulation was found in participants' ratings of pleasantness. While AM cued from negative words were rated as less pleasant overall, older adults rated AM in response to negative cue words more positively than the younger group. This could reflect the goal of emotion regulation dictating patterns of activation/inhibition making positive AM more available than negative AM (Carstensen, 1993; Conway & Pleydell-Pearce, 2000). Similar results have been documented in several studies in which older adults have been found to retrieve more positive than negative AM (Comblain et al., 2005; Gallo, et al., 2011; Rubin & Schulkind, 1997).

It has been suggested that the positivity experienced when revisiting past positive experiences encourages the rehearsal and therefore the resilience of those AM (Walker & Wood, 2006; Walker, et al., 2009). Our results support past studies that have contradicted this idea (Comblain, et al., 2005; Gallo, et al., 2011; Scrauf & Rubin, 1998). Overall, there was no difference found in the rehearsal of reported AM between younger and older adults. There was also no difference found within the older adult group in the rehearsal of AM from positive or negative cue words. These results suggest that perhaps both positive and negative episodic details are available in older and younger adults, but it is the motivation to emotionally regulate that causes older adults to reconstruct past negative experiences in a more positive light (Comblain, et al., 2005; Gallo, et al., 2011).

According to this study, the life story account is mostly supported by the other accounts it encompasses. Younger adults retrieved more specific AM overall, suggesting better cognitive abilities expected by the maturation development account (Serauf & Rubin, 1998). The self-narrative/identity account is supported by the concentration of important AM in the bump as well as the content of those memories, but the low ratings for vividness run counter to what would be expected by this account (Habermas & Bluck, 2000). The novel/distinctiveness of the bump AM were predicted by the cognitive account, but the lack of rehearsal was not (Rubin, et al., 1998). According to life script account, bump AM were expected to be important and transitional (Fitzgerald, 1998). While important AM were concentrated in the bump, the lack of transitional events in this period contradicts the life script (Fitzgerald, 1998; Berntsen & Rubin, 2004).

This study appears to lend the most support to the self-narrative/identity account for the bump. It appears that more AM are retrieved from the bump era due to their relevance to personal goals and therefore identity (Conway, 2005). These AM are mostly positive in older adults due to the role of emotion regulation in the reconstruction of AM (Lang & Carstensen, 2002). The next study will further explore the role of goals in the retrieval of past experiences.

Chapter 9. Experiment 2

Personal identities are defined by past experiences (McAdams, 1996). Defining oneself in this manner allows the self to be more individualized and flexible (Fischer-Rosenthal, 1995; McAdams, 1996). Many things change over time as people age, such as relationships, work, or place of residence. According to the self-memory system (SMS) model of autobiographical memory (AM), these changes result in different lifetime periods each with its own goal hierarchy and groups of highly accessible (highly goal-relevant) AM. While those groups of AM may not be currently self-relevant, they still define the self in the past. The construction of personal narratives explains and justifies change by contextualizing the self within past events and thus permitting for a coherence and consistency (Habermas & de Silveira, 2008; McAdams, 2001; Singer & Blagov, 2004). Which past experiences are readily available depends largely on the current goals of the self (Conway & Pleydell-Pearce, 2000). Within the SMS the self is conceptualized as a set of currently active & hierarchally organized goals, referred to as the “working self” (Section 3.2.2). The working self mediates retrieval of AM, stored according to level of specificity, from the autobiographical knowledge base. Together, these two cognitive structures reconstruct AM in terms of goal-relatedness.

Consider the following example of goal processes across a life span: An adolescent’s current goals are to make the varsity football team, hang out with friends, and date the cheerleading captain. As this boy grows into a young adult, past goals of dating cheerleaders and playing football become less prioritized. His current goals now include meeting physical fitness requirements and testing for flight school. His current identity is “I am a soldier;” however, when he thinks back to when he was in high school, he still thinks, “I was a great

athlete.” The current identity does not cancel the previous or future identities. The goals of playing football and dating cheerleaders defined this boy in adolescence. Therefore, AM closely associated with those past goals will always be more readily available when he reminisces about that time period. As he enters young adulthood and joins the military, AM closely relating to physical training and studying for flight school will be the most readily available. Later in life, this (now) man gets married and has a child. His new identity as “a father” generates current goals relating to this role (e.g. spend time with baby, be a good bread-winner) and makes AM relating to those goals most accessible. Again, as this individual thinks back to adolescence, AM relating to being an athlete will be the easiest to access. Similarly, as he thinks on his time as a young adult, AM relating to military training will be the most readily available. These past goal hierarchies, while not currently relevant, define this individual in the past, forming lifetime period knowledge (Conway, 2005). When these groups of highly accessible AM are viewed across a lifetime, they form a coherent life story.

Life story memories are AM that are/were highly relevant to personal goals and identity (Conway, 2005; Thomsen & Berntsen, 2008). These AM endure in the form of lasting life narratives and are incorporated into personal identity (McAdams, 1985). As individual identities are developed during adolescence and young adulthood, the majority of AM retrieved by older adults are from between the ages of 10-30, forming a distribution of remembering termed the reminiscence bump (Erikson, 1968; Rubin, Rahhal, & Poon, 1998; Rubin, Wetzler, & Nebes, 1986). When life story memories are related to abstract knowledge about the self (e.g. attitudes/beliefs, personal semantic AM) through meaning-making, self-defining memories are formed (SDM; Blagov & Singer, 2004). SDM are a specific type of life story memory and are characterised as vivid, emotionally intense, linked to other AM,

frequently retrieved, and focused on a central goal-hierarchy (Singer & Blagov, 2004; Singer & Salovey, 1993).

Both older and younger adults appear to express greater specificity in AM retrieved from the reminiscence bump because it is a time of biological maturation, new and unique experiences, adult identity formation, and important events in life scripts (life story account; Baltes, 1996; Berntsen & Rubin, 2004; Jansari & Parkin, 1997; Piolino et. al., 2006; Thomsen, Pillemer, & Ivcevic, 2011); however, studies have found that when only SDM from the bump period are considered, older adults' SDM are more general than those from younger adults (Blagov & Singer, 2004; Singer, et al., 2007). When young adults are asked to generate SDM, 70-83% of the memories recalled are of specific events (Blagov & Singer, 2004; Singer & Moffitt, 2007; Singer, Rexhaj, et al., 2007). When older adults are asked to recall SDM, these memories tend to be more general (44%; Singer, et al., 2007). This difference in specificity within the older group illustrates the creation of SDM from life story memories through the process of meaning-making (Section 4.2; Blagov & Singer, 2004; Singer & Blagov, 2004). Blagov & Singer (2004) explain that the ability to look over life events at a more global level allows the person to compare and contrast experiences across the lifespan and extract meaning and life lessons from important events and time periods.

Older adults' SDM as a whole, have been found to be more positive than younger adults. Past studies have discovered that 55-58% of young adults' retrieved SDM were negative (Blagov & Singer, 2004; Moffitt & Singer, 1994). Singer, et al. (2007) found that younger adults' SDM were 35% negative- less than previously found; however, older adults' SDM were only 4% negative. These findings also follow the processes of emotion regulation, predicted by socioemotional selectivity theory (SST); as people age and time horizons shrink,

personal goals change as a result (Carstensen, 1993; Carstensen, Isaacowitz & Charles, 1999). When the future is perceived as expansive (as in most healthy young adults), goals aimed at optimising the future as prioritized (e.g. receiving social acceptance, be financially independent). When the future is perceived as limited, emotionally meaningful goals are prioritized as these goals typically have short-term benefits. Two such goals that are prominent in older adulthood are generativity (e.g. leaving a legacy or taking responsibility for future generations) and emotion regulation (e.g. seeking to be in control of one's emotions).

The first aim of this study was to examine the relationship between goals and SDM. Both older and younger adults were asked to provide five SDM and then, on a separate occasion, rank 20 different goals (relating to social acceptance, autonomy, generativity and emotion regulation) according to personal priority. According to SST, younger adults place greater emphasis on autonomy and social acceptance and older adults prioritize generativity and emotion regulation (Lang & Carstensen, 2002). If identities are developed in adolescence, and more autonomous goals are prioritized during that time, then younger adult's SDM (as well as older adults' SDM from the bump) should be more self-focused. Therefore, it is hypothesised that according to SST, the influences of emotion regulation in older age should result in older adults rating SDM from the bump era as more positive than younger adults. Also in line with this theory, the shift in goal prioritization from identity development to generativity should result in older adults' bump SDM being more self focused and than SDM from after the bump period.

The ability to connect various life events at a more global level allows the person to compare and contrast experiences and extract meaning and life lessons from important events

and time periods (Blagov & Singer, 2004). The generalization of SDM found in older adults is seen as evidence of this meaning-making process. The second aim of this study was to explore the process of attributing meaning by comparing AM deemed self-defining versus those considered significant. This will be accomplished in this experiment using an SDM measure, and in the following experiment (Experiment 3) by asking for significant events. According to the majority of past studies, older adults' SDM were predicted to be more general when compared to those of younger adults.

Method

Participants

A total of 82 participants were recruited for this study. Fifty undergraduates ranging in age between 18 and 23 ($M = 19.64$, $SD = 1.31$) were recruited from the University of St. Andrews. The older adult group was comprised of 32 older adults aged between 59 and 91 ($M = 73.16$, $SD = 8.24$) from Fife and Dundee, Scotland. The younger adults' years of education ranged from 12-14 years ($M = 12.82$, $SD = .85$). The older adults' average education ranged from 9-20 years ($M = 12.78$, $SD = 3.45$).

Due to participants' unforeseen scheduling conflicts, not all participants took part in both the goal and SDM measures. Of the 50 young adults, 37 took part in the goal measure and 35 completed the SDM measure; 22 young adults completed both. Of the 32 older adults, 28 took part in in the goal measure and 32 completed the SDM measure. All the older adults who completed the goal measure also completed the SDM. That is, 28 older adults completed both measures. The data for each task are considered separately.

Design

Participants were asked to take part in a two-part experiment, randomized with respect to task order. On the first session, the participants took part in one of either the goal or SDM measure. Two weeks later, on the second session, the participant completed the other of the two tasks. Interviews were conducted in a designated unoccupied room within the participating senior activity centres or for those who were able, in the School of Psychology interview room at University of St. Andrews. Each room was set out to allow the participant and the experimenter to sit opposite each other at a table.

Self-Defining Memories

Participants

Sixty-eight participants, 35 young adults (5 men; age $M = 19.63$, $SD = 1.22$; education $M = 13.51$, $SD = .81$) and 33 healthy older adults (15 men; age $M = 73.16$, $SD = 8.24$; education $M = 12.78$, $SD = 3.45$), participated in this measure.

Mini-Mental State Examination (MMSE; Section 4.2, Appendix 6; Folstein, Folstein, & McHugh, 1975). The Mini-Mental State Examination was given to all participants in the older group as a screening measure to confirm their mental well-being. All of the men and women in the healthy older adult group ($M = 28.53$; $SD = .57$) scored within the healthy range, 27-30.

Hospital Anxiety and Depression Scale (HADS; Section 4.3, Appendix 7; Zigmond & Snaith, 1983). The Hospital Anxiety and Depressions scale was administered to both groups to ensure participants' emotional well-being. Both the younger adults (anxiety $M = 5.31$, $SD = 2.12$; depression $M = 2.62$, $SD = 1.99$) as well as the older adults (anxiety $M = 4.25$, $SD = 2.23$; depression $M = 3.11$, $SD = 1.89$) scored within this healthy range; however, younger adults' anxiety scores were significantly higher than the older adults, $F(1,65) = 5.41$, $p < .05$. An ANCOVA was also considered at this point, however, violations were found for 'positive emotion' in homogeneity of regression for the SDM measure, and covariate did not adjust the group means. This suggests that the HADS anxiety scores are not significantly affecting the data. For this reason, and because all HADS scores were within the healthy range, a covariate was decided against.

| | Age | | Years of Education | | MMSE | | HADS - Anxiety | | HADS - Depression | |
|-----------------|----------|-----------|--------------------|-----------|----------|-----------|----------------|-----------|-------------------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young n = 35 | 19.63 | 1.22 | 13.51 | .81 | - | - | 5.31 | 2.12 | 2.62 | 1.99 |
| Old n = 33 | 73.16 | 8.24 | 12.78 | 3.45 | 28.53 | .57 | 4.25 | 2.23 | 3.11 | 1.89 |

Table 9.1. Descriptive information of participants who took part in the self-defining memories task.

Measure

Participants were asked to provide five memories that they felt have defined themselves throughout their lives (Sutherland & Bryant, 2005). They were allowed as much time as necessary and reminded that the event could be of anything from anytime in their lives, as long as the memory was one that was important and has a strong relation to the

person they are currently. Participants then provided their age at the time of each self-defining memory recalled. The questions and answers were given verbally and were audio recorded for later transcription and coding.

Scoring. Participants' memories were labelled as either *specific*, happening at a particular time and place (e.g. "When I bought my first motorbike;" Singer & Blagov, 2002; Williams, 1992), or *general*, happening over an extended period of time or on multiple occasions (e.g. "The year I spent abroad in France" or "Ballet lessons when I was younger;" Barsalou, 1988; Williams, 1996).

Next, the SDM were considered for emotional tone, either positive or negative, and whether the participants focused on themselves versus other people. SDM that were focused on the self were tallied (Wang, 2001). A second rater independently labelled each event for: specificity with 100% reliability, positive emotion with 100% reliability, and self-focus with 95% reliability. In the event of a discrepancy, a third rater was consulted.

An analysis of covariance (ANCOVA) was considered to control for the difference between groups in the HADS anxiety scores. The following assumptions were checked: independence of observations, normal distribution of the dependent variable, homogeneity of variances, linear relationships between the covariates and the dependent variable, and homogeneity of regression slopes. Violations were found for generativity and emotion regulation in homogeneity of regression for the goal measure, perhaps the most important of assumptions for ANCOVA. Also, the ANCOVA did not adjust the group means, indicating that the HADS anxiety scores are not significantly affecting the goal scores. For these reasons, and also because all HADS scores were within the healthy range, it was decided that

the one-way analysis of variance (ANOVA) should be used. The following assumptions were checked and met: independence of observations, normal distribution of the dependent variable, and homogeneity of variances.

Goals

Participants

Sixty-five participants, 37 young adults (8 men; age $M = 19.68$, $SD = 1.31$; education $M = 13.49$, $SD = .80$) and 28 healthy older adults (14 men; age $M = 71.21$, $SD = 6.76$; education $M = 13.29$, $SD = 3.40$), took part in this measure.

Mini-Mental State Examination (MMSE; Section 4.2, Appendix 6; Folstein, Folstein, & McHugh, 1975). The Mini-Mental State Examination was given to all participants in the older group as a screening measure to confirm their mental well-being. All of the older men and women in this sample ($M = 28.60$, $SD = .57$) scored within the healthy range, 27-30.

Hospital Anxiety and Depression Scale (HADS; Section 4.3, Appendix 7; Zigmond & Snaith, 1983). The Hospital Anxiety and Depressions scale was administered to both groups to ensure participants' emotional well-being. Both the younger adults (anxiety $M = 5.78$, $SD = 1.75$; depression $M = 2.55$, $SD = 2.05$) and the older adults (anxiety $M = 4.07$, $SD = 2.20$; depression $M = 2.95$, $SD = 1.84$) scored within the healthy range (Table 9.2). However, younger adults' anxiety scores were significantly higher than the older adults, $F(1,63) = 12.24$, $p < .01$. This difference is likely due to the more stressful day to day life of being a university student

| | Age | | Years of Education | | MMSE | | HADS – Anxiety | | HADS - Depression | |
|-----------------|----------|-----------|--------------------|-----------|----------|-----------|----------------|-----------|-------------------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young n = 37 | 19.68 | 1.31 | 13.49 | .80 | - | - | 5.78 | 1.75 | 2.55 | 2.05 |
| Old n = 28 | 71.21 | 6.76 | 13.29 | 3.40 | 28.60 | .57 | 4.07 | 2.20 | 2.95 | 1.84 |

Table 9.2. Descriptive information about participants who took part in in the goal card sort.

Measure

Pilot study. Six older adults (5 female, 2 male) between the ages of 62 to 79 ($M = 72.83$, $SD = 6.82$) were recruited from Fife, Scotland. Participants' years of education ranged from 7 to 25 years ($M = 12.83$, $SD = 7.28$). Each adult participated in one of six trials. The first four trials required the participants to list their 15 present goals (Sutherland & Bryant, 2005). This measure was abandoned after discovering that conjuring 15 present goals appears to be very difficult for older adults. All participants included goals relating to health (e.g. "stay active" or "remain mentally on top of things") and family (e.g. "take more attention in my grandchildren"). Two participants included goals relating to favourite past-times or interests (e.g. "keep playing golf to a high standard" or "keep on tap dancing"). Three participants stopped after three or four goals; one participant listed five.

The last two trials included two measures. The first measure used was the *twenty statements test* (Kuhn & McPartland, 1953). This test requires the participant to complete 20 "I am..." statements. For example, "I am a mother," "I am a student," or "I am a nurse." This

test was eliminated due to criticism in literature for being a poor measure of self (Tucker, 1972).

The second measure included in these two trials was an adaptation of the *autobiographical memory test* (Robinson, 1976; Williams & Broadbent, 1986) using goal-related words in place of the standard positive and negative emotion words. The goal words used were derived from Conway and Holmes' investigation of psychosocial stages across the lifespan (2004): *acceptance, progress, independence, achievement, intimacy, confusion, conflict, avoidance, rejection, and disapproval*. Participants were asked to retrieve a specific AM in response to each cue word. There was no emphasis on retrieving important memories. The goal words used were found to be too abstract and difficult for participants to retrieve specific memories. Therefore, this measure was discarded.

Goal Card Sort. This measure was chosen because it requires the participants to rank goals into tiers; mirroring the hierarchal nature of goal prioritization (Conway & Pleydell-Pearce, 2000). Before starting this task, participants completed practice card sort in which 10 different foods were arranged according to preference (Appendix 8). This practice trial was included in order to clarify the process of grouping items into ranked tiers. Common foods that participants would likely encounter frequently (e.g. banana or ice cream) were chosen with the intent of simplifying the process as much as possible.

Then, following Lang and Carstensen's constructs of goal priority (2002), participants sorted 20 cards, each with a description of various social goals according to subjective priority (Appendix 9). The 20 social goals load onto four factors (a) Social Acceptance, (b) Autonomy, (c) Generativity, and (d) Emotion Regulation. The exact instructions dictated

were as follows:

On these cards you will find descriptions of different goals and plans that one can have and find important in life. Please read each of these cards carefully and sort the cards into several piles with respect to how important these goals and plans are for you personally. Again, please begin on the left side with the pile of those goals and plans that are most important to you. Please order those goals and plans that are less important or not important to you at all on the right side. You may build as many piles as you think necessary.

After the participants were satisfied with the number of piles created, they were then instructed to prioritize within those piles. Thus, each participant created a hierarchy of preferred goals within tiers. Each card was assigned a number according to its overall rank order (from one to 20) in order to obtain priority scores. The individual's subjective separations between piles as well as the number of piles created were also recorded.

Results

Self-Defining Memories

Older and younger adults' SDM were compared for specificity, positive emotion, and self-focus. Contrary to previous findings, older adults' SDM were more specific, (old $M = .81$, $SD = .13$; young $M = .71$, $SD = .20$), $F(1,66) = 5.83$, $p < .05$ (Blagov & Singer, 2004; Singer, et al., 2007). Also countering past studies, no differences were found in the positive emotion of older versus younger adults' SDM (Moffitt & Singer, 1994; Singer, et al., 2007).

Overall, older adults' SDM were found to be less focused on self, following predictions from SST and the prioritization of generativity (old $M = .70$, $SD = .22$; young $M = .81$, $SD = .15$), $F(1,66) = 5.67$, $p < .05$ (Lang & Carstensen, 2002).

| | Young | | Old | |
|------------------|----------|-----------|----------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Specificity | .71 | .20 | .81 | .13 |
| Positive Emotion | .83 | .20 | .85 | .17 |
| Self-focus | .81 | .15 | .70 | .22 |

Table 9.3. Means and standard deviations of the specificity, positive emotion, and self-focus of younger ($n = 35$) and older adults' ($n = 33$) SDM.

| | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p</i> |
|------------------|-----------|-----------|----------|----------|
| Specificity | 1 | .16 | 5.83 | .02* |
| Positive Emotion | 1 | .01 | .20 | .66 |
| Self-focus | 1 | .20 | 5.67 | .02* |

Table 9.4. Analysis of variance for three qualities of SDM as a function of age group (young $n = 35$; old $n = 33$; * $p < .05$).

When plotted according to age at the time of the event, SDM from older adults were centred between ages 10-30 (Rubin, et al., 1998; Rubin, et al., 1986). No recency effect was found in the distribution of SDM. This suggests that the creation and incorporation of SDM is limited to events that occur during identity development (Conway, 2005; Erickson, 1959).

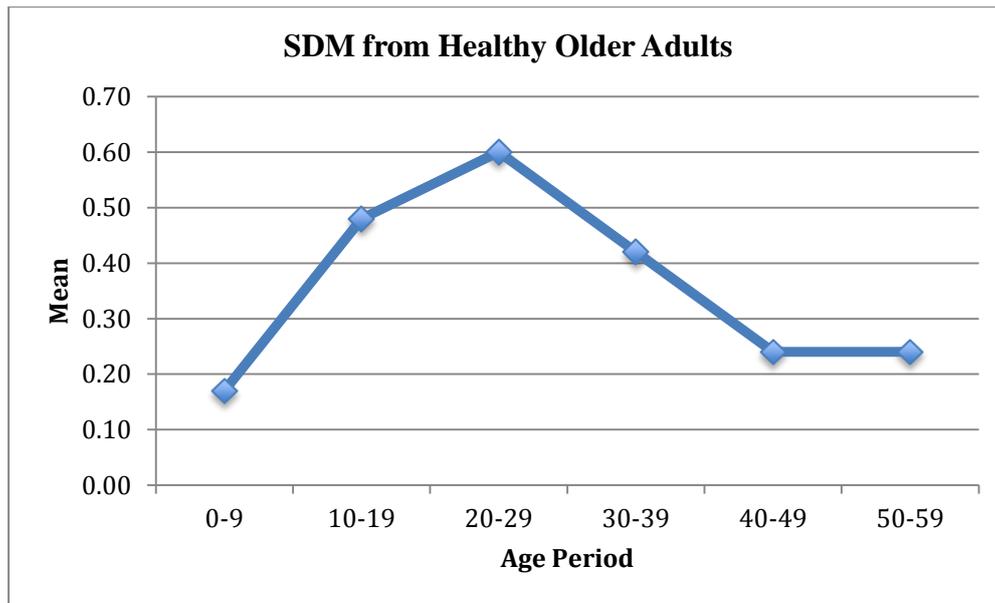


Figure 9.1. SDM of healthy older adults ($n = 33$) plotted according to age at the time of the SDM.

| Age Period | | | | | | | | | | | |
|------------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|
| 0-9 | | 10-19 | | 20-29 | | 30-39 | | 40-49 | | 50-59 | |
| <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| .17 | .33 | .48 | .39 | .60 | .30 | .42 | .39 | .24 | .37 | .24 | .37 |

Table 9.5. Means and standard deviations for the frequency of SDM reported by older adults ($n = 33$) from six decades of the lifespan.

Next, older adults' SDM from outside and inside the reminiscence bump period were considered for positive emotion and self-focus. When only SDM from the bump period were considered, 92% from older adults were positive. A one-way ANOVA revealed the difference in positivity in bump SDM was different between groups. That is, older adults ($M = 3.26$, $SD = 1.35$) rated SDM from within the bump as more positive than younger adults SDM from after age 10, ($M = 2.39$, $SD = 1.20$), $F(1.66) = 7.69$, $p < .01$.

Three repeated measures ANOVAs were conducted. No differences were found between time periods in specificity (inside $M = 2.06$, $SD = 1.02$; outside $M = 2.21$, $SD = 1.02$), $F(1,32) = .80$, $p = .37$. Positive SDM were found to be concentrated within the bump (inside $M = 2.39$, $SD = 1.20$; outside $M = 1.73$, $SD = .99$), $F(1,32) = 42.44$, $p < .00$, along with self-focused SDM (inside $M = 1.27$, $SD = 1.15$; outside $M = 1.21$, $SD = .99$), $F(1,32) = 31.25$, $p < .00$, (Table 9.6 and 9.7).

| | Inside | | Outside | |
|------------------|----------|-----------|----------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Specific | 2.06 | 1.22 | 2.21 | 1.02 |
| Positive Emotion | 2.39 | 1.20 | 1.73 | .99 |
| Self-Focus | 1.27 | 1.15 | 1.21 | .99 |

Table 9.6. Older adults' ($n = 33$) SDM rated for positive emotion and self-focus from outside and inside the reminiscence bump period.

| | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p</i> |
|------------------|-----------|-----------|----------|----------|
| Specific | 32 | .37 | .80 | .37 |
| Positive Emotion | 32 | 102.38 | 42.44 | .00** |
| Self-Focus | 32 | 69.14 | 31.25 | .00** |

Table 9.7. T-tests comparing older adults' ($n = 33$) SDM rated for positive emotion and self-focus from outside and inside the bump era (* $p < .00$).

Goal Card Sort

Overall rankings for goals. The raw priority scores were grouped according to Lang

and Carstensen's constructs of goal priority (2002). Thus, four means were compiled for each participant according to the four factors (a) Social Acceptance, (b) Autonomy, (c) Generativity, and (d) Emotion Regulation. In this analysis, means represented the rankings of the goal constructs, therefore lower numbers indicated higher ranking (Table 9.8).

In accordance to SST and previous findings from Lang & Carstensen (2002), younger adults ranked social acceptance goals highest overall ($M = 10.16$; $SD = 4.02$). Contrary to SST, which suggests the prioritization of more emotionally meaningful goals in old age, older adults also considered social acceptance to be of highest importance and ranked it even higher than the younger participants ($M = 9.26$, $SD = 3.21$). Another contradictory finding was that the younger participants ($M = 10.31$, $SD = 2.82$) ranked generativity goals higher overall than the older participants ($M = 11.80$, $SD = 2.00$), $F(1,63) = 5.61$, $p < .05$ (Tables 9.8 and 9.9).

| | Social Acceptance | | Autonomy | | Generativity | | Emotion Regulation | |
|-------|-------------------|-----------|----------|-----------|--------------|-----------|--------------------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young | 10.16 | 4.02 | 10.41 | 2.80 | 10.31 | 2.82 | 11.19 | 3.05 |
| Old | 9.26 | 3.21 | 9.96 | 3.05 | 11.80 | 2.00 | 10.78 | 3.07 |

Table 9.8. Means and standard deviations of younger ($n = 37$) older ($n = 28$) and adults' prioritized goal constructs.

| | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p</i> |
|--------------------|-----------|-----------|----------|----------|
| Social Acceptance | 1 | 12.70 | .93 | .34 |
| Autonomy | 1 | 3.10 | .37 | .55 |
| Generativity | 1 | 35.10 | 5.61 | .02* |
| Emotion Regulation | 1 | 2.66 | .28 | .60 |

Table 9.9. Analysis of variance for four different goal dimensions as a function of age group (young $n = 37$; old $n = 27$; * $p < .05$).

First and last piles. In consideration of the hierarchal nature of goal organization, the goals included in the first and last piles were considered (Conway & Pleydell-Pearce, 2000). The frequency of goals included within the first pile was compared between groups. Higher scores in this breakdown indicate higher frequency and therefore higher prioritization. One older gentleman created only one pile, and as it was impossible to determine this as a first or last tier, his data was excluded from this particular analysis.

As with the previous findings of overall goal prioritization, younger and older adults also included more social acceptance goals within the first pile (young $M = 1.84$, $SD = 1.72$; old $M = 2.15$, $SD = 1.77$). Additionally, a marginally significant difference between groups difference was found in the including of autonomy goals within the first pile. Contrary to the hypotheses, healthy older adults included more goals related to autonomy within the first pile ($M = 2.15$, $SD = 1.77$), $F(1,63) = 5.76$, $p = .05$ (Table 9.10 and 9.11). No significant differences were found between groups in the last pile.

| | Social Acceptance | | Autonomy | | Generativity | | Emotion Regulation | |
|-------|-------------------|-----------|----------|-----------|--------------|-----------|--------------------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young | 1.84 | 1.72 | 1.54 | 1.12 | 1.62 | 1.30 | 1.11 | 1.05 |
| Old | 2.15 | 1.77 | 2.15 | 1.32 | 1.89 | 1.55 | 1.48 | 1.22 |

Table 9.10. Means and standard deviations of young ($n = 37$) and older ($n = 28$) adults' prioritized goals within the first pile.

| | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p</i> |
|--------------------|-----------|-----------|----------|----------|
| Social Acceptance | 1 | 1.50 | .50 | .49 |
| Autonomy | 1 | 5.77 | 3.94 | .05* |
| Generativity | 1 | 1.11 | .56 | .46 |
| Emotion Regulation | 1 | 2.17 | 1.72 | .19 |

Table 9.11. Analysis of variance for four dimensions of personal goals included within the first pile as a function of age group (young $n = 37$; old $n = 27$; $*p = .05$).

Discussion

This experiment attempted to investigate the link between personal goal constructs and SDM. This was achieved by examining the relationship between the SST and SMS constructs. According to SST, younger adults place greater emphasis on autonomy and social acceptance and older adults prioritize generativity and emotion regulation (Lang & Carstensen, 2002). It was predicted that older adult's SDM from within the reminiscence bump would reflect the change in goal prioritization and processing over the lifespan.

The SDM reported from older and younger adults support these hypotheses. Older adults' SDM were found to be more positive than younger adults overall. When only SDM from the bump were considered, 92% of SDM were positive and these memories were rated more positive than younger adults. These findings provide support for the prioritization of emotion regulation as proposed by SST as well as for the positivity bias in the reconstruction of AM (Carstensen, 1993; Lang & Carstensen, 2002; Comblain, D'Argembeau, & Van der Linden, 2005; Gallo, Korthauer, McDonough, Teshale, & Johnson, 2011).

In addition to emotion regulation, older adults were also expected to prioritize generativity (Carstensen, 1993; Lang & Carstensen, 2002). Overall, older adults' SDM were more focused on others, reflecting the current influence of this goal. This was emphasised further in finding older adults' SDM from within the bump more self-focused than SDM from outside the bump period. This suggests that from ages 10-30, identity development and autonomy are prioritized emphasizing a focus on self (Conway, 1995; Erikson, 1959; Lang & Carstensen, 2002). As individuals move through the lifespan, generativity becomes prioritized, changing focus to others. These findings support the shift in goal prioritization from identity development to generativity as young adults age into older adults.

In contrast, the findings from the goal measure were contrary to what would be expected from SST. It was predicted that older adults would prioritize goals based on future time perspective, rating goals relating to generativity and emotion regulation the highest (Lang & Carstensen, 2002). Instead, while the younger participants fell in line with previous literature favouring goals related to social acceptance, older adults unexpectedly rated those goals the highest as well (Carstensen, et al., 1999; Lang & Carstensen, 2002). This emphasis on social acceptance is mirrored when goal cards from only the first pile are considered. Both

younger and older adults included more goals relating to social acceptance in the first pile. Older adults also included just as many autonomy related goals in the first pile as social acceptance. In particular, the autonomy related goal “be financially independent” was included in the first pile by the vast majority of the older participants. This is contrary to what was found by Lang and Carstensen (2002) using the same task.

Also unexpected was that younger adults rated generativity higher overall than older participants. This may be due to the specific generativity-related goals “leave my mark on this world” and “have a large experience of life,” both specific goals largely favoured by the younger participants. These contradictory findings within the goal card sort are likely the result of the smaller and younger sample size than Lang and Carstensen (2002). Their goal card sorting task included 480 participants from 20 to 90 years of age. This sample consisted of only 65 total participants of which only 28 were older adults. The older adults ranged in age from 59 to 91, however the majority were in their late 60s ($M = 71.21$, $SD = 6.76$). It is hypothesised that perhaps adults at this age do not see their future time as limited as adults in their 80s and 90s.

Older adults’ SDM were more specific than those from younger adults. One possibility for this could be that nearly every older participant listed marriage and birth of children as self-defining. The reminiscence bump plotted from those SDM reflects this in the peak in the 20-29 year decade, an age when most people in that generation were starting families. This increased specificity runs counter to expectations according to the generalization of AM as a result of meaning-making (Blagov & Singer, 2004; Singer, et al., 2007). It is hypothesised that perhaps AM are generalised in the *process* of relating various personal experiences in order to derive meaning. However, when an AM is determined to be

self-defining, perhaps it is treated more like a personal semantic memory.

It is also suggested that perhaps the difference in specific SDM found between this study and others is a difference in interpretation on the part of the researchers (Blagov & Singer, 2004; Singer, et al., 2007). For example, many older adults include “getting married” as a SDM. According to the remember/know paradigm, it is possible for an individual to *remember* the wedding ceremony and events surrounding the occasion, or to *know* “I’m married” without bringing to mind episodic details (Tulving, 2001; Piolino, Belliard, Desgranges, Perron, & Eustache, 2003). If no other context is provided, “getting married” could be interpreted as the actual day of marriage (specific AM), a collection of AM relating to and including the actual wedding (general categoric or general extended AM), or it could be categorized as a personal fact (e.g. I’m married, therefore an event that defines me is “getting married”). This shift from specific episodic details to semantic facts reflects the nature of personal semantic memories; they are personal facts derived from specific autobiographical events and are able to be recalled without retrieval of those original experiences (Haslam, Jetten, Haslam, Pugliese, & Tonks, 2011; Sakaki, 2007). The following study will explore this hypothesis using significant versus defining prompt for cueing AM.

Chapter 10. Experiments 3 and 4

The following two experiments share some of the same methodology, photo cues and analysis of AM at the idea unit level. The first part of this chapter will introduce these two methodologies, then experiments three and four will follow. The first experiment (Experiment 3) uses photo cues to prompt significant events from older and younger adults. These AM are then examined in detail at the idea unit level (Dritschel, 1991). The final experiment (Experiment 4), uses the same photo cues with healthy older adults and older adults with Alzheimer's disease (AD) in an effort to determine if a loss of AM results in a loss of identity. The AM from these two groups will also be examined at the idea unit level (Dritschel, 1991).

Personal identities are the product of goal-driven AM constructed into life stories (Conway & Pleydell-Pearce, 2000; Habermas & Bluck, 2000; McAdams, 1985). Due to self-relevance determined by personal goal hierarchies, the majority of autobiographical memories (AM) retrieved by healthy older adults are from between the ages of 10-30 (Rubin, Rahhal, & Poon, 1998). The most self-relevant AM are those that have been assigned personal meaning and labelled self-defining (Blagov & Singer, 2004). In the previous experiment (Experiment 2), the majority of SDM retrieved from older adults were specific, contradicting previous studies which have found older adults' SDM to be more general as a result of meaning-making (Blagov & Singer, 2004; Singer, et al., 2007). The focus of experiment 3 was to compare SDM with AM that are deemed *significant*.

10.1. Photo Cues

The manner in which we remember autobiographical events across the life course is determined by a number of factors. In the animated Disney movie *Ratatouille*, a food critic is vividly transported back to his youth and his mother's cooking by a single spoonful of soup (Bird, 2007); paralleling the well known *Proust phenomenon*, the ability of odours spontaneously to cue AM which are highly vivid, affectively toned and very old (Gilbert & Wysocki, 1987; Proust, 1922, 1960; Rubin, Groth, & Goldsmith, 1984). The *encoding specificity principle*, proposed by Tulving and Thomsen (1973), states that remembering is the most effective when information available at encoding is also available at retrieval. The past two studies have lent great support to the role of personal goal hierarchies in determining which autobiographical memories (AM) are retained and which are forgotten (Conway & Pleydell-Pearce, 2000). The following two studies used photos of annual events to cue AM; then memories collected were categorized in a more detailed manner by breaking them down into idea units (Dritschel, 1991).

Using photos to cue AM has been shown to both improve (Hudson & Fivush, 1991) and interfere with (Van den Hoven & Eggen, 2009) remembering. Hudson and Fivush (1991) used both an open-ended question and photo cues to interview kindergarteners regarding a trip to the Jewish Museum (a museum of archaeology). All children were able to describe their day at the museum immediately after the trip. On three subsequent occasions: six weeks after the trip, one year later, and six years later the children were asked, "Can you tell me what happened when we went to the Jewish Museum?" After reporting all they could remember, the children were shown six photos showing different activities they had participated in on that day. After one year, only one of the fifteen children was able to answer the open-ended question. With the photo cues, however, the event was remembered

by 87% of the children- even after six years. However, this increase in remember could also be due to the repeated remembering of those events (i.e. rehearsal).

In a similar experiment using adult participants, Van den Hoven and Eggen (2009) interviewed participants regarding a guided tour of a history-themed park in the Netherlands. Five different cues were used to encourage remembering (artefact, odour, sound, video, or picture) one month after their visit. Each participant was given one of the five cues then asked to write down as much as they could remember about one of the activities from the tour. Then, the participants wrote all they could remember about a second activity without any cues. It was found that none of the five cues enhanced specificity; the participants provided more specific details when they were not given any cue at all. It was concluded that the additional cues hampered the production of specific AM.

For these experiments, photographs depicting six different annual events (*Christmas, Easter, Birthday, Burns Night, New Year, and Holiday*) were selected for their relevance to the age, culture, and geographical location of the participants of this study. Three versions of each event were selected in the form of *scene, food, or people*. These different representations were chosen in an effort to see if it would affect specificity in remembering in any way. For example, the Birthday *scene* was a decorated table with a present and cards; Birthday *people* showed four children blowing out candles on a cake; and *food* was represented by a cake with candles and “Happy Birthday” written in frosting. Since colour photos were not widely available until the 1950s, and our older groups grew into adults before then, each photograph was presented in colour and black and white versions giving a total of 36 photographs (Collins, 1990). In order to determine if the representation (scene, food, people) or colour format influence the photo cueing, the total set was divided into six

sets of six photographs, containing one of each event, two scenes, two food, two people, three in colour and three in black and white.

It should be noted that the occasions chosen are mostly positive in nature and tend to be spent with family and friends. Christmas and Easter are both Christian holidays.

According to the 2011 Scotland census, 54% of the population identify themselves as Christian (32% Church of Scotland, 16% Roman Catholic, and 6% other; Office for National Statistics, 2011). These occasions, along with birthdays, also have an element of excitement for children. Christmas and birthdays generally come with presents; in Scotland, children decorate and roll hardboiled eggs representing the stone that was rolled away from Jesus' tomb on Easter morning (Polan, 1983). New year and Burns' night (a Scottish annual event celebrating the poet Robert Burns) are mostly celebrated by adults. The event holiday (i.e. vacation) is the only event from these six that is not marked on a calendar. Nonetheless, it was included as an event that would likely be experienced by Scottish participants.

Interviews were conducted in a designated unoccupied room within the participating senior activity centres or for those who were able, in the School of Psychology interview room at University of St. Andrews. Each room was set out to allow the participant and the experimenter to sit opposite each other at a table. All images were displayed on an 8.5 X 11 inch laptop screen. The participants were allowed to talk for as long as they wanted or until their discourse came to a natural end. Each session was recorded using an audio recorder.

10.2. Idea Units

All interviews were transcribed verbatim and coded into categories developed by a

team of four researchers. Memories were first divided into *idea units*, defined as “a clause consisting of a finite verb plus all its modifiers” (Dritschel, 1991, p. 320). This more detailed breakdown allows for a more accurate analysis of AM specificity. For example, “dinner was terrible, and usually she does such a great job.” The specific event (terrible dinner) is qualified by a general AM (usually dinner is good). As such, idea units were first classified as either *non-autobiographical* or *autobiographical*. Repeated idea units were excluded from analyses.

Non-Autobiographical

Sub-categories of non-autobiographical idea units included:

1. *Non-Memory Comments*, comments on the pictures, comparisons between past and present, or statements about the present in general
2. *Semantic Memories*, memories for general common knowledge facts unrelated to personal life.

Categories for *miscellaneous* and *incomplete* non-autobiographical idea units were also created.

Autobiographical

Autobiographical idea units were classified according to:

1. *Self-Focus*: Based on the most common themes found in bump and life story research (relationships and school/work), two over-arching labels were applied: *self-focused* or *others-focused* (Singer, et al., 2007; Cohen & Faulkner, 1988;

Holmes & Conway, 1999; Schroots & Assink, 2005). AM describing personal experiences and achievements that do not make reference to others were labelled as *self-focused*. For example: “I just went for a hill walk along the moorland.”

The *others-focused* category included AM referencing other people. For example: “All my family was around, my son took his first walking steps.” The more detailed analysis allows the discrimination between experiences that were spent with others but may or may not be focused on others. For example, two people experience the same Christmas with the same family and report it using 20 idea units. One person may include more self-focused idea units than the other or vice versa.

2. *Time*: The lifespan was divided into decades: 0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, and 70-79. An additional *recent* category was created for idea units describing memories within the last three years. (Janssen, Chessa, & Murre, 2005).

Autobiographical idea units were then further categorized as:

1. *Specific*: a specific unique event, lasting less than one day, including the specific details of that event: who, what, when, where, why, and how (Williams, 1992). For example: “...it was the first time I did the thing where you hide Easter eggs for children in the garden.”
2. *General Extended*: a specific event that lasts for more than one day (Williams & Dritschel, 1992). For example: “I remember the first time I went abroad with my family to France.”
3. *General Categorical*: an event that is repeated in several instances over a single time period (Williams, 1996). For example: “...for the last 18 years we’ve

visited the same friends at the new year.”

4. *Personal Semantic*: autobiographical facts about the participants’ past and present (Kopelman, Wilson, & Baddeley, 1989). For example: “My son lives in London.”

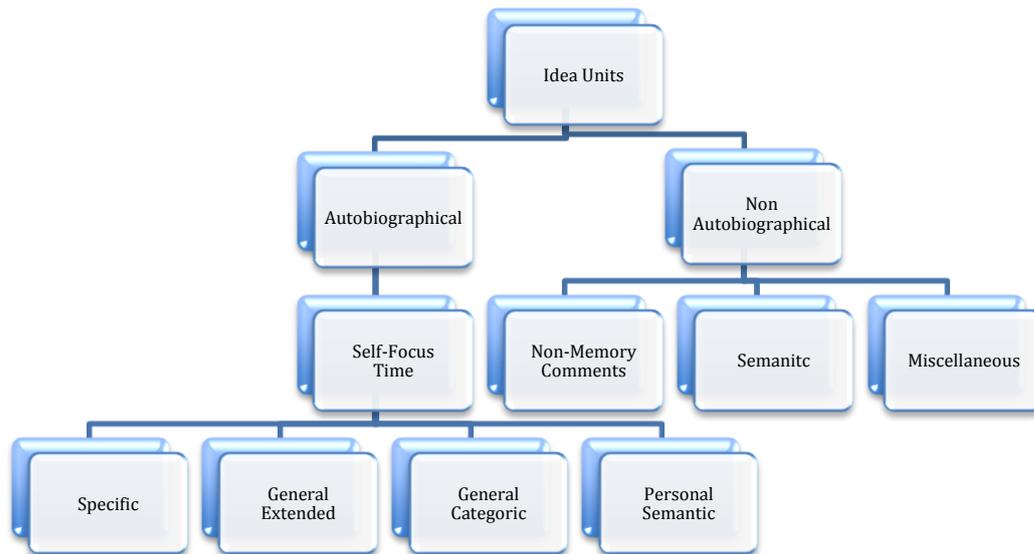


Figure 10.1. Hierarchical structure of coding applied to idea unit categories.

The first experiment in this chapter explores AM between younger and older adults in an attempt to determine the difference between significant and self-defining memories. This is followed with an experiment comparing healthy older adults with older adults with AD with the aim of determining the types of AM that are the most resilient against AD.

Experiment 3

This experiment compared older and younger adult responses to photos of annual events. The prompt “what was your most significant (event)?” was used in order to see if there were similarities between older and younger groups in the types of annual events that

were deemed significant and if these significant AM are similar to those that are self-defining.

According to cognitive theory, experiences that are better remembered are more novel or distinctive and it is this difference from AM preceding or following the experience that causes it to stand out (Rubin, Rahhal, & Poon, 1998). It was originally intended to consider the role of novel/distinctiveness in the significance of AM retrieved; however the vast majority of the responses from younger adults were so brief, this was deemed impossible. For example, this young adults' response to the photo of a birthday, "21st was pretty important. I spent it with family." It is very likely that this person has spent more than one birthday with family, therefore it cannot be concluded whether or not this AM is novel/distinctive. It is hypothesised that the shorter answers from younger adults may reflect a more pressured student lifestyle where tasks need to be completed quickly so as to move on to the next assignment.

The chief aim of this study was to compare significant AM with the self-defining memories collected in the previous experiment (SDM; Blagov & Singer, 2004). Significance is equated with self-relevance according to self-narrative/identity formation theories (Conway, 2005; Habermas & Bluck, 2000). In order to ascertain if self-relevance is determined by a person's individual experience (e.g. personal accomplishment) or through others (e.g. working together or achievements of own children) the self versus others-focus in AM deemed significant was examined. Based on identity formation and socioemotional selectivity theory (SST), it was hypothesized that significant AM from within the bump period would be more self focused due to the imperative to form a personal identity; significant AM from after the bump will be more others focused due to the influence of

generativity resulting from a decrease in future time perspective (Carstensen, 1993; Carstensen, Isaacowitz, & Charles, 1999; Conway & Pleydell-Pearce, 2000; Erikson, 1968).

Past studies have found SDM from older adults to be mostly general and less specific than younger adults (Blagov & Singer, 2004; Singer, et al., 2007). This has been attributed to the processes of meaning-making; life story AM are generalized in order to link them to abstract self-knowledge and make comparisons between experiences across time (Blagov & Singer, 2004). The previous experiment did not find this generalization in older adults' SDM, following the findings from Martinelli, Anssens, Sperduti, and Piolino (2013); older and younger adults' SDM do not differ in specificity. It is hypothesised that perhaps generalization is used in the process of relating various personal experiences in order to derive meaning. However, when an AM is determined to be self-defining perhaps it is treated more like a personal semantic memory.

Support for this hypothesis is derived from the remember/know paradigm distinguishing episodic and semantic memory proposed by Tulving (2001). The remember/know paradigm distinguishes between the recollection of a memory, known as *remembering*, and the familiarity of a memory, known as *knowing*. It is described as “a shift from a sense of remembering to a sense of just knowing” (Martinelli, et al., 2013). This idea is also paralleled in the idea that personal semantic memories are episodic in origin; personal facts are derived from those episodes and are able to be recalled without retrieval of those original experiences (Haslam, Jetten, Haslam, Pugliese, & Tonks, 2011; Sakaki, 2007). SDM have been conceived of as an integration of episodic memory with self-concept (Singer, et al., 2013). As self-concept corresponds with personal semantic AM, it is possible that SDM are more semantic than episodic in nature.

Method

Participants

Two groups of participants were recruited for this study. The first comprised twenty-three older adults (12 male) from Fife and Dundee, Scotland between 62 and 86 years of age ($M = 71.78$, $SD = 7.12$). Their years of education ranged between 7 and 20 years ($M = 13.39$, $SD = 3.46$). Twenty-three younger adults (six male) attending the University of St. Andrews were also recruited. They ranged in age between 18-21 years ($M = 19.43$, $SD = .90$). Their years of education ranged between 12-15 ($M = 13.43$, $SD = .89$). No significant differences were found between the two groups in level of education.

Mini-Mental State Examination (MMSE; Section 4.2, Appendix 6; Folstein, Folstein, & McHugh, 1975). In order to rule out cognitive impairment, the MMSE was used as a broad measure of cognitive function for the older adult group. All of the older adults scored within the healthy range, 27-30 ($M = 29.09$, $SD = 1.24$).

Hospital Anxiety and Depression Scale (HADS; Section 4.3, Appendix 7; Zigmond & Snaith, 1983). The HADS was used as a broad measure of emotional wellbeing for the all participants. All of the older (anxiety $M = 4.17$, $SD = 2.64$; depression $M = 2.91$, $SD = 2.02$) and younger (anxiety $M = 7.07$, $SD = 2.54$; depression $M = 2.80$, $SD = 1.84$) participants scored within the healthy range, less than 8 on either measure. The difference in anxiety scores was significant between groups, $F(1,44) = 14.29$. $p < .00$.

An analysis of covariance (ANCOVA) was considered to control for the higher HADS anxiety scores from the younger group. However, the groups means were not affected by the covariate, suggesting that the HADS anxiety scores are not significantly affecting the data. For this reason, and because all HADS scores were within the healthy range, a covariate was decided against.

| | Age | | Years of Education | | HADS - Anxiety | | HADS - Depression | | MMSE | |
|-------|----------|-----------|--------------------|-----------|----------------|-----------|-------------------|-----------|----------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young | 19.43 | .90 | 13.43 | .89 | 7.07 | 2.54 | 2.80 | 1.84 | - | - |
| Old | 71.78 | 7.12 | 13.39 | 3.46 | 4.17 | 2.64 | 2.91 | 2.02 | 29.09 | 1.24 |

Table 10.1. Descriptive information for younger (n = 23) healthy older (n = 23) adults who participated in the photo-cuing task.

Materials

Six different annual events (*Christmas, Easter, Birthday, Burns Night, New Year, and Holiday*) were selected for their relevance to the age, culture, and geographical location of the participants of this study and presented to participants as described in Section 10.1.

Procedure

Each participant completed the HADS (Zigmond & Snaith, 1983); the older adults also completed the MMSE (Folstein, et al., 1975) before viewing the photographs. Each photograph was presented with the prompt, “What was your most significant (event)?” Participants were asked their age at the time of each memory provided.

Scoring. All interviews were audio recorded and transcribed verbatim. AM were divided into idea units, then categorized according to the classifications specified earlier in Section 10.2. One researcher independently scored 100% of the transcribed interviews, while a second rater randomly sampled the transcribed interviews. In the event of interrater disagreement, a third and (if necessary) fourth judge were consulted.

| Interrater Reliability | % Agreement |
|-------------------------------|--------------------|
| Idea Units | 88.75 |
| AM/ Non AM | 95.45 |
| AM Specificity | 96.00 |
| Self-Focus | 96.15 |

Table 10.2. Interrater reliability for idea units, autobiographical versus non-autobiographical, specificity, and self-focus.

Results

Event representation. Before exploring the memories recalled by the participants, the effectiveness of the stimuli were examined to see if there were any features that may have influenced the number or types of AM recalled. Three mixed ANOVAs were conducted in order to assess the effects the six events, three representations, and two colour formats had on the number of significant memories retrieved by the participants. In each mixed ANOVA the following assumptions were tested: (1) independence of observations, (2) normality, (3) sphericity. The assumptions of independence of observations and normality were met;

sphericity was violated. Greenhouse-Geisser values were used. Thus, results should be viewed with caution.

The first mixed ANOVA revealed that the six different annual events depicted did not notably affect the number of significant memories retrieved between groups. However, a significant main effect was found for annual event with the least number of significant memories retrieved for Burns night, $F(3.63, 159.84) = 7.72, p < .01$. The next two mixed ANOVAs found that neither the three different versions of each event nor the colour format had any measurable effect on the number of significant memories retrieved, between or within groups.

Total responses. Older adults' responses were lengthier, contained significantly more words (old $M = 586.96, SD = 298.34$; young $M = 228.13, SD = 131.11$), $t(30.19) = -5.28, p < .01$, two-tailed, equal variances not assumed, and idea units (old $M = 68.78, SD = 38.08$; young $M = 29.74, SD = 18.82$), $t(32.14) = -4.41, p < .01$, two-tailed, equal variances not assumed. It is also important to note that many of the older adults responded with more than one significant memory per photograph resulting in their mean ($M = 7.04, SD = 2.38$) number of responses being higher than the number of stimuli (six). This was not anticipated, as the prompt "most significant (event)" implies only one event.

Only two of the younger adults responded with more than one significant memory for a single photograph ($M = 5.65, SD = .71$). This difference between groups was found to be significant, $t(25.92) = -2.68, p = .01$, two-tailed, equal variances not assumed. Due to this finding, an overall comparison was made between groups in the total number of idea units, words, and whole AM included in responses. Then all resulting analyses were conducted with

a smaller data set based only on the first significant memory recalled in response to each annual event photograph.

| <i>All Memories</i> | Young | | | Old | | | t-test | | |
|-------------------------|----------|----------|-----------|----------|----------|-----------|----------|-----------|------------------------|
| | <i>f</i> | <i>M</i> | <i>SD</i> | <i>f</i> | <i>M</i> | <i>SD</i> | <i>t</i> | <i>df</i> | <i>Sig. (2-tailed)</i> |
| Idea Units ^e | 684 | 29.74 | 18.82 | 1582 | 68.78 | 38.08 | -4.41 | 32.14 | .00** |
| Word Count ^e | 5247 | 228.13 | 131.11 | 13500 | 586.96 | 298.34 | -5.28 | 30.19 | .00** |
| AM (Whole) ^e | 130 | 5.65 | .71 | 162 | 7.04 | 2.38 | -2.68 | 25.92 | .01* |

Table 10.3. Descriptive statistics and t-tests with total dataset from older ($n = 23$) and younger ($n = 23$) adults. Total frequencies are listed for the reader's reference; however, relative frequencies were used for calculations (^eequal variances not assumed, ** $p < .01$, * $p < .05$).

Within this subset of just the first significant memories provided, there was no statistical difference between younger and older adults in the number of AM (Table 10.4). However, younger adults' AM contained significantly fewer AM idea units (old $M = 50.13$, $SD = 30.59$; young $M = 25.48$, $SD = 14.31$), $t(31.19) = 3.50$, $p < .01$, equal variances not assumed, and words (old $M = 418.78$, $SD = 234.96$; young $M = 197.48$, $SD = 108.38$), $t(30.96) = -4.10$, $p < .01$, equal variances not assumed. This suggests that older participants offered significant memories that were longer and more detailed than those of the younger adults.

| <i>Ist Significant Memory Only</i> | Young | | | Old | | | t-test | | <i>Sig. (2-tailed)</i> |
|---|----------|----------|-----------|----------|----------|-----------|----------|-----------|------------------------|
| | <i>f</i> | <i>M</i> | <i>SD</i> | <i>f</i> | <i>M</i> | <i>SD</i> | <i>t</i> | <i>df</i> | |
| Idea Units ^e | 584 | 25.48 | 14.31 | 1123 | 50.13 | 30.59 | 3.50 | 31.19 | .00** |
| Word Count ^e | 4542 | 197.48 | 108.38 | 9632 | 418.78 | 234.96 | -4.10 | 30.96 | .00** |
| AM (Whole) | 117 | 5.09 | 1.04 | 107 | 4.65 | 1.23 | 1.30 | 44 | .20 |

Table 10.4. Descriptive statistics and t-tests with subset of first significant memories from older (n = 23) and younger (n = 23) adults. Total frequencies are listed for the reader's reference; however, relative frequencies were used for calculations (^eequal variances not assumed, ** $p < .01$).

Non-autobiographical versus Autobiographical idea units. The lengthier responses of the older adults raised the question of whether their responses contained more detailed autobiographical remembering or reflected a different response style to that adopted by the younger participants. To examine this, the number of non-autobiographical idea units contained in the first responses of the two groups was compared. Non-autobiographical idea units comprised 8% of young adult responses ($M = .35$; $SD = .37$) and 24% of older adults' responses ($M = 1.96$; $SD = 1.74$), $t(23.94) = -4.32$, $p < .01$, two-tailed, equal variances not assumed (Table 10.5). More specifically, independent t-tests revealed older adults' responses included more non-memory comment idea units, specifically more small talk that was not memory related (old $M = .45$, $SD = .41$; young $M = .07$, $SD = .11$), $t(25.19) = -4.25$, $p < .01$, two-tailed, equal variances not assumed. Finally, older adults also included more general facts in their responses, as indicated by total number of semantic idea units (old $M = .29$, $SD = .54$; young $M = .01$; $SD = .04$), $t(22.19) = -2.49$, $p < .02$, two-tailed, equal variances not assumed.

| | Young | | | Old | | | t-test | | |
|---------------------------------|----------|----------|-----------|----------|----------|-----------|----------|-----------|------------------------|
| | <i>f</i> | <i>M</i> | <i>SD</i> | <i>f</i> | <i>M</i> | <i>SD</i> | <i>t</i> | <i>df</i> | <i>Sig. (2-tailed)</i> |
| Non-AM Idea Units ^e | 49 | .35 | .37 | 270 | 1.96 | 1.74 | -4.32 | 23.94 | .00** |
| Non-Memory Comment ^e | 10 | .07 | .11 | 62 | .45 | .41 | -4.25 | 25.19 | .00** |
| Semantic ^e | 1 | .01 | .04 | 40 | .29 | .54 | -2.49 | 22.19 | .02* |

Table 10.5. Descriptive statistics and t-tests with non-autobiographical and autobiographical idea units from older ($n = 23$) and younger adults ($n = 23$). Total frequencies are listed for the reader's reference; however, relative frequencies were used for calculations (^eequal variances not assumed, ** $p < .01$, * $p < .05$).

Autobiographical idea units comprised the bulk of the younger adults' responses. Specifically, they accounted for 96% of the young adults' responses and 76% of the older adults', although the older adults retrieved significantly more autobiographical idea units in total (old $M = 37.43$, $SD = 24.24$; young $M = 22.91$; $SD = 12.18$), $t(32.45) = -2.57$, $p < .02$, two-tailed, equal variances not assumed (Table 10.6). Older participants' responses also included more general categoric idea units, that is idea units from general AM that is repeated over several instances over an extended period (old $M = .53$, $SD = .73$; young $M = .13$; $SD = .25$), $t(26.87) = -2.48$, $p = .02$, two-tailed, equal variances not assumed. Finally, older adults retrieved more personal semantic idea units (old $M = 1.37$, $SD = 1.27$; young $M = .27$; $SD = .29$), $t(24.25) = -4.05$, $p < .01$, two-tailed, equal variances not assumed. The two groups did not differ in the number of specific idea units, idea units describing a specific AM that happened at a particular time and place, or general extended idea units, idea units from a general AM that extends over a long period of time.

| | Young | | | Old | | | t-test | | |
|-----------------------------------|----------|----------|-----------|----------|----------|-----------|----------|-----------|------------------------|
| | <i>f</i> | <i>M</i> | <i>SD</i> | <i>f</i> | <i>M</i> | <i>SD</i> | <i>t</i> | <i>df</i> | <i>Sig. (2-tailed)</i> |
| AM Idea Units ^e | 535 | 22.91 | 12.18 | 853 | 37.43 | 24.24 | -2.57 | 32.45 | .02* |
| Specific | 371 | 2.77 | 1.51 | 464 | 3.36 | 2.49 | -.97 | 44 | .34 |
| General Extended | 65 | .48 | .63 | 87 | .67 | .74 | -.97 | 44 | .34 |
| General Categoric ^e | 18 | .13 | .25 | 73 | .53 | .73 | -2.48 | 26.87 | .02* |
| Personal Semantic ^e | 39 | .27 | .29 | 190 | 1.36 | 1.27 | -4.05 | 24.25 | .00** |

Table 10.6. Descriptive statistics and t-tests with autobiographical idea units from older ($n = 23$) and younger adults ($n = 23$). Total frequencies are listed for the reader's reference; however, relative frequencies were used for calculations (^eequal variances not assumed, ** $p < .01$, * $p < .05$).

The following two excerpts illustrate the way these differences manifested in the types of and distribution of idea units as a whole. The first is taken from the transcript of an older adult, the second from a younger adult, both of who were responding to the question: “*What was your most significant Christmas?*” The older participant began by giving some general information about how Christmases are spent with her family before giving a specific example, then concluded with more general information (*categorization in italics*):

Er, every Christmas was of significance

AM - General Categoric

because we always spend it together, er my family

AM - General Categoric

Right, fine, it's main Christmas Day

MISC

Er, we had a lovely cat called Bertie,

AM – Personal Semantic

and we had a big flat,

AM – Personal Semantic

it was very cold, (unintelligible)

AM - Specific

and we put the turkey by the fire,

AM - Specific

we also had Norman's Mother for Christmas,

AM - Specific

but then Norman's turkey happened to have been eaten by the cat,

AM – Specific

and Norman's mother was a very fastidious lady

AM – Personal Semantic

and you couldn't tell her the cat had eaten half a turkey,

AM – Specific

so, we camouflaged it and ate half a turkey.

AM – Specific

That was a long time ago.

AM – Personal Semantic

That was when we lived in Glasgow,

AM – Personal Semantic

we lived in Glasgow from '79 to '90.

AM – Personal Semantic

In contrast, the younger participant immediately begins by detailing a specific event. Her response is short and concise:

One Christmas we bought a turkey

AM – Specific

and it stayed in the freezer for a long time

AM – General Extended

and it went off

AM – Specific

So we didn't have a turkey to eat for Christmas day

AM – Specific

That was quite disappointing

AM – Specific

It was a good Christmas anyways

AM – Specific

The two responses both discuss Christmas turkey, however, the older adults response is more detailed and conversational in style. The younger adult gets straight to the point and ends the response.

The Reminiscence Bump. In order to gain a broad picture of the distribution of remembering, older adults' whole AM were plotted according to age at the time of the event (Figure 10.2). The AM were expected to be concentrated around the 10-30 year period. A reminiscence bump was indeed found during that age period, peaking between 20-30. In addition a second bump of significant AM peaked between the ages 60-69.

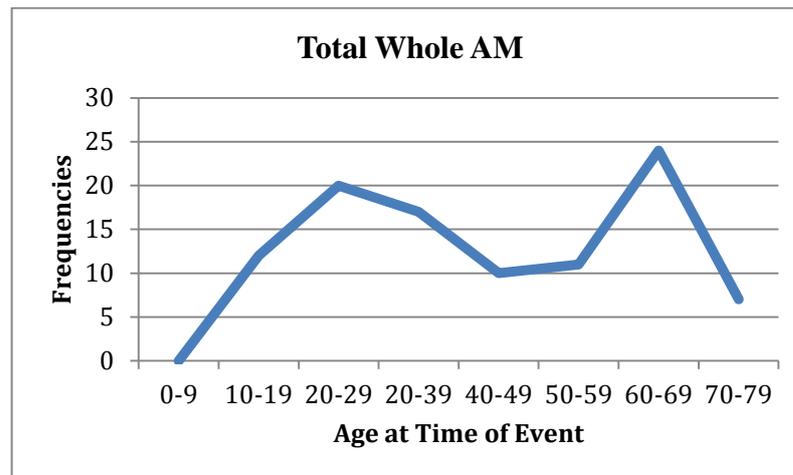


Figure 10.2. Frequencies of whole AM produced by old adults ($n = 23$) divided across decades of life.

A mixed ANOVA was used to examine the distribution of self and others-focused significant memories produced by the younger and older adults (Table 10.7). The assumptions of normality, equal variances, and sphericity were met. No significant difference was found between the groups; overall both groups retrieved significantly more others-focused (young $M = 1.77$, $SD = 1.50$; old $M = 2.26$, $SD = 1.50$) than self-focused significant memories (young $M = .53$, $SD = .41$; old $M = .60$, $SD = .89$), $F(1,44) = 47.57$, $p < .01$.

| | Others | | Self | |
|-------|----------|-----------|----------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Young | 1.77 | 1.50 | .53 | .41 |
| Old | 2.26 | 1.50 | .60 | .89 |

Table 10.7. Means and standard deviations for older ($n = 23$) and younger ($n = 23$) participants' others-focused and self-focused significant idea units.

When older adults' others-themed significant memories were plotted according to age

of memory, a reminiscence bump emerged with a peak in the 20-29 year decade and a secondary bump in the 60-69 year decade (Figure 10.3). This suggests that the annual events that retain the most significance are those involving relationships that occurred when the participants were in their 20s and 60s. This was supported by examination of the transcripts, which indicated that the important events were the ones that were shared with their own children and grandchildren. The younger adults' others-themed memories followed the same pattern, with the most coming from before age 10 (221 idea units, compared to 158 from after age 10); however, this difference was not found to be significant.

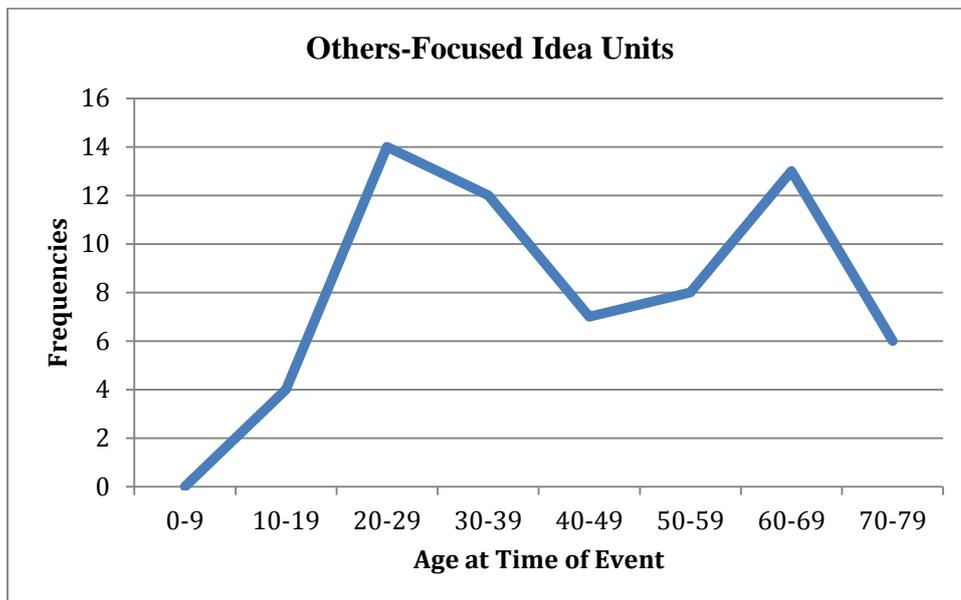


Figure 10.3. Distribution of frequency of others-focused AM idea units from older adults (n = 23) divided across decades of life.

A similar plot of the older adults' self-focused memories across the life course revealed a reminiscence bump in the 20-29 year decade and a much smaller secondary bump in the 60-69 year decade (Figure 10.4). The younger adults' self-focused memories were mainly from their teenage years, unlike their others-themed ones, which tended to be from

before age 10; although this difference was not found to be significant.

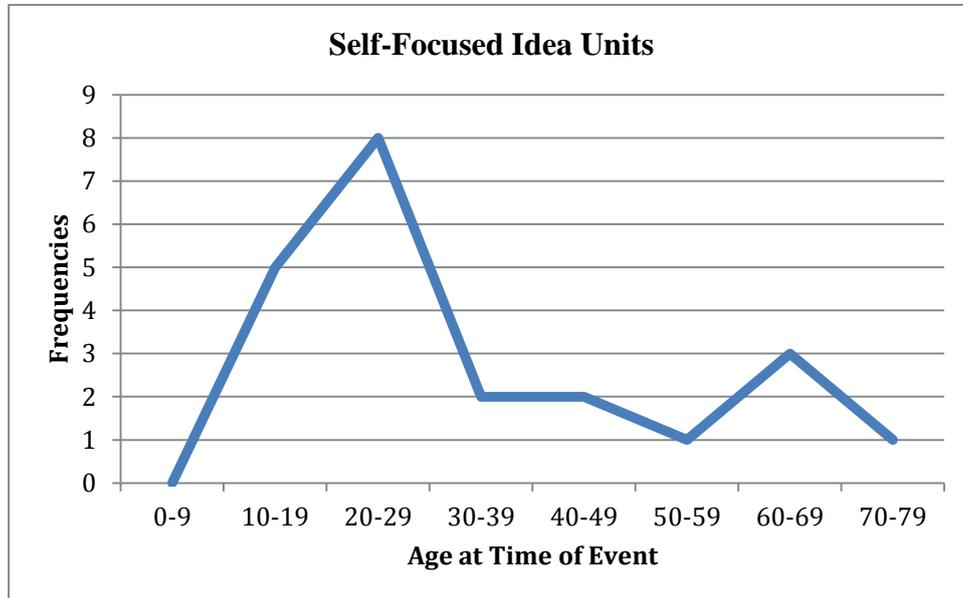


Figure 10.4. Distribution of frequency of older adults' ($n = 23$) self-focused AM idea units across the lifespan.

Discussion

Forty-six participants, recalled their most significant memories of annual events prompted by photographs. The majority (81%) of the responses contained at least one significant AM; there were no significant differences between the types of stimuli or the events, with the exception of Burns Night, which proved to be the least successful trigger for AM retrieval.

Examination of the participants' responses revealed that the younger and older adults answered the prompt questions differently. Many older adults provided more than one

significant AM to a single photographic prompt, whereas only two younger adults included more than one significant event in response to a single photo. It is hypothesised that this may be because the older adults, having lived longer, had more memories to sort through and choose from, as alluded to by one participant, “I’ve got two significant Christmases (taps the table)... Yes, I’ll give you this one.” Older adults’ responses were also substantially longer than those of the younger adults, with an average word count more than double those of the younger participants. One component of the lengthier responses from older adults was the inclusion of more non-autobiographical idea units, specifically non-memory comments and semantic idea units. The presence of these additional components clearly distinguished the responses made by the two groups. The older adults took their time in responding to each prompt and photograph with a conversational style, whereas the younger adults were very straightforward and concise. This differs from the more summarized and less detailed responses from older adults reported in previous studies (Piolino, et al., 2010; Ros, et al., 2010; Singer, et al., 2007). It is postulated that the nature of photos and word cues may differ in the amount of context provided. An emotional word such as “angry” might require a more elaborative response in order to explain the context of the event and why it relates to “angry.” In contrast, a photo of a Christmas tree paired with “what was your most significant Christmas?” provides much of the context and can be responded to with a very brief statement. This hypothesis, however, does not take into account the lengthier responses of the older group. Thus, in addition, it is also postulated that the shorter responses from the younger adults may reflect a more pressured academic lifestyle where tasks need to be completed quickly so as to move on to the next assignment. Perhaps the additional context provided by the photo cues and prompt allowed for this time saving response style.

Younger adults provided more whole AM overall, however the responses of the two

groups contained similar numbers of specific AM idea units. This suggests that older adults' AM are just as specific as those from the younger group. This is contrary to most other studies, which have found that younger participants tend to have more specific AM and older participants tend to have more general AM (Piolino, et al., 2010; Ros, Latorre, & Serrano, 2010; Singer, et al., 2007).

Another contributor to the lengthier responses from the older adults was the inclusion of more general categoric (series of repeated events) and personal semantic (autobiographical information rather than a personal memory) idea units in their responses. Two explanations are proposed for these findings. First, this result may reflect the annual event stimuli and the greater number of instances of each event the older adults have experienced in their lives. This larger time frame also means the older group has had more time to establish traditions; as one gentleman reported spending the past 18 New Years in a similar fashion with the same group of close friends.

Second, the inclusion of more general categoric and personal semantic idea units could also be a reflection of meaning-making. According to Blagov & Singer (2004), the process of attributing meaning to past events requires the generalization of AM in order to form links to autobiographical knowledge (i.e. personal semantic memory) and other events across time. It is proposed that perhaps, in determining the significance of past annual events, older adults were 'thinking out loud.' This can be seen in the earlier example of the older woman who first mentions typical Christmases with her family (general categoric AM) before settling on a particular memory that is described using specific AM (cat eating turkey) and contextual personal semantic AM (name of cat, living in Glasgow).

Although the length and composition of the responses differed significantly, both groups retrieved far more positive than negative autobiographical memories. This finding is in accord with previous research into spontaneous retrieval of AM, particularly those memories that are retrieved during the reminiscence bump period, between 10-30 years (Berntsen & Rubin, 2002, 2004; Bohn, 2010; Glück & Bluck, 2007). However, examination of the temporal distribution of the AM retrieved for annual events revealed slightly different patterns in both the young and older adults to those reported for other types of AM retrieval.

While the older adults' significant memories of annual events resulted in a bump for the period between 20-29 years of age, a larger bump emerged for the period from 60-69 years. At first it was thought that this second bump could reflect a recency effect as the mean age of our older adult group was 71.78 years. Upon closer inspection, the period between 60-69 years accounts for 13% of older adults' significant AM; only 4% of those memories are from within the last three years. When this distribution is inspected at the idea unit level, both self-focused and others-focused idea units had the highest peak in the 20-29 period, with others-focused idea units showing a second substantial bump in the 60-69 period. This could reflect the effects of goal processing across the lifespan (Carstensen, 1993; Conway, 2005; Conway & Pleydell-Pearce, 2000). The time between 20-29 years of age is associated with emerging adult identity (Conway, 2005; Erikson, 1968, 1997). A bump during this period in both self and others-focused idea units could be the result of developing a personal identity through relationships with others (Erikson, 1968; Tajfel & Turner, 1987). Self-focused memories show the characteristic bump for the late teens, and early adulthood, specifically in the years 10-19 for the younger adults and 20-29 for the older adults. The even larger others-focused bump during this period could suggest that relationships are a requirement for identity formation, that is, that individual identities cannot exist without others. This

suggestion is evidenced in prisoners that are forced to stay in solitary confinement; their sense of identity and ability to understand the world is undermined (Guenther, 2013).

The additional bump in the age period between 60-69 in others-focused idea units could reflect the transition from identity formation goals to generative goals as predicted by SST (Carstensen, 1993; Lang & Carstensen, 2002). The others-focused memories of annual events appear to reflect strong family involvement in these events, which in the younger adults is focused on their childhoods (ages 0-9) and the older adults on their own children (ages 20-29) and grandchildren (ages 60-69). For example, Easter was mostly reported as significant when the participant was a child (rolling Easter eggs with parents & grandparents) or with children (rolling Easter eggs with their own children and grandchildren). These findings may also reflect the nature of the stimuli used to prompt AM retrieval. Arguably four of the annual events – Christmas, Easter, Birthday and Holidays (vacation) – are heavily child-focused, in contrast to New Year and Burns Night, which are adult-focused celebrations. The participants' responses reflect this in that they recall mostly family-oriented memories in response to these events. In the younger adults, these appear to be from their early childhoods; in the older adults these seem relate to their own children and more recently their grandchildren. The older adults hardly included memories from childhood. It is proposed that this may relate to many older adults reporting that they had little celebration of birthdays or Christmas as a child due to the rationing and relocation that occurred during World War II (Zweiniger-Bargielowska, 2000).

It may also be possible that with age comes a certain life perspective (Carstensen, et al., 2011). It has been shown that older people perceive their time as more limited than younger people, and thus focus more on “social partners with strong emotional meaning”

(Lang & Carstensen, 2002, p. 136). Large family gatherings may have more significance because older people want to spend as much time with their loved ones during the time they have left (Carstensen, et al., 1999).

The present findings confirm previous studies by reinforcing the idea that identity is formed in late adolescence/early adulthood (Demiray, et al., 2009; McLean, 2008) and our priorities change as our view of time remaining changes (Lang & Carstensen, 2002). The results also suggest that when older adults are asked for a significant AM, their responses contain more semantic, general categoric, and personal semantic idea units. Older adults appeared to “think out loud,” often listing general events and personal semantic information before providing one (or often more than one) particular experience. In contrast, when asked for an SDM in the previous experiment, older adults produced AM that were mostly specific and concise (e.g. “getting married” or “graduating from university.”)

The different response styles of older adults in response to a significant versus defining prompt could reflect the processes of meaning-making; summarizing events in order to link them across time to abstract self-knowledge and other similar events in order to derive meaning (Blagov & Singer, 2004). SDM have been described as an integration of specific AM and personal semantic memory (Singer, et al., 2013). This idea is paralleled in the unitary system view of AM in which semantic and episodic AM are seen as overlapping (Baddeley, 1984; Rahjah & McIntosh, 2005). It is proposed that SDM operate according to the multiple trace theory within a unitary system of episodic and semantic memory (Baylis, Rolls, & Leonard, 1987; Nadel & Moscovitch, 1997; Squire & Alvarez, 1995). As AM are generalized and compared to other similar AM across time, the working self is vigorously moving up and down the autobiographical knowledge base from the broadest level of the life

story all the way down to episodic elements (Blagov & Singer, 2004; Conway, 2005; 2009). As personal meaning is attributed, the specific AM is appropriately categorized according to its place within the life story and associated theme, lifetime period, and general event (Conway, 2005). Activation across these memory traces strengthens the pathways associated making these AM more accessible for future reference (Nadel & Moscovitch, 1997). It is hypothesised based on these previous theories, SMS and MTT, that AM determined by the working self to be so goal-relevant as to be self-defining are maintained at the life story level of the autobiographical knowledge base (Conway, 2005; Conway & Pleydell-Pearce, 2000). Therefore, when SDM are retrieved, it is not necessary to activate the original episodic elements of the specific experience. The working self only has to go as far as the life story level to access these defining events.

Together, the unitary system view and the multiple trace theory support the idea that as AM are revisited over time, personal facts are derived from those episodes and are therefore able to be recalled without retrieval of those original experiences (Haslam, Jetten, Haslam, Pugliese, & Tonks, 2011; Sakaki, 2007). It is suggested, based on the findings from Experiments 2 and 3, that as self-relevant AM are re-evaluated over time, self-defining facts are extracted from those experiences and incorporated as part of the life story. As a result, SDM are a particular kind of significant AM that have a more personal semantic than episodic element.

Experiment 4

In healthy adults, personal identity exists in the form of life stories, which are comprised of autobiographical memories (AM; Habermas & Bluck, 2000; McAdams, 1985;

Pillemer, 1998). Accessibility to AM is determined by personal goal hierarchies (Conway & Pleydell-Pearce, 2000). Prioritized goals are also the driving factor behind identity formation in adolescence and young adulthood (Conway & Holmes, 2004; Erikson, 1968). In an effort to determine if a loss in AM results in a loss in identity, older adults with Alzheimer's disease (AD) were included as comparison group, as AD is characterised by a loss of AM (Piolino, Desgranges, Clarys, Guillery-Girard, Taconnat, Isingrini, & Eustache, 2006).

When healthy older adults speak freely about the past the majority of AM retrieved are from the reminiscence bump period (ages 10-30; Rubin, Rahhal & Poon, 1998). These AM are the most accessible because they are the most relevant to personal goal hierarchies (Conway & Pleydell-Pearce, 2000). As people grow and develop, clusters of AM that were highly goal relevant, and highly accessible, are left behind. Although those past AM may not reflect current identity, they still define the past identities that have influenced the current (Conway, 2005).

In contrast to the mostly positive and detailed experiences retrieved by healthy older adults from the bump era, when asked for their personal experiences, older adults with AD mostly share events from childhood (Eustache, Piolino, Giffard, Viader, Sayette, Baron, et al., 2004; Ribot, 1882). These AM have been categorized as less detailed and negatively toned in emotion (Fromholt & Larson, 1991; Irish, Lawlor, O'Mara, & Coen, 2001). When AM from AD patients are plotted, they form a downward incline called the Ribot gradient (Ribot, 1882). Three major theories account for this preservation of earlier AM: consolidation theory, multiple trace theory, and semantization.

According to the consolidation theory, the gradient is the result of deterioration in the hippocampus (Leyhe, Müller, Milian, Eschweiler, & Saur, 2009; Meeter & Murre, 2004). Since the hippocampus is viewed as responsible for consolidating memories before passing them to the neocortex for storage, and the hippocampus is one of the first sites within the brain to deteriorate as a result of AD, only early AM that have been preserved in the neocortex of the temporal lobe are saved (Baylis, Rolls, & Leonard, 1987; Squire & Alvarez, 1995). A second view comes from multiple trace theory (MTT; Nadel & Moscovitch, 1997). This account states that older AM have been reconstructed more often over time, and therefore have more connections. The greater number of connections makes these AM less vulnerable to damage in the hippocampus. The third account proposes that all AM are initially episodic and frequent retrieval over time causes that AM to become semantic, retrieved without any sensory details (Gilboa, 2004; Leyhe, et al., 2009). Older AM have had more opportunities to become preserved through retrieval and rehearsal across the lifespan, therefore AD patients have many detailed events from early in life. Based on these accounts, it is expected that the older adults with AD will be less likely to retrieve AM from adulthood and more likely to relate stories from youth.

Studies have also shown a weakened sense of self in older adults with AD (Addis & Tippett, 2004; Fargeau, Jaafari, Ragot, Houeto, Pluchon, & Gil, 2011; Massimi, Berry, Browne, Smyth, Watson, & Baecker, 2008). It has been suggested that this is the result of an inability to mobilise the working self and corresponding goal hierarchies (Martinelli, Assens, Sperduti, & Piolino, 2013). According to the self-memory system, reconstruction of AM is a combined effort between the working-self and autobiographical knowledge (Conway & Pleydell-Pearce, 2000). If this is the case, then access to specific AM, or episodic elements,

within the autobiographical knowledge base is only possible if the working-self is operational. Therefore older adults with AD are not expected to retrieve specific AM.

Method

Participants

Two groups of participants were recruited and matched for age and years of education. Forty-two adults from Fife and Dundee, Scotland agreed to participate: twenty-one adults that had been diagnosed with Alzheimer's disease (7 male) between 57 to 98 years of age and twenty-one healthy older adults (5 male) between 59 to 98 years of age.

| | Age | | Years of Education | |
|---------|----------|-----------|--------------------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Healthy | 82.24 | 11.16 | 9.33 | 1.19 |
| AD | 82.14 | 10.35 | 10.24 | 1.85 |

Table 10.8. Demographic information for healthy older adults ($n = 21$) and older adults with AD ($n = 21$).

Mini-Mental State Examination (MMSE; Folstein, et al., 1975). The MMSE provides a broad measure of cognitive function. Scores between 25-30 are considered to be in the normal range (Folstein, et al., 1975). All of the adults in the control group scored within this range and these scores were significantly different from the group of adults with AD, $F(1, 40) = 99.62, p < .01$.

Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The HADS was used as a broad measure of emotional wellbeing for the healthy older participants. All of the healthy older adults scored within this healthy range (M anxiety = 5.35, SD = 2.82; M depression = 3.81, SD = 2.06). The HADS was not used with the AD participants due to the self-report measure not being designed for people with cognitive impairment.

| | HADS - Anxiety | | HADS - Depression | | MMSE | |
|---------|----------------|-----------|-------------------|-----------|----------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Healthy | 5.35 | 2.82 | 3.81 | 2.06 | 27.12 | 2.17 |
| AD | - | - | - | - | 14.76 | 5.24 |

Table 10.9. HADS and MMSE scores for healthy older adults ($n = 21$) and older adults with AD ($n = 21$) who participated in the photo cuing study (Folstein, et al., 1975; Zigmond & Snaith, 1983).

Materials

Photographs. Participants in this study viewed the same set of photographs using the same randomization in presentation outlined in the previous study (Section 10.1).

Procedure. Just as the taste or smell of a familiar childhood food can bring to mind associated childhood memories (Gilbert & Wysocki, 1987); it has been shown that deterioration in AM in AD patients can be overcome by providing context cues from the encoding phase (El Haj & Kessels, 2013; Rubin, et al., 1984). Studies have also found that an increase in requirements when asking for AM (from adults with AD) places too

much demand on the working-self and results in less AM retrieval (Baddeley, Bressi, Della Salla, Logie, & Spinnler, 1991; Martinelli, et al., 2013; Morris, & Mograbi, 2013). Therefore, in this experiment photographs were paired with either a general “*What memories come to mind when you see this picture?*” or specific prompt “*This is a picture of (event). What are your memories of (event)?*”

Participants were given as much time as needed to answer. The experimenter provided guidance if the participants with AD asked or indicated that they had forgotten what was being asked of them. This was not an issue with the healthy older adults; all understood and responded appropriately. 54 extra prompts were given to the adults with AD.

Scoring. All interviews were transcribed verbatim, divided into idea units, and then labelled for the categories and subcategories of *non-autobiographical* or *autobiographical*, specified at the beginning of this chapter (Section 10.1). This experiment also included categorization of idea units as *positive* or *negative* in emotional tone.

The older adults with AD were unable to reliably date their AM. Therefore, researchers divided the lifespan into five chapters, based upon the life script account for the life story, and categorized the idea units as: childhood, adolescence, young adulthood, middle adulthood, and late adulthood (Thomsen & Berntsen, 2008; Thomsen, Pillemer & Ivcevic, 2011). A category for unknown time period was created for when the timeframe of the memory was unclear. One researcher independently scored 100% of the transcribed interviews, while a second rater randomly sampled the transcribed interviews. In the event of interrater disagreement, a third and (if necessary) fourth judge were consulted.

| Interrater Reliability | % Agreement |
|-------------------------------|--------------------|
| Idea Units | 89.88 |
| AM/ Non AM | 95.38 |
| AM Specificity | 95.25 |
| Emotion | 98.57 |

Table 10.10. Interrater reliability for idea units, autobiographical or non-autobiographical, specificity, and emotion.

Results

Event representation. Before exploring the memories recalled by the participants, the effectiveness of the stimuli were examined to see if there were any features that may have influenced the number or types of AM recalled. Four mixed ANOVAs were conducted in order to assess the effects the (1) two prompts, (2) six events, (3) three representations, and (4) two colour formats had on the number of significant memories retrieved by the participants. In each mixed ANOVA the following assumptions were tested: independence of observations, normality, sphericity. The assumptions of independence of observations and normality were met. Sphericity was violated in all but the first mixed ANOVA comparing the two different prompts. Greenhouse-Geisser values were used in the other mixed ANOVAs. Thus, results should be viewed with caution. The four mixed ANOVAs revealed that the two prompts, six events, three representations and two colour formats did not have any measurable effect on the number of significant memories retrieved, between or within groups.

General versus specific prompt. A mixed ANOVA was conducted to assess any differences that may have resulted as a result of the variation in specifying the photo content. All assumptions were met. No differences were found within groups in the number of AM retrieved between a specific or general prompt; also no interaction was found. A significant main effect was found for group membership indicating an overall difference between groups in the total number of AM retrieved, $F(1,40) = 5.09, p = .03$.

| | General | | Specific | |
|---------|----------|-----------|----------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Healthy | 27.81 | 17.58 | 28.19 | 16.44 |
| AD | 20.38 | 21.76 | 20.38 | 21.75 |

Table 10.11. Means and standard deviations of the number of AM retrieved by healthy older adults ($n = 21$) and older adults with AD ($n = 21$) in response to a general versus specific prompt.

The reminiscence bump. A mixed ANOVA compared all whole AM between groups across the five life chapters (Figure 10.5; Table 10.12). All assumptions were met, except for sphericity; therefore Greenhouse-Geisser values were used and results should be interpreted with caution. A significant main effect was found for life chapters, indicating that chapters were successful in distinguishing AM idea units from the six periods of life, $F(1.83,73.36) = 12.96, p < .01$. A significant main effect was also discovered for group, indicating an overall difference in remembering between groups, $F(1,40) = 9.50, p < .01$. No interaction was found between these two variables.

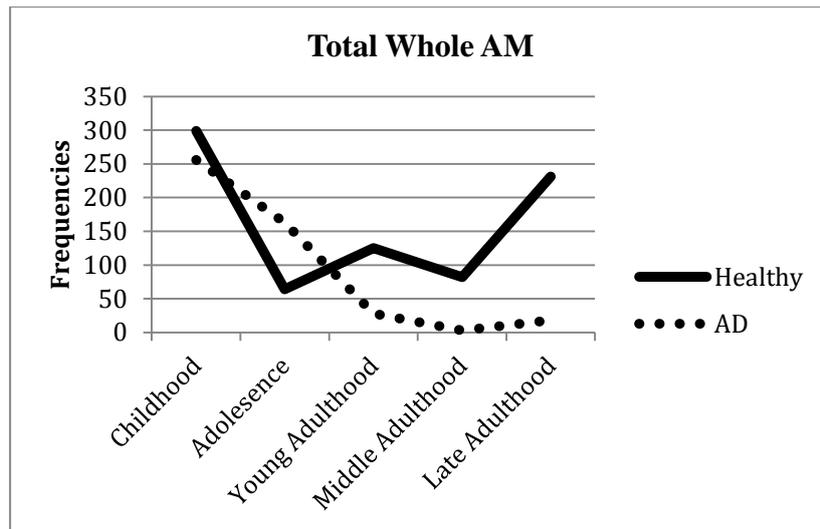


Figure 10.5. Frequencies of whole AM from healthy older adults ($n = 21$) and older adults ($n = 21$) with AD plotted according to life chapter.

| | Childhood | | Adolescence | | Young Adulthood | | Middle Adulthood | | Late Adulthood | |
|---------|-----------|-----------|-------------|-----------|-----------------|-----------|------------------|-----------|----------------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Healthy | 14.67 | 16.79 | 3.52 | 5.04 | 6.33 | 7.08 | 3.90 | 6.16 | 11.43 | 11.81 |
| AD | 11.95 | 15.95 | 7.76 | 18.28 | 1.33 | 1.71 | .14 | .48 | 1.95 | 7.68 |

Table 10.12. Means and standard deviations of all whole AM retrieved by healthy older adults ($n = 21$) and adults with Alzheimer's disease ($n = 21$) per life chapter.

The AD group shows a clear Ribot gradient, with childhood AM best preserved (Ribot, 1885). This group included more AM from adolescence; however, this difference was not found to be significant. This could be due to the high amount of standard deviation found within either group; which suggests a wide range of variation between individuals (Table 10.12). Therefore, results from this study should be interpreted with caution. The healthy group shows a distribution similar to the previous study, a bump peaking between ages 20-29 and a second even more prominent bump between ages 60-69. These adults retrieved a larger

number of AM from late adulthood; however this was not found to be significant, again due to high standard deviations in both groups

Total responses. Healthy older adults' responses ($M = 81.74$, $SD = 2.62$) were lengthier in number of words than the older adults with AD ($M = 50.75$, $SD = 40.79$), $t(40) = 2.45$, $p < .02$, two-tailed, equal variances assumed. The healthy group also included more idea units overall (healthy; AD, and idea units (healthy $M = 5.79$, $SD = 2.62$; AD $M = 3.27$, $SD = 2.66$, $t(40) = 3.10$, $p < .01$, two-tailed, equal variances assumed. The majority of participants from both groups responded with more than one memory per photograph resulting in the mean number of responses being higher than the number of stimuli (six) for the healthy group (Table 10.11; healthy $M = 10.10$, $SD = 3.87$; AD $M = 5.48$, $SD = 3.50$). This difference between groups in the total number of memories retrieved was found to be significant, $t(40) = 4.06$, $p < .01$, two-tailed, equal variances assumed. Contrary to the previous experiment, all memories provided were included in the following analyses.

| <i>All Memories</i> | Healthy | | | AD | | | t-test | | |
|-------------------------|----------------|----------|-----------|-----------|----------|-----------|---------------|-----------|------------------------|
| | <i>f</i> | <i>M</i> | <i>SD</i> | <i>f</i> | <i>M</i> | <i>SD</i> | <i>t</i> | <i>df</i> | <i>Sig. (2-tailed)</i> |
| AM | 205 | 10.10 | 3.87 | 115 | 5.48 | 3.50 | 4.06 | 40 | .00** |
| Idea Units ^c | 1760 | 87.00 | 40.10 | 1963 | 93.48 | 61.82 | -.40* | 34.30 | .69 |
| Word Count | 15788 | 778.48 | 428.05 | 14364 | 684.00 | 513.12 | .65 | 40 | .52 |
| Idea Units Per AM | - | 30.15 | 12.84 | - | 17.73 | 18.46 | 2.53 | 40 | .01* |
| AM Per Photo Set | - | 10.29 | 3.90 | - | 5.57 | 3.64 | 4.04 | 40 | .00** |

Table 10.13. Descriptive statistics and t-tests with total dataset from healthy older adults ($n = 21$) and older adults with AD ($n = 21$). Total frequencies are listed for the reader's reference; however, relative frequencies were used for calculations (^c equal variances not assumed, ** $p < .01$, * $p < .05$).

Non-autobiographical versus Autobiographical idea units. Healthy older adults ($M = 30.15$, $SD = 12.84$) included more idea units per AM than adults with AD ($M = 17.73$, $SD = 18.46$), $t(40) = 2.53$, $p = .01$, two-tailed, equal variances assumed. The healthy group ($M = 10.29$, $SD = 3.90$) also included more whole AM for each photo presented than the group with AD ($M = 5.57$, $SD = 3.64$), $t(40) = 4.04$, $p < .01$, two-tailed, equal variances assumed.

The lengthier responses of the healthy older adults prompted the question of whether their responses contained more detailed autobiographical remembering or reflected a different response style to that of the participants with AD. To examine this, the total number of non-autobiographical idea units, including semantic idea units, contained in the responses of the two groups was compared. The older adults with AD included more non-AM idea units.

| | Healthy | | | AD | | | t-test | | |
|--------------------------------|----------|----------|-----------|----------|----------|-----------|----------|-----------|------------------------|
| | <i>f</i> | <i>M</i> | <i>SD</i> | <i>f</i> | <i>M</i> | <i>SD</i> | <i>t</i> | <i>df</i> | <i>Sig. (2-tailed)</i> |
| Non-AM Idea Units ^e | 529 | 4.36 | 2.69 | 999 | 7.93 | 4.85 | -2.95 | 31.20 | .01* |
| Semantic | 103 | .84 | 1.45 | 71 | .56 | 1.24 | -.68 | 40 | .50 |
| AM Idea Units | 1130 | 5.72 | 5.52 | 722 | 9.33 | 4.78 | 2.26 | 40 | .03* |
| Specific ^e | 186 | 1.48 | 1.22 | 130 | 1.03 | 2.28 | -.80 | 30.53 | .43 |
| General Extended ^e | 8 | .86 | 2.06 | 18 | .38 | .59 | 1.01 | 23.31 | .32 |
| General Categorical | 600 | 4.94 | 3.19 | 337 | 2.68 | 2.53 | -2.5 | 40 | .01* |
| Personal Semantic | 253 | 1.39 | 1.22 | 185 | 1.47 | 1.37 | .20 | 40 | .84 |

Table 10.14. Descriptive statistics and t-tests with non-autobiographical and autobiographical idea units from healthy older adults ($n = 21$) and older adults with AD ($n = 21$). Total frequencies are listed for the reader's reference; however, relative frequencies were

used for calculations (^cequal variances not assumed, $*p < .05$).

As displayed in Table 10.14, healthy older adults retrieved significantly more AM idea units overall (healthy $M = 5.72$, $SD = 25.52$; AD $M = 9.33$, $SD = 4.78$; $t(40) = 2.26$, $p < .01$, two-tailed, equal variances assumed. Healthy older adults also retrieved significantly more general categoric AM idea units overall (healthy $M = 4.94$, $SD = 3.19$; AD $M = 2.68$, $SD = 2.53$; $t(40) = -2.5$, $p = .01$, two-tailed, equal variances assumed. The two groups did not differ in the number of specific AM idea units (idea units describing an experience that happened at a particular time and place), general extended idea units (idea units from a general AM that extends over a long period of time), or personal semantic idea units (idea units relating personal facts; Table 10.14). As there were hardly any general extended idea units (8 from healthy group, 18 from AD group), this category was not included Figure 10.6, below.

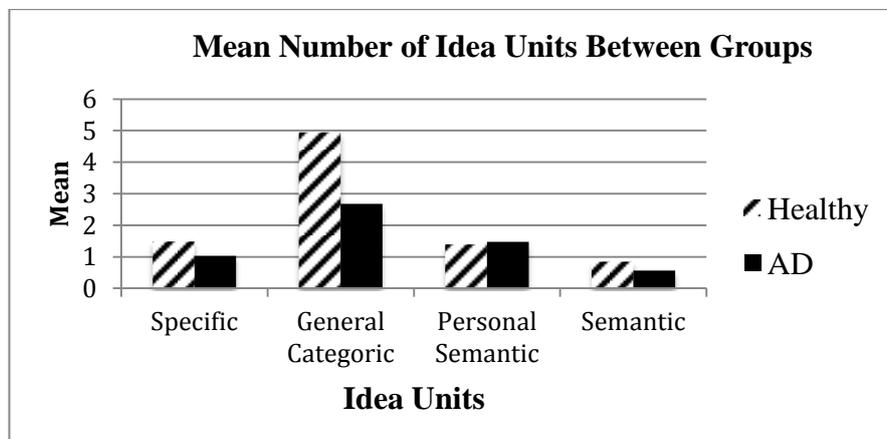


Figure 10.6. Mean number of specific, general categoric, personal semantic, and semantic idea units retrieved per photo by healthy older adults ($n = 21$) and older adults with AD ($n = 21$).

An independent samples t-test was used to compare the AM retrieved from the two groups in emotional tone. Healthy older adults ($M = 6.05$, $SD = 4.57$) retrieved more positive

idea units than the AD group ($M = 2.67$, $SD = 3.50$), $t(40) = -2.69$, $p < .01$, two-tailed, equal variances assumed. No difference was found between groups in the number of negative idea units. A one sample analysis was conducted for the AD group revealing that older adults with AD retrieved more positive ($M = .21$, $SD = .27$) than negative idea units ($M = .07$, $SD = .20$), $t(20) = 3.65$, $p < .01$, two-tailed. The following two excerpts illustrate the way these overall differences manifested in the responses from the two groups of older adults. The first is a healthy control response, the second a patient response.

The healthy participant was shown a picture of children blowing out candles on a cake and given the specific prompt, “*Here is a picture of people at a birthday party. What are your memories of birthdays?*” The participant began retrieving autobiographical information immediately after the prompt. She started by describing the many birthday cakes she has baked over the years for her children, and now her grandchildren. She then went on to detail a specific event, her tenth birthday when her friends came over and they mistook a pile of soot for a giant rock and dirtied their party dresses.

All my children, I had three

AM - Personal Semantic

Making hundreds of birthday cakes

AM – General Categorical

Now doing it for the grandchildren

AM – General Categorical

I remember a party in Monifieth

AM – Specific

when I was about ten

AM –Specific

and all my friends came along

AM –Specific

well, we'd had the chimney swept the week before

AM –Specific

and in those days you kept the soot.

AM –Specific

I think my father dug it in the garden.

AM –Specific

He did something with the soot anyway,

AM –Specific

we, behind the shed there was this great pile of soot.

AM –Specific

So all my friends came to this party

AM –Specific

in all their little party frocks

AM –Specific

and, and we didn't realise this was soot so,

AM –Specific

we thought it was a big kind of stone thing.

AM –Specific

Jumping we'd jump over this thing.

AM –Specific

Of course, we all ended up (both laugh) black as soot.

AM –Specific

The participant with AD was shown a photo of a table set with whisky, shortbread and cake and given the general prompt, “What memories come to mind when you look at this picture?” This participant begins by confirming what she sees in the photo. “... *cake*...” The interviewer repeated the prompt, and then the participant states what New Years were generally like in her childhood home, and then details a specific experience:

We lived in Brechin in a quiet place.

AM – General Categorical

There wasn't much drinking at our house

AM – General Categorical

But my father made up for it.

AM – General Categorical

And he made up to hit my mother.

AM – General Categorical

So there was one time he hit.

AM – Specific

He'd been drinking

AM – Specific

and he gave her an awful beating

AM – Specific

And she was lying on the floor

AM – Specific

and couldn't get up.

AM – Specific

And I just walked out the door

AM – Specific

and that was the end of it.

AM – Specific

Here was Dave Johnston and

AM – Semantic

Willie Reid,

AM – Semantic

the police.

AM – Semantic

He says Alice, what are you doing up here?

AM – Specific

I says well, my dad hit my mum

AM – Specific

and she's lying on the floor and she can't get up.

Repeated Idea

Would you help me?

AM – Specific

He says, come with me, come on.

AM – Specific

He says Spence, do you ken where you're going tonight?

AM – Specific

He went, you're going along to Bank Street.

AM – Specific

He says, we've heard about this and couldn't get it.

AM – Specific

But now we see - she's lying on the floor.

AM – Specific

So they got a stretcher and took her away.

AM – Specific

But he got sixty days.

AM – Semantic

And he never got back

AM – Semantic

She never took him back

AM – Semantic

The healthy control and the AD patient show two marked differences in their responses to the photos. First, the control participant began initiation of AM recollection immediately while the patient confirmed aspects of the photograph and what was expected from her before beginning recollection. Second, the healthy adult mentions her present situation as well as her past and includes details of specific events as examples; whereas the patient begins by confirming what is expected (reflecting the greater number of non-AM idea units in the AD group), makes general references to youth, and then details a specific event from her youth.

Discussion

The purpose of this study was to determine if a loss of AM results in a loss of identity. The healthy group, not surprisingly, retrieved more AM and more idea units overall than the

group with AD (Eustache, et al., 2004; Ribot, 1882). When plotted, the AM reported displayed a distribution similar to that in the last experiment (Experiment 3), a bump in the period between 20-29, and an even larger bump between 60-69. This distribution is, again, likely due to the nature of the stimuli used; the annual events chosen were heavily oriented toward spending time with family, particularly with young children.

One difference in responses from the healthy group when the emphasis on significant was removed was inclusion of more general categoric AM and a drop in general extended AM. It is proposed that this could be due to the inclusion of more extended annual events (e.g. “the Christmas we spent skiing in France”) as significant versus casually listing what Christmases used to be like and what they are like now in this experiment, when no emphasis was placed on importance (as shown previously in the healthy older adult’s excerpt).

Second, the distribution of remembered events differed between *significant* annual events and events with no emphasis on importance with the inclusion of childhood AM. When asked for their most significant annual event, healthy older adults mostly included those from between ages 20-29 and 60-69 with hardly any from childhood. Initially, it was thought that this could reflect the rations and hardships of World War II (Zweiniger-Bargielowska, 2000). However, when asked without emphasis on importance, healthy older adults included more AM from childhood than from any other time period. It should be noted, however, that this difference was not found to be significant within the healthy older adult group. It is proposed that the lack of inclusion of childhood AM in the previous study is due to the emphasis on *significant*. For an event to be significant, it must be determined personally relevant through goal processing (Conway & Pleydell-Pearce, 2000). Personal goal hierarchies are not theorised to emerge until late adolescence/early adulthood, therefore

goal-relevant (i.e. significant) experiences would not be included in childhood AM (Conway & Pleydell-Pearce, 2000; Habermas & de Silveira, 2008).

As predicted, the AM produced from the older adults with AD displayed a clear Ribot gradient with the majority of AM from childhood and adolescence (Eustache, et al., 2004; Ribot, 1885). Contrary to what was expected however, the majority of those AM reported were positive and the two groups did not differ in the number of specific AM idea units (Eustache, et al., 2004). The positivity in this group could be argued as evidence of emotion regulation. Although, it is more likely a product of the generally happy occasions used as stimuli (Carstensen, 1993; Carstensen, Isaacowitz, & Charles, 1999). It appears, based on these findings, that older adults with AD are capable of accessing specific AM in great detail, but these AM are restricted to childhood. This was shown in the previous excerpt from the woman with AD; she began reminiscing about childhood and continued in detail within that age period.

The largest drop in the number of AM retrieved from the adults with AD occurred between the age periods of adolescence and young adulthood. Following the previous hypothesis regarding significant versus non-important AM within the healthy group, this drop could reflect the absence of goal hierarchies in the cognitive processing of AD patients (Martinelli, et al., 2013). According to Conway & Pleydell-Pearce (2000), retrieval of AM is collaboration between the working self and autobiographical knowledge. The goal structures within the working self access specific episodic details through the conceptual self within the autobiographical knowledge base (Conway, 2005; 2009). Without an operating working-self, it would not be possible to access goal-relevant AM within the autobiographical knowledge base. In the healthy older adult's excerpt, she begins in the bump era with baking cakes for

her own children, then a statement about present (doing it for the grandchildren) and finally an example of her own youth. It is theorised that without an active working-self, perhaps this woman may have only related the story of her childhood birthday.

This leaves the question, “Why are these earlier AM preserved?” According to consolidation theory, these earlier AM may have been retrieved often enough that the hippocampus is no longer needed to access them in the neocortex (Squire & Alvarez, 1995). This is in line with the idea of semantization (Gilboa, 2004). As proposed by Haslam and colleagues (2011), all personal semantic memories are episodic in origin. However, as with the remember/know paradigm, over time personal facts are extracted from those episodes and are therefore able to be recalled without retrieval of those original experiences (Haslam, et al., 2011, Sakaki, 2007; Tulving, 2001).

If the preservation of AM in AD is, in fact, due to semantization of those AM and the past two experiments suggest that SDM are more semantic than episodic, then why are the older adults with AD not retrieving SDM from the bump era? According to McAdams (1985), the utilization of mental time travel allows for the linking of past experiences chronologically leading to the creation of personal narratives. This skill is believed to emerge at roughly five years of age (Povinelli, 2001; Povinelli, Landry, Theall, Clarke, & Castille, 1999). An inspection of life stories by Habermas and de Silveira (2008) revealed that temporal coherence emerges between ages 8-12, causal coherence between 12-16, and thematic coherence between 16-20. Thematic coherence is the foundation for meaning-making and deriving meaning requires an understanding of self-relevance, which requires a working-self (Conway & Pleydell-Pearce, 2000; Habermas & Bluck, 2000). This suggests

that the AM from before age 16 would not have as much goal-relevance as AM from after development of a working-self goal structure.

It is possible, as evidenced in the adults with AD, for AM from before development of the working self to be organised and related in the form of narratives (McAdams, 1985). However, it theorised that these AM are stored in a way that does not require the working-self, as this structure has not yet developed (Conway & Pleydell-Pearce, 2000; Habermas & de Silveira, 2008). Once the working-self goal structure is cognitively developed, it begins to determine which AM are self-relevant and stored and which AM are irrelevant and forgotten (Conway & Pleydell-Pearce, 2000). Since this development occurs during late adolescence/young adulthood, it is proposed that damage to the working-self results in loss of access to all AM from after that age period (Martinelli, et al., 2013). Therefore, it is hypothesised that AM remaining in older adults with AD are those that are non-goal related and do not require the working-self to gain access.

So, does a loss in AM result in a loss in identity? It has been suggested that identity can be maintained in the absence of memory for personal experiences, provided there is some preservation of personal semantic memory (Klein, Cosmides, Costabile, & Mei, 2002; Tulving, 1993; Viskontas, McAndrews, & Moscovitch, 2000). However, according to the SMS model, a working-self is required in order to access these personal semantic AM within the autobiographical knowledge base; this is evidenced in the lack of personal semantic memory found in AD patients after adolescence (Conway & Pleydell-Pearce, 2000).

Early childhood AM appear to be preserved in personal narratives within the AD group. If identity is defined as personal narratives, then there appears to be some preservation

of identity within this group (McAdams, 1985). However, childhood is only a small fraction of the lifespan and a working-self goal structure would be required for thematic coherence in personal narratives (Conway, 2005; Habermas & de Silveria, 2008).

If relationships define personal identity then the same issue emerges, a working-self is required in order to determine how those relationships are self-relevant (Conway & Pleydell-Pearce, 2000; Erikson, 1968; Tajfel & Turner, 1987). Therefore, it appears the common factor in each of these definitions is the requirement of a working-self across the lifespan. This structure appears to be the key in the creation and maintenance of personal identity.

In sum, identity is composed of AM (McAdams, 1985). The encoding and reconstruction of AM is determined by level of self-relevance and relevance to prioritized goal hierarchies (Conway & Pleydell-Pearce, 2000). These goal hierarchies are structures within the working-self (Conway & Pleydell-Pearce, 2000). It is the working-self that mentally time travels, allowing comparison of experiences across time to extract meaning, construct personal narratives, and relate the self to others (Blagov & Singer, 2004; McAdams, 1985; Tajfel & Turner, 1987). The working-self is the centre of identity. Therefore, loss of AM may not necessarily result in a loss of identity. It appears, based on the findings across these four experiments, that it is damage to the working-self that results in the loss of identity (Conway, 2005; Conway & Pleydell-Pearce, 2000).

Chapter 11. Conclusion

Although a sense of self emerges early in infancy, the life story does not develop until adolescence and early adulthood, as selecting and interpreting past events in order to form them into a coherent narrative requires cognitive tools that do not fully develop until that age period (Habermas & Bluck, 2000; McLean, 2008; Singer & Blagov, 2004). The formation of identity is a life-long process that continually incorporates new experiences into the life story (McAdams, 1985). Achieving a cohesive identity provides a feeling of continuity, well-being, and a sense of purpose and direction (Erikson, 1968). This thesis investigated autobiographical memory (AM) across the life course through a series of four experiments with young and older adults, including a group with AD. The overarching question was “does the loss of AM result in a loss of identity?”

The first aim of this thesis was to establish the qualities of healthy AM. The purposes of the first experiment were threefold: (1) to determine whether the life story account for the bump provides a comprehensive explanation, (2) to gain insight into the subject matter of AM incorporated into identity across the lifespan, and (3) to determine if the positivity of specific AM in older adults is the result of rehearsal or a bias in reconstruction (Carstensen, 1993; Carstensen, et al., 1999; Demiray, Gülgoz, & Bluck, 2009). Young and older adults were asked to retrieve a specific AM in response to five positive and five negative cue words, then rate the qualities of each reported AM (importance, rehearsal, vividness and pleasantness) on a five-point scale (Rubin & Schulkind, 1997).

The emotional cue words selected were successful in indexing positive and negative AM from both groups. That is, positive words elicited positive AM and negative words elicited negative AM. Older adults' AM displayed a reminiscence bump with a peak between 20-29 years of age as well as a recency period, following previous studies using emotional word cues (Demiray, et al., 2009; Fitzgerald and Lawrence, 1984; Robinson, 1976). This experiment appeared to lend the most support to the self-narrative/identity account for the bump; more AM are retrieved from the bump era due to their relevance to personal goals and therefore identity (Conway, 2005). These AM are mostly positive in older adults due to the role of emotion regulation in the reconstruction of AM (Lang & Carstensen, 2002).

The next study focused on the role of goals in the retrieval of self-defining memories (SDM). Both older and younger adults were asked to provide five SDM and then, on a separate occasion, rank 20 different goals (relating to social acceptance, autonomy, generativity and emotion regulation) according to personal priority. It was hypothesised, according to socioemotional selectivity theory (SST), that the influences of emotion regulation in older age would result in older adults rating SDM from the bump era as more positive than younger adults (Carstensen & Lang, 2002). Also based on SST, the shift in goal prioritization from identity development to generativity should result in older adults' bump SDM being more self focused and than SDM from after the bump period (Carstensen & Lang, 2002; Erikson, 1997).

The generalization of SDM found in older adults is seen as evidence of the meaning-making process (Blagov & Singer, 2004). The second aim of this study was to explore the process of attributing meaning by comparing AM deemed self-defining versus those considered significant. This was accomplished using an SDM measure, and in the following

experiment (Experiment 3) by asking for significant events. According to the majority of past studies, older adults' SDM were predicted to be more general when compared to those of younger adults.

Older adults' SDM were found to be more positive than younger adults overall, providing support for the prioritization of emotion regulation as proposed by SST as well as for the positivity bias in the reconstruction of AM (Carstensen, 1993; Lang & Carstensen, 2002; Comblain, D'Argembeau, & Van der Linden, 2005; Gallo, Korthauer, McDonough, Teshale, & Johnson, 2011). SDM from older adults were also more focused on others, reflecting the current influence of generativity (Carstensen, 1993; Erikson, 1997; Lang & Carstensen, 2002). These findings support the shift in goal prioritization from identity development to generativity as young adults age into older adults.

In contrast, the findings from the goal card sort were contrary to what was found by Lang and Carstensen (2002) using the same task. Older adults rated goals relating to social acceptance and autonomy the highest. In particular, the autonomy related goal "be financially independent" was included in the first pile by the vast majority of the older participants. The contradictory findings are likely the result of the smaller and younger sample size used in this experiment. Lang and Carstensen (2002) included 480 participants from 20 to 90 years of age in their study. This sample consisted of only 28 older adults with a mean of 71.21 years of age. It is hypothesised that perhaps adults at this age do not see their future time as limited as adults in their 80s and 90s.

Older adults' SDM were more specific than those from younger adults, contrary to expectations according to the generalization of AM as a result of meaning-making (Blagov &

Singer, 2004; Singer, et al., 2007). It was hypothesised that perhaps AM are generalised in the *process* of relating various personal experiences in order to derive meaning. However, when an AM is determined to be *self-defining*, perhaps it is treated more like a personal semantic memory.

The chief aim of experiment three was to compare significant AM with the SDM collected in the previous experiment (Blagov & Singer, 2004). In order to ascertain if self-relevance is determined by a person's individual experience (e.g. personal accomplishment) or through others (e.g. working together or achievements of own children) the self versus others-focus in AM deemed significant was examined. Based on identity formation and SST, it was hypothesized that significant AM from within the bump period would be more self-focused due to the imperative to form a personal identity; significant AM from after the bump would be more others-focused due to the influence of generativity and resulting decrease in future time perspective (Carstensen, 1993; Carstensen, Isaacowitz, & Charles, 1999; Conway & Pleydell-Pearce, 2000; Erikson, 1968).

Although the length and composition of the responses differed significantly, both groups retrieved far more positive than negative autobiographical memories. This finding is in accord with previous research into spontaneous retrieval of AM, particularly those memories that are retrieved during the reminiscence bump period, between 10-30 years (Berntsen & Rubin, 2002, 2004; Glück & Bluck, 2007; Bohn, 2010). While the older adults' significant memories of annual events resulted in a bump for the period between 20-29 years of age, a larger bump emerged for the period from 60-69 years. When this distribution was inspected at the idea unit level, both self-focused and others-focused idea units had the highest peak in the 20-29 period, with others-focused idea units showing a second substantial

bump in the 60-69 period. This was thought to reflect the effects of goal processing across the lifespan (Carstensen, 1993; Conway, 2005; Conway & Pleydell-Pearce, 2000).

It was suggested that the time between 20-29 years of age is associated with emerging adult identity and a bump during this period in both self and others-focused idea units could be the result of developing a personal identity through relationships with others (Conway, 2005; Erikson, 1968, 1997; Tajfel & Turner, 1987). Self-focused memories displayed the characteristic bump for the late teens, and early adulthood. It was proposed that the even larger others-focused bump during this period suggests relationships are a requirement for identity formation, that is, that individual identities cannot exist without others, as evidenced in prisoners that are forced to stay in solitary confinement (Guenther, 2013).

The additional bump found in the age period between 60-69 in others-focused idea units may be a product of the stimuli used; the majority of annual events presented were celebrations often spent with children. It was also suggested that it could reflect the transition from identity formation goals to generative goals as predicted by SST (Carstensen, 1993; Lang & Carstensen, 2002). It has been shown that older people perceive their time as more limited than younger people, and thus focus more on “social partners with strong emotional meaning” (Lang & Carstensen, 2002, p. 136). Large family gatherings may have more significance as a result (Carstensen, et al., 1999).

When older adults are asked for a significant AM, their responses contain more semantic, general categoric, and personal semantic idea units. Older adults appeared to “think out loud,” listing general events from the past and personal semantic information before relating one (or often more than one) particular experience. In contrast, when asked for an

SDM in the previous experiment, older adults listed events that were mostly specific and concise (e.g. “getting married” or “graduating from university.”)

The different response styles of older adults in response to a *significant* versus *defining* prompt could reflect the processes of summarizing events in order to link them across time to abstract self-knowledge and other similar events in order to derive meaning (Blagov & Singer, 2004). It was suggested that SDM operate according to the multiple trace theory within a unitary system of episodic and semantic memory (Baylis, Rolls, & Leonard, 1987; Nadel & Moscovitch, 1997; Squire & Alvarez, 1995). The working self is vigorously moves up and down the autobiographical knowledge base from the broadest level of the life story all the way down to episodic elements linking various AM across time (Blagov & Singer, 2004; Conway, 2005; 2009). As the working-self attributes meaning, the specific AM is appropriately categorized according to its place within the life story as well as associated theme, lifetime period, and general event. This process strengthens the pathways associated and these AM are made more accessible for future reference as a result (Conway, 2009; Nadel & Moscovitch, 1997). It was theorised that AM determined by the working self to be self-defining are maintained at the life story level of the autobiographical knowledge base (Conway & Pleydell-Pearce, 2000; Conway, 2005). Therefore, when SDM are retrieved, the working self only has to go to the life story level to access these defining events, it is not necessary to activate the original episodic elements of the specific experience. Based on the findings from experiments two and three, it appears that as self-relevant AM are re-evaluated over time, self-defining facts are extracted from those experiences and incorporated as part of the life story. The results suggest that SDM may be a particular type of significant AM that contain a more personal semantic than episodic element.

The purpose of the final study was to ultimately determine if a loss of AM results in a loss of self. This was achieved through the inclusion of a group with AD. This experiment paired the same six photos from the previous study with a prompt containing no emphasis on importance. When asked for their most significant annual event, healthy older adults mostly included those from between ages 20-29 and 60-69 with hardly any from childhood. However, when asked without emphasis on importance in this experiment, healthy older adults included more AM from childhood than from any other time period (although this difference was not found to be statistically significant). It was suggested that childhood AM were not included by healthy older adults in the previous study due to the emphasis on *significant*. The significance of personal experiences are determined according to goal hierarchies within the working self, which are not theorised to emerge until late adolescence/early adulthood (Conway & Pleydell-Pearce, 2000; Habermas & de Silveira, 2008). Therefore it is unlikely that goal-relevant (i.e. significant) experiences would be included in childhood AM.

As predicted, the AM produced from the older adults with AD displayed a clear Ribot gradient; the majority of AM retrieved were from childhood and adolescence. Unexpectedly, the two groups did not differ in the number of specific AM idea units reported (Eustache, et al., 2004; Ribot, 1885). It appears, based on these findings, that older adults with AD are capable of accessing specific AM in great detail, but these AM are restricted to childhood. The steep drop in the number of AM retrieved from the adults with AD following adolescence was thought to reflect the absence of goal hierarchies in the cognitive processing of AD patients (Martinelli, et al., 2013). According to Conway & Pleydell-Pearce (2000), retrieval of AM is the result of collaboration between the working self and autobiographical knowledge. The goal structures within the working self access specific episodic details

through the conceptual self within the autobiographical knowledge base (Conway, 2005; 2009). Without an operating working-self, goal-relevant AM cannot be accessed within the autobiographical knowledge base. Since this development occurs during late adolescence/young adulthood, it is proposed that damage to the working-self results in loss of access to all AM from after that age period (Martinelli, et al., 2013). This suggests that the AM from before age 16 would not have as much goal-relevance as AM from after development of a working-self goal structure. Therefore, AM remaining in older adults with AD are possibly non-goal related and do not require the working-self to gain access.

AM from before development of the working-self can be organised and related in the form of narratives (McAdams, 1985). It is theorised that these AM are stored in a way that does not require the working-self, as this structure has not yet developed (Conway & Pleydell-Pearce, 2000; Habermas & de Silveira, 2008). Once the working-self goal structure is cognitively developed, it begins to use goal hierarchies to determine which AM are self-relevant and stored and which AM are irrelevant and forgotten (Conway & Pleydell-Pearce, 2000).

So, does a loss in AM result in a loss in identity? Personal identities are comprised of AM, the encoding and reconstruction of which are determined by relevance to prioritized goal hierarchies (Conway & Pleydell-Pearce, 2000; McAdams, 1985). These goal structures are embodied in the working-self which mentally time travels, allowing comparison of experiences across time to extract meaning, construct personal narratives, and relate the self to others (Blagov & Singer, 2004; McAdams, 1985; Tajfel & Turner, 1987). The working-self is the centre of identity. Therefore, loss of AM may not necessarily result in a loss of

identity. It appears, based on the findings across these four experiments, that damage to the working-self results in the loss of identity (Conway, 2005; Conway & Pleydell-Pearce, 2000).

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Appendix 1. Volunteer Information Sheet – Undergraduate Students

Volunteer Information Sheet

This is a 2-part study which will examine the recall of life events.

In one session participants will be asked to rank different goals according to priority; you will then complete two brief questionnaires; then provide personal memories in response to word cues.

In another session participants will provide five life defining events; you will then complete two brief questionnaires; then provide personal memories in response to picture cues.

Participants will receive either £5 or 1 credit for each session attended.

Eligibility Requirements: must have been born and raised in the UK

DO YOU HAVE ANY QUESTIONS?

Appendix 2. Volunteer Information Sheet – Healthy Older Adults, Dundee

Volunteer Information Sheet

This study will examine the recall of life events. It involves two 45 min – 1 hour sessions spaced four weeks apart.

For one session you will be shown six pictures and asked to retrieve memories related to them. Then, for the next 20-30 minutes, you will complete two brief questionnaires. Finally, you will be asked about life defining events.

For the other session, you will be shown 10 words and asked to retrieve memories related to them. Then, for the next 20-30 minutes, you will complete two brief questionnaires. Finally, you will be asked about life goals.

A donation will be made to Dundee's sheltered housing services for your participation. Any information you give will be treated with complete confidentiality. Please remember that you are free to withdraw at any time.

DO YOU HAVE ANY QUESTIONS?

Appendix 3. Volunteer Information Sheet – Healthy Older Adults, Cupar

Volunteer Information Sheet

This study will examine the recall of life events.

You will be shown six pictures and asked to retrieve memories related to them. Then, you will complete two brief questionnaires.

A donation will be made to Age Concern for your participation. Any information you give will be treated with complete confidentiality. Please remember that you are free to withdraw at any time.

DO YOU HAVE ANY QUESTIONS?

Appendix 4. Volunteer Consent Form

Volunteer Consent Form

Examination of the role of life themes and goals in autobiographical memory retrieval.

The purpose of this form is to ensure that you are willing to take part in this study and to let you understand what it entails. Signing this form does not commit you to anything you do not wish to do.

(1) Have you read the Volunteer Information Sheet? YES / NO

(2) Have you had the opportunity to ask questions and discuss the study? YES / NO

(3) Have you received satisfactory answers to your questions?
YES / NO

(4) Do you understand that you are free to withdraw from this study:

- At any time
 - Without having to give a reason for withdrawing
- YES/ NO

(5) Do you understand that all information gathered from this study will be kept completely confidential? YES/ NO

(6) Do you agree to the recording of this interview?
YES / NO

(7) Do you agree to take part in the study? YES / NO

Signature _____ Date _____

Name in BLOCK LETTERS _____

Appendix 5. Debriefing

Debriefing

The purpose of this study is to examine the way life themes and personal goals influence the spontaneous retrieval of memory for personally experienced events. For example, if a person's current goal is being involved with family, we would expect that spontaneously retrieved personal memories would be family related.

If you are feeling distressed as a result of any part of this study, please contact your general practitioner. If you have any questions or concerns about the study, or if you would be interested in learning the results of our investigation, please feel free to contact us at any time.

Celeste Lonson / PhD Student (01334) 425 069
Dr. Arlene Astell / Supervisor (01334) 462 056

Appendix 6. Mini Mental State Examination (Folstein, Folstein, & McHugh, 1975)

| Initials | Max points | Score |
|----------------------------|-------------------|--------------|
| Date of birth | | |
| Date of test | | |
| Years of ed. | | |

1.

a) Can you tell me today's (date)/(month)/(year)? () () ()

.....
 Which (day of the week) is it today? ()

.....
 Can you also tell me which (season) it is? () **5** ()

.....
b) What (city/town) are we in? ()

.....
 What (region) are we in? ()

.....
 What (country) are we in? ()

.....
 What (building) are we in? ()

.....
 What (floor) are we on? () **5** ()

.....

2.

I'm going to say 3 words and I'd like you to repeat them after me

(apple, table, penny) () **3** ()

(repeat up to 6 trials until all words are remembered)

(number of trials:)

3.

- a) Think of the number 100. Can you tell me what 100 take away 7 is?
- b) Good. And if you take 7 from that? And 7 from that? (maximum of 5 subtractions)
Record all responses

.....

AND

- c) Can you spell 'WORLD' for me?
- d) Good, now can you spell it backwards? (D_L_R_O_W_) **5**

Record all of response (each letter and order of recall)

.....

(4.)

Do you remember what the 3 words were I said earlier? **3** ()

**Skip this according to 2.*

.....

(5) Can you name this? (show a watch)

and this (show a pencil) **2** ()

.....
Record response verbatim

6. Show 'CLOSE YOUR EYES' (see sheet)

Please follow these instructions **1** ()

.....
Repeat after me: "no ifs, ands or buts" **1** ()

Can you write a short sentence for me please? (on sheet) **1** ()

.....
7. Present a blank sheet of paper

Can you take this paper in your right hand

Fold it in half

And put it on your lap

3

()

CLOSE YOUR EYES

Write a sentence.

8. Will you copy this drawing please?

Appendix 7. Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983).

Chart I — Hospital Anxiety and Depression Scale

This questionnaire will help your physician know how you are feeling. Read every sentence. Place an "X" on the answer that best describes how you have been feeling during the LAST WEEK. You do not have to think too much to answer. In this questionnaire, spontaneous answers are more important. Mark only one answer for each question.

A (1) I feel tense or wound up:

- 3 () Most of the time
- 2 () A lot of times
- 1 () From time to time
- 0 () Not at all

D (8) I feel as I am slowed down:

- 3 () Nearly all the time
- 2 () Very often
- 1 () From time to time
- 0 () Not at all

D (2) I still enjoy the things I used to:

- 0 () Definitely as much
- 1 () Not quite so much
- 2 () Only a little
- 3 () Hardly at all

A (9) I get a sort of frightened feeling like butterflies in the stomach:

- 0 () Not at all
- 1 () From time to time
- 2 () Quite often
- 3 () Very often

A (3) I get a sort of frightened feeling as if something awful is about to happen:

- 3 () Very definitely and quite badly
- 2 () Yes, but not too badly
- 1 () A little, but it doesn't worry me
- 0 () Not at all

D (10) I have lost interest in my appearance:

- 3 () Definitely
- 2 () I don't take so much care as I should
- 1 () I may not take quite as much care
- 0 () I take just as much care as ever

D (4) I can laugh and see the funny side of things:

- 0 () As much as I always could
- 1 () Not quite as much now
- 2 () Definitely not so much now
- 3 () Not at all

A (11) I feel restless, as if I had to be on the move:

- 3 () Very much indeed
- 2 () Quite a lot
- 1 () Not very much
- 0 () Not at all

A (5) Worrying thoughts go through my mind:

- 3 () Most of the time
- 2 () A lot of times
- 1 () From time to time
- 0 () Only occasionally

D (12) I look forward with enjoyment to things:

- 0 () As much as I ever did
- 1 () A little less than I used to
- 2 () Definitely less than I used to
- 3 () Hardly at all

D (6) I feel cheerful:

- 0 () Most of the time
- 1 () Usually
- 2 () Not often
- 3 () Not at all

A (13) I get a sudden feeling of panic:

- 3 () Very often indeed
- 2 () Quite often
- 1 () From time to time
- 0 () Not at all

A (7) I can seat at ease and feel relaxed:

- 0 () Definitely
- 1 () Usually
- 2 () Not often
- 3 () Not at all

D (14) I can enjoy a good TV or radio program or book:

- 0 () Often
- 1 () Sometimes
- 2 () Not often
- 3 () Hardly at all

Appendix 8. Practice Card Sort

Verbal instructions for the *practice goal card sort* were as follows:

On these cards you will find descriptions of different types of food. Please read each of these cards carefully and sort the cards into several piles with respect to how much you personally enjoy these types of food. Please begin on the left side with the pile of the foods you most enjoy. Please order the foods you like least into piles on the right side. You may build as many piles as you think necessary.

The food choices were printed onto ten different cards, and are listed below:

Pizza
Banana
Cereal
Fish
Salad
Chips
Ice Cream
Steak Pie
Pasta
Pork Chop

Appendix 9. Goal Card Sort

Verbal instructions for the *goal card sort* were as follows:

On these cards you will find descriptions of different goals and plans that one can have and find important in life. Please read each of these cards carefully and sort the cards into several piles with respect to how important these goals and plans are for you personally. Again, please begin on the left side with the pile of those goals and plans which are most important to you. Please order those goals and plans that are less important or not important at all to you into piles on the right side. You may build as many piles as you think necessary.

The goals are listed here according to their corresponding category.

Social Acceptance

- (1) Have good friends who accept me the way I am
- (2) Have close friends who trust me
- (3) Be able to confide in a close friend at any time
- (4) Receive good advice on important decision
- (5) Not feel lonely

Autonomy

- (6) Determine my future myself
- (7) Receive approval for my work
- (8) Have strong power of discernment
- (9) Be financially independent
- (10) Be well educated and knowledgeable

Generativity

- (11) Be available to others who need to be comforted
- (12) Leave my mark on this world
- (13) Give my knowledge/experience to others
- (14) Help others to find their purpose in life
- (15) Have large experience of life
- (16) Be with people who set high value on my opinion

Emotion Regulation

- (17) Be autonomous in my feelings
- (18) Know myself and my feelings very well
- (19) Have control over my feelings
- (20) Not depend on someone else's feelings

Appendix 10. Set of Photos for the Annual Event “Birthday”



Birthday Scene



Birthday Food

