Identity Change Impacts Autobiographical Reconstruction of Identity-Relevant Events: Influences of the Self-System on Remembering

by

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Dissertation submitted in partial fulfillment of
the requirements for
the degree of Doctor of Philosophy
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ABSTRACT

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Abstract

The focus on how one is behaving, feeling, and thinking, provides a powerful source of self-knowledge. How is this self-knowledge utilized in the dynamic reconstruction of autobiographical memories? How, in turn, might autobiographical memories support identity and the self-system? I address these questions through a critical review of the literature on autobiographical memory and the self-system, with a special focus on the self-concept, self-knowledge, and identity. I then outline the methods and results of a prospective longitudinal study examining the effects of an identity change on memory for events related to that identity. Participant-rated memory characteristics, computer-generated ratings of narrative content and structure, and neutral-observer ratings of coherence were examined for changes over time related to an identity-change, as well as for their ability to predict an identity-change. The conclusions from this study are threefold: (1) when the rated centrality of an event decreases, the reported instances of retrieval, as well as the phenomenology associated with retrieval and the number of words used to describe the memory, also decrease; (2) memory accuracy (here, estimating past behaviors) was not influenced by an identity change; and (3) remembering is not unidirectional – characteristics of identity-relevant memories and the life story predict and may help support persistence with an identity (here, an academic trajectory).

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I am who I am, because of you

1 The Role of the Self-System in Autobiographical Memory Reconstruction

1.1 Purpose of the review

Cognitive psychologists utilize the term "self" to motivate a variety of theoretical statements, often succumbing to the tautological implications of the use of such an abstract word. It is not the interest of this review to re-define the "self" in either the scientific or the philosophical sense, nor do I wish to harshly critique popular, yet untestable, theories of autobiographical memory. I choose instead to look at humans' self-referential ability and how this focus on how one is behaving, feeling, and thinking, provides a powerful source of knowledge which is utilized in the dynamic reconstruction of autobiographical memories. Self-knowledge is special only in the sense that it is diverse and robust; it is the same as any other knowledge structure, only richer, therefore one needs no special entity or mechanism to explain autobiographical remembering. By eliminating the ethereal "Self" from autobiographical memory and replacing it with more tangible constructs, we can make testable predictions based upon the large body of research examining memory, social interactions, and self-perceptions

I root this review in the literatures concerning autobiographical memory, the self-system in social psychology, and knowledge (particularly expertise) as understood by cognitive psychologists. This review begins with a brief foray into the vast literature examining the Self and the reflexive self-system. An overview of autobiographical memory reconstruction follows. I then summarize the research on the properties of the self-concept, self-knowledge, and identity, and examine how

theories from cognitive psychology can elaborate our understanding of the structure of self-knowledge. Finally, I discuss how self-knowledge is a robust source of information that affects memory for events from our personal past.

1.2 Definitions

Before I begin, I will clarify my use of particular definitions in this review and within the dissertation as whole, as what the terms refer to becomes sticky at times.

Autobiographical memory is memory for personally relevant events.

Self-knowledge is the entirety of one's knowledge concerning one's personage and one's place in the world.

Identity is a trait, characteristic, or role that helps to define who one is. Identity is a form of self-knowledge.

The *self-concept* is the self-knowledge (including identities) that is currently accessed, available, and being brought to bear as one navigates the world.

Self-reference is the examining of one's own thoughts, behaviors, and emotions; self-referential processing helps to create self-knowledge.

Given the complexities surrounding the term *Self, oneself* is used to indicate what the laymen would consider their personage, or "self" to be. I use the term *Self* (capitalized) when referring to other researcher's conceptualizations (however vague) of one's personage.

1.3 What is the Self?

Early researchers and philosophers defined the Self in a variety of ways, including but not limited to: the soul (for review, see Lorenz, 2009), an essence existing outside of the body (Dualist perspective; Descartes, 1650/2003), bodily sensations and impressions of those sensations (Hume, 1789), the object and agent of thought (James, 1890), a "looking-glass" through which we see ourselves (Cooley, 1902), and the ego (Freud, 1920). Researchers have even determined where people, including preschoolers and blind adults, think that their self exists; most people indicate that their Self is situated inside of their head, behind their eyes (Bertossa, Besa, Ferrari, & Ferri, 2008; Starmans & Bloom, 2012).

The Self's various proposed functions and philosophical meanings make it difficult to comprehend and even more difficult to isolate and study. Because the construct of the Self in social psychology (and other domains) is simply too complex to be adequately expressed in a simple and straightforward explanation, researchers tend to focus on the different subtopics that can be lumped together to make up a Self (Baumeister, 1998). These subtopics are often "hyphenated elaborations" (Allport, 1955, p. 87) with modifiers specifying the exact function of each aspect of the Self. Popular subfields studied include, but are not limited to, self-esteem, self-regulation, self-concept, self-actualization, self-efficacy, self-determination, self-protection, self-verification, and self-presentation (derived from Leary & Tangney, 2012b). In general, current research implies that the Self is a system that regulates itself. Hoyle and colleagues define this self-system as:

> an interactive, self-regulating system of self-reference thoughts, feelings, and motives. It gives rise to an enduring experience of physical and psychological existence – a phenomenological sense of continuity and predictability. The self is reflexive and dynamic in nature: responsive yet stable, complex yet unified; both private and public, conscious and nonconscious, variable and fixed. (Hoyle, Kernis, Leary, & Baldwin, 1999, p. 11)

The use of the term Self becomes problematic when thinking about the influence of such a construct on not only information processing, but other social, motivational, and emotional functions. We rely on the subfields and hyphenated elaborations to provide more nuanced definitions of what the Self can do. Combined, these subfields provide us with a better picture of the overall nature of the self-system by differentiating it into distinct topics: the self as one's personality; the "I", or experiencing, self; the regulatory self; and the "me," or self-as-knowledge (Leary & Tangney, 2012a). Humans (and to a degree, other animals; See Mitchell, 2012) plan and evaluate their behavior, monitor the social environment and their social needs, and understand incoming information about the environment and themselves (Hoyle et al., 1999; Leary, 2004) through self-referential processing, or the examining of one's own thoughts, behaviors, and emotions (Leary & Tangney, 2012a).

I choose to focus on role of self-knowledge, parts of which are activated to form the self-concept, specifically because these measureable knowledge constructs map on to what we already know about memory retrieval, and will therefore be most useful in understanding the cognitive processes underlying autobiographical remembering. Similar to the learning of information from the external world, self-reference provides a potent and diverse source of knowledge that functions akin to a theory, in that it is an organized body of dynamic knowledge about oneself, based upon one's own observations (Epstein, 1973; Neisser, 1988). Other aspects of the

self-system are likely important to our understanding of autobiographical remembering, but the complexity and breadth of the self-system prevent a concise and substantial review of the role of every aspect of the self-system in memory reconstruction.

1.4 Autobiographical memory reconstruction and the role of the self-system

Researchers define autobiographical memory as memory for personal events that one has experienced (c.f. Pillemer, Steiner, Kuwabara, Thomsen, & Svob, 2015, for a discussion of vicarious memories). Specifically, an early edited book (Rubin, 1986) highlights the study of autobiographical memories as being concerned with the Self, including self-theories, self-reference, and identity. Other researchers posit that autobiographical memories are for information related to the Self (Brewer, 1986; Conway & Pleydell-Pearce, 2000; Rathbone, Conway, & Moulin, 2011) and can include both autobiographical facts and personal episodic memories that come with a sense of reliving. Using the terminology coined by Tulving (1972, 1993), remembering a personal event can be "episodic", in that it comes with a sense of reliving and a spatial context (Rubin & Umanath, 2015; Deffler, Umanath, & Rubin, in prep) or "semantic", in that it is factual knowledge not grounded in space or time.

Before undertaking a review of role that the self-system is assumed to play in autobiographical memory remembering, I first review three interrelated principles of autobiographical memory retrieval: 1) autobiographical remembering is reconstructive; 2) autobiographical remembering is knowledge-driven; and 3) autobiographical memory is malleable. Research outside of the autobiographical

memory niche supports these principles and suggests that they may be constructs that apply to cognition, or at least memory, as whole.

1.4.1 Autobiographical remembering is reconstructive

The laypersons view of memory recall (Personal communication, December 2015) belongs to the Ebbinghaus (1885/1913) school of thought – a veridical reproduction of an event (e.g. word list) is thought to be retrieved from a unique trace in memory. Memory is a thing. While this account makes theorizing less fuzzy and court-room testimony more trustworthy, it does not capture the true nature of the phenomenon, namely that what we call "memory" is the product of the dynamic process of remembering. Every time a particular event is recalled, one's account of it is reconstructed from existing knowledge structures to form a memory.

We reconstruct past events through the use of schemata. Used by Head and colleagues (1920) in reference to a model of postural adjustments, "schema" was later expanded by Bartlett (1932) in his seminal book, *Remembering*, to refer to "an active organization of past reactions, or of past experiences, which must always be supposed to be operating in any well-adapted organic response" (p. 201). This organization groups experiences with other related events and condenses them into one generalized knowledge structure. We use this synthesized past information to interpret incoming stimuli and recall events from our past (Oldfield & Zangwill, 1942). Schematic structures have been uncovered for coins (McCurdy, 1956; Rubin & Kontis, 1983), gender-specific behaviors (Signorella & Liben, 1984), relational partners (Jose, Rajaram, O'Leary, & Williams, 2010), family dynamics (Shore, 2009) and many other domains of information. However, Bartlett expressed discontent

with his definition of schemata, referring to it as both "too definite and too sketchy" (1932, p. 201); later researchers helped to elucidate the theoretical boundaries of the term.

One especially relevant form of schema is that for culturally shared sequences of action patterns, known as scripts. Studies of scripts reveal that existing knowledge structures organize the encoding of new events (Bower, Black, & Turner, 1979; Reiser, Black, & Abelson, 1985; Schank & Abelson, 1977) and aid in the imagining of potential events (Bohn & Berntsen, 2014). Scripts and schemas form by extracting gist-based information from encounters with repeated similar events. Later, when retrieving the new information, the knowledge structure activated at encoding helps to predict features of the to-be-retrieved event. We then reconstruct the event using these features, coupled with event-specific information (Neisser, 1981). Supporting the account of schemata as generalized knowledge structures, schematic information appears to be "semantic" (Tulving, 1972) in that it is source-less; we often fail to remember when and where specifically we learned schematic information, although we often can generate possible schema-consistent sources of that information (Kuhlmann, Vaterrodt, & Bayen, 2012). This does not mean that schemata are not related to a spatial context. In fact, it seems beneficial to activate the appropriate schemata for a given context (e.g. I would not activate my "eating at a fancy restaurant" script when sitting in McDonald's). Importantly, the mental and social context at retrieval matters, both for the types of schemata activated to provide event details (Reiser, Black, & Kalamarides, 1986) and the narrative schemata that govern how a story is relayed to one's audience (Barclay, 1986;

Bruner, 1995). Schemata, like all knowledge, are not fixed, but instead are updated with new experiences. When the schema used to encode an event is updated, future retrievals of that event will be in line with the current schema and may lack veridicality.

Because schemata are generalized representations of events, schema-consistent inaccuracies in reconstruction can arise due to this gist-based recall (Barclay, 1986; Neisser, 1981). Inference based upon schemata helps to fill in gaps in one's memory for an event. Research on source memory errors reveals that people often succumb to stereotypes when attributing information to a source (Mather, Johnson, & De Leonardis, 1999), particularly when recollection is difficult because of forgetting (Spaniol & Bayen, 2002) or impaired due to limited cognitive resources (Sherman, Lee, Bessenoff, & Frost, 1998). Schemata-based inference also occurs when remembering ambiguous information (Tuckey & Brewer, 2003) or recalling which actor performed a given action (Kleider, Goldinger, & Knuycky, 2008; Kleider, Pezdek, Goldinger, & Kirk, 2008). The heuristic of inferring past information from a knowledge structure is adaptive, as we then do not need to encode each event which we encounter as an isolated trace in memory, but this inference may lead to errors in recall.

1.4.2 Autobiographical remembering is knowledge-driven

This principle follows directly from the previous discussion of schema theory. To put it simply, one must have knowledge structures (some in the form of schemata) from which to extract information in order to recall any event. But, where does this knowledge come from?

We derive our knowledge base from both internal and external sources. Experiencing the world certainly plays a large role in the development of our knowledge, and repeated exposure to events helps us to abstract commonalities across situations and contexts. The encoding of these experiences (whether social experiences or more formal learning experiences) allows us to make predictions about the future and also provides us with information that can be utilized in problem solving. Internal thought processes, particularly self-referential processing, also shape our knowledge base. We think about our past actions and their repercussions, we daydream about our past and our future, and we construct elaborate theories about the world and society.

When knowledge pertains to events that include oneself and the social world, it is considered autobiographical knowledge (Conway, 1996; Schulkind, Rahhal, Klein, & Lacher, 2012; Srull & Wyer, 1993; Tulving, Schacter, McLachlan, & Moscovitch, 1988). There is dispute as to how this information is organized and accessed, but no real conflict as to its existence and its importance for autobiographical memory reconstruction. Many researchers maintain that autobiographical information is organized into an abstract hierarchy according to periods in one's life (Anderson & Conway, 1993; Conway & Jobson, 2012; Conway & Pleydell-Pearce, 2000; Shum, 1998). This organization may be governed by temporal information and delineated by life transitions or turning points (Brown et al., 2009; Brown & Schopflocher, 1998; Pillemer, 1998; Pillemer, Krensky, Kleinman, & Goldsmith, 1991). However, although phenomenologically it may seem as if our memories and autobiographical knowledge are organized according to the time

periods in which they were encoded, this hierarchy, with abstract time periods granting access to specific details experienced during those times, does not match up with the difficulty that most people have with dating their specific memories (Barclay & Wellman, 1986), nor does it explain how specific information may be accessed without being able to place oneself in a specific time period. Furthermore, research on priming and memory retrieval suggests that both generic semantic primes and personal primes speed up autobiographical memory retrieval (Conway, 1987; Conway & Bekerian, 1987; Reiser, et al., 1985; but see Conway, 1990). In a recent study, Schulkind and colleagues (2012) sampled autobiographical memories using word cues or brief narratives and showed that the perceived organization of autobiographical memories according to time periods may simply be a function of the cuing methods used to elicit the memories. Additionally, a temporal hierarchy of autobiographical memories fails to account for autobiographical remembering of events that occur repeatedly.

There is also evidence that autobiographical knowledge (and really, all knowledge) may be organized according to the spatial context in which it was learned (Brown, Hansen, Lee, Vanderveen, & Conrad, 2012; Rubin & Umanath, 2015) or simply as distributed networks that are organized by many different relationships and are accessed using a temporal hierarchy or other organization scheme, depending on one's search strategy (Rubin, 1988, 2012). While an important debate that has implications for reconstruction and knowledge accessibility, one does not need a definitive answer on how the knowledge is organized to conclude that the knowledge itself is important for remembering events from our lives.

Further evidence for the importance of knowledge in memory reconstruction comes from the literature on episodic future thought. Future thinking, or mental time travel to the future, utilizes similar cognitive processes as remembering the past (Tulving, 1985) and is impaired, along with explicit memory for the past, in amnesiacs (Hassabis, Kumaran, Vann, & Maguire, 2007), schizophrenics (D'Argembeau, Raffard, & Van der Linden, 2008), and patients with depression (Williams et al., 1996). Future events that will happen closer in time (and therefore are more related to one's current circumstances and knowledge base) are more detailed than those that will happen further in the future. Presumably, this is because future events that will happen sooner utilize existing knowledge structures that help to specify the type of event that will occur and how it will occur (Addis, Wong, & Schacter, 2007; Szpunar, Watson, & McDermott, 2007). Events that are perceived to happen further in the future are more abstract because less current knowledge can be brought to bear on the representation of the event (D'Argembeau & Van der Linden, 2012; Spreng & Levine, 2006). We can parallel this episodic future thinking with the reconstruction of events from the personal past; events that happened longer ago tend, on average, to be more abstract and contain less detail than those that happened closer to the present time (Arnold, McDermott, & Szpunar, 2011; Szpunar, 2010).

1.4.3 Autobiographical memory is malleable

The reconstructive nature of autobiographical memory leads to malleability; memories are often not exactly the same from one instance of recall to the next. This malleability arises from the updating of the knowledge base and through

remembering in different environmental contexts, which affects knowledge activation and future reconstructions.

Internal factors influence the change in memory over time, particularly when recalling one's own past attitudes, emotions, and actions. People unconsciously revise memories of their past behaviors to be in line with their current attitudes and beliefs (Katz, 1989; Olson & Cal, 1984; Ross, McFarland, Conway, & Zanna, 1983; Ross, McFarland, & Fletcher, 1981). Reconstruction of ourselves in the past, because it is based on our current schemata, often aligns with our current views of who we are and what we value (Ross, 1989) or disparages our past actions to give us a sense of self-improvement (Wilson & Ross, 2001). Even if we recall unique information about our past that is misaligned with our current self-view, we view this information as subjectively more distant than other, schemata-congruent memories, even when the objective temporal distance of the two events is the same (Ross & Wilson, 2002). The rewriting of personal history arises as an adaptive function of how we generally store and update knowledge; impaired veridicality of our memories is merely a by-product of this system.

Research looking at the veridicality of eyewitness testimony has uncovered several external factors that lead to the incorporation of new (often false) information into the reconstruction of an event. In a classic study by Loftus and Zanni (1975), participants who were exposed to post-event misinformation about an automobile accident were more likely to incorporate the misinformation into their subsequent memory of the event. Misinformation, especially when incorporated into imagery exercises, has also caused individuals to "recover" memories of events from

very early childhood (before the offset of childhood amnesia), past lives, abduction by space aliens, events missing from a traumatic video, and even childhood sexual abuse that most likely has not occurred (Clark & Loftus, 1996; Garry, Loftus, & Brown, 1994; Loftus, 1996; Loftus, Garry, Brown, & Rader, 1994; Strange & Takarangi, 2012). Although troubling in this context, the incorporation of misinformation into the knowledge base and its subsequent override of older factual information points to a dynamic system of memory that changes with experience. Updating the knowledge base therefore has consequences for later reconstruction of autobiographical memory; our memories are not fixed, but rather are susceptible to influence from newly learned information.

Retelling in different social situations has implications for reconstruction. Remembering does not often happen in a vacuum; rather, the social situation and the goals behind narrating a memory often influence what facts are included, distorted, and excluded from a narrative (Marsh & Tversky, 2004). As events are not narrated for accuracy and completeness, these retellings often are not complete and may contain exaggerations. Narrating an event as a form of entertainment often leads the speaker to include fewer sensory details than narrating an event with the goal of accuracy. Importantly, these incomplete and quasi-accurate reconstructions can have implications for later memory retrieval, either due to selective rehearsal or the amendment of important schemata during the reconstruction process; events told for entertainment often are recalled with fewer story details later on (Dudukovic, Marsh, & Tversky, 2004). Retelling a memory in a distorted fashion also

leads to later remembering that is biased towards this initial reconstruction (Marsh, Tversky, & Hutson, 2005; Tversky & Marsh, 2000).

We retell memories as a means of communicating with others (Hirst & Manier, 1996). Remembering together can have a profound impact on an individual's representation of an event (Bruner & Feldman, 1996). Pasupathi's (2001) ideas of co-construction and consistency suggest that social influences impact memory from one reconstruction to the next. The *consistency principle* states that recollections tend to be consistent with previous reconstructions of the same event. Notably, this is not the same as stating that reconstructions remain veridical over repeated retrieval. Rather, if an exaggeration or other change in detail (even if minute) is introduced, it is likely to be reproduced in a later reconstruction of the event (Pasupathi, 2001). Given that characteristics of the social environment, especially characteristics of the speaker's audience, can influence exaggerations and omissions, the consistency principle suggests that over time and with repeated reconstructions in various social settings, the details comprising a memory will be altered or reconstructed ways that decrease the accuracy of the memorial account.

The *co-construction principle* (Pasupathi, 2001) states that autobiographical recollection is the product of the conversation between the speaker and her audience. The speaker may edit or exaggerate certain details in line with the views or expectations of the listener(s). A listener may also provide positive social reinforcement for the story, dispute specifics of the recollected event, appear bored, or ask for clarification when confused. The characteristics of the listener are critical, as individuals will structure their narrative differently depending upon the

characteristics of their audience. This is true not only when telling a story to a boss versus a friend, but also when parents communicate with their children and children communicate with their mothers or teachers, when writing a formal autobiography, or when speaking to a stranger versus a close friend (Barclay, 1996; D'Odorico & Franco, 1985; Gonzales, Hancock, & Pennebaker, 2010; Torr, 2004).

The conversational rules underlying co-construction govern the structure of retellings and narration. Skowronski and Walker (2004) defined these rules in a review of the cultural norms underlying the sharing of autobiographical events. They identified several norms of conversation, including brevity, honesty, clarity, novelty, and relevancy. All of these norms constrain the type of information retrieved during reconstruction and the way in which this information influences the memorial account. Additionally, the need for relevancy to the current situation and the requirement of a point to the story elicit post-encoding processes that try to attach meaning or significance to an event after it has occurred. Attaching this underlying meaning will influence later reconstructions of the event as the individual attempts to remain consistent and further expand upon the apparent significance of an event.

Besides the conversational context, the general impact of the situation on encoding, retrieving, and updating memory has been studied in depth by Barsalou and colleagues (Barsalou, 2008; Barsalou, Niedenthal, Barbey, & Ruppert, 2003; Yeh & Barsalou, 2006). Perceptual, motor, and introspective states are encoded during an experience; these states are later reactivated and synthesized into a simulation of the past experience (Barsalou, 2008). These simulated states, particularly those that

involve motor and posture, are linked to the social interactions and introspective feelings that occurred during encoding. Later, the same bodily states may call to mind similar cognitions (Barsalou et al., 2003). Importantly, this theory stresses that cognition is socially situated, in that cognitions are distributed not only throughout the brain but also throughout the environment (e.g. through interaction and discussion with other people; Smith & Semin, 2004). In turn, the situation constrains the cognitive processing that can occur within a particular environment; even if one is capable of completing a cognitive task in other settings, one may be prevented from doing so because cognition is situated in an environment that is not conducive to task completion (Yeh & Barsalou, 2006).

1.4.4 The Self in autobiographical memory

To summarize above, I elucidated the constructivist principles underlying autobiographical memory, explored how memory construction is based upon existing knowledge structures, and explained how updating those knowledge structures leads to malleable reconstructions. I now turn to the assumed role of the Self in autobiographical memory. However, I should note my difficulty in constructing this section, as there is very little empirical evidence supporting the claims that have been made in the literature concerning the specific role of a global Self in remembering.

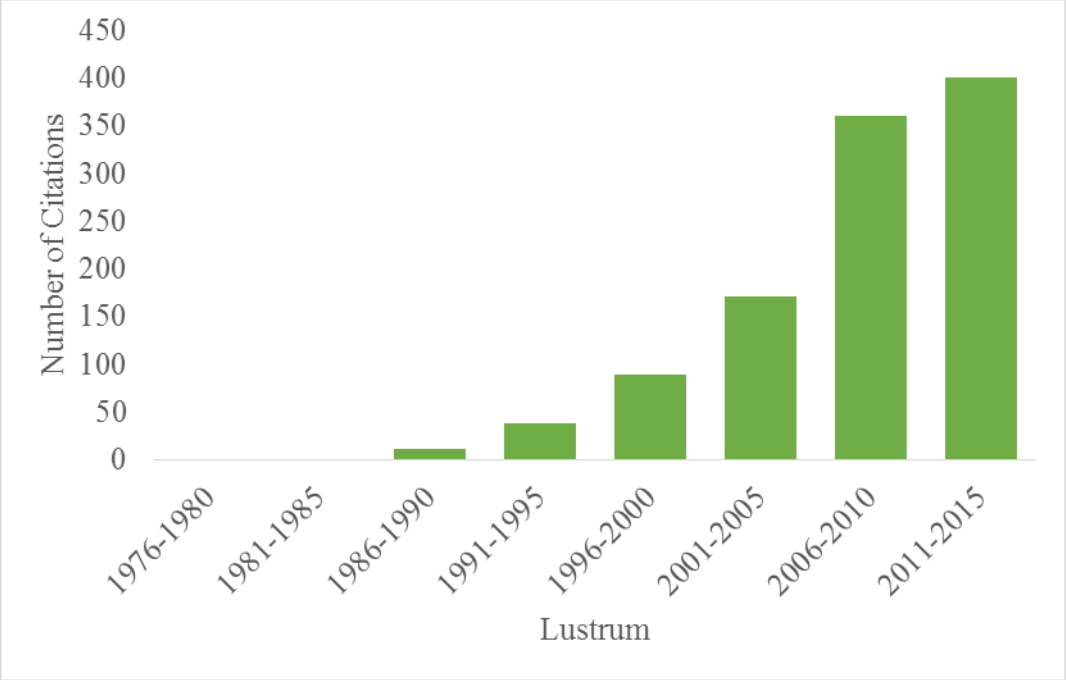

Figure 1: Number of Articles with "Self" and "Episodic Memory" or "Semantic Memory" in the Abstract

The very nature of autobiographical memories, or memories for personal events, warrants a study of the role played by the self-system, by its very nature "personal," during the act of remembering events. A PsycINFO search of the terms "self" and "episodic memory" or "autobiographical memory" reveals 1,076 citations with these search terms contained in their abstracts that were published before 2016. The topics covered include remembering in normal adult populations, the development of autobiographical memory, memory in autistic individuals, and amnesia. Additionally, the interest in this topic has been increasing exponentially, as shown by Figure 1, which plots the number of articles containing the search terms within their abstracts for each lustrum (5-year period) from 1976 to 2015. This overwhelming presence of the Self in our understanding of memory points to

the central role that the self-system plays in researchers' understanding of autobiographical remembering.

Conway and colleagues' (Conway, 2005; Conway & Jobson, 2012; Conway & Pleydell-Pearce, 2000) Self-Memory System (SMS) theory of autobiographical memory places the Self, particularly the goals of the Self, at the center of reconstruction. They propose the existence of a "working self", or a transient composite of implicit current goals, that governs the accessibility of details that make up autobiographical memories. Conway and colleagues borrowed the idea of a "working self" from the literature on the self-concept (e.g., the working-self-concept; Markus & Nurius, 1986; Markus & Wurf, 1987; Rhodewalt & Agustsdottir, 1986; see discussion below), but erroneously conclude that one's self-concept is solely a conglomeration of current goals. Although this model is valuable in that it focuses on one's goals during the reconstruction of relevant memories, it fails to take into account other factors that relate to or are part of the self-concept and self-system and may be differentially activated, but do not fit within the definition of a goal. Such factors include one's motivations (Habermas, 2012), the social situation (McGuire, 1984; McGuire & McGuire, 1982), impression management (Leary & Allen, 2011), identity (Fivush, Habermas, Waters, & Zaman, 2011; Reese et al., 2011), emotions (Andersen, 1984; Andersen & Ross, 1984), and the physical context (Berntsen, 2012); these (and others) all may affect the activation of particular self-knowledge that is brought to bear during memory reconstruction. However, we can take one central tenet of the SMS, that at least some part of the reflexive self-system is important for autobiographical remembering, and focus on how to study the role of

the self-system in a way that will best allow us to understand autobiographical memory.

Researchers have noted the need for a sense of oneself, particularly present self-awareness, as necessary for autobiographical remembering (for a review, see Prebble, Addis, & Tippett, 2013). However, having the ability to mentally travel through time, or recollect an event with autonoetic consciousness (Tulving, 1985), is not sufficient for one to have autobiographical memory. There needs to be information about oneself at a particular event in order to create a memory of the event. Self-processes are needed for successful autobiographical remembering, but the dearth of true empirical studies in the literature makes it difficult to conceptualize and test a model that takes into account the complexities of all of the processes that collect under the umbrella of the term Self.

One way to observe how memory reconstruction is affected by the self-system would be to look at how memory changes over time. Instead of focusing on the moment-to-moment active "working self", Fitzgerald and Broadbridge (2012) take a life-span perspective that notes the influence of the context on recall, as well as the rememberer's current motives, different identities, genetics, and past and current mood disorders, such as depression. Although there are few long-term or prospective studies of autobiographical memory change, various short-term retrospective studies and theories point to changes in the reconstruction of personal events over time (Fivush & Shukat, 1995; Friedman & deWinstanley, 1998; McAdams, 2001; Rubin, Boals, & Klein, 2010; Talarico & Moore, 2012; Talarico & Rubin, 2007; Thomsen & Brinkmann, 2009). It is difficult to account for all of these changes simply by

relating them to one's "current goals". Instead, we should take into account how knowledge is activated and altered by both internal and external factors. It therefore seems more parsimonious for researchers to start with the building blocks of autobiographical memory: the knowledge structures that provide the details that go into constructing a representation of our past. The self-concept is not just a set of current goals, but rather encompasses a broad structure of activated self-knowledge. We can examine how different internal and external factors influence the activation of these structures and subsequent reconstruction.

Similar to the idea that novel information shapes and is shaped by existing knowledge structures, recall of the past is thought to influence and be influenced by our current self-knowledge. Some autobiographical memories may act as directives that guide our actions and encourage us to pursue certain paths in life (Pillemer, 1998). Others, coined "self-defining memories" by Singer and Salovey (1993) provide us with concrete examples of why we are who we are. Available memories also affect the construction of the self-concept (Sanitioso, Kunda, & Fong, 1990) and alterations to how an event is reconstructed can have benefits for mental health and psychosocial functioning (Habermas, 2012). More globally, the life story, when told through narrative, helps to construct an internal view of oneself to share with others; one's current representation of oneself also influences how these narratives are constructed (Bruner, 1997; McAdams, 2013). One's self-concept may shape autobiographical narratives through autobiographical reasoning, or the effort to fit events into one's life story (Fivush et al., 2011; McAdams, 2001; Pasupathi & Mansour, 2006).This notion seems circular, unless one forgoes the notion that "self"

and "memory" are unitary constructs (Prebble et al., 2012) and takes the view that the "self" influencing construction is actually a schematized representation of one's personage. The idea of self-as-knowledge has long been studied as a construct that organizes self-relevant information and aids in interpreting new incoming information about our actions and the social environment.

1.5 What is the evidence that people have self-knowledge structures?

The prevalence of Self-based studies of autobiographical memory in the literature warrants a more extensive review of the evidence for self-related knowledge structures. The layperson can attest to the existence of knowledge structures about herself, and research into the organization and retrieval of memories also supports this notion (e.g., Conway & Bekerian, 1987; Reiser et al., 1985). Perception of oneself and comparison to others (Festinger, 1954; Freund & Kasten, 2012; Frey & Ruble, 1985; Rinn, Jamieson, Gross, & McQueen, 2009; Schoeneman, 1981; Suls & Miller, 1977), cultural influences (Cross & Gore, 2012; Markus & Kitayama, 1991; Ross & Wang, 2010), and arousal (Bandura, 1977), among other factors, all contribute to the formation of self-knowledge. Just like other knowledge structures, self-knowledge encompasses a large amount of information and is highly organized and elaborated (Bower & Gilligan, 1979; Greenwald & Banaji, 1989; Luo, Watkins, & Lam, 2009; McConnell & Strain, 2007; Showers & Zeigler-Hill, 2012). This information can be utilized when encoding other tangentially-related knowledge, a phenomenon known as the self-reference effect

(Rogers, Kuiper, & Kirker, 1977). Critically, this self-knowledge is gleaned through a developmental process within a cultural framework (Ryan & Deci, 2012).

Self-knowledge is akin to a traditional concept, or organized body of information surrounding a central premise or entity (Bruner, Goodnow, & Austin, 1956). Early theories of self-knowledge borrowed Bartlett's idea of schemata (1932) and applied its principles to self-knowledge. In a heavily cited theory, Markus (1977) proposed and tested the idea that self-schemata were gist structures based upon past experience and observation of one's actions; these structures help to organize and interpret self-relevant information. People aggregate knowledge about themselves in a particular domain by observing their own behavior (i.e., self-reference) and forming knowledge structures that represent what they know about themselves. They then use this knowledge to interpret other related information as they navigate the social environment. These schemata also function, as other schemata do, as scaffolds upon which to reconstruct autobiographical memories (Barclay & Subramaniam, 1987). However, the distinction of independent versus dependent self-schemata, as utilized in Markus's (1977) experiment seems more like a bipolar trait and less like a schematic construction in the way that Bartlett (1932) operationalized schema. Self-schemata are treated as "special" in the literature, but do not need to be. Just like other schemata, these knowledge structures exert their influence on reconstruction from memory and could be updated to account for new information.

The self-knowledge used to construct the self-concept functions like a schema and is organized in memory around or connected to a domain-specific knowledge

structure; different domains of self-knowledge vary in their organization and diversity of information. Critical to the longitudinal study discussed in later chapters is an understanding of identity as a form of self-knowledge. However, gaps still remain in the literature regarding the function and structure of stored identities and how these long-term structures may influence behavior and cognition (a problem referred to by Oyserman and colleagues (2012) as the "theory-evidence gap"). Both personal and social identities (Hogg, 2012) provide us with a meaning-making lens through which to see and interpret the world (Oyserman, Elmore, & Smith, 2012). Research suggests that these identities can be both stable (e.g., Stryker & Burke, 2000) and malleable (e.g., Abrams, 1999), depending upon the situational context and internal factors; however, this malleability may be due to differential activation of an identity for the self-concept, as opposed to an actual changing of the stored information associated with that identity.

The self-concept is comprised of differentially activated self-knowledge, including identities (roles, traits, and characteristics), that are constructed on-line as we encounter different contexts. One's activated attitudes, self-evaluations, and other self-knowledge give meaning to the world and focus on our current goals by facilitating meaning-making and maintenance of our self-worth (Oyserman & Markus, 1998). While one may have multiple self-schemata, we have only one dynamically constructed self-concept, which is influenced by internal and external contexts so that one can place oneself not only within the currently encountered situation (Oyserman, et al., 2012) but also within the past or future through mental time travel (Metcalfe & Kober, 2005).

Researchers have already outlined how the self-concept influences behavior. The self-concept represents the activated self-knowledge being utilized in a certain context (Cantor, Markus, Niedenthal, & Nurius, 1986); it is a set of activated schemas, theories, goals, facts, and images (Carver & Scheier, 1982; Epstein, 1980; Greenwald & Pratkanis, 1984; Markus, 1983; Schlenker, 1985). Specifically, we store self-knowledge in associative networks with varying connection strengths (Showers & Zeigler-Hill, 2012). Differential patterns of activation in this vast knowledge base form the dynamic self-concept; these activations are influenced by environmental, motivational, emotional, and cognitive processes. However, little empirical evidence examining the on-line formation of the self-concept and its subsequent impact on behavior has been undertaken. One could empirically test the various functions of self-knowledge by manipulating the activation of certain knowledge structures and examining the behavioral effects.

Varied activations of diverse self-knowledge in the self-concept create malleability across time, but this malleability comes in direct conflict with the layperson's feeling of stability and self-continuity. One can resolve the discrepancy between perceived stability and actual lability of the self-concept by concluding that, similar to autobiographical memory reconstruction, individuals dynamically construct self-concepts from their own self-knowledge (McConnell, Rydell, & Leibold, 2002) depending upon the context that they find themselves in (Strack & Deutsch, 2004; Wyer & Srull, 1986, 1989). Specifically, the self-concept varies in response to changes in both the internal and external environment, where an individual's reaction times and endorsement of different traits vary as a function of the perceived

similarity to others (Markus & Kunda, 1986), physical and social context (Oyserman & Packer, 1996), and social network (Antunes & Fontaine, 2000; Kindermann, 1993). The perceived consistency of the self-concept arises from the interpretation of situations and reactions as being congruent with one's identity (Ross, 1989), as well as the tendency of the individual to favor certain constructions across contexts (Markus & Nurius, 1986).

1.6 Using research on knowledge to make predictions about self-knowledge and the self-concept

Experiments in the laboratory, though less ecologically valid than would be ideal, provide testable assumptions about the nature of self-knowledge and the conception of oneself. Specifically, we can think of self-knowledge as a category or concept that we are experts on. Information from this concept can be retrieved. Additionally, we can view potential changes in self-knowledge through a cognitive lens and determine a mechanism of change and effects of this change on later memory reconstruction.

1.6.1 "Concept" in the cognition literature

Discrepancies in the definition of a "concept" exist between research in the domain of the self-system and research on traditional knowledge structures. Although in the social psychology literature the self-concept is said to be formulated "on-line", research in the cognitive tradition defines a concept as an updateable structure of knowledge organized according to semantic meaning (Healy & Levitt, 1978). The latter definition will be used in this section, where I talk about concept

formation. Concept structures pertaining to oneself will be denoted as self-knowledge.

Neisser (1988) noted the existence of a "conceptual self", a knowledge structure containing information about ourselves as a particular person in a particular environment. This concept of oneself contains information similar to that found in other semantic knowledge structures. But, how do we come by the information that makes up self-knowledge? Concepts are formed through repeated exposure and expanded by making connections to information that is related semantically (Healy & Levitt, 1978). Given the benefits of generation for memory, repeatedly calling to mind aspects of our thoughts, emotions, and behaviors (such as through rumination or narration) would lead to an organized conglomerate of information related to oneself.

Conceptual knowledge is distributed across the brain and stored according to the particular modality from which the information was obtained (McNorgan, Reid, & McRae, 2011; Rubin, 2006, 2012). When accessed, richer concepts cause greater magnitudes of interaction throughout the brain, which in turn have a greater impact on downstream cognitive processes (Kounios et al., 2009). By thinking of self-knowledge as a concept that can be utilized to produce autobiographical memory, we link the notion of the Self with what has been found in other literatures relating to distributed basic systems underlying autobiographical memory reconstruction (Rubin, 2006, 2012). This link eliminates the need for a more ethereal Self in autobiographical memory while still keeping intact the basic premise that we are remembering events from our own lives.

1.6.2 The Role of expertise

We are experts on ourselves. Expertise in a domain often allows a person to excel at tasks in which novices perform poorly, even though experts do not have better overall intelligence or general memory skills. Expertise effects have been found in a variety of domain masters, including chess players (Chase & Simon, 1973), bridge players, (Engle & Bukstel, 1978), computer programmers, (McKeithen, Reitman, Rueter, & Hirtle, 1981), medical practitioners (Patel & Groen, 1991), physicists (Chi, Glaser, & Rees, 1981), and musicians (Dowling, Bartlett, Halpern, & Andrews, 2008). Overall, experts encode a more elaborate representation of relevant information and show better recognition memory for domain-related stimuli than novices (Herzmánn & Curran, 2011); the richer database of domain-relevant knowledge in experts drives better performance on memory tasks by favoring recollection over familiarity-based processes (Brandt, Cooper, & Dewhurst, 2005). This diverse high-knowledge domain also allows for flexibility in memory search (Bhaskar & Simon, 1977) and problem solving (Larkin, McDermott, Simon, & Simon, 1980).

Experts perform superiorly in their given domain. We are experts at remembering our experiences and narrating them to others; this ability to narrate develops early (Bauer, 2012; Fivush, 1995; Fivush, Gray, & Fromhoff, 1987), allows us to communicate our experiences for social and other goals (Bluck, Alea, Habermas, & Rubin, 2005), and helps us to make meaning of our lives (McLean & Pratt, 2006; Sommer, Baumeister, & Stillman, 2012). Expertise also makes learning new information more efficient, even if that knowledge is only tangentially related to

the expert-domain. The more information contained with a domain, the easier new information is linked conceptually to that domain (Van Overschelde & Healy, 2001). We also have better memories for information that is self-generated and/or manipulated (known as the generation effect; Crutcher & Healy, 1989), and information that is encoded in reference to oneself (known as the self-reference effect; Belleza, 1984; Rogers, et al., 1977). Overall, our superior memory for information that we have cognitively manipulated, combined with our status as experts about who we are, makes self-knowledge the most diverse and robust concept within our knowledge base. Additionally, the more cues associated with a concept, the easier it is to recall, especially when the processes performed at encoding of the information are later used as retrieval cues (Crutcher & Healy, 1989). This suggests that differential processing of information that occurs in the changing social and emotional environment causes the retrieval of certain self-information, thus creating the perceived instability of the self-concept across different situations.

1.6.3 The effects of retrieval

When we deliberately retrieve information, we perform an attentive memory search and select relevant information to add to our reconstruction (McCloskey & Bigler, 1980). Retrieval itself has profound effects on memory. Retrieval practice, sometimes known as the "testing effect," leads to a memorial benefit that is not seen with mere repeated exposure to material (Bjork, 1988; Karpicke & Roediger, 2008; Marsh, Roediger, Bjork, & Bjork, 2007; Roediger, Agarwal, Kang, & Marsh, 2010; Roediger & Butler, 2011; Roediger & Karpicke, 2006), especially when a complete

retrieval process is elicited (Glover, 1989). The same effect occurs with repeated narration of a memory, and perhaps may explain the phenomenon of self-defining memories (Singer & Salovey, 1993) and the recall of memories as a means of problem solving or expressing one's current direction in life (Bluck et al., 2005; Pillemer, 2003). When we repeatedly narrate a memory, we strengthen the connections between the facts that make up that memory, thus making it more likely to be similarly retrieved in the future. Of course, repeated retrieval also has the consequence of altering our memorial representation, as seen by the work on retellings discussed previously.

Remembering certain events from our lives may also adversely affect the retrieval of other personal events, a phenomenon known as retrieval-induced forgetting (RIF). RIF occurs when activation of some information (such as a category exemplar) interferes with the later retrieval of other information (Anderson, Bjork, & Bjork, 1994). For example, retrieving the word "apple" may prevent the later generation of the word "orange" when asked for names of fruits. However, RIF is diminished when memories are connected and share a similar retrieval cue (Anderson & McCulloch, 1999). Because of the interconnectedness of our self-knowledge, one may assume that RIF does not occur in self-knowledge structures, but the research on socially shared retrieval-induced forgetting counters this hypothesis by showing that RIF can occur during collective remembering in both speakers and passive listeners in a conversation (Cuc, Koppel, & Hirst, 2007; Stone, Barnier, Sutton, & Hirst, 2010), even when the events being spoken about are autobiographical events (Barnier, Hung, & Conway, 2004; Stone, Barnier, Sutton, &

Hirst, 2013). However, the studies on within-individual RIF were conducted in a laboratory using generic cuing words; more research is needed to investigate what role RIF may have in the reconstruction of autobiographical memories in a real-world context. For example, does RIF impair reconstruction or enhance it by preventing the activation of irrelevant knowledge?

Because information about ourselves is stored as knowledge in a way similar to that in other domains, we must accept that this self-knowledge is malleable. Knowledge changes with experience and learning. As we experience ourselves in the world, we are apt to make new conclusions about who we are and what we think and feel. Some self-knowledge may become more salient based upon retrieval cues in the environment, and thus more activated than they had been in the past. Although some aspects of our self-knowledge may remain stable across time (e.g., my name is Samantha. I grew up in New Jersey.), others may cease to be true or may no longer be relevant (e.g., I am an undergraduate. I spend every Saturday playing rugby.). If we did not update our knowledge stores, our ability to interact effectively with our environment and to plan our future actions would be adversely affected. However, these changes in knowledge structures can also alter our reconstruction of the past away from a veridical account of what occurred.

1.7 Conclusions: Incorporating self-knowledge into our understanding of autobiographical memory

The above review synthesizes the vast literatures encompassing autobiographical memory, knowledge and expertise, and the self-system, to create a unified understanding of reconstruction that places the emphasis on self-knowledge,

because it is supported by empirical and theoretical contributions in these literatures. Reconstruction is governed by the self-knowledge activated at the time of remembering; self-knowledge may be brought on-line through internal cognitive influences or influences of the social and physical environment. While remembering, we wear "A-MASK". Autobiographical Memory is influenced by Activated Self-Knowledge.

Given that people have dynamic knowledge structures about who they are and who they have been, I now examine how dynamic activation of self-knowledge, including identities, can affect remembering, by returning to the three core principles of autobiographical remembering discussed previously.

1.7.1 Autobiographical remembering is reconstructive

Given that personal event memories are reconstructed from the knowledge base during retrieval, the social and emotional context in which the reconstruction occurs should impact the product of retrieval. For example, recalling your Friday night to your mother will result in a different narrative than telling your friend about your Friday night; these varied reconstructions will impact later memory for that night.

1.7.1.1 How has this already been studied?

Although cues in the physical environment can elicit memory retrieval and impact memory reconstruction (Berntsen, 2012), here I focus on the influence of the social environment on reconstruction. One's understanding of oneself is thought to be at least partially constructed in a social setting through the narrating of relevant personal events (Pasupathi, 2001). This meaning-making occurs as the narrator

strives to provide a coherent account of her actions and thoughts during an event (McLean & Pratt, 2006; Sommer et al., 2012). However, a narrative reconstruction of an event often does not relay a full, veridical account of what happened. Rather, people's self-presentations, embedded in their narratives (Schwalbe, 2009; Shaw, 1997), are often affected by the social audience; we convey a particular view of ourselves during social interactions depending upon the situation (a strategy known as impression management; Leary & Kowalski, 1990). Event reconstructions are likely to be biased when information is less accessible due to the social context or has been forgotten. In this case, events are often described in a way that is consistent with the narrator's currently activated self-knowledge (Willard & Gramzow, 2008), or self-concept.

Given the work on retellings by Marsh and others (Dudukovic et al., 2004; Marsh & Tversky, 2004; Marsh et al., 2005; Tversky & Marsh, 2000), we know that speaking to (or writing for) different audiences can impact the reconstruction of an event. When communicating with an audience, people often take into account who the listeners are, especially what they may know and feel about a particular topic (Echterhoff, Higgins, & Groll, 2005; Echterhoff, Higgins, Kopietz, & Groll, 2008; Echterhoff, Lang, Krämer, & Higgins, 2009; Fussell & Krauss, 1989; Higgins, 1999), and tailor their communications to suit a particular audience.

When taken into account alongside the work on impression-management, we can imagine that different audiences will spur the narrator to present herself in different ways, both as an abstract individual and to explain how or why she undertook a particular action. The differential activation of self-knowledge due to

context shapes the reconstruction of an event at a particular instance. The narrator is not overtly trying to deceive the audience (in most instances; c.f., any political speech), but is instead influenced by the self-knowledge activated as a result of being in the presence of a particular audience. Research by McGuire and colleagues provides empirical support for the changing salience of self-knowledge by demonstrating that the self-concept can be manipulated by altering the makeup of the social environment, particularly the characteristics of others in the social space with whom one interacts (McGuire, McGuire, & Cheever, 1986; McGuire, McGuire, Child, & Fujioka, 1978; McGuire, McGuire, & Winton, 1979; McGuire & Padawer-Singer, 1976).

1.7.1.2 What needs to be done?

It should be possible to covertly manipulate participants into narrating an event in different ways. This could be accomplished through priming, in which one piece of self-knowledge is primed over and above another using social, emotional, and spatial cues, to examine the effects of changes in these different types of contexts. A study by Kunda and Sanitioso (1989) showed that manipulating the desirability of extraversion or introversion in relation to academic achievement caused students to view themselves as possessing more qualities of the desirable attribute, but they did not study how this affected the recall of memories from the participant's life. A study priming participants to present themselves in a certain way to an audience has already been conducted (Schlenker & Wowra, 2003), but a within-subjects and within-events study of different reconstructions over time has not been undertaken. This idea maps nicely onto Markus's study on self-schemata

(Markus, 1977), but I would not designate participants as having one or another type of self-schemata (e.g., independent or dependent). Rather, I would work under the assumption that we all have knowledge of ourselves acting independently or dependently. What differs is the extent of this knowledge, the strength of its memory trace, and its activation at a given point in time. Therefore, we should be able to prime people to believe they are independent or dependent by activating the relevant self-schema and then measure how these conditions affect memory reconstruction.

One could also study the effect of social context on internal monologues of events, as opposed to covert retrieval. Specifically, we know that the social environment has an impact on the verbal narration of an event, and even that imagining talking to a significant other can impact recall of self-knowledge (Schlenker, et al., 2008), but little has been done to examine what, if any, effects the social environment may have on an individual's covert remembering of an event (except in the case of someone listening to a speaker; e.g., audience-tuning effects; Echterhoff, et al., 2005, 2008, 2009). Also, if the social environment does affect how an individual thinks about an event, does this internal retelling affect future reconstructions of the event?

Finally, although reconstructions may vary in terms of the words used or the specific facts given, we do not know if individual's gist understanding of an event is really altered. Although it is interesting that specific information about an event may be activated, I would argue that the overall summary, or flavor, of the event could also be impacted by an individual's understanding not only of herself but also

of the world. However, the general representation of the event may not be altered dramatically unless there is a change in a large proportion of the schematic knowledge that is used to remember the event.

1.7.2 Autobiographical remembering is knowledge-driven

If the knowledge underlying reconstruction matters, than what we know and think about ourselves will have bearing on what we remember and how we remember it. Because knowledge is used in the reconstruction of autobiographical memories, a majority of the key points have already been elucidated above.

1.7.2.1 How has this already been studied?

Perhaps the most famous account of gist-based recall comes from Bartlett's (1932) work on remembering. When English participants were asked to recall a story of an unfamiliar culture, they showed schema-consistent generalities and intrusions in their reconstruction of the story. Further work on autobiographical recall has demonstrated a tendency on the part of participants to supply overly general, or summarized, accounts of events in responses to cues (Barsalou, 1988; Burt, Kemp, & Conway, 2003), possibly because repeated events are synthesized into a unified schema (Neisser, 1981), the information was initially encoded abstractly (Rudoy, Weintraub, & Paller, 2009), or specific information is not available (e.g., when imagining the future; Anderson & Dewhurst, 2009). However, generalized memory representations provided by participants in a lab study may arise more as a function of the cues given and less as a function of the true representation of the event in memory. Williams and colleagues (1999) found that cue words that are rated as low in visual imagery elicit less specific autobiographical

memories, compared to words rated as high in visual imagery. Schulkind and colleagues (2012) also investigated the role that cuing method plays in the elicitation of memories from study participants. They found that when cued with a narrative and not given a specific audience, participants produced more specific memories than if they are cued with a set of words or told to respond as if talking to a friend. These results suggest that the perceived generalization of autobiographical memories may be a function of the methods used to elicit them. Given that gist-based recall is a good heuristic for conveying information in certain environments, it does not seem surprising that participants tend to provide generalized memories in situations where cues are themselves general. In fact, this is quite an adaptive means of relaying key points to a listener (particularly when that listener is a friend who shared common knowledge with you, a la the given-new contract).

1.7.2.2 What needs to be done?

Given that autobiographical remembering can be specific or generalized according to the types of cues and instructions provided, it would be beneficial to investigate the mechanisms that may generate specific versus gist-based recall in autobiographical memory. One could extend prior work (Schulkind et al., 2012) and investigate the different factors affecting reconstruction. I suspect that the audience will play a large role in the degree of specific knowledge that is included in a memory reconstruction. Instructions should also be manipulated, with one conditioning having minimal instructions in order to examine the "natural" way that participants engage in autobiographical narrative in the laboratory. Furthermore, the temporal distance of the memories, as well as their personal importance, could

be measured, or even manipulated, to observe whether knowledge that is supporting the reconstructions is general or specific. If a memory happened longer ago in time, then less specific knowledge is probably available and gist-based recall would be favored. However, personally important events may be more specific because they will be highly connected to robust self-knowledge structures and likely often retrieved.

1.7.3 Autobiographical memory is malleable

If memory is malleable, then self-knowledge is malleable. As self-information changes, the nature of reconstruction will change. Fluctuations in self-knowledge used to form the self-concept give rise to a myriad of possible selves that one can embody in a given situation or could embody in the future (Markus & Kunda, 1986; Markus & Nurius, 1986; Markus & Wurf, 1987; Nurius & Markus, 1990). The current, and most activated, knowledge of oneself is used to reconstruct how one has behaved in the past and how one may behave in the future.

1.7.3.1 How has this already been studied?

Narrating one's past experiences serves not only to share one's self-knowledge with others, but is also a means of actively constructing the self-concept (Barclay & Smith, 1993; McAdams, 1993, 2011; McAdams & Adler, 2010; McAdams & Cox, 2010; McAdams, Josselson, & Lieblich, 2006; Raggatt, 2006). According to McAdams's Life Story Model of Identity, we establish a view of ourselves and elaborate on it through the construction of a personal myth. This myth is a composition of episodes from our life that often centers on a central theme or motif. In this model, "I" serves as the narrator, or active composer of the myth, and "me"

serves as the narrated self of the myth (McAdams, 1987, 1993, 2011; McAdams et al., 2006). The self-knowledge base may be changed through an active recruitment of memories from past personal events. In turn, these memories help to support the self-concept that the person holds. This cyclical process may be driven by narrative, whereby one talks about one's life to convey or construct a certain impression of oneself (Barclay & Smith, 1993; Barclay & Subramaniam, 1987), and then encodes that impression. Bruner (1996) also considers narrative as a driving factor in self-construction. Considering Lejeune's (1989, cited in Bruner, 1996) idea of the "autobiographical pact," or the social rules concerning how one should narrate a life story, Bruner suggests that when social rules constrain the narration of oneself, they also constrain the composition and structure of the self-concept. Therefore, he concludes that the process of telling others about oneself provides limits to which the self-concept must adhere.

1.7.3.2 What needs to be done?

Self-knowledge can be modified in a number of ways, including by moving spatial contexts (Brown et al., 2009, 2012; Brown & Schopflocher, 1998), the experience of life turning points (Pillemer, 1998; Enz & Talarico, 2015), and through narrating events to other people. Most situational changes probably result in minute changes in the self-knowledge base, but we could expect large global changes in self-knowledge as a function of a changing social group (e.g., I am a different person after graduate school) or as a result of a major life transition (e.g., I change my career path). While it has been speculated that a global change in self-knowledge should have an impact on memory reconstruction, even for events that happened before a

global change or life transition (Brown et al., 2009; Brown & Schopflocher, 1998; Pillemer, 1998), no prospective study of these changes had been undertaken until this dissertation. Retrospective studies on revisions of the past to align with current views have been done (Ross et al., 1983; Ross et al., 1981; Ross & Wilson, 2002; Wilson & Ross, 2001), as have studies on the effects of a major social upheaval on the types of autobiographical memories retrieved (Brown et al., 2009, 2012), but these do not fully support a hypothesis of causality. It seems intuitive that a change in the knowledge structures used to construct an autobiographical memory would lead to changes in the reconstruction of the event. The following chapters of the dissertation will explore how a change in activated self-knowledge, here a change in identity, influences autobiographical remembering of identity-relevant and identity-irrelevant events over time.

2 General Methods of the Longitudinal Study

How does a change in the self-concept, or activated self-knowledge, influence the reconstruction of autobiographical memories? Imagine two undergraduate students, each holding the same academic identity as pre-medical students. During their first semester of college, the students remember events related to why they want to pursue medicine. Over time, however, one student transitions out of the pre-medical program and no longer holds the identity of a pre-medical student. How might her memories change as a function of this change in identity? Will her memories show greater change over time, compared to the other student who remained in the pre-medical program?

I answer these questions through a prospective longitudinal study of undergraduates' autobiographical memories, which measured how reconstruction of identity-relevant memories changed over time as a function of an identity change. The following chapter will lay out the general methods of this longitudinal study. Later chapters pertain to data analysis and interpretation of the findings from this large study.

2.1 Methods

2.1.1 Participants

At Session 1, two different cohorts of Duke University undergraduates were tested: 57 participants (73.7% female) from the Class of 2015 and 93 (54.8% female) from the Class of 2016 completed Session 1, for a total of 150 participants (62.0% female). All participants were following the pre-medical curriculum at the time of

Session 1 and were between 18 and 20 years old (M = 18.13; SD = .38). I recruited participants through postings around campus and on the Duke Psychology Participant Pool website. Participants were paid $25 or given class credit for their participation. The second cohort provided race and ethnicity information and we later asked everyone for this information at Session 2. Of the 135 participants that we have race/ethnicity data for, 1 is American Indian/Alaska Native, 46 are Asian, 21 are Black or African American, 57 are White, and 10 reported their race as "other" or more than one race. Of these participants, 7 also reported themselves as Hispanic or Latino/a.

Of the participants that completed Session 1, 80.7% of the first cohort completed Session 2; 68.9% of the second cohort had completed Session 2 as of this writing. They received monetary compensation ($25 or $50) or course credit for participating. Of the original participants, 110 (62.7% female) completed Session 2 and are included in the sample analyzed for this manuscript; 70 remained in the pre-health program and 40 participants left the pre-medical program (three additional participants who left the pre-medical program did not complete Session 2).

2.1.2 Measures

2.1.2.1 Autobiographical Memory Questionnaire (AMQ)

The AMQ (Rubin, Schrauf, & Greenberg, 2003, 2004) is a series of questions concerning the processes and phenomenology involved in remembering an event. Participants completed the AMQ for each of their memories and future events. The full AMQ for past events is in Table 1..

Table 1: Autobiographical Memory Questionnaire for Past Events

Items
Reliving – While remembering the event, I feel as though I am reliving it.
Perspective – When remembering an event, most people imagine the scene in one of two ways. One way is as an outside observer, or onlooker, looking at the situation from an external vantage point (e.g. a bird's eye view), where the person remembering may seem him or herself in the memory. Another way is through one's own eyes, from roughly the same viewpoint that it was originally experienced. You may remember an event only from an observer perspective, or only from your own eyes, or from both perspectives, changing between perspectives while thinking about the event.
Field – Did you experience the memory from your own eyes?
Observer – Did you experience the memory from an observer's perspective?
Intensity – While remember the event, the emotions that I feel are extremely intense.
Valence – While remembering the event, the emotions are extremely negative or positive.
Physical – While remembering the event, I had a physical reaction (I laughed, felt tense, sweaty, felt cramps or butterflies in my stomach, my heart pound or race, etc.).
Setting – While remembering the event, I know the setting where it occurred.
See – While remembering the event, I can see it in my mind.
Hear – While remembering the event, I can hear it in my mind.
Smell – While remembering the event, I can smell it.
Story – While remembering the event, it comes to me in words or in pictures as a coherent story or episode and not as an isolated fact, observation, or scene.
Pieces – My memory comes in pieces with missing bits.
Words – While remembering the event, it comes to me in words.
Voluntary – Since it happened, I have willfully thought back to the event in my mind and thought about it or talked about it.
Involuntary – The memory of the event has suddenly popped up in my thoughts by itself, that is, without my having attempted to remember it.
Belief – I believe the event in my memory really occurred in the way I remember it and that I have not imagined or fabricated anything that did not occur.
Closeness – How distant do you feel from this memory?
Date – Please date this memory (month/day/year) as accurately as you can. Fill in the month, day, and year even if you must estimate. If the memory extended over a period of time, report the approximate middle of the period. If you know the month but not the day, record a 1, 15, or 30 for the beginning, middle, or end of the month. It sometimes helps to date the event by using known dates, such as holidays, birthdays, what year you were in school, etc.

All items, except as noted below, were rated on a 1 to 7 Likert scale, with 1 labeled "not at all" and 7 labeled "as if it were happening now" (reliving, setting, see,

hear, smell), “completely” (field, observer, story, pieces, words), “extremely” (intensity, physical), and “very often” (voluntary, involuntary). Valence was rated from -3 (extremely negative) to 0 (neutral) to 3 (extremely positive). For analyses, it was recoded to a scale from 1 to 7. Belief was anchored by 1 (100% imaginary) to 7 (100% real). One question, closeness, was created specifically for this study based on work by Wilson and Ross (2001, 2003); it was rated from 1 (feels far away) to 5 (feels like yesterday).

2.1.2.2 Centrality of Events Scale (CES)

The CES measures how central an event is to a person’s identity by having participants rate statements about their memory on a scale from 1 (totally disagree) to 5 (totally agree). Here, I used the short 7-item scale (Berntsen & Rubin, 2006) for the past events (see Table 2).

Table 2: Centrality of Events Scale for Past Events

Items
I feel that this event has become a part of my identity.
This event has become a reference point for the way I understand myself and the world.
I feel that this event has become a central part of my life story.
This event has colored the way I think and feel about other experiences.
This event permanently changed my life.
I often think about the effect this event will have on my future.
This event was a turning point in my life.

2.1.2.3 Big Five Inventory (BFI)

This 44-item scale (John & Srivastava, 1999) independently and reliably measures five personality factors: openness (adventurousness and imagination), conscientiousness (self-efficacy and the drive to complete tasks well), extraversion

(gregariousness and social engagement), agreeableness (cooperativeness and kindness), and neuroticism (anxiety, guilt and frustration).

2.1.2.4 Identity Questionnaire (IDQ)

The IDQ was created for this study and was based on the CES. Only participants in the second cohort completed this questionnaire. It is comprised of 10 items rated on a scale from 1 (disagree strongly) to 5 (agree strongly). The full list of items is found in Table 3.

Table 3: Identity Questionnaire

Items
I feel that pursuing pre-health has become an important part of my identity.
Pursuing pre-health has become a reference point for the way I understand myself and the world.
I feel that pursuing pre-health has become a central part of my life story.
It is not my choice to pursue the pre-health curriculum. (reverse scored)
Pursuing pre-health has colored the way I think and feel about my experiences.
I often think about the effects that pursuing pre-health will have on my future.
I am not confident that I will complete the pre-health curriculum. (reverse scored)
Pursuing pre-health will permanently change my life.
Deciding to pursue pre-health was a turning point in my life.
Pursuing pre-health has become a reference point for the way I look upon my future.

The results from the IDQ were analyzed using exploratory factor analysis. Principal axis factoring with direct oblimin rotation was utilized. Examination of the scree plot (Figure 2) revealed only one plausible factor with an eigenvalue of 3.94, however a second and third factor also had eigenvalues greater than one (1.21 and 1.05, respectively). The model with these three factors did not converge because the communality of an item exceeded 1. Given the scree plot (Figure 2), I conclude that

there is likely only one factor and all of the items in the questionnaire correspond to the same underlying latent variable: identity. Cronbach's alpha, indicating the reliability between items, supported this conclusion (α = .81).

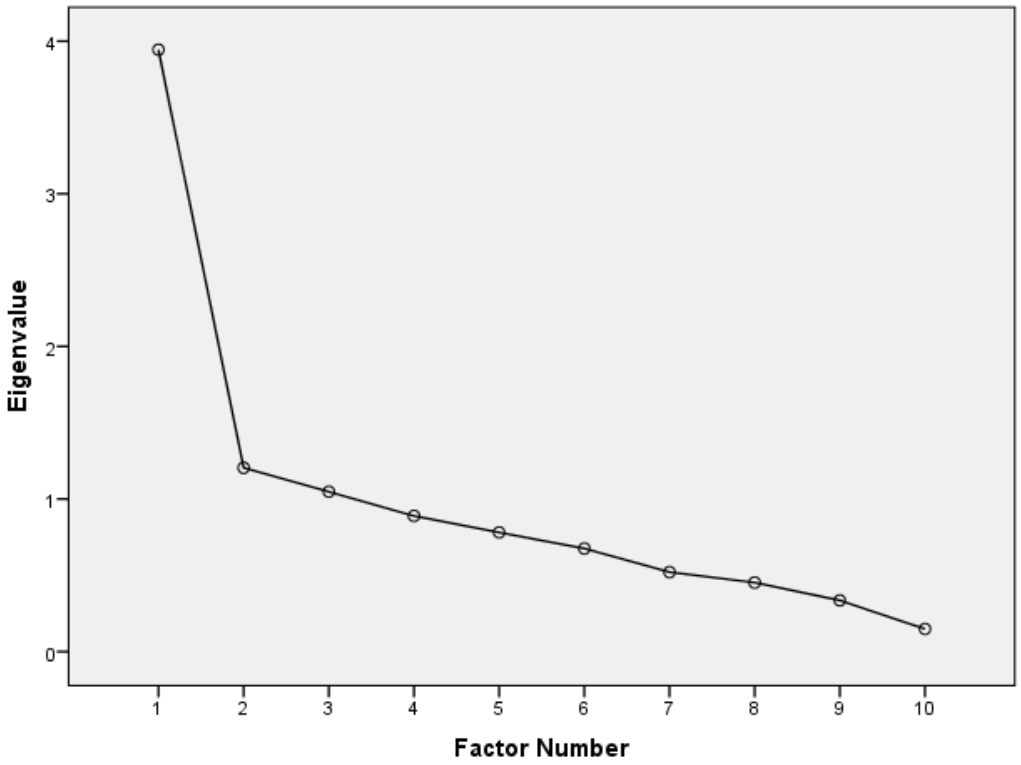

Figure 2: Scree Plot from Exploratory Factor Analysis of the IDQ

2.1.2.5 Rosenberg Self-Esteem Scale (RSE)

This ten-item scale quantifies trait self-esteem (Rosenberg, 1965).

2.1.3 Session 1 procedure

First, participants filled out a demographics questionnaire. They then provided three memories for events related to why they wanted to follow the pre-medical curriculum (see Appendix A for the prompts used). For each of these three identity-relevant memories, they wrote a description of the event for three minutes or more, provided a phrase to use for cued recall during Session 2, and filled out the

AMQ and CES. They then imagined it was 20 years in the future and wrote a description of a typical day in their professional life; they also rated this future event on a modified version of the AMQ and CES[1]. Participants then repeated the same procedure, except for three events not related to their desire to pursue medicine (identity-irrelevant memories) and a future event pertaining to their family life (see Appendix A).

Next, the BFI and RSE were completed. The 2016 cohort also completed the IDQ.

Participants then wrote a life narrative; they pretended that they were talking to their academic advisor and were asked what about their past affects their current career goals. Next, participants provided the 7 most important events that had happened to them before arriving at Duke[2] (this wording was also used for recall during Session 2) and rated each of the events on the AMQ and CES. Finally, participants listed the classes they were currently taking and were told about an optional study, explained in Chapter 4, which they would be invited to later in the semester.

2.1.4 Interim procedure

In order to determine which participants had undergone an identity change and left the pre-medical program, and to invite them to complete Session 2, participants were contacted at the beginning of each semester and asked to fill out two brief questions via email. They rated the likelihood that they would leave the

[1] The future events were not analyzed for this dissertation.
[2] The important events were not analyzed for this dissertation.

pre-medical curriculum on a scale of 1 (definitely staying) to 6 (definitely leaving). If they said they had left the pre-medical program, they were asked to date their decision to leave.

The participants that indicated that they had left the pre-medical program (ID-Change) were invited back for a second session. Additionally, another student that was matched on gender and cohort to each ID-Change participant, but had indicated that they were highly unlikely to leave the pre-medical program, was also invited back for Session 2 as an identity-constant control. During their senior year, all of the participants that had not yet completed Session 2 were invited back for this session.

2.1.5 Session 2 procedure

Upon arrival at the lab, participants were asked if they were still following the pre-medical curriculum. If they had not undergone an identity change, they completed the following procedure: using cues that they had provided at Session 1, they recalled each of the 3 pre-medical (ID-relevant) memories and rated the memories on the AMQ and CES; imagined it was 20 years in the future and wrote a description of a typical day in their professional life and rated this future event on modified versions of the AMQ and CES; and then repeated the same procedure, except for three events not related to their desire to pursue medicine (ID-irrelevant) and a future event pertaining to their family life.

They then completed the BFI and RSE and provided another life narrative with the same prompt as in Session 1. Then, participants ranked and rated the seven most important events that had happened to them *before* they came to Duke

(to match the Session 1 instructions). Next, participants were given the sheet they had filled out with their most important events during Session 1. They indicated which of the events on the Session 1 sheet had not been ranked and rated during Session 2, and completed the AMQ and CES for these events.

Participants next estimated the amount of time that they had spent on each of their classes per week during their first semester at Duke. For an extension of this study not discussed here, some participants also provided their GPA for pre-medical courses, ranked reasons why someone might stay in the pre-medical program or transition from it, and completed a measure of emotional intelligence.

Participants who indicated that they had undergone an identity change completed the exact same procedure, except they wrote one addition narrative: they explained their reason(s) for leaving pre-health after completing the last future memory (and before completely the BFI)[3].

See Table 4 for the full list of measures and the time points at which they were administered.

[3] This narrative was not analyzed for this dissertation.

Table 4: Measures Taken at Each Time Point

Note. * indicates that only some participants completed this task.

	Session 1		Between Sessions	Session 2	
Task	Cohort 1	Cohort 2	1 & 2	ID-Change	ID-Constant
		Demographics			
Gender	X	X		X	X
Race/Ethnicity		X		X	X
Major	X	X		X	X
GPA				X*	X*
Still Pre-Med?			X		
		Pre-Med Memories			
Narrative	X	X		X	X
AMQ/CES	X	X		X	X
		Non-Pre-Med Memories			
Narrative	X	X		X	X
AMQ/CES	X	X		X	X
		Future Projections – Career and Family			
Narrative	X	X		X	X
AMQ/CES	X	X		X	X
		Why Did You Transition?			
Narrative				X*	
AMQ/CES				X*	
Rate reasons				X*	X*
		Individual Difference Measures			
IDQ		X			X*
BFI	X	X		X	X
RSE	X	X		X	X
		Life Narrative			
Life story	X	X		X	X
7 Important events					
Name of event	X	X		X	X
AMQ/CES	X	X		X	X
Re-rate Old				X	X
Classtime log			X*		
Classtime estimates				X	X

2.1.6 Analysis of narratives

The written narratives provided by the participants (6 past memories, 2 future projections, and a life narrative per session) were analyzed using the two different assessment techniques described below.

2.1.6.1 Linguistic Inquiry Word Count (LIWC)

The LIWC (Pennebaker, Booth, & Francis, 2007) analyzes written or transcribed text and calculates the percentage of different types of words used. Here, the LIWC2007 program and dictionary were used. The LIWC provides many different categories of words, but I limited my investigation of the LIWC data to the theoretically motivated categories described below. For each category, if a shortened label was used throughout the dissertation, it is indicated in parentheses. Examples from each category are provided. The word count was also examined.

To examine the structure of the narratives, function words, in the form of pronouns, were examined. The categories were *personal pronouns* (personal; e.g., I, my, he, she, we, they), *first person singular pronouns* (I; e.g., me, my, I, mine), *first person plural pronouns* (we; e.g., our, let's, we, us), and *impersonal pronouns* (impersonal; e.g., anyone, it, stuff, what, other). Pronouns are a type of style word that reflects how the participants are communicating their narratives (Tausczik & Pennebaker, 2010). The use of first-person singular pronouns have been linked to depression (Rude, Gortner, & Pennebaker, 2004), the experience of emotional pain and attentional focus on oneself (Davis & Brock, 1975; Tausczik & Pennebaker, 2010), and lower perceived social status (Kacewicz, Pennebaker, Davis, Jeon, & Graesser, 2014; Sexton & Helmreich, 2000).

Verbs with different tenses were also counted, as these can indicate the time orientation of the narrator (Gunsch, Brownlow, Hayes, & Mabe, 2000), as well as the narrative structure. The categories were *past verbs* (past; e.g., asked, drove, knew),

present verbs (present; e.g., do, have, support), and *future verbs* (future; e.g., will, won't, would've).

Because the events that participants are writing about may vary systematically in emotionality, affect words were analyzed. LIWC reliability measures the affect of a narrative (Alpers et al., 2005; Kahn, Tobin, Massey, & Anderson, 2007). Greater use of affect words indicates the narrator's degree of immersion with the story (Holmes et al., 2007). Affect words included a general *affect* (e.g., anger, grin, respect) category, as well as *positive emotions* (positive; e.g., accept, good, hilarious) and *negative emotions* (negative; e.g., bitter, crazy, pity);

Cognitive mechanism (cognitive; e.g., imply, obvious, think) words, which are related to narrative coherence, (Pennebaker, Mehl, & Niederhoffer, 2003; Rubin, Dennis, & Beckham, 2011; Rubin, et al., 2016; Rude, et al., 2004), were also measured, as were content words related to the narratives of interest: *feel* (e.g., caress, press, smooth), *time* (e.g., abrupt, begin, minute), *biology* (e.g., disease, neural, sick), *work* (e.g., achieve, hardwork, study), and *social* (e.g., friend, party, socialize).

2.1.6.2 Narrative Coherence Coding Scheme (NaCCs)

The NaCCs (Reese, et al., 2011; Morris, Baker-Ward, & Bauer, 2010) is comprised of three coherence dimensions: context, chronology, and theme. Dimensions were rated by four coders on a 4-point scale from 0 to 3; inter-rater reliability was calculated as Cronbach's alpha for the 1777 narratives that were rated for the longitudinal study. Context ($\alpha = .81$) measures the degree to which the narrator provides information needed to locate the event in space and time.

Chronology (α = .78) concerns the degree to which the narrator provides sufficient information to place the actions in the event on a time line. Theme (α = .61) measures the degree to which the narrator substantially develops the narrative using causal linkages, interpretations, and elaborations; describes a resolution that relates the event to other autobiographical experiences or self-concept or identity; or describes a sense of closure. The NaCCs has been used to assess the development of these three components of narrative coherence across the lifespan for autobiographical memories (Chen, McNally, Wang, & Reese, 2012; Larkina & Bauer, 2012; Reese et al., 2011; Rubin, et al., 2016) and laboratory events (Bauer et al., 2012).

3 Changes in Remembering Over Time as a Function of Identity Change

How does an identity change affect memories of the past? Although it has been speculated that a change in identity and subsequently the self-concept, should impact reconstruction for events relevant to that identity (Brown et al., 2009; Brown & Schopflocher, 1998; Conway & Pleydell-Pearce, 2000; Pillemer, 1998), this is the first prospective longitudinal study of the impact of an identity change on memory reconstruction.

The effects of an identity change on the memories of the past elicited from the above procedure were examined through several different types of measures: participant-reported measures, including phenomenology and content (AMQ and CES); computer measures of content, narrative structure, and coherence (LIWC); and neutral observer ratings of coherence (NaCCs).

In the following chapter, I will show that the feelings associated with mental time travel which remembering an event decrease as the identity related to that event becomes less central. Events not related to one's currently activated identities were also retrieved less and fewer words were used to describe these events. This is important theoretically because it shows, through a prospective study, that the phenomenology, but *not* the content of a memory is affected by changes in the self-concept.

3.1 Results

Participants that completed both Session 1 and Session 2 were divided into two groups: an *Identity Change* (ID-Change) group that had transferred out of the

pre-medical curriculum between Sessions 1 and 2, and an *Identity Constant* (ID-Constant) group that remained in the pre-medical curriculum.

Before the effect of an identity change could be examined, I first identified whether the two groups (ID-Change and ID-Constant) were different from one another on a number of different characteristics. If the groups differed on some of these measures, any differences in reconstruction that were found may be due to these trait individual differences, as opposed to being driven by the identity change, and these differences should be controlled for.

3.1.1 Differences between groups

The Session 1 demographics for these two groups and the average time between sessions are in Table 5. There were no significant differences between Session 1 and Session 2 for the BFI or RSE scores, $t(108)$'s < 1.50, p's > .16. The ID-Constant group had higher average agreeableness scores than the ID-Change group. However, a correction for multiple comparisons would render this difference non-significant. For those in Cohort 2, who were given the IDQ at Session 1, there was a significant difference in IDQ scores between the groups. Those that would eventually undergo an identity change had lower scores on the IDQ while they still held that identity. The groups were statistically equal on all other measures.

Table 5: Group Demographics at Session 1

Note. [a]df for IDQ are 65. For all variables except IDQ, ID-Change n =40 and ID-Constant n = 69. *

	ID-Change *M* (*SE*)	*ID-Constant* *M* (*SE*)	*t*(107)[a]
Days between sessions	777.15 (49.62)	867.04 (33.14)	1.56
Extraversion (BFI)	3.10 (.16)	3.35 (.11)	1.37
Agreeableness (BFI)	3.77 (.09)	4.01 (.07)	1.99*
Conscientiousness (BFI)	3.50 (.11)	3.70 (.08)	1.39
Neuroticism (BFI)	2.94 (.14)	2.85 (.12)	.50
Openness (BFI)	3.49 (.09)	3.46 (.08)	.22
Self-esteem (RSE)	20.35 (.95)	21.91 (.70)	1.33
Identity (IDQ)	3.73 (.59)	4.22 (.08)	3.35**

3.1.2 Effect of an identity change

How does a change in identity influence the phenomenology, content, narrative structure, and coherence of a memory? First, I determined whether the Centrality of Events Scale (CES) would provide a measure of the identity relevance of a memory, by examining whether the CES score of a memory relevant to an identity would change over time when that identity changed. Once this was established, I used the change in the rated centrality of an event (the change in identity-relevance) between Session 1 and Session 2 to predict changes in the reconstruction of that event.

What was the effect of an identity change on the rated centrality of the ID-Relevant events (here, pre-medical memories) versus the centrality of the ID-Irrelevant events (here, the non-pre-medical memories)? The CES scores for the ID-relevant were averaged for each participant, as were the CES scores for the ID-irrelevant memories. A 2 (participant group: ID-Change or ID-Constant) by 2 (time: Session 1 or Session 2) by 2 (memory type: ID-Relevant or ID-Irrelevant) or non-pre-

med) repeated measures ANOVA was computed on the CES scores. The change in the CES over time for each memory type varied as a function of group, as shown by a significant three-way interaction that precluded the examination of the other effects from this ANOVA, $F(1, 108) = 4.90$, $p = .029$, $\eta^2_p = .04$[4]. The three-way interaction was probed by computing separate 2 (time: Session 1 or Session 2) by 2 (memory type: pre-med or non-pre-med) ANOVAs for each group.

For the ID-Change group, the centrality of the events related to that identity decreased over time to a greater degree than the rated centrality of the events not related to that identity, as indicated by a significant interaction between memory type and session for that group, $F(1, 39) = 9.67$, $p = .003$, $\eta^2_p = .20$. There was no such interaction for the ID-Constant group, only significant main effects of session and memory type, F's > 25, p's < .00. Put another way, the centrality of the ID-Relevant memories was greater than the centrality of the ID-Irrelevant memories for both the ID-Change group ($M = 3.01$, $SE = .11$; $M = 2.68$, $SE = .13$, respectively) and the ID-Constant group ($M = 2.98$, $SE = .09$; $M = 2.52$, $SE = .09$, respectively) at Session 1 when both participant groups held the identity, but at Session 2, the centrality of the ID-Relevant memories was not different from the centrality for the ID-Irrelevant memories for the ID-Change group ($M = 2.19$, $SE = .12$; $M = 2.30$, $SE = .13$, respectively), $t(43) = .83$, $p > .05$. At Session 2, the ID-Constant group still had ID-Relevant memories that were more central to their lives compared to their ID-

[4] This interaction remained when separate ANCOVAs accounting for individual difference measures that varied between groups were computed. For the ANCOVA with agreeableness, the three-way interaction was significant, $F(1, 107) = 5.06$, $p = .027$, $\eta^2_p = .04$; it was also significant for the ANCOVA with IDQ, $F(1, 62) = 4.45$, $p = .039$, $\eta^2_p = .06$).

Irrelevant memories (M = 2.59, SE = .08; M = 2.18, SE = .10, respectively). See Figure 3 for a graphical depiction of these results.

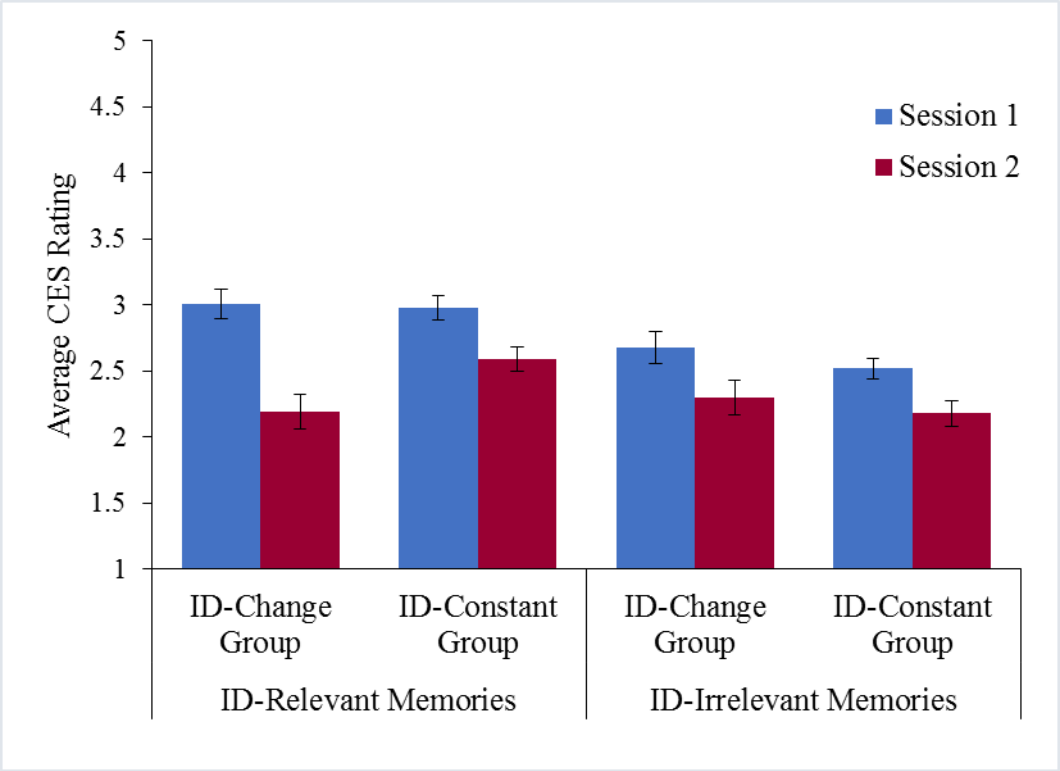

Figure 3: Average Centrality Ratings of Each Memory Type by Group over Time

As shown by these differences in CES scores, the identity change undergone by the students that left the pre-medical program was captured by the change in the centrality of the ID-Relevant events over time. No longer holding a pre-medical identity, the ID-Change group had less central memories for events related to why they initially wanted to be doctors. I therefore use the change in the CES score as a marker of *any* identity change for each memory and moved to a multilevel modeling framework to predict changes in the phenomenology, memory content, and narrative content and structure over time as a function of an identity change.

3.1.2.1 Analytical method: Multilevel modeling

First, the difference scores for each memory measure between Session1 and Session 2 were computed for each memory. Difference scores were used to eliminate the need to account for repeated measures over time; individual memories were analyzed (as a opposed to averages within a type of memory) to examine changes at the memory level (within-subjects, as opposed to between-subjects), as well as to take into account that some memories within a memory type (e.g., non-pre-medical memories) may have been related to participants' other identities which may have also changed. Although participants were cued with their own memory descriptions at Session 2, some of the memories provided at Session 2 were not for the same event that was given at Session 1. This was determined by reading the narratives. Some participants stated that they did not know what the cue referred to. A neutral observer also rated the memories as the same event across sessions or different events across sessions. Only those memories that were the same across sessions were analyzed, so that the differences within a memory could be examined. Critically, the total number of matching memories from Session 1 to Session 2 did not vary as a function of participant group, $X^2(5) = 3.21$, $p = .668$, nor did the number of matching pre-medical memories vary as a function of group, $X^2(2) = .07$, $p = .97$[5]. The total number of memories analyzed was 541.

Given that there were multiple memories per participant, there was nesting within the data. Multilevel modeling (MLM) with Level 2 as the participant level and Level 1 as the memory level was employed using maximum likelihood

[5] Including the non-matching memories in the analyses did not change the results.

estimation so that nested models could be compared. Maximum likelihood estimation is robust when the number of units (here, participants) at Level 2 is larger than 50; there were 110 participant-level units. The variance components covariance structure was used. Memory-level variables (e.g., AMQ, CES) were centered at the participant-level mean to fully parse the within- and between-subjects variance (Raudenbush & Bryk, 2002; Snijders & Bosker, 2009). The one participant-level variable (time between sessions) was grand mean-centered. For each dependent variable (e.g., change in reliving over time), three models were fit to the data.

The *Null Model* accounted for the nesting within the data by modeling a random intercept for each participant at Level 2. Three parameters were estimated for this model: the fixed intercept, random intercept, and residual. The intraclass correlation (ICC) and Wald's *Z* for the variance accounted for at the participant-level were examined to see if there was variation due to nesting that should be accounted for through MLM. Note, however, that in some instances the Wald's *Z* was not significant and the ICC was small. I still remained in the MLM framework for consistency between analyses because the use of MLM was theoretically driven; I would expect that memories within a participant were more similar than memories from different participants.

The *Covariate Model* included the parameters from the *Null Model*, as well as the time between sessions at the participant-level and the baseline scores on the DV and the CES at the memory-level. Accounting for the baseline scores means that the residualized change scores were actually analyzed, not true difference scores.

Residualized change scores allow one to account for ceiling or floor effects (e.g., if someone starts at the floor of a measure, there is not much room for them to decrease over time). Six parameters were estimated: the residual, the random intercept, and the fixed effects of the intercept, time between sessions, baseline score on the DV, and baseline score on the CES. This model was compared to the *Null Model* by subtracting the -2 Log Likelihood scores; this difference can be construed as a X^2 distribution with the difference between the number of parameters estimated for each model serving as the degrees of freedom (here, 6-3 = 3 *df*).

The *Full Model* included all of the parameters from the *Covariate Model*, as well as the fixed effect of the change in the CES from Session 1 to Session 2. The effect of the change in the CES over time was determined by subtracting the -2 Log Likelihood score of the *Full Model* from the -2 Log Likelihood score of the *Covariate Model* and examining it as a X^2 with 1 *df* (7 parameters – 6 parameters = 1 *df*). If the addition of change in the CES over time is significant, then the change in the relevance of an event to one's identity over time is related to other memory changes over time. The variance accounted for at the memory-level by the change in the CES was also examined as a within-subjects (or memory-level) ΔR^2.

For the next sections, I examine the effect of a change in the CES over time on the participant-rated remembering characteristics on the AMQ (Section 3.1.2.2), the computer-scored narrative content, structure, and coherence on the LIWC (Section 3.1.2.3), and neutral observer ratings of coherence on the NaCCs (Section 3.1.2.4).

Given the large number of models analyzed, I corrected the family-wise *p*-value using a Bonferroni correction to reduce the chance of a Type II error. For the AMQ variables, 17 nested models were tested; the *p* value indicating a significant model fit is therefore .05/17, or $p < .0029$. For the LIWC variables, 16 nested models were tested; the *p* value indicating a significant model fit is therefore .05/16, or $p < .0031$. For the NaCCs variables, 3 nested models were tested; the *p* value indicated a significant model fit is therefore .05/3, or $p < .0167$.

3.1.2.2 Relationship between change in identity relevance and change in participant rated phenomenology and content

The relevant means for the AMQ and CES variables are in Table 6. The Session 1 and Session 2 means are reported, as well as the difference scores that were calculated by subtracting the Session 1 score from the Session 2 score. A negative difference score indicates that the measure decreased over time. The difference scores of the AMQ variables served as the dependent variables for these analyses. The Session 1 score for the dependent variable and the CES, as well as the CES difference score served as predictors in the models.

I categorized the AMQ ratings according to the type of memory characteristics that they described. There are 7 different categories of remembering characteristics: mental time travel (category based upon findings from Deffler, Umanath, & Rubin, in prep), other phenomenology, coherence, perspective, emotionality, content, and retrieval.

Table 6: CES and AMQ Means for Memories of the Past for Each Session

Note. $N = 541$.

	Session 1		Session 2		Difference	
	M	SE	M	SE	M	SE
Centrality (CES)	2.77	.05	2.38	.05	-.39	.04
Phenomenology – Mental Time Travel						
Reliving	5.26	.06	4.45	.08	-.81	.08
See	6.18	.05	5.61	.06	-.57	.06
Hear	4.89	.08	4.13	.09	-.76	.09
Smell	2.59	.09	2.38	.08	-.22	.08
Words	3.06	.08	2.76	.07	-.29	.07
Phenomenology - Other						
Belief	6.00	.05	5.52	.06	-.49	.06
Closeness	3.41	.05	2.58	.06	-.83	.06
Physical	3.65	.09	3.30	.09	-.35	.09
Coherence						
Story	5.06	.08	4.48	.08	-.58	.10
Pieces	3.90	.08	4.73	.07	.83	.09
Perspective						
Field	5.32	.08	4.82	.08	-.51	.09
Observer	3.18	.09	3.25	.08	.07	.10
Emotionality						
Intensity	4.54	.07	3.90	.08	-.64	.07
Valence	5.49	.06	5.11	.06	-.38	.06
Content						
Setting	6.19	.05	5.77	.07	-.42	.07
Retrieval						
Voluntary	4.26	.08	3.21	.08	-1.04	.09
Involuntary	3.74	.08	2.82	.08	-.91	.09

The fit statistics for the nested models predicting the dependent variables are found in Table 7. We can first examine the fit of the *Null Model* for each of the dependent variables for significant differences between-subjects. In other words, if the Wald's *Z* is significant for the *Null Model,* then the independence assumption of the general linear model framework would have been violated, and I was correct in switching to an MLM framework. For a majority of the AMQ variables, there was a significant effect of the nesting of the data structure; memories within-participants were more similar to one another than memories between-participants. The

Covariate Model for all of the AMQ variables was significant. The ΔR^2_{within} provides the proportion of variance explained at the memory-level by the *Covariate Model*.

The interesting action, however, is in the *Full Model,* which demonstrates how well a change in identity relevance of a memory over time predicted changes in self-reported remembering characteristics within-memories. ΔR^2_{within} in the last column of Table 7 indicates the proportion of unique memory-level variance in the dependent variable explained by the change in the centrality of an event over time. A change in the identity relevance of a memory significantly predicted change in the degree of mental time travel (reliving, see, hear) that participants experienced over time, as well as belief in the memory, temporal closeness, emotionality (intensity, valence) and retrieval (voluntary and involuntary). One measure of coherence (story) also varied as a function of the CES score. The perspective, content, and reported incoherence of the memory did not change as the relevance of the memory to the self-concept changed.

Table 7: Fit Statistics and Within-Subjects Variance Explained by Nested Multilevel Models Predicting Residualized Change Scores – AMQ Variables

Note. A Bonferroni correction was applied to p values to control for family-wise error. *$p < .05/17$; **$p < .01/17$; ***$p < .001/17$.

	Null Model		Covariate Model		Full Model	
DV	Wald's Z	ICC	Δ-2LL	ΔR^2_{within}	Δ-2LL	ΔR^2_{within}
			Phenomenology – Mental Time Travel			
ΔReliving	3.37*	.15	136.31***	.27	44.83***	.10
ΔSee	2.86	.12	76.62***	.16	20.86***	.05
ΔHear	4.41***	.23	192.34***	.36	27.15***	.06
ΔSmell	4.98***	.32	191.07***	.36	7.69	
ΔWords	5.51***	.39	207.68***	.38	4.91	
			Phenomenology – Other			
ΔBelief	3.49***	.17	173.08***	.33	15.55**	.04
ΔCloseness	3.05*	.14	239.96***	.41	54.15***	.12
ΔPhysical	3.90*	.20	177.91***	.34	17.31***	.04
			Coherence			
ΔStory	4.65***	.26	166.26***	.32	20.07***	.05
ΔPieces	4.58***	.27	260.44***	.45	5.44	
			Perspective			
ΔField	2.91	.13	227.59***	.41	8.46	
ΔObserver	3.79*	.19	287.10***	.48	2.41	
			Emotionality			
ΔIntensity	3.33	.15	93.37***	.19	55.07***	.12
ΔValence	1.87	.07	84.89***	.18	17.76***	.04
			Content			
ΔSetting	3.01*	.14	83.23***	.18	6.65	
			Retrieval			
ΔVoluntary	3.62*	.18	166.30***	.32	112.37***	.23
ΔInvoluntary	4.38***	.24	248.95***	.43	81.79***	.17

The parameter estimates for the phenomenology variables are reported in

Table 8. The ΔCES parameter estimate shows the effect of a change in the CES over time on the residualized change in the dependent variable, controlling for the baseline CES and the time between sessions. As an identity became less central to a participant, the remembering of events associated with that identity gave rise to weaker phenomenology associated with mental time travel. As shown by the significant positive parameter estimates for the change in the CES, participants reported less reliving, seeing, and hearing while remembering, as well as less belief in their memory for the event as the CES decreased. The measure of subjective temporal closeness also decreased (memories felt further away), as did a physical reaction to remembering.

Table 8: Parameter Estimates for the Significant Full Multilevel Models Predicting Residualized Change in Phenomenology

Note. *$p < .05/17$; **$p < .01/17$; ***$p < .001/17$

Fixed Parameter	Estimate	*SE*	*df*	*t*
Predicting ΔReliving				
Days Between	.00	.00	103.54	1.35
DV Baseline	-.64	.05	433.66	13.18***
CES Baseline	.44	.07	433.66	6.40***
ΔCES	.59	.09	433.66	6.87***
Predicting ΔSee				
Days Between	.00	.00	104.64	.05
DV Baseline	-.57	.06	436.82	9.04***
CES Baseline	.30	.06	436.82	4.66***
ΔCES	.36	.08	436.82	4.62***
Predicting ΔHear				
Days Between	.00	.00	106.96	.04
DV Baseline	-.74	.05	435.41	16.02***
CES Baseline	.36	.08	435.41	4.62***
ΔCES	.51	.10	435.41	5.29***
Predicting ΔBelief				
Days Between	.00	.00	101.58	1.15
DV Baseline	-.80	.05	430.29	14.58***
CES Baseline	.25	.06	430.34	4.27***
ΔCES	.28	.07	430.30	3.98*
Predicting ΔCloseness				
Days Between	.00	.00	100.07	3.68*
DV Baseline	-.74	.04	429.51	17.97***
CES Baseline	.35	.05	429.51	6.83***
ΔCES	.48	.06	429.51	7.60***
Predicting ΔPhysical				
Days Between	.00	.00	103.25	1.13
DV Baseline	-.67	.04	432.37	15.31***
CES Baseline	.33	.08	432.37	4.07***
ΔCES	.41	.10	432.37	4.20***
Predicting ΔStory				
Days Between	.00	.00	104.98	1.25
DV Baseline	-.80	.06	433.37	14.52***
CES Baseline	.25	.08	433.37	3.03*
ΔCES	.46	.10	433.37	4.53***

Table 9 reports the parameter estimates for the *Full Models* predicting emotionality and retrieval. The emotionality of the events changed over time as a function of the changing centrality of the events. As the CES decreased, the events

became more neutral or negative and the emotions experienced while remembering became less intense. Voluntary and involuntary retrieval also changed over time as the CES scores changed; events no longer central to one's identity were retrieved less often over time.

Critically, neither some of the self-rated coherence measures (pieces, words) nor the content (setting) of the memories changed as a function of the change in their identity relevance.

Table 9: Parameter Estimates for the Significant Full Multilevel Models Predicting Residualized Change in Emotionality and Retrieval

Note. $*p < .05/17$; $**p < .01/17$; $***p < .001/17$

Fixed Parameter	Estimate	*SE*	*df*	*t*
Predicting ΔIntensity				
Days Between	.00	.00	103.05	.67
DV Baseline	-.56	.05	433.54	11.24***
CES Baseline	.38	.08	433.54	4.98***
ΔCES	.66	.09	433.54	7.66***
Predicting ΔValence				
Days Between	.00	.00	97.79	.79
DV Baseline	-.42	.04	431.09	9.65***
CES Baseline	.03	.06	431.09	.49
ΔCES	.32	.08	431.09	4.26***
Predicting ΔVoluntary				
Days Between	.00	.00	106.51	.60
DV Baseline	-.77	.05	435.37	16.86***
CES Baseline	.80	.08	435.37	10.36***
ΔCES	.98	.09	435.37	11.32***
Predicting ΔInvoluntary				
Days Between	.00	.00	105.69	2.14*
DV Baseline	-.86	.04	433.44	20.01***
CES Baseline	.63	.07	433.44	9.21***
ΔCES	.76	.08	433.44	9.49***

3.1.2.3 Relationship between change in identity relevance and change in computer-scored narrative content and coherence

The relevant means for the LIWC variables are in Table 10. As with the AMQ variables, a negative difference score indicates that the measure decreased over time. The difference scores of the LIWC variables served as the dependent variables for these analyses. The Session 1 score for the dependent variable and the CES, as well as the CES difference score, served as predictors in the models.

Table 10: LIWC Means for Memories of the Past at Each Session

Note. $N = 541$.

	Session 1		Session 2		Difference	
	M	SE	M	SE	M	SE
Word count	183.23	3.00	148.59	3.09	-34.64	3.40
Narrative Structure						
Personal	11.90	.13	11.99	.15	.09	.14
I	8.02	.15	8.37	.15	.36	.13
We	1.85	.10	1.51	.08	-.34	.08
Impersonal	4.51	.09	4.56	.10	.05	.11
Past	7.80	.12	8.22	.13	.42	.14
Present	3.45	.10	3.24	.11	-.21	.13
Future	.75	.04	.62	.04	-.13	.05
Narrative Content						
Affect	4.95	.10	4.98	.11	.03	.11
Positive	3.86	.09	3.93	.10	.07	.10
Negative	1.05	.05	1.01	.05	-.05	.05
Feel	.60	.03	.61	.03	.01	.04
Time	6.56	.12	6.40	.12	-.16	.13
Narrative Coherence						
Cognitive	17.52	.19	17.26	.19	-.26	.20
Tentative	1.89	.06	2.00	.07	.12	.08
Certain	1.56	.05	1.40	.05	-.15	.06

The fit statistics of each of the nested models are found in Table 11. We can first examine the fit of the *Null Model* for each of the dependent variables for significant differences between subjects. Unlike the models predicting change in the AMQ variables, here only the model predicting the change in the word count had significant Wald *Z*-scores indicating a need for MLM. However, as noted above, I remained in the MLM framework for theoretical reasons, as well as to remain consistent throughout the analyses[6]. The lack of appreciable ICC's for the other variables is noteworthy and counterintuitive. It suggests that the narratives

[6] Moving to a multiple regression framework did not change any of the results.

provided by the same participant are not more similar to other narratives within-participants, compared to narratives between-participants.

The *Covariate Models* for all of the LIWC variables were significant. Interestingly, only one of the *Full Models,* which included the change in the centrality of the event, showed significant improvement of predictive power: word count changed as a function of a change in identity. Contrary to predictions about the accessibility of memories as a function of the self-concept, the retrieved content of the memories did not change as a function of the changing self-concept.

Table 11: Fit Statistics and Within-Subjects Variance Explained by Nested Multilevel Models Predicting Residualized Change Scores – LIWC Variables

Note. A Bonferroni correction was applied to p values to control for family-wise error. *$p < .05/16$; **$p < .01/16$; ***$p < .001/16$.

	Null Model		Covariate Model		Full Model	
DV	Wald's Z	ICC	Δ-2LL	ΔR^2_{within}	Δ-2LL	ΔR^2_{within}
ΔWord count	5.88***	.45	204.05***	.37	13.54**	.03
			Narrative Structure			
ΔPersonal	.66	.02	63.92***	.13	.29	
ΔI	1.32	.05	104.70***	.21	.07	
ΔWe	.88	.03	172.21***	.32	2.07	
ΔImpersonal	2.71	.11	152.32***	.29	.40	
ΔPast	2.52	.10	101.61***	.21	.52	
ΔPresent	2.52	.10	195.48***	.37	.07	
ΔFuture	1.02	.03	182.07***	.34	.55	
			Narrative Content and Emotionality			
ΔAffect	1.03	.03	113.21***	.23	3.34	
ΔPositive	1.08	.04	102.29***	.20	2.14	
ΔNegative	.60	.02	96.42***	.19	.36	
ΔFeel	1.35	.05	161.21***	.31	1.49	
ΔTime	.81	.03	130.35***	.26	3.92	
			Narrative Coherence			
ΔCognitive	.72	.02	147.68***	.28	1.33	
ΔTentative	.22	.01	188.16***	.35	.17	
ΔCertain	1.28	.04	221.10***	.40	1.56	

Table 12 shows parameter estimates for the significant *Full Model* predicting the change in word count as a function of the change in the CES. As shown by the

ΔR^2_{within} for the *Full Model* (Table 11), 3% of the within-subjects variance was accounted for by the change in centrality. The smaller the change in the CES over time, the smaller the change in the word count of the narratives.

Table 12: Parameter Estimates for the Significant Full Multilevel Models Predicting Residualized Change Scores on LIWC Word Count

Note. *p < .05/16; **p < .01/16; ***p < .001/16.

Fixed Parameter	Estimate	*SE*	*df*	*t*
Predicting ΔWord Count				
Days Between	.00	.02	107.34	.07
DV Baseline	-.75	.05	433.99	15.95***
CES Baseline	4.51	2.41	433.99	1.87
ΔCES	10.95	2.95	433.99	3.71*

3.1.2.4 Relationship between change in identity relevance and change in neutral observer ratings of coherence

The relevant means for the NaCCs variables are in Table 13. As with the AMQ and LIWC variables, a negative difference score indicates that the measure decreased over time. The difference scores of the NaCCs variables served as the dependent variables for these analyses; note that all three measures of neutral observer ratings of coherence decreased over time. The Session 1 score for the dependent variable and the CES, as well as the CES difference score, served as predictors in the models.

Table 13: NaCCs Means for Memories of the Past for Each Session

Note. $N = 541$

	Session 1		Session 2		Difference	
	M	SE	M	SE	M	SE
Context	1.95	.03	1.71	.03	-.23	.03
Chronology	2.26	.03	1.97	.03	-.29	.03
Theme	2.28	.02	2.06	.02	-.22	.02

The fit statistics of each of the nested models are found in Table 14. We can first examine the fit of the *Null Model* for each of the dependent variables for significant differences between subjects. Here, as in the models predicting change in the AMQ variables, all three measures had significant Wald *Z*-scores, indicating a need for MLM.

The *Covariate Model* for all of the NaCCs variables was significant. Only the *Full Model* predicting theme, which included the change in the centrality of the event, showed significant improvement of predictive power. The change in the CES predicted 5% of the within-subjects variance in the change in theme.

Table 14: Fit Statistics and Within-Subjects Variance Explained by Nested Multilevel Models Predicting Residualized Change Scores – NaCCs Variables

Note. A Bonferroni correction was applied to p values to control for family-wise error. *$p < .05/3$; **$p < .01/3$; ***$p < .001/3$.

	Null Model		Covariate Model		Full Model	
DV	Wald's *Z*	ICC	Δ-2LL	ΔR^2_{within}	Δ-2LL	ΔR^2_{within}
ΔContext	3.57*	.17	152.94***	.30	2.67	
ΔChronology	3.40*	.16	99.18***	.21	1.13	
ΔTheme	4.51***	.25	181.20***	.34	24.44***	.05

Table 15 provides the parameter estimates for the significant *Full Model* predicting the change in thematic coherence as a function of a change in identity

relevance. The smaller the change in the centrality of a memory over time, the smaller the decrease in the thematic coherence of that memory.

Table 15: Parameter Estimates for the Full Multilevel Model Predicting the Residualized Change Scores on NaCCs Theme

Note. $*p < .05/3$; $**p < .01/3$; $***p < .001/3$.

Fixed Parameter	Estimate	*SE*	*df*	*t*
	Predicting ΔTheme			
Days Between	.00	.00	105.03	1.29
DV Baseline	-.73	.05	433.40	14.97***
CES Baseline	.09	.02	433.40	4.77***
ΔCES	.12	.02	433.40	5.01***

3.2 Discussion

How does an identity change affect memories of the past? In this prospective longitudinal study spanning five years of data collection across two cohorts of participants, I observed several important changes in remembering as a function of time passing and participants' changing self-concepts. Critically, I also found null results that contradict popular theories regarding autobiographical remembering.

The change over time in the self-concept relevance of each memory was used to predict changes in the phenomenology, emotionality, content, coherence, retrieval, and narrative structure of the memories. As an event became less relevant to the self-concept, it also decreased in the degree to which participants experienced phenomenology associated with mental time travel and emotional intensity. If an event is not as related to one's self-concept, there may be difficulty participating in the reliving and mental time travel associated with these dimensions (Deffler, Umanath, & Rubin, in prep). Placing oneself in a memory may be more difficulty if the event does not match the current self-concept. This is supported by the decrease

in reported "seeing" and "hearing" during reconstruction, as well as increased subjective temporal distance.

The changing CES best predicted changes in the amount of voluntary and involuntary retrieval that participants reported overtime; the less central an event was to their lives, the less likely participants were to recall it. Retrieval may represent a mediating factor in the influence of identity on remembering. That is, if an event is less central to one's self-concept, one will not retrieve it as often as a self-concept relevant memory. This decreased rehearsal may influence the phenomenology of subsequent reconstructions of the memory. One future direction would be to measure these characteristics at more than two time points to better examine potential causal mechanisms vis a vis an identity change causing a change in remembering.

For the LIWC analysis, the greater the decrease in the rated centrality of an event, the greater the decrease in the amount of words that a participant used to describe the event. Although participants were told to write their narratives for about three minutes, this difference shows that participants are (1) more willing to write about events that still matter to them or (2) have more to write about (e.g., remember more) when an event still matters to them. These two hypotheses cannot be teased apart by the current study, but a follow-up study could force participants to write all that they remember about an event and then measure the number of reported details as a function of identity-relevance.

However, given the null effects for the analyses of memory and narrative content, I suspect that the self-concept does not influence the accessibility of

memories relevant to one's past identities. The null effects for the analyses of content and narrative structure call into question the notion that the self-concept interferes with the accessibility of information not relevant to currently activated identities. None of the measures of narrative content (either participant rated or computer-scored) varied as a function of changing self-concept relevance.

The changing self-concept does appear to have an impact on at least some measures of narrative coherence. Specifically, thematic coherence decreased as a function of self-concept relevance. This is likely driven by a lack of meaning-making activity once an event is no longer central to one's understanding of oneself. If an event is no longer relevant to the current self-concept, there may be no need to incorporate a theme centering on one's ego-development (Reese, et al., 2011) into the narration of the event. However, the need to provide a context and a chronological accounting of how the event transpired is still necessary so as to follow the socially-acceptable rules for relaying a story. Therefore, the lack of an effect of the change in CES on the change in NaCCs context and chronology is not surprising.

This study and the set of analyses discussed within this chapter are not without limitations. Although I discuss the influence of an identity change on memory, the analyses themselves are only approximating the presence of an identity change or self-concept shift through the change in the CES over time. Despite these limitations, this study is an important and ambitious first step in establishing a testable model of memory phenomenology and content that includes the potential influence of the self-system, especially self-knowledge, identity, and the self-concept. It is important theoretically because it highlights the role of the self-concept not in

retrieval of memory content, but rather in giving rise to the phenomenology that is a product of remembering.

4 Influences of an Identity Change on Memory Accuracy

As shown above, a change in identity has consequences for mental time travel while remembering, belief in the memory of the event, retrieval, and thematic coherence. Critically, the *content* of the memories was not altered as a function of changing self-concept relevance, although this may be a function of the type of information being retrieved, as well as its veracity. Given the nature of the typical procedure querying autobiographical remembering, the influence of an identity change on the accuracy of the memory content was not examined.

We know that internal factors influence the change in memory over time, particularly when recalling one's own past attitudes, emotions, and actions. People unconsciously revise memories of their past behaviors to be in line with their current attitudes and beliefs (Katz, 1989; Olson & Cal, 1984; Ross, et al., 1983). Reconstruction of ourselves in the past, because it is based on our currently activated self-schemata, often aligns with our current views of who we are and what we value (Ross, 1989), or disparages our past actions to give us a sense of self-improvement (Wilson & Ross, 2001). The rewriting of personal history arises as an adaptive function of how we generally store and update knowledge; impaired veridicality of our memories is merely a by-product of this system.

Will the accuracy of students' memories for their past actions vary as a function of an identity change? To examine this, I asked students to log the amount of time that they had spent in each of their classes each day for three weeks; some of these classes were relevant to their pre-medical identity. Later, students estimated

the amount of time that they spent in each of their classes, and these estimates were compared to their previous veridical records. The accuracy (or inaccuracy) of students' estimations were analyzed as a function of whether the student underwent an identity change (left the pre-medical program) and if the class was relevant to that identity (part of the Duke pre-medical curriculum).

4.1 Method

In order to examine the role of an identity change on memory accuracy, students from the larger longitudinal study were invited to participate in a study during the interim between Session 1 and Session 2.

4.1.1 Participants

All of the participants from the longitudinal study were invited to participant for $12 or 1 hour credit for the Duke Psychology Participant Pool. Seventy-nine students completed at least one week's classtime log. Of these, 64 participants completed Session 2 of the longitudinal study, in which they estimated the time spent on their classes. The data from these 64 participants is analyzed below.

4.1.2 Procedure

During the first semester of their first year at Duke, a subset of the participants from the longitudinal study recorded the amount of time that they spent on each of their classes each day for three weeks. At the beginning of each week, they were emailed a word document that had space for each class on each day in that week. Students were instructed to write the number of hours they had spent outside of the traditional class time on each of their classes, per day. The students

completed up to three weeks of logs. The amount of time per week, per class, was averaged for each participant.

During Session 2 of the longitudinal study, the students estimated the amount of time that they had spent on each of their classes each week during their first semester.

Each student's classes were coded as part of the pre-medical curriculum or not part of the curriculum; the coding was based on the participant's own designation of the course and was double checked by a pre-medical student at Duke. The participants were again placed in the ID-Change group or ID-Constant group, depending upon whether they had remained in the pre-medical program after Session 1.

4.2 Results

Were the number of pre-med classes taken by the ID-Change group different from the number of pre-med classes taken by the ID-Constant group? For this sample, 22 participants underwent an identity change; 42 did not. The number of identity-relevant classes taken by each group while all participants still held the identity were not statistically different, which suggests that course load was not predictive of an identity change (see Chapter 5). Out of four potential classes, students that would remain in the pre-medical (M = 1.55; SE = .10) took no more pre-medical classes than the students that would eventually leave the pre-medical program (M = 1.45, SE = .17), $t(62) = .51$, $p = .612$. I therefore did not include the number of pre-med classes as a covariate in subsequent analyses.

The logged hours and the estimated hours were averaged within each class type (ID-Relevant or ID-Irrelevant). The data were first analyzed in a 2 (reported classtime: actual vs. estimated) by 2 (class type: ID-Relevant or ID-Irrelevant) by 2 (group: ID-Change vs. ID-Constant). How well did the participants estimate the amount of time they had spent on each class? This question is answered by examining the main effect of the type of report (veridical account from the classtime log or time estimated at Session 2). There was a significant main effect, with students' inflating their estimates of the time spent on their classes each week on average per week (M = 7.37 hours, SE = .37), compared to the actual amount of time that they spent on those classes (M = 5.46 hours, SE = .30), $F(1, 59) = 19.51$, $p < .001$, $\eta^2_p = .25$. This estimate inflation was not affected by the type of class or if the participant's had undergone an identity change, nor was there a three-way interaction, Fs < 3, ps < .15.

Could the time between the actual logging of hours and the estimation of the classtime have influenced the estimates? The same ANOVA was computed as above, except that the time between sessions in days was also included as a factor.[7] The results did not change from the analysis above. Even when the time between the event and the estimate of the event was controlled for, all students overestimated the amount of time that they had spent on each of their classes during their first

[7] In SPSS, you can "trick" the program into including a continuous variable as a factor, complete with interactions, in the analysis. This is kosher because ANOVA and multiple regression are both part of the general linear model, and I have used this type of analysis successfully before (Deffler, Leary, & Hoyle, in press).

semester of college, and these estimates were not influenced by the type of class or an identity change after completing the class.

4.3 Discussion

Does the accuracy of students' memories for their past actions vary as a function of a change in the self-concept change? Based upon the analyses above, the answer is no. There was no effect of an identity change on the inflation of identity-relevant or identity-irrelevant classtime estimates. Overall, students did inflate their estimations of the amount of time that they spent on each of their classes. Why might this be? According to theories on the subjective nature of estimation and influences of current opinions and self-concepts (e.g., Kunda & Sanitioso, 1999), there are two potential mechanisms by which this estimation inflation may occur: (1) students may perceive (somewhat falsely) their lives as frenetic and filled with classwork, even if the reality of their situation does not match this perception or (2) when the time comes for them to estimate, the participants are now advanced college students and much busier than before; this current situation may influence their perception of the past.

Either or both of these potential mechanisms may be true; one could prime students before their estimation to either inflate or deflate their perceived amount of time spent on their classes (see Ross, McFarland, & Fletcher, 1981, for a similar study with tooth brushing) and examine whether certain types of estimates (e.g., for ID-Relevant classes) are less likely to be influenced by priming. Additionally, to test the influence of the students' current situation, one could ask students to give their estimates during the first week of school (when the schedule is theoretically lighter)

or during the midterm week of school (when students, at least by my observation, are frantic).

This subset of the longitudinal study is not without its own unique limitations. Although the entire longitudinal study, like most psychological studies, was in and of itself self-selecting, here the participants had to do three weeks' worth of extra work; it is likely that a certain type of student opted to participate in this type of study, and this may have influenced the results. Furthermore, it would have been interesting to examine the influence of transferring out of the pre-medical program to a non-science major, as opposed to a science major, on estimations of classtime, but I was prevented from doing this due to low sample sizes. One potential avenue to re-analyze this data may be to only look at the traditional "weed-out" courses in the pre-medical curriculum (e.g., Organic Chemistry), or those that have a reputation as taking a lot of work outside of class. The current analysis lumped these classes in with more traditional liberal arts classes (e.g., Writing 101) that are still considered part of the pre-medical curriculum. This may have masked a significant effect of an identity change.

Despite the null result, this particular portion of the longitudinal study is important because it points to a potential avenue by which the changes over time in the self-concept may *not* influence reconstruction: although the participants' memories for their past behaviors are not particularly accurate, this accuracy does not vary based upon an identity change and suggests that the accessibility of memory content was not impaired by such a change.

5 Predicting Identity Change

What factors might influence whether a person undergoes an identity change, particularly an academic identity change? Given that self-knowledge and identities are a type of memory, how might the characteristics of memories for the past influence our persistence with a given identity?

My goal for this set of analyses was to predict, based upon memory and trait characteristics, which students would undergo an academic identity change and leave the pre-medical program at Duke. Predicting pre-medical attrition is important for both practical and theory-driven reasons. First, many students enter college at Duke on the pre-medical track, but a large portion of them do not persist on this track. Second, beyond the implications of this analysis for pre-medical advising, following the pre-medical curriculum is a type of identity. The role of autobiographical remembering in everyday includes a *directive function*, whereby we recruit memories to help us make decisions congruent with our long-term goals, as well as to persist with an identity or upon a certain life path (Habermas; Pillemer, 2003) How might this directive function arise, and what characteristics of memories are important when it comes to directing one's persistence with an identity?

Predictors from the longitudinal study described above were selected to help to predict which students would persist with the pre-medical curriculum. *Conscientiousness*, as measured by the BFI, was included because recent literature suggests that conscientiousness predicts academic success (Chamorro-Premuzic & Furnham, 2003) by mediating the relationship between intrinsic motivation and

grade point average (Komarraju, Karau, & Schmeck, 2009). Conscientiousness gives rise to intrinsic motivation, which in turn helps students to do well in their classes. It also, in the short term, predicts persistence on unsolvable tasks (Solberg Nes, Carlson, Crofford, de Leeuw, & Segerstrom, 2011).

The participant-, computer-, and observer-characteristics of the identity-relevant memories (here, pre-medical memories) and the participants' life stories, told in relation to their pursuit of their academic goals, were also examined as potential predictors of academic identity persistence. Prior research has indicated that autobiographical memories are recruited to support one's persistence in the face of diversity or difficulty with a given path (Pillemer, 1998). The memory characteristics were included to see what phenomenological and content characteristics were driving this directive function. The content and structure of the life story was analyzed because people often engage in meaning-making while telling the story of their lives (e.g., McAdams, 2013; McLean & Pratt, 2006). Participants' conceptualization of the relationship between their past and their identity may influence persistence with that identity.

5.1 Analytical method

First, potential variables at Session 1 that could distinguish between the two groups *before* an identity change were identified. The memory measures from the ID-Relevant memories and life narrative at Session 1 were analyzed by an independent samples *t*-test, with eventual identity status (ID-Change or ID-Constant) as the grouping variable. Note that there is likely the chance of Type II error because of the number of *t*-tests that I am conducting. However, these *t*-tests

were used solely to determine which predictors to include in the logistic regression and were not used to draw substantive conclusions about the predictive power of the measures. I therefore did not perform a Bonferroni correction on the critical *p*-value. Because I am analyzing Session 1 data, I was able to include the three participants that have left the pre-medical identity, but did not come in for Session 2. There are 43 people in the ID-Change group and 70 people in the ID-Constant group.

All of the measures on which the two groups differed were input as predictor variables in a logistic regression, including the conscientiousness of the participants, as this trait differed between groups (see Table 5 on page 55). Logistic regression predicts a categorical variable (here, group membership) from continuous (or categorical, in some instances) predictors.

5.2 Results

5.2.1 Group differences in past memories at Session 1

5.2.1.1 AMQ

As shown in Table 16, before participants underwent an identity change they were less likely to have a physical reaction for memories related to that identity and those memories also felt farther away. ID-Change participants also reported a less coherent story for identity-relevant memories. However, although a different measure of coherence, the eventual ID-Change group also reported less coherent identity-irrelevant memories. These significant variables were selected for the logistic regression.

Table 16: Differences between Groups for Identity-Relevant Memories at Session 1 – AMQ Variables

Note. ID-Change $n = 43$; ID-Constant $n = 70$.

	ID-Change		ID-Constant			
	M	*SE*	*M*	*SE*	*t*(111)	η^2_p
Reliving	4.60	.16	4.82	.11	1.15	
Field	4.99	.19	5.20	.16	.82	
Observer	3.19	.17	3.38	.16	.76	
Intensity	3.93	.18	4.18	.16	1.00	
Valence	5.04	.12	5.27	.11	1.37	
Physical	2.77	.17	3.45	.18	2.53*	.05
Setting	5.83	.15	6.13	.11	1.63	
See	5.95	.13	6.04	.10	.52	
Hear	4.59	.20	4.68	.18	.31	
Smell	2.05	.19	2.29	.17	.91	
Story	4.48	.21	5.09	.15	2.38*	.05
Pieces	4.30	.19	3.83	.16	1.90	
Words	3.22	.23	3.28	.17	.21	
Voluntary	4.42	.18	4.21	.13	.97	
Involuntary	3.44	.18	3.55	.14	.49	
Real	5.82	.15	6.05	.11	1.26	
Distance	2.93	.11	3.30	.09	2.62**	.06
CES	2.96	.11	2.98	.09	.18	

5.2.1.2 LIWC

For the analysis of the computer-rated narrative content, structure, and coherence, I added variables in addition to those analyzed in Chapter 3. Here, the types of events that participants talked about may predict whether or not they persist with an identity. Therefore, the *biology*, *work*, and *social* categories were included, as they were relevant to the types of events that the participants described. Table 17 shows the relevant data. Participants that would eventually undergo an identity change used more affect words, especially negative emotion words, in their narratives of identity-relevant memories. They also used more words

associated with cognitive processing and tentative words for identity-relevant memories. These significant variables were selected for the logistic regression.

Table 17: Differences between Groups for Each Memory Type at Session 1 – LIWC Variables

Note. ID-Change n =43; ID-Constant n = 70.

	Pre-Med Memories					
	ID-Change		ID-Constant			
	M	*SE*	*M*	*SE*	*t*(111)	η^2_p
Word count	177.12	10.17	180.10	6.95	.25	
Personal	11.85	.33	12.25	.22	1.06	
I	8.69	.28	9.04	.18	1.07	
We	.71	.10	.64	.08	.51	
Impersonal	4.92	.21	4.75	.16	.65	
Past	7.62	.34	7.82	.21	.54	
Present	4.15	.26	3.84	.19	.97	
Future	.74	.08	.61	.05	1.35	
Affect	4.76	.16	4.19	.14	2.65**	.06
Positive	3.59	.18	3.41	.14	.82	
Negative	1.13	.10	.76	.06	3.30**	.09
Cognitive	17.95	.36	16.19	.31	3.64***	.11
Tentative	2.18	.15	1.72	.09	2.90**	.07
Certain	1.56	.11	1.38	.09	1.21	
Inhibitory	.24	.03	.29	.04	.81	
Feel	.53	.07	.50	.05	.40	
Time	5.35	.23	5.78	.19	1.45	
Biology	3.78	.22	3.74	.16	.16	
Work	5.93	.30	6.34	.26	1.01	
Social	7.72	.39	7.91	.27	.41	

5.2.1.3 NaCCs

As shown in Table 18, neutral observer ratings of the coherence of identity-relevant memories at Session 1 were not predictive of eventual group membership.

Table 18: Differences between Groups for Each Memory Type at Session 1 – NaCCs Variables

Note. ID-Change $n = 42$; ID-Constant $n = 68$.

	Identity-Relevant Memories					
	ID-Change		ID-Constant			
	M	SE	M	SE	t(108)	η^2_p
Context	1.74	.08	1.92	.06	1.81	
Chronology	2.02	.08	2.15	.06	1.32	
Theme	2.44	.05	2.45	.04	.28	

5.2.2 Group differences in life narrative at Session 1

Participants had also provided a life narrative at Session 1. The narrative was written as if the participant was explaining to an academic advisor why she wanted to pursue medicine as a career. These narratives, because they likely included descriptions of multiple events, were not rated by the participants on the AMQ and CES. However, the narratives were analyzed using LIWC and NaCCs.

5.2.2.1 LIWC

As shown in Table 19, participants that would eventual undergo an identity change used more future-oriented verbs in their life narratives and fewer certain words. These significant variables were selected for the logistic regression.

Table 19: Differences between Groups for the Life Narrative at Session 1 – LIWC Variables

	Narrative					
	ID-Change		ID-Constant			
	M	*SE*	*M*	*SE*	*t*(105)	η^2_p
Word count	200.79	14.79	219.31	14.15	.87	
Personal	12.59	.53	12.88	.32	.49	
I	10.94	.47	11.53	.30	1.12	
Impersonal	4.78	.32	4.52	.27	.64	
Past	4.81	.48	5.30	.34	.86	
Present	7.25	.56	6.66	.43	.84	
Future	1.20	.20	.76	.09	2.22*	.04
Affect	5.16	.33	5.19	.25	.07	
Positive	4.32	.30	4.01	.24	.82	
Negative	.79	.14	1.14	.15	1.63	
Cognitive	19.22	.89	18.02	.46	1.30	
Tentative	2.33	.19	2.03	.16	1.22	
Certain	1.35	.16	1.85	.14	2.30*	.05
Feel	.65	.12	.51	.08	1.02	
Time	4.77	.40	4.99	.26	.49	
Biology	3.05	.33	2.95	.27	.25	
Work	6.42	.43	7.24	.42	1.30	
Social	6.91	.57	6.21	.39	1.04	

5.2.2.2 NaCCs

According to neutral observer ratings, the life narratives of those that would eventually undergo an identity change were less contextually and chronologically coherent than those that remained constant in their pre-med identity (See Table 20). These significant variables were selected for the logistic regression.

Table 20: Differences between Groups for the Life Narrative at Session 1 – NaCCs Variables

Note. ID-Change $n = 42$; ID-Constant $n = 65$.

	Life Narrative					
	ID-Change		ID-Constant			
	M	SE	M	SE	t(111)	N2p
Context	1.21	.10	1.53	.10	2.19*	.04
Chronology	1.42	.11	1.75	.08	2.41*	.05
Theme	2.53	.09	2.65	.04	1.36	

5.2.3 Logistic regression

Once potential predictors of group membership were determined, their ability to improve the prediction of group membership over and above a null model was examined. The null model assumes that all people are members of the largest group (here, the ID-Constant group); it correctly predicted group membership in 63.6% of the cases. The results from the *Full Model*, which include all of the potential predictors of group membership determined above, are in Table 21. The Wald *Z* tests the significance of each variable in predicting group membership, controlling for all of the other variables.

The Exp(B) is the change in the odds ratio of membership in the ID-Change group for each unit increase on the predictor variable, controlling for all other predictors. The Exp(B) is interpreted as follows: If the Exp(B) is greater than one, for every unit increase on the predictor variable, there is an Exp(B) increase in the odds of being in the ID-Change group (because this group was code as "1"). If the Exp(B) is equal to 1, the predictor variable does not help to distinguish between the groups. If the Exp(B) is less than one, then the odds of being in the ID-Change group

decrease as the predictor variable increases. The Exp(B) confidence interval indicates how precise this model estimate is for a given parameter (Meyers, Gamst, & Guarino, 2013). The Exp(B) is only reported for significant predictors.

Table 21: Logistic Regression Predicting Identity Change

Note. $^{**}p < .01$

				Exp(B) Confidence Interval	
Measure	Memory Type	Wald Z	Exp(B)	Lower	Upper
Conscientiousness (BFI)		1.93			
Affect (LIWC)	ID-Relevant	7.29**	2.72	1.32	5.62
Negative (LIWC)	ID-Relevant	10.02**	9.04	2.31	35.33
Cognitive (LIWC)	ID-Relevant	8.03**	1.58	1.15	2.16
Tentative (LIWC)	ID-Relevant	.05			
Physical (AMQ)	ID-Relevant	8.13**	.44	.25	.77
Story (AMQ)	ID-Relevant	.96			
Closeness (AMQ)	ID-Relevant	.10			
Future (LIWC)	Life Story	8.16**	3.64	1.50	8.84
Certain (LIWC)	Life Story	6.92**	.42	.22	.80
Context (NaCCs)	Life Story	2.44			
Chronology (NaCCs)	Life Story	.01			

Critically, all of these measures were taken *before* a participant underwent an identity change. As shown in Table 21, participants who used more affect words, especially negative words, and cognitive mechanism words to describe their identity-relevant memories were more likely to undergo an identity change in the future. Although events explained with negative emotion words, which could include the death of a loved one due to illness, may seem on the surface like a good reason to become a doctor, they perhaps do not serve as good self-defining memories (Singer & Salovey, 1993), or strong enough directives or turning points to persist with an identity (Bluck, et al., 2005; Pillemer, 1998, 2003)

Participants that experienced an autonomic response while remembering events related to why they want to be doctors, as demonstrated by their rated physical reaction, were more likely to persist with their pre-medical identity. This result is talked about in more detail in Section 5.3 below.

How participants described their life story in the context of their pursuit of medicine also predicted eventual identity-change or -constancy. Participants that used more future-oriented verbs and more certain words while describing their life story were more likely to undergo an identity change. Possibly, students who focus more on their future without fully grounding their identity and life story in their past may be unable to persist when their academic pathway is difficult. Or, these students may not have experienced enough events in their past to ground their identity, which could lead them to adopt a future orientation.

5.3 General discussion and future directions

Predicting students' persistence with the pre-medical curriculum at Duke make help academic advisors identify those students that are likely to do poorly in the pre-medical curriculum; those students could then be targeted for an intervention (either one that helps them to persist with the pre-medical curriculum, or one that helps them explore other career options sooner). How might we identity students likely to change career paths, and create such an intervention? The IDQ designed for this longitudinal study would be a useful first step in determining who is likely to remain on the pre-medical track, as students who held the pre-medical identity strongly were likely to persist with that identity more so than someone who did not initially feel strongly about that aspect of their self-knowledge *before* an

identity change. In the future, it would be interesting to use this identity questionnaire to group participants into different types of identity change groups. Given the variation in the IDQ responses, there are people who strongly hold an identity and yet change that identity. Predicting (and potentially preventing) this type of identity change may be especially important for understanding why some groups of people are less likely to succeed in certain academic trajectories (such as medicine or other STEM fields).

One of the best predictor of identity persistence is having a physical reaction to an identity-relevant memory. Previous research suggests different emotional states give rise to different physical reactions (Lang, 1995; LeDoux, 1996; Leventhal & Scherer, 1987; Pivetti, Camodeca, & Rapino, 2015). These physical reactions can arise during remembering (Washburn, Field, & Wolf, 1923; Strongman & Kemp, 1991; Schwartz, Weinberger, & Singer, 1981) and can act independently of emotional intensity or valence (Rubin, Feldman, & Beckham, 2004; Talarico & Rubin, 2003). Talarico and colleagues (Talarico, LaBar, & Rubin, 2004) found that memories from longer ago evoked a greater physical reaction in rememberers; it is possible that this difference due to time arises because other older, less visceral memories do not readily come to mind. It is unclear whether the physical, or visceral, reaction during remembering can be modified with repeated retrievals; further investigation is needed to see if the physical reaction while remembering can be increased to bolster identity persistence (or, in the case of some mental illnesses, tamped down to reduce anxiety and other negative symptomology).

Another potential avenue for an intervention would be to identify the reasons *why* a person wishes to purse a given path. If she focuses her narratives on negative emotions, new ways of framing events related to that path could be encouraged, or she could be exposed to new, positive events related to that identity. Another avenue could be to encourage a person at risk for an identity change to shift her life story focus to past events and the pathway to forming her identity, as opposed to life story with a future orientation. This future orientation may be due to a *lack* of past events to talk about in relation to one's chosen path; providing students with opportunities to explore the medical field may also help with persistence.

I have identified several factors underlying why someone leaves a particular identity, particularly an academic identity such as pursuing medicine, but these factors are certainly influenced by the participant population and the identity itself. The focus of future research, particularly one that aims to develop an intervention to help with identity persistence beyond the pre-medical curriculum at Duke, should be on extending these findings to different, more variable participant populations.

Beyond encouraging participants to pursue a medical career, this investigation also highlights a potential mechanism underlying the directive function of autobiographical memory. Participants that experienced a physical reaction while remembering identity-relevant events were more likely to persist with that identity. Possibly, retrieval of a memory that gives rise to an emotional or autonomic response will direct identity- and goal-relevant behavior more strongly than memories that do not give rise to an autonomic response.

6 General Discussion

I conclude this dissertation with a discussion of the overarching aims of my research program, including a brief discussion of research not previously addressed here due to space (and time) constraints. Throughout graduate school, I have developed three lines of inquiry to elucidate the cognitive and social processes involved in remembering our past: (1) Given that autobiographical memories by definition involves the person remembering, how does our self-system influence our memory of the stories of our lives? (2) Remembering, especially for autobiographical events, is often a social process; how does the environment influence our memory of the past? and (3) How do the details of the event influence the subjective experience that accompanies remembering?

6.1 How do changes in our self-system influence our memories of the stories of our lives?

The goal of my dissertation was to begin to answer the first question: Given that autobiographical memory by definition involves the person remembering, how does changes in our self-system influence our memory of the stories of our lives? Remembering is an active process; every time people recall information, whether it is an event or factual knowledge, the memory is reconstructed. Over time, changes occur in the phenomenological characteristics of the memory (such as the sense of reliving during remembering; Chapter 3, pg. 53), the substantive details of the memory (who was there and what happened; Chapter 4, pg. 77), and how the memory is relayed to an observer (the language used and the coherence of the narrative; Chapter 3, pg. 53). Many factors influence how these memories change;

one important factor to consider is the role of self-knowledge, especially identity, and the current self-concept.

Autobiographical remembering is knowledge driven. Relevant self-knowledge is brought to bear during the reconstruction of autobiographical events. Just like other knowledge structures, self-knowledge encompasses a large amount of information and is highly organized and elaborated (Bower & Gilligan, 1979; Greenwald & Banaji, 1989; Luo, Watkins, & Lam, 2009; McConnell & Strain, 2007; Showers & Zeigler-Hill, 2012). Identity is a form of self-knowledge and both personal and social identities (Hogg, 2012) provide us with a meaning-making lens through which to see and interpret the world (Oyserman, et al., 2012). Changes to self-knowledge, including identity, after the occurrence of an event may mean that new or altered self-knowledge is used to reconstruct an event.

As outlined in Chapter 3, a change in the relevance of a memory to one's identity may predict changes in the phenomenological characteristics of the memory, especially those associated with mental time travel, such as reliving and emotional intensity. An identity change did not influence the content (Chapter 3) or accuracy (Chapter 4) of identity-relevant memories. A change in the relevance of information to one's identity did not influence one's estimation of that information; participants that left the pre-medical academic trajectory did not inflate (or deflate) their classtime estimation for their pre-medical classes any more than those students that remained pre-medical program.

The analyses addressed in Chapter 5 were perhaps the most interesting for me, because I did not plan on being able to predict whether a person had undergone

an identity change from their memories and life narrative *before* that identity change occurred. The relationship between identity and remembering is not unidirectional. The details of a remembered event can impact its phenomenology; in turn, subjective experience, such as intensity of emotions and a visceral reaction, may influence how important a memory is to a person's identity and serve as a means through which the individual validates and maintains that identity (Pillemer, 1998). I am interested in how memory and narrative can support academic success, particularly in diverse populations. After testing the potential memory characteristics that support identity and influence persistence in additional samples of students, I plan to develop and test an intervention that targets and enhances these supportive memory characteristics in students that are at risk for leaving a difficult but rewarding academic trajectory.

6.2 How does the environment influence our memory of the past?

Beyond characteristics of the person, such as identity or trait variables, the environment in which an event occurs can influence how it is remembered. Specifically, the background on which an unfamiliar face is presented influences the perceived familiarity of this unknown face, with highly familiar backgrounds (e.g., a picture of the Eiffel Tower) associated with unfamiliar faces being perceived as more familiar (Deffler, Brown, & Marsh, 2015). Recognition and recall of familiar faces may also be influenced by the social environment in which they are encountered. The misnaming of familiar individuals is influenced by one's mood as well as one's relationship to the misnamed. You are more likely to call your daughter the wrong

name when you are tired, frustrated, or angry, and the name that you call her is likely to be the name of another family member, rather than the name of a friend or acquaintance (Deffler, Fox, Ogle, & Rubin, conditional acceptance). Remembering does not happen in a vacuum. Rather, the physical and social environment influences, sometimes unconsciously, our memory retrieval.

6.3 How do the details of an event influence the subjective experience that accompanies remembering?

The characteristics of the event being recalled can also influence the reconstruction of the memory and the phenomenology associated with remembering (e.g., how vivid the memory is; the intensity of the emotions while remembering). Events reconstructed with more spatial details (such as knowing where certain actions occurred) tend to be remembered with a greater sense of reliving, vividness, and belief in the accuracy of the memory than events with fewer spatial details. By using structural equation modeling, I showed that spatial information is the strongest predictor of these three properties (Deffler, Umanath, & Rubin, in prep). This phenomenology can provide a sense of mental time travel while remembering, and may be a driving force in making an event "episodic-like".

6.4 Future directions and conclusions

The best way to conclude, perhaps, is with new beginnings. During the construction of this dissertation, I identified a number of potential future directions to pursue as a follow-up to this work. Anecdotally from undergraduate research assistants who have worked with me on the longitudinal study, some of the memories that participants report become more general over time. Over-general

memories have been linked to depression (e.g., Williams, 1995). Might a change in the identity-relevance of an event over time lead to the memory of that event becoming more general and gist-based?

Additionally, elucidating the casual mechanism underlying changes in the phenomenology of remembering is an important next step to this work. One potential mechanism by which these changes come about may be through retrieval practice. Retelling an event can change how it is recalled in the future. Voluntarily thinking about or narrating an event may be another mechanism by which an identity change influences remembering through meaning-making. If an event is no longer related to one's identity, one may not retrieve that event. Or, if that event is retrieved, one may engage in meaning-making to mold the representation of the event into one that is congruent with the current self-concept. For example, Pauspathi (2007) showed that undisclosed, or un-retrieved, events are more likely to be narrated using the present tense.

Finally, narrating past experiences often serves as a means to bond people together or to collectively create a shared version of events. However, the self-concept is dynamic and the social environment can influence the salience of different identities. A woman in a room full of men may be more aware of her identity as a woman; does this activation of her "woman" self-knowledge have long-term consequences because of how she overtly or covertly remembers her past while in that room? Furthermore, are there gender differences in how one conceptualizes the future, and do these differences have consequences for identity persistence?

To conclude, remembering is an active process; reconstruction of an event is influenced by many different factors, including the self-concept, other self-system processes, the social environment, and individual differences such as trait characteristics. This dissertation represents the first (and largest) prospective, longitudinal study to examine how the self-system, especially the self-concept and self-knowledge, interacts with the systems involved in autobiographical remembering.

Appendix A: Prompts used to elicit memories

Pre-Med Memory Prompts

- Why do you want to pursue a career in medicine? Provide a memory of a specific event that captures the essence of your decision to study medicine.
- What inspired you to be pre-med? Provide a memory of an interaction with a doctor, professional, friend, or family member that motivated you to pursue a pre-health track in college.
- Think of a specific memory of an academic achievement in your life that helped you in deciding to be pre-med in college.

Non-Pre-Med Memory Prompts

- What was it like growing up in your family? Give a memory of a specific event that captures the essence of how you interacted with your family.
- Think of an achievement in your life that was not related to academics.
- What did you and your friends do for fun in high school? Think of a memory of a specific event that you experienced with a friend or friends from high school.

Future Events

- Imagine that it is 20 years from now. Describe the events of one day in your family life.
- Imagine that it is 20 years from now. Describe the events of one day in your professional life.

References

Abrams, D. (1999). Social identity, social cognition, and the self: The flexibility and stability of self-categorization. In D. Abrams, M. A. Hogg, D. Abrams, M. A. Hogg (Eds.), *Social identity and social cognition* (pp. 197-229). Malden: Blackwell Publishing.

Addis, D. R., Wong, A. T., & Schacter, D. L. (2007). Remembering the past and imagining the future: Common and distinct neural substrates during event construction and elaboration. *Neuropsychologia, 45*, 1363-1377.

Allport, G. W. (1955). *Becoming: basic considerations for a psychology of personality*. New Haven, CT US: Yale University Press.

Alpers, G. W., Winzelberg, A. J., Classen, C., Roberts, H., Dev, P., Koopman, C., & Taylor, C. B. (2005). Evaluation of computerized text analysis in an Internet breast cancer support group. *Computers in Human Behavior*, *21*, 361-376.

Andersen, S. M. (1984). Self-knowledge and social inference: II. The diagnosticity of cognitive/affective and behavioral data. *Journal of Personality and Social Psychology, 46*, 294-307.

Andersen, S. M., & Ross, L. (1984). Self-knowledge and social inference: I. The impact of cognitive/affective and behavioral data. *Journal of Personality and Social Psychology, 46*, 280-293.

Anderson, M. C., Bjork, R. A., & Bjork, E. L. (1994). Remembering can cause forgetting: Retrieval dynamics in long-term memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 20*, 1063-1087.

Anderson, M. C., & McCulloch, K. C. (1999). Integration as a general boundary condition on retrieval-induced forgetting. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 25*, 608-629.

Anderson, R. J., & Dewhurst, S. A. (2009). Remembering the past and imagining the future: Differences in event specificity of spontaneously generated thought. *Memory, 17*, 367-373.

Anderson, S. J., & Conway, M. A. (1993). Investigating the structure of autobiographical memories. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 19*, 1178-1196.

Antunes, C., & Fontaine, A. M. (2000). Relations between self-concept and social support appraisals during adolescence: A longitudinal study. *Psychology: The Journal of the Hellenic Psychological Society, 7*, 339-353.

Arnold, K. M., McDermott, K. B., & Szpunar, K. K. (2011). Imagining the near and far future: The role of location familiarity. *Memory & Cognition, 39*, 954-967.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215.

Barclay, C. R. (1986). Schematization of autobiographical memory. In D. C. Rubin (Ed.), *Autobiographical memory* (pp. 82-99). New York, NY US: Cambridge University Press.

Barclay, C. R. (1996). Autobiographical remembering: Narrative constraints on objectified selves. In D. C. Rubin (Ed.), *Remembering our past: Studies in autobiographical memory* (pp. 94-125). New York, NY US: Cambridge University Press.

Barclay, C. R., & Smith, T. S. (1993). Autobiographical remembering and self-composing. *International Journal of Personal Construct Psychology, 6*, 231-251.

Barclay, C. R., & Subramaniam, G. (1987). Autobiographical memories and self-schemata. *Applied Cognitive Psychology, 1*, 169-182.

Barclay, C. R., & Wellman, H. M. (1986). Accuracies and inaccuracies in autobiographical memories. *Journal of Memory and Language, 25*, 93-103.

Barnier, A. J., Hung, L., & Conway, M. A. (2004). Retrieval-induced forgetting of emotional and unemotional autobiographical memories. *Cognition and Emotion, 18*, 457-477.

Barsalou, L. W. (1988). The content and organization of autobiographical memories. In U. Neisser & E. Winograd (Eds.), *Remembering reconsidered: Ecological and traditional approaches to the study of memory* (pp. 193-243). New York, NY US: Cambridge University Press.

Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology, 59*, 617-645.

Barsalou, L. W., Niedenthal, P. M., Barbey, A. K., & Ruppert, J. A. (2003). Social embodiment. In B. H. Ross (Ed.), *The psychology of learning and motivation: Advances in research and theory, Vol. 43* (pp. 43-92). New York, NY US: Elsevier Science.

Bartlett, F. C. (1932). *Remembering: a study in experimental and social psychology*. Oxford England: Macmillan.

Bauer, P. A. (2012). The life I once remembered: the waxing and waning of early memories. In D. Berntsen & D. C. Rubin (Eds.), *Understanding autobiographical memory: Theories and approaches* (pp. 205-225). New York: Cambridge University Press.

Bauer, P. J., Doydum, A. O., Pathman, T., Larkina, M., Güler, O. E., & Burch, M. (2012). It's all about location, location, location: Children's memory for the "where" of personally experienced events. *Journal of Experimental Child Psychology*, *113*, 510–522.

Baumeister, R. F. (1998). The self. In D. T. Gilbert, S. T. Fiske & G. Lindzey (Eds.), *The handbook of social psychology, Vols. 1 and 2 (4th ed.)* (pp. 680-740). New York, NY US: McGraw-Hill.

Bellezza, F. S. (1984). The self as a mnemonic device: The role of internal cues. *Journal Of Personality And Social Psychology*, *47*, 506-516.

Berntsen, D. (2012). Spontaneous recollections: Involuntary autobiographical memories are a basic mode of remembering. In D. Berntsen & D. C. Rubin (Eds.), *Understanding autobiographical memory: Theories and approaches* (pp. 290-310). New York: Cambridge University Press.

Berntsen, D., & Rubin, D. C. (2006). The centrality of event scale: A measure of integrating a trauma into one's identity and its relation to post-traumatic stress disorder symptoms. *Behaviour Research and Therapy*, *44*, 219–231

Bertossa, F., Besa, M., Ferrari, R., & Ferri, F. (2008). Point zero: A phenomenological inquiry into the seat of consciousness. *Perceptual and Motor Skills, 107*, 323-335.

Bhaskar, R., & Simon, H. A. (1977). Problem solving in semantically rich domains: An example from engineering thermodynamics. *Cognitive Science, 1*, 193-215.

Bjork, R. A. (1988). Retrieval practice and the maintenance of knowledge. In M. M. Gruneberg, P. E. Morris & R. N. Sykes (Eds.), *Practical aspects of memory: Current research and issues, Vol. 1: Memory in everyday life* (pp. 396-401). Oxford England: John Wiley & Sons.

Bluck, S., Alea, N., Habermas, T., & Rubin, D. C. (2005). A Tale of Three Functions: The Self-Reported Uses of Autobiographical Memory. *Social Cognition, 23*, 91-117.

Bohn, A., & Berntsen, D. (2014). Cultural life scripts and the development of personal memories. In P. J. Bauer, R. Fivush, P. J. Bauer, R. Fivush (Eds.) , *The Wiley handbook on the development of children's memory* (Vols. I-II) (pp. 626-644). Wiley-Blackwell.

Bower, G. H., Black, J. B., & Turner, T. J. (1979). Scripts in memory for text. *Cognitive Psychology, 11*, 177-220.

Bower, G. H., & Gilligan, S. G. (1979). Remembering information related to one's self. *Journal of Research in Personality, 13*, 420-432.

Brandt, K. R., Cooper, L. M., & Dewhurst, S. A. (2005). Expertise and recollective experience: Recognition memory for familiar and unfamiliar academic subjects. *Applied Cognitive Psychology, 19*, 1113-1125.

Brewer, W. F. (1986). What is autobiographical memory? In D. C. Rubin (Ed.), *Autobiographical memory* (pp. 25-49). New York, NY US: Cambridge University Press.

Brown, N. R., Hansen, T. G. B., Lee, P. J., Vanderveen, S. A., & Conrad, F. G. (2012). Historically defined autobiographical periods: their origins and implications. In D. Berntsen & D. C. Rubin (Eds.), *Understanding autobiographical memory: Theories and approaches* (pp. 160-180). New York: Cambridge University Press.

Brown, N. R., Lee, P. J., Krslak, M., Conrad, F. G., Hansen, T. G. B., Havelka, J., & Reddon, J. R. (2009). Living in history: How war, terrorism, and natural disaster affect the organization of autobiographical memory. *Psychological Science, 20*, 399-405.

Brown, N. R., & Schopflocher, D. (1998). Event clusters: An organization of personal events in autobiographical memory. *Psychological Science, 9*, 470-475.

Bruner, J. (1995). The Autobiographical Process. *Current Sociology, 43*, 161-177.

Bruner, J. (1996). A narrative model of self construction. *Psyke & Logos, 17*, 154-170.

Bruner, J. (1997). A narrative model of self-construction. In J. G. Snodgrass & R. L. Thompson (Eds.), *The self across psychology: Self-recognition, self-awareness, and the self concept* (pp. 145-161). New York, NY US: New York Academy of Sciences.

Bruner, J., & Feldman, C. F. (1996). Group narrative as a cultural context of autobiography. In D. C. Rubin (Ed.), *Remembering our past: Studies in autobiographical memory* (pp. 291-317). New York, NY US: Cambridge University Press.

Bruner, J., Goodnow, J. J., & Austin, G. A. (1956). *A study of thinking*. Oxford England: John Wiley and Sons.

Burt, C. D. B., Kemp, S., & Conway, M. A. (2003). Themes, events, and episodes in autobiographical memory. *Memory & Cognition, 31*, 317-325.

Cantor, N., Markus, H., Niedenthal, P., & Nurius, P. (1986). On motivation and the self-concept. In R. M. Sorrentino & E. T. Higgins (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (pp. 96-121). New York, NY US: Guilford Press.

Carver, C. S., & Scheier, M. F. (1982). Control theory: A useful conceptual framework for personality–social, clinical, and health psychology. *Psychological Bulletin, 92*, 111.

Chamorro-Premuzic, T., & Furnham, A. (2003). Personality predicts academic performance: Evidence from two longitudinal university samples. Journal Of *Research in Personality*, *37*, 319-338.

Chase, W. G., & Simon, H. A. (1973). Perception in chess. *Cognitive Psychology, 4*, 55-81.

Chen, Y., McAnally, H. M., Wang, Q., & Reese, E. (2012). The coherence of critical event narratives and adolescents' psychological functioning. *Memory*, *20*, 667–681.

Chi, M. T., Glaser, R., & Rees, E. (1981). *Expertise in problem solving*: Learning Research and Development Center, University of Pittsburgh Pittsburgh.

Clark, S. E., & Loftus, E. F. (1996). The construction of space alien abduction memories. *Psychological Inquiry, 7*, 140-143.

Conway, M. A. (1987). Verifying autobiographical facts. *Cognition, 26*, 39-58.

Conway, M. A. (1990). Associations between autobiographical memories and concepts. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 16*, 799-812.

Conway, M. A. (1996). Autobiographical knowledge and autobiographical memories. In D. C. Rubin (Ed.), *Remembering our past: Studies in autobiographical memory* (pp. 67-93). New York, NY US: Cambridge University Press.

Conway, M. A. (2005). Memory and the self. *Journal of Memory and Language, 53*, 594-628.

Conway, M. A., & Bekerian, D. A. (1987). Organization in autobiographical memory. *Memory & Cognition, 15*, 119-132.

Conway, M. A., & Jobson, L. (2012). On the nature of autobiographical memory. In D. Berntsen & D. C. Rubin (Eds.), *Understanding autobiographical memory: Theories and approaches* (pp. 54-69). New York: Cambridge University Press.

Conway, M. A., & Pleydell-Pearce, C. W. (2000). The construction of autobiographical memories in the self-memory system. *Psychological Review, 107*, 261-288.

Cooley, C. H. (1902). *Human Nature and the Social Order*.

Cross, S. E., & Gore, J. S. (2012). Cultural models of the self. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity (2nd ed.)* (pp. 587-614). New York, NY US: Guilford Press.

Crutcher, R. J., & Healy, A. F. (1989). Cognitive operations and the generation effect. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 15*, 669-675.

Cuc, A., Koppel, J., & Hirst, W. (2007). Silence is not golden: A case for socially shared retrieval-induced forgetting. *Psychological Science, 18*, 727-733.

D'Argembeau, A., Raffard, S., & Van der Linden, M. (2008). Remembering the past and imagining the future in schizophrenia. *Journal of Abnormal Psychology, 117*, 247-251.

D'Odorico, L., & Franco, F. (1985). The determinants of baby talk: Relationship to context. *Journal of Child Language, 12*, 567-586.

D'Argembeau, A., & Van der Linden, M. (2012). Predicting the phenomenology of episodic future thoughts. *Consciousness and Cognition: An International Journal, 21*, 1198-1206.

Davis, D., & Brock, T. C., 1975. Use of first person pronouns as a function of increased objective self-awareness and performance feedback. *Journal of Experimental Social Psychology*, *11*, 3810-388.

Deffler, S. A., Brown, A. S., & Marsh, E. J. (2015). Judging the familiarity of strangers: Does the context matter? *Psychonomic Bulletin & Review*, *22*, 1041-1047.

Deffler, S. A., Fox, C., Ogle, C. M., & Rubin, D. C. (Conditional Acceptance) All My Children: The Roles of Semantic Category and Phonetic Similarity in the Misnaming of Familiar Individuals. *Memory & Cognition.*

Deffler, S. A., & Halpern, A. R. (2011). Contextual information and memory for unfamiliar tunes in older and younger adults. *Psychology and Aging*, *26*, 900-904.

Deffler, S. A., Leary, M. R., & Hoyle, R. H. (In Press). Knowing what you know: Intellectual humility and judgments of recognition memory. *Personality and Individual Differences*.

Deffler, S. A., Umanath, S., & Rubin, D. C. (In Prep). Scene construction gives rise to a sense of reliving: Implications for a fundamental change in our understanding of episodic memory.

Descartes, R. (1650/2003). Treatise of man (selections). *The history of psychology: Fundamental questions* (pp. 68-80). New York, NY US: Oxford University Press.

Dowling, W. J., Bartlett, J. C., Halpern, A. R., & Andrews, M. W. (2008). Melody recognition at fast and slow tempos: Effects of age, experience, and familiarity. *Perception & Psychophysics, 70*, 496-502.

Dudukovic, N. M., Marsh, E. J., & Tversky, B. (2004). Telling a Story or Telling it Straight: The Effects of Entertaining Versus Accurate Retellings on Memory. *Applied Cognitive Psychology, 18*, 125-143.

Ebbinghaus, H. (1885/1913). *Memory: A contribution to experimental psychology* (H. A. Ruger & C. E. Bussenius, Trans.). New York, NY US: Teachers College Press.

Echterhoff, G., Higgins, E. T., & Groll, S. (2005). Audience-tuning effects on memory: The role of shared reality. *Journal of Personality and Social Psychology, 89*, 257-276.

Echterhoff, G., Higgins, E. T., Kopietz, R., & Groll, S. (2008). How communication goals determine when audience tuning biases memory. *Journal of Experimental Psychology: General, 137*, 3-21.

Echterhoff, G., Lang, S., Krämer, N., & Higgins, E. T. (2009). Audience-tuning effects on memory: The role of audience status in sharing reality. *Social Psychology, 40*, 150-163.

Engle, R. W., & Bukstel, L. H. (1978). Memory processes among bridge players of differing expertise. *The American Journal of Psychology, 91*, 673-689.

Enz, K. F., & Talarico, J. M. (2015). Forks in the road: Memories of turning points and transitions. *Applied Cognitive Psychology.*

Epstein, S. (1973). The self-concept revisited: Or a theory of a theory. *American Psychologist, 28*, 404-416.

Epstein, S. (1980). The self-concept: A review and the proposal of an integrated theory of personality. *Personality: Basic aspects and current research,* 81-132.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117-140.

Fitzgerald, J. M., & Broadbridge, C. L. (2012). Theory and research in autobiographical memory: A life-span developmental perspective. In D. Berntsen & D. C. Rubin (Eds.), *Understanding autobiographical memory: Theories and approaches* (pp. 246-266). New York: Cambridge University Press.

Fivush, R. (1995). Language, narrative, and autobiography. *Consciousness and Cognition: An International Journal, 4*, 100-103.

Fivush, R., Gray, J. T., & Fromhoff, F. A. (1987). Two-year-olds talk about the past. *Cognitive Development, 2*, 393-409.

Fivush, R., Habermas, T., Waters, T., & Zaman, W. (2011). The making of autobiographical memory: Intersections of culture, narratives and identity. *International Journal of Psychology, 46*, 321-345.

Fivush, R., & Shukat, J. R. (1995). Content, consistency, and coherence of early autobiographical recall. In M. S. Zaragoza, J. R. Graham, G. C. N. Hall, R. Hirschman & Y. S. Ben-Porath (Eds.), *Memory and testimony in the child witness* (pp. 5-23). Thousand Oaks, CA US: Sage Publications, Inc.

Freud, S. (1920). Beyond the Pleasure Principle. In E. Jones (Ed.), *Beyond the pleasure principle.* (Vol. 4, pp. 1-83). London England: The International Psycho-Analytical Press.

Freund, P. A., & Kasten, N. (2012). How smart do you think you are? A meta-analysis on the validity of self-estimates of cognitive ability. *Psychological Bulletin, 138*, 296-321.

Frey, K. S., & Ruble, D. N. (1985). What children say when the teacher is not around: Conflicting goals in social comparison and performance assessment in the classroom. *Journal of Personality and Social Psychology, 48*, 550-562.

Friedman, W. J., & deWinstanley, P. A. (1998). Changes in the subjective properties of autobiographical memories with the passage of time. *Memory, 6*, 367-381.

Fussell, S. R., & Krauss, R. M. (1989). Understanding friends and strangers: The effects of audience design on message comprehension. *European Journal of Social Psychology, 19*, 509-525.

Garry, M., Loftus, E. F., & Brown, S. W. (1994). Memory: A river runs through it. *Consciousness and Cognition: An International Journal, 3*, 438-451.

Glover, J. A. (1989). The 'testing' phenomenon: Not gone but nearly forgotten. *Journal of Educational Psychology, 81*, 392-399.

Gonzales, A. L., Hancock, J. T., & Pennebaker, J. W. (2010). Language style matching as a predictor of social dynamics in small groups. *Communication Research, 37*, 3-19.

Greenwald, A. G., & Banaji, M. R. (1989). The self as a memory system: Powerful, but ordinary. *Journal of Personality and Social Psychology, 57*, 41-54.

Greenwald, A. G., & Pratkanis, A. R. (1984). The self. In R. S. Wyer, Jr. & T. K. Srull (Eds.), *Handbook of social cognition, Vol 3* (pp. 129-178). Mahwah, NJ US: Lawrence Erlbaum Associates Publishers.

Gunsch, M. A., Brownlow, S., Haynes, S. E., & Mabe, Z. (2000). Differential linguistic content of various forms of political advertising. *Journal of Broadcasting & Electronic Media*, *44*, 27-42.

Habermas, T. (2012). Identity, emotion, and the social matrix of autobiographical memory: a psychoanalytic narrative view. In D. Berntsen & D. C. Rubin (Eds.), *Understanding autobiographical memory: Theories and approaches* (pp. 33-53). New York: Cambridge University Press.

Hassabis, D., Kumaran, D., Vann, S. D., & Maguire, E. A. (2007). Patients with hippocampal amnesia cannot imagine new experiences. *PNAS Proceedings of the National Academy of Sciences of the United States of America, 104*, 1726-1731.

Head, H., Rivers, W. H. R., Sherren, J., Holmes, G., Thompson, T., & Riddoch, G. (1920). *Studies in neurology, in two volumes, Vol 2*. New York, NY London USUnited Kingdom: Oxford University Press

Healy, A. F., & Levitt, A. G. (1978). The relative accessibility of semantic and deep-structure syntactic concepts. *Memory & Cognition, 6*, 518-526.

Herzmánn, G., & Curran, T. (2011). Experts' memory: An ERP study of perceptual expertise effects on encoding and recognition. *Memory & Cognition, 39*, 412-432.

Higgins, E. T. (1999). 'Saying is believing' effects: When sharing reality about something biases knowledge and evaluations. In L. L. Thompson, J. M. Levine & D. M. Messick (Eds.), *Shared cognition in organizations: The management of knowledge* (pp. 33-48). Mahwah, NJ US: Lawrence Erlbaum Associates Publishers.

Hirst, W., & Manier, D. (1996). Remembering as communication: A family recounts its past. In D. C. Rubin (Ed.), *Remembering our past: Studies in autobiographical memory* (pp. 271-290). New York, NY US: Cambridge University Press.

Hogg, M. A. (2012). Social identity and the psychology of groups. In M. R. Leary, J. P. Tangney, M. R. Leary, J. P. Tangney (Eds.), *Handbook of self and identity (2nd ed.)* (pp. 502-519). New York, NY, US: Guilford Press.

Holmes, D., Alpers, G. W., Ismailji, T., Classen, C., Wales, T., Cheasty, V., Miller, A., & Koopman, C. (2007). Cognitive and emotional processing in narratives of women abused by intimate partners. *Violence against Women*, *13*, 1192-1205.

Hoyle, R. H., Kernis, M. H., Leary, M. R., & Baldwin, M. W. (1999). *Selfhood: Identity, esteem, regulation*. Boulder, CO US: Westview Press.

Hume, D. (1789). Division of the subject. In L. A. Selby-Bigge (Ed.), *A treatise of human nature (reprinted from the original ed. in 3 volumes)* (pp. 7-8). Oxford England: The Clarendon Press.

James, W. (1890). *The principles of psychology*. NY US: Henry Holt and Company.

John, O. P., & Srivastava, S. (1999). The Big Five Trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin, O. P. John, L. A. Pervin, O. P. John (Eds.) , *Handbook of personality: Theory and research* (2nd ed.) (pp. 102-138). New York, NY, US: Guilford Press.

Jose, A., Rajaram, S., O'Leary, K. D., & Williams, M. C. (2010). Memory for partner-related stimuli: Free recall and frequency estimation. *Journal of Social and Personal Relationships, 27*, 658-670.

Kacewicz, E., Pennebaker, J. W., Davis, M., Jeon, M., & Graesser, A. C. (2014). Pronoun use reflects standings in social hierarchies. *Journal of Language and Social Psychology*, *33*, 125-143.

Kahn, J. H., Tobin, R. M., Massey, A. E., & Anderson, J. A. (2007). Measuring emotional expression with the Linguistic Inquiry and Word Count. *American Journal of Psychology*, 120, 263-286

Karpicke, J. D., & Roediger, H. L., III. (2008). The critical importance of retrieval for learning. *Science, 319*, 966-968.

Katz, A. N. (1989). Autobiographical memory as a reconstructive process: An extension of Ross's hypothesis. *Canadian Journal of Psychology/Revue canadienne de psychologie, 43*, 512-517.

Kindermann, T. A. (1993). Natural peer groups as contexts for individual development: The case of children's motivation in school. *Developmental Psychology, 29*, 970-977.

Kleider, H. M., Goldinger, S. D., & Knuycky, L. (2008). Stereotypes influence false memories for imagined events. *Memory, 16*, 97-114.

Kleider, H. M., Pezdek, K., Goldinger, S. D., & Kirk, A. (2008). Schema-driven source misattribution errors: Remembering the expected from a witnessed event. *Applied Cognitive Psychology, 22*, 1-20.

Komarraju, M., Karau, S. J., & Schmeck, R. R. (2009). Role of the big five personality traits in predicting college students' academic motivation and achievement. *Learning and Individual Differences*, 19, 47-52.

Kounios, J., Green, D. L., Payne, L., Fleck, J. I., Grondin, R., & McRae, K. (2009). Semantic richness and the activation of concepts in semantic memory: Evidence from event-related potentials. *Brain Research, 1282*, 95-102.

Kuhlmann, B. G., Vaterrodt, B., & Bayen, U. J. (2012). Schema bias in source monitoring varies with encoding conditions: Support for a probability-matching account. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 38*, 1365-1376.

Kunda, Z., & Sanitioso, R. (1989). Motivated changes in the self-concept. *Journal of Experimental Social Psychology, 25*, 272-285.

Lang, P. J. (1995). The emotion probe: Studies of motivation and attention. *American Psychologist*, 50, 372-385.

Larkin, J., McDermott, J., Simon, D. P., & Simon, H. A. (1980). Expert and novice performance in solving physics problems. *Science, 208*, 1335-1342.

Larkina, M., & Bauer, P. J. (2012). "Family stories" and their implications for preschoolers' memories of personal events. *Journal of Cognition and Development*, *13*, 473–504.

Leary, M. R. (2004). *The curse of the self: Self-awareness, egotism, and the quality of human life*. New York, NY US: Oxford University Press.

Leary, M. R., & Allen, A. B. (2011). Personality and persona: Personality processes in self-presentation. *Journal of Personality, 79*, 889-916.

Leary, M. R., & Kowalski, R. M. (1990). Impression management: A literature review and two-component model. *Psychological Bulletin, 107*, 34-47.

Leary, M. R., & Tangney, J. P. (2012a). The self as an organizing construct in the behavioral and social sciences. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity (2nd ed)* (pp. 3-14). New York, NY US: Guilford Press.

Leary, M. R., & Tangney, J. P. (Eds.). (2012b). *Handbook of Self and Identity (2nd ed.)*. New York, NY US: Guilford Press.

LeDoux, J. E. (1996). *The emotional brain: The mysterious underpinnings of emotional life.* New York, NY, US: Simon & Schuster.

Leventhal, H., & Scherer, K. (1987). The relationship of emotion to cognition: A functional approach to a semantic controversy. *Cognition and Emotion*, *1*, 3-28.

Loftus, E. F. (1996). Memory distortion and false memory creation. *Bulletin of the American Academy of Psychiatry & the Law, 24*, 281-295.

Loftus, E. F., Garry, M., Brown, S. W., & Rader, M. (1994). Near-natal memories, past-life memories, and other memory myths. *American Journal of Clinical Hypnosis, 36*, 176-179.

Loftus, E. F., & Zanni, G. (1975). Eyewitness testimony: The influence of the wording of a question. *Bulletin of the Psychonomic Society, 5*, 86-88.

Lorenz, H. (2009). Ancient theories of soul. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy (Summer 2009 Edition)*.

Luo, W., Watkins, D., & Lam, R. Y. H. (2009). Validating a new measure of self-complexity. *Journal of Personality Assessment, 91*, 381-386.

Markus, H. (1977). Self-schemata and processing information about the self. *Journal of Personality and Social Psychology, 35*, 63-78.

Markus, H. (1983). Self-knowledge: An expanded view. *Journal of Personality, 51*, 543-565.

Markus, H., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review, 98*, 224-253.

Markus, H., & Kunda, Z. (1986). Stability and malleability of the self-concept. *Journal of Personality and Social Psychology, 51*, 858-866.

Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist, 41*, 954-969.

Markus, H., & Wurf, E. (1987). The dynamic self-concept: A social psychological perspective. *Annual Review of Psychology, 38*, 299-337.

Marsh, E. J., Roediger, H. L., III, Bjork, R. A., & Bjork, E. L. (2007). The memorial consequences of multiple-choice testing. *Psychonomic Bulletin & Review, 14*, 194-199.

Marsh, E. J., & Tversky, B. (2004). Spinning the Stories of our Lives. *Applied Cognitive Psychology, 18*, 491-503.

Marsh, E. J., Tversky, B., & Hutson, M. (2005). How Eyewitnesses Talk about Events: Implications for Memory. *Applied Cognitive Psychology, 19*, 531-544.

Mather, M., Johnson, M. K., & De Leonardis, D. M. (1999). Stereotype reliance in source monitoring: Age differences and neuropsychological test correlates. *Cognitive Neuropsychology, 16*, 437-458.

McAdams, D. P. (1987). A life-story model of identity. *Perspectives in Personality, 2*, 15-50.

McAdams, D. P. (1993). *The stories we live by: Personal myths and the making of the self*. New York, NY US: William Morrow & Co.

McAdams, D. P. (2001). The psychology of life stories. *Review of General Psychology, 5*, 100-122.

McAdams, D. P. (2011). Narrative identity. In S. J. Schwartz, K. Luyckx & V. L. Vignoles (Eds.), *Handbook of identity theory and research (Vols 1 and 2)* (pp. 99-115). New York, NY US: Springer Science + Business Media.

McAdams, D. P. (2013). How actors, agents, and authors find meaning in life. In K. D. Markman, T. Proulx & M. J. Lindberg (Eds.), *The psychology of meaning* (pp. 171-190). Washington, DC US: American Psychological Association.

McAdams, D. P., & Adler, J. M. (2010). Autobiographical memory and the construction of a narrative identity: Theory, research, and clinical implications. In J. E. Maddux & J. P. Tangney (Eds.), *Social psychological foundations of clinical psychology* (pp. 36-50). New York, NY US: Guilford Press.

McAdams, D. P., & Cox, K. S. (2010). Self and identity across the life span. In M. E. Lamb, A. M. Freund & R. M. Lerner (Eds.), *The handbook of life-span development, Vol 2: Social and emotional development* (pp. 158-207). Hoboken, NJ US: John Wiley & Sons Inc.

McAdams, D. P., Josselson, R., & Lieblich, A. (2006). *Identity and story: Creating self in narrative*. Washington, DC US: American Psychological Association.

McCloskey, M., & Bigler, K. (1980). Focused memory search in fact retrieval. *Memory & Cognition, 8*, 253-264.

McConnell, A. R., Rydell, R. J., & Leibold, J. M. (2002). Expectations of consistency about the self: Consequences for self-concept formation. *Journal of Experimental Social Psychology, 38*, 569-585.

McConnell, A. R., & Strain, L. M. (2007). Content and structure of the self-concept. In C. Sedikides & S. J. Spencer (Eds.), *The self* (pp. 51-73). New York, NY US: Psychology Press.

McCurdy, H. G. (1956). Coin perception studies and the concept of schemata. *Psychological Review, 63*, 160-168.

McGuire, W. J. (1984). Search for the self: Going beyond self-esteem and the reactive self. In R. A. Zurcher, J. Arnoff & A. I. Rabin (Eds.), *Personality and the prediction of behavior* (pp. 73-120). New York: Academic Press.

McGuire, W. J., & McGuire, C. V. (1982). Significant others in self space: Sex differences and developmental trends in social self. In J. Suls (Ed.), *Psychological perspectives of the self* (Vol. 1, pp. 71-96). Hillsdale, NJ: Erlbaum.

McGuire, W. J., McGuire, C. V., & Cheever, J. (1986). The self in society: Effects of social contexts on the sense of self. *British Journal of Social Psychology, 25*, 259-270.

McGuire, W. J., McGuire, C. V., Child, P., & Fujioka, T. (1978). Salience of ethnicity in the spontaneous self-concept as a function of one's ethnic distinctiveness in the social environment. *Journal of Personality and Social Psychology, 36*, 511-520.

McGuire, W. J., McGuire, C. V., & Winton, W. (1979). Effects of household sex composition on the salience of one's gender in the spontaneous self-concept. *Journal of Experimental Social Psychology, 15*, 77-90.

McGuire, W. J., & Padawer-Singer, A. (1976). Trait salience in the spontaneous self-concept. *Journal of Personality and Social Psychology, 33*, 743-754.

McKeithen, K. B., Reitman, J. S., Rueter, H. H., & Hirtle, S. C. (1981). Knowledge organization and skill differences in computer programmers. *Cognitive Psychology, 13*, 307-325.

McLean, K. C., & Pratt, M. W. (2006). Life's little (and big) lessons: Identity statuses and meaning-making in the turning point narratives of emerging adults. *Developmental Psychology, 42*, 714-722.

McNorgan, C., Reid, J., & McRae, K. (2011). Integrating conceptual knowledge within and across representational modalities. *Cognition, 118*, 211-233.

Metcalfe, J., & Kober, H. (2005). Self-Reflective Consciousness and the Projectable Self. In H. S. Terrace & J. Metcalfe (Eds.), *The missing link in cognition: Origins of self-reflective consciousness* (pp. 57-83). New York, NY US: Oxford University Press.

Meyers, L. S., Gamst, G., & Guarino, A. J. (2013). *Applied multivariate research: Design and interpretation (2nd ed.).* Thousand Oaks, CA, US: Sage Publications, Inc.

Mitchell, R. W. (2012). Self-recognition in animals. In M. R. Leary, J. P. Tangney, M. R. Leary, J. P. Tangney (Eds.), *Handbook of self and identity (2nd ed.)* (pp. 656-679). New York, NY, US: Guilford Press.

Morris, G., Baker-Ward, L., & Bauer, P. J. (2010). What remains of that day: The survival of children's autobiographical memories across time. *Applied Cognitive Psychology*, *24*, 527–544.

Neisser, U. (1981). John Dean's memory: A case study. *Cognition, 9*, 1-22.

Neisser, U. (1988). Five kinds of self-knowledge. *Philosophical Psychology, 1*, 35-59.

Nurius, P. S., & Markus, H. (1990). Situational variability in the self-concept: Appraisals, expectancies, and asymmetries. *Journal of Social and Clinical Psychology, 9*, 316-333.

Oldfield, R. C., & Zangwill, O. L. (1942). Head's concept of the schema and its application in contemporary British psychology. Part III. Bartlett's theory of memory. *British Journal of Psychology, 33*, 113-129.

Olson, J. M., & Cal, A. V. (1984). Source credibility, attitudes, and the recall of past behaviours. *European Journal of Social Psychology, 14*, 203-210.

Oyserman, D., Elmore, K., & Smith, G. (2012). Self, self-concept, and identity. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity (2nd ed.)* (pp. 69-104). New York, NY US: Guilford Press.

Oyserman, D., & Markus, H. R. (1998). Self as social representation. In U. Flick (Ed.), *The psychology of the social* (pp. 107-125). New York, NY US: Cambridge University Press.

Oyserman, D., & Packer, M. J. (1996). Social cognition and self-concept: A socially contextualized model of identity. In J. L. Nye & A. M. Brower (Eds.), *What's social about social cognition? Research on socially shared cognition in small groups* (pp. 175-201). Thousand Oaks, CA US: Sage Publications, Inc.

Pasupathi, M. (2001). The social construction of the personal past and its implications for adult development. *Psychological Bulletin, 127*, 651-672.

Pasupathi, M. (2007). Telling and the remembered self: Linguistic differences in memories for previously disclosed and previously undisclosed events. *Memory*, 15, 258-270

Pasupathi, M., & Mansour, E. (2006). Adult age differences in autobiographical reasoning in narratives. *Developmental Psychology, 42*, 798-808.

Patel, V. L., & Groen, G. J. (1991). The general and specific nature of medical expertise: A critical look. In K. A. Ericsson & J. Smith (Eds.), *Toward a general theory of expertise: Prospects and limits* (pp. 93-125). New York, NY US: Cambridge University Press.

Pennebaker, J. W., Booth, R. J., &Francis, M. E. (2007). Linguistic Inquiry and Word Count: LIWC2007—Operator's Manual. Retrieved from http:// www.liwc.net/

Pennebaker, J. W., Mehl, M. R., & Niederhoffer, K. G. (2003). Psychological aspects of natural language. use: Our words, our selves. *Annual Review of Psychology*, *54*, 547–577.

Pillemer, D. B. (1998). *Momentous events, vivid memories*. Cambridge, MA US: Harvard University Press.

Pillemer, D. B. (2003). Directive functions of autobiographical memory: The guiding power of the specific episode. *Memory, 11*, 193-202.

Pillemer, D. B., Krensky, L., Kleinman, S. N., & Goldsmith, L. R. (1991). Chapters in narratives: Evidence from oral histories of the first year in college. *Journal of Narrative & Life History, 1*, 3-14.

Pillemer, D. B., Steiner, K. L., Kuwabara, K. J., Thomsen, D. K., & Svob, C. (2015). Vicarious memories. *Consciousness and Cognition: An International Journal*, *36*, 233-245.

Pivetti, M., Camodeca, M., & Rapino, M. (2015). Shame, guilt, and anger: Their cognitive, physiological, and behavioral correlates. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues.*

Prebble, S. C., Addis, D. R., & Tippett, L. J. (2013). Autobiographical memory and sense of self. *Psychological Bulletin*, *139*, 815-840.

Raggatt, P. T. F. (2006). Multiplicity and Conflict in the Dialogical Self: A Life-Narrative Approach. In D. P. McAdams, R. Josselson & A. Lieblich (Eds.), *Identity and story: Creating self in narrative* (pp. 15-35). Washington, DC US: American Psychological Association.

Rathbone, C. J., Conway, M. A., & Moulin, C. J. A. (2011). Remembering and imagining: The role of the self. *Consciousness and Cognition: An International Journal, 20*, 1175-1182.

Raudenbush, S.W. & Bryk, A.S. (2002). *Hierarchical Linear Models: Applications and Data Analysis Methods, Second Edition*. Thousand Oaks, CA: Sage Publications, Inc.

Reese, E., Haden, C. A., Baker-Ward, L., Bauer, P. A., Fivush, R., & Ornstein, P. (2011). Coherence of personal narratives across the lifespan: A multidimensional model and coding method. *Journal of Cognition and Development, 12*, 424-462.

Reiser, B. J., Black, J. B., & Abelson, R. P. (1985). Knowledge structures in the organization and retrieval of autobiographical memories. *Cognitive Psychology, 17*, 89-137.

Reiser, B. J., Black, J. B., & Kalamarides, P. (1986). Strategic memory search processes. In D. C. Rubin (Ed.), *Autobiographical memory* (pp. 100-121). New York, NY US: Cambridge University Press.

Rhodewalt, F., & Agustsdottir, S. (1986). Effects of self-presentation on the phenomenal self. *Journal of Personality and Social Psychology, 50*, 47-55.

Rinn, A. N., Jamieson, K. M., Gross, C. M., & McQueen, K. S. (2009). A canonical correlation analysis of the influence of social comparison, gender, and grade level on the multidimensional self-concepts of gifted adolescents. *Social Psychology of Education, 12*, 251-269.

Roediger, H. L., III, Agarwal, P. K., Kang, S. H. K., & Marsh, E. J. (2010). Benefits of testing memory: Best practices and boundary conditions. In G. M. Davies & D. B. Wright (Eds.), *Current issues in applied memory research* (pp. 13-49). New York, NY US: Psychology Press.

Roediger, H. L., III, & Butler, A. C. (2011). The critical role of retrieval practice in long-term retention. *Trends in Cognitive Science, 15*, 20-27.

Roediger, H. L., III, & Karpicke, J. D. (2006). The power of testing memory: Basic research and implications for educational practice. *Perspectives on Psychological Science, 1*, 181-210.

Rogers, T. B., Kuiper, N. A., & Kirker, W. S. (1977). Self-reference and the encoding of personal information. *Journal of Personality and Social Psychology, 35*, 677-688.

Ross, M. (1989). Relation of implicit theories to the construction of personal histories. *Psychological Review, 96*, 341-357.

Ross, M., McFarland, C., Conway, M., & Zanna, M. P. (1983). Reciprocal relation between attitudes and behavior recall: Committing people to newly formed attitudes. *Journal of Personality and Social Psychology, 45*, 257-267.

Ross, M., McFarland, C., & Fletcher, G. J. (1981). The effect of attitude on the recall of personal histories. *Journal of Personality and Social Psychology, 40*, 627-634.

Ross, M., & Wang, Q. (2010). Why we remember and what we remember: Culture and autobiographical memory. *Perspectives on Psychological Science, 5*, 401-409.

Ross, M., & Wilson, A. E. (2002). It feels like yesterday: Self-esteem, valence of personal past experiences, and judgments of subjective distance. *Journal of Personality and Social Psychology, 82*, 792-803.

Rubin, D. C. (1986). *Autobiographical memory*. New York, NY US: Cambridge University Press.

Rubin, D. C. (1988). Go for the skill. In U. Neisser & E. Winograd (Eds.), *Remembering reconsidered: Ecological and traditional approaches to the study of memory* (pp. 374-382). New York, NY US: Cambridge University Press.

Rubin, D. C. (2006). The basic-systems model of episodic memory. *Perspectives on Psychological Science, 1*, 277-311.

Rubin, D. C. (2012). The basic systems model of autobiographical memory. In D. Berntsen & D. C. Rubin (Eds.), *Understanding autobiographical memory: Theories and approaches* (pp. 11-32). New York: Cambridge University Press.

Rubin, D. C., Boals, A., & Klein, K. (2010). Autobiographical memories for very negative events: The effects of thinking about and rating memories. *Cognitive Therapy and Research, 34*, 35-48.

Rubin, D.C., Deffler, S. A., Ogle, C. M., Dowell, N., & Graesser, A. (2016) Participant, rater, and computer measures of coherence in posttraumatic stress disorder: Trauma vs. control memories in clinical vs. control samples. *Journal of Abnormal Psychology*, *125*, 11-25.

Rubin, D. C., Dennis, M. F., & Beckham, J. C. (2011). Autobiographical memory for stressful events: The role of autobiographical memory in posttraumatic stress disorder. *Consciousness and Cognition: An International Journal*, *20*, 840–856.

Rubin, D. C., Feldman, M. E., & Beckham, J. C. (2004). Reliving, emotions, and fragmentation in the autobiographical memories of veterans diagnosed with PTSD. *Applied Cognitive Psychology*, *1*, 17-35.

Rubin, D. C., & Kontis, T. C. (1983). A schema for common cents. *Memory & Cognition, 11*, 335-341.

Rubin, D. C., Schrauf, R. W., & Greenberg, D. L. (2003). Belief and recollection of autobiographical memories. *Memory & Cognition*, *31*, 887–901.

Rubin, D. C., Schrauf, R. W., & Greenberg, D. L. (2004). Stability in autobiographical memories. *Memory*, 12, 715–721

Rubin, D. C., & Umanath, S. (2015). Event memory: A theory of memory for laboratory, autobiographical, and fictional events. *Psychological Review*, *122*, 1-23.

Rude, S., Gortner, E. M., & Pennebaker, J. (2004). Language use of depressed and depression-vulnerable college students. *Cognition and Emotion*, *18*, 1121–1133.

Rudoy, J. D., Weintraub, S., & Paller, K. A. (2009). Recall of remote episodic memories can appear deficient because of a gist-based retrieval orientation. *Neuropsychologia, 47*, 938-941.

Ryan, R. M., & Deci, E. L. (2012). Multiple identities within a single self: A self-determination theory perspective on internalization within contexts and cultures. In M. R. Leary, J. P. Tangney (Eds.), *Handbook of self and identity (2nd ed.)* (pp. 225-246). New York, NY, US: Guilford Press.

Sanitioso, R., Kunda, Z., & Fong, G. T. (1990). Motivated recruitment of autobiographical memories. *Journal of Personality and Social Psychology, 59*, 229-241.

Schank, R. C., & Abelson, R. P. (1977). *Scripts, plans, goals and understanding: An inquiry into human knowledge structures*. Oxford England: Lawrence Erlbaum.

Schlenker, B. R. (1985). *The self and social life*: McGraw-Hill College.

Schlenker, B. R., & Wowra, S. A. (2003). Carryover Effects of Feeling Socially Transparent or Impenetrable on Strategic Self-Presentation. *Journal of Personality and Social Psychology, 85*, 871-880.

Schlenker, B. R., Wowra, S. A., Johnson, R. M., & Miller, M. L. (2008). The impact of imagined audiences on self-appraisals. *Personal Relationships, 15*, 247-260.

Schoeneman, T. J. (1981). Reports of the sources of self-knowledge. *Journal of Personality, 49*, 284-294.

Schulkind, M. D., Rahhal, T. A., Klein, M. R., & Lacher, S. R. (2012). The specificity and organisation of autobiographical memories. *Memory, 20*, 923-934.

Schwalbe, M. (2009). Framing the self. *Symbolic Interaction, 32*, 177-183.

Schwartz, G. E., Weinberger, D. A., & Singer, J. A. (1981). Cardiovascular differentiation of happiness, sadness, anger, and fear following imagery and exercise. *Psychosomatic Medicine*, *43*, 343-364

Sexton, J. B., & Helmreich, R. L., 2000/ Analyzing cockpit communications: The links between language, performance, and workload. *Human Performance in Extreme Environments*, *5*, 63-68.

Shaw, C. L. M. (1997). Personal narrative: Revealing self and reflecting other. *Human Communication Research, 24*, 302-319.

Sherman, J. W., Lee, A. Y., Bessenoff, G. R., & Frost, L. A. (1998). Stereotype efficiency reconsidered: Encoding flexibility under cognitive load. *Journal of Personality and Social Psychology, 75*, 589-606.

Shore, B. (2009). Making time for family: Schemas for long-term family memory. *Social Indicators Research, 93*, 95-103.

Showers, C. J., & Zeigler-Hill, V. (2012). Organization of self-knowledge: Features, functions, and flexibility. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity (2nd ed.)* (pp. 105-123). New York, NY US: Guilford Press.

Shum, M. S. (1998). The role of temporal landmarks in autobiographical memory processes. *Psychological Bulletin, 124*, 423-442.

Signorella, M. L., & Liben, L. S. (1984). Recall and reconstruction of gender-related pictures: Effects of attitude, task difficulty, and age. *Child Development, 55*, 393-405.

Singer, J. A., & Salovey, P. (1993). *The remembered self: Emotion and memory in personality*. New York, NY US: Free Press.

Skowronski, J. J., & Walker, W. R. (2004). How describing autobiographical events can affect autobiographical memories. *Social Cognition, 22*, 555-590.

Smith, E. R., & Semin, G. R. (2004). Socially Situated Cognition: Cognition in its Social Context. In M. P. Zanna (Ed.), *Advances in experimental social psychology, Vol. 36* (pp. 53-117). San Diego, CA US: Elsevier Academic Press.

Snijders, T.A.B. & Bosker, R.J. (2009). *Multilevel analysis: An introduction to basic and advanced multilevel modeling (2nd ed.).* London: Sage Publications, Inc.

Solberg Nes, L., Carlson, C. R., Crofford, L. J., de Leeuw, R., & Segerstrom, S. C. (2011). Individual differences and self-regulatory fatigue: Optimism, conscientiousness, and self-consciousness. *Personality and Individual Differences*, 50, 475-480.

Sommer, K. L., Baumeister, R. F., & Stillman, T. F. (2012). The construction of meaning from life events: Empirical studies of personal narratives. In P. T. P. Wong (Ed.), *The human quest for meaning: Theories, research, and applications (2nd ed.)* (pp. 297-313). New York, NY US: Routledge/Taylor & Francis Group.

Spaniol, J., & Bayen, U. J. (2002). When is schematic knowledge used in source monitoring? *Journal of Experimental Psychology: Learning, Memory, and Cognition, 28*, 631-651.

Spreng, R. N., & Levine, B. (2006). The temporal distribution of past and future autobiographical events across the lifespan. *Memory & Cognition, 34*, 1644-1651.

Srull, T. K., & Wyer, R. S., Jr. (1993). *The mental representation of trait and autobiographical knowledge about the self*. Hillsdale, NJ England: Lawrence Erlbaum Associates, Inc.

Starmans, C., & Bloom, P. (2012). Windows to the soul: Children and adults see the eyes as the location of the self. *Cognition, 123*, 313-318.

Stone, C. B., Barnier, A. J., Sutton, J., & Hirst, W. (2010). Building consensus about the past: Schema consistency and convergence in socially shared retrieval-induced forgetting. *Memory, 18*, 170-184.

Stone, C. B., Barnier, A. J., Sutton, J., & Hirst, W. (2013). Forgetting Our Personal Past: Socially Shared Retrieval-Induced Forgetting of Autobiographical Memories. *Journal of Experimental Psychology: General, 142*, 1084-1099.

Strack, F., & Deutsch, R. (2004). Reflective and Impulsive Determinants of Social Behavior. *Personality and Social Psychology Review, 8*, 220-247.

Strange, D., & Takarangi, M. K. T. (2012). False memories for missing aspects of traumatic events. *Acta Psychologica, 141*, 322-326.

Strongman, K. T., & Kemp, S. (1991). Autobiographical memory for emotion. *Bulletin of the Psychonomic Society*, *29*, 195-198.

Stryker, S., & Burke, P. J. (2000). The past, present, and future of an identity theory. *Social Psychology Quarterly*, *63*, 284-297.

Suls, J. M., & Miller, R. L. (1977). *Social comparison processes: Theoretical and empirical perspectives*. Oxford England: Hemisphere.

Szpunar, K. K. (2010). Episodic future thought: An emerging concept. *Perspectives on Psychological Science, 5*, 142-162.

Szpunar, K. K., Watson, J. M., & McDermott, K. B. (2007). Neural substrates of envisioning the future. *PNAS Proceedings of the National Academy of Sciences of the United States of America, 104*, 642-647.

Talarico, J. M., & Moore, K. M. (2012). Memories of 'the rivalry': Differences in how fans of the winning and losing teams remember the same game. *Applied Cognitive Psychology.*

Talarico, J. M., LaBar, K. S., & Rubin, D. C. (2004). Emotional intensity predicts autobiographical memory experience. *Memory & Cognition*, *32*, 1118-1132.

Talarico, J. M., & Rubin, D. C. (2007). Flashbulb memories are special after all; in phenomenology, not accuracy. *Applied Cognitive Psychology, 21*, 557-578.

Tausczik, Y. R., & Pennebaker, J. W. (2010). The psychological meaning of words: LIWC and computerized text analysis methods. *Journal of Language and Social Psychology*, *29*, 24-54.

Thomsen, D. K., & Brinkmann, S. (2009). An interviewer's guide to autobiographical memory: Ways to elicit concrete experiences and to avoid pitfalls in interpreting them. *Qualitative Research in Psychology, 6*, 294-312.

Torr, J. (2004). Talking about picture books: The influence of maternal education on four-year-old children's talk with mothers and pre-school teachers. *Journal of Early Childhood Literacy, 4*, 181-210.

Tuckey, M. R., & Brewer, N. (2003). The influence of schemas, stimulus ambiguity, and interview schedule on eyewitness memory over time. *Journal of Experimental Psychology: Applied, 9*, 101-118.

Tulving, E. (1972). Episodic and semantic memory *Organization of memory.* Oxford England: Academic Press.

Tulving, E. (1985). Memory and consciousness. *Canadian Psychology/Psychologie canadienne, 26*, 1-12.

Tulving, E. (1993). What is episodic memory? *Current Directions in Psychological Science, 2*, 67-70.

Tulving, E., Schacter, D. L., McLachlan, D. R., & Moscovitch, M. (1988). Priming of semantic autobiographical knowledge: A case study of retrograde amnesia. *Brain and Cognition, 8*, 3-20.

Tversky, B., & Marsh, E. J. (2000). Biased retellings of events yield biased memories. *Cognitive Psychology, 40*, 1-38.

Van Overschelde, J. P., & Healy, A. F. (2001). Learning of nondomain facts in high- and low-knowledge domains. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 27*, 1160-1171.

Washburn, M. F., Field, R., & Wolf, E. D. (1923). A study of revived emotions. *American Journal of Psychology*, *34*, 99-103.

Willard, G., & Gramzow, R. H. (2008). Exaggeration in memory: Systematic distortion of self-evaluative information under reduced accessibility. *Journal of Experimental Social Psychology, 44*, 246-259.

Williams, J. M. G. (1995). Depression and the specificity of autobiographical memory. In D. C. Rubin (Ed.), *Remembering our past: Studies in autobiographical memory* (pp. 244-267). Cambridge: Cambride University Press.

Williams, J. M. G., Ellis, N. C., Tyers, C., Healy, H., Rose, G., & MacLeod, A. K. (1996). The specificity of autobiographical memory and imageability of the future. *Memory & Cognition, 24*, 116-125.

Williams, J. M. G., Healy, H. G., & Ellis, N. C. (1999). The effect of imageability and predicability of cues in autobiographical memory. *The Quarterly Journal of Experimental Psychology A: Human Experimental Psychology, 52A*, 555-579.

Wilson, A. E., & Ross, M. (2001). From chump to champ: People's appraisals of their earlier and present selves. *Journal of Personality and Social Psychology, 80*, 572-584.

Wyer, R. S., & Srull, T. K. (1986). Human cognition in its social context. *Psychological Review, 93*, 322-359.

Wyer, R. S., & Srull, T. K. (1989). *Memory and cognition in its social context*. Hillsdale, NJ England: Lawrence Erlbaum Associates, Inc.

Yeh, W., & Barsalou, L. W. (2006). The situated nature of concepts. *The American Journal of Psychology, 119*, 349-384.

Biography

Samantha Ann Deffler was born in Edison, New Jersey on August 18, 1988 to Marie Deffler (née Olah) and John (Jack) Deffler. She grew up in South Plainfield, New Jersey. Samantha attended Bucknell University, graduating *summa cum laude* in 2010 with a Bachelor's of Science in Neuroscience. She was elected to Phi Beta Kappa and received Departmental Honors and the Bucknell Prize.

Samantha attended graduate school in the Department of Psychology and Neuroscience at Duke University under the mentorship of Dr. David C. Rubin. She completed a Master's of the Arts in 2012 and will obtain her Doctorate of Philosophy with a Certificate in College Teaching in May 2016. While at Duke, Samantha received the Bass Instructor of Record Fellowship, Preparing Future Faculty Fellowship, Summer Graduate Research Fellowship, and Graduate School Administrative Internship.

Samantha's published articles include:

Deffler, S. A., Fox, C., Ogle, C. M., & Rubin, D. C. (In Press) All My Children: The Roles of Semantic Category and Phonetic Similarity in the Misnaming of Familiar Individuals. *Memory & Cognition.*

Deffler, S. A., Leary, M. R., & Hoyle, R. H. (In Press). Knowing what you know: Intellectual humility and judgments of recognition memory. *Personality and Individual Differences*.

Rubin, D.C., Deffler, S. A., Ogle, C. M., Dowell, N., & Graesser, A. (2016) Participant, rater, and computer measures of coherence in posttraumatic stress disorder: Trauma vs. control memories in clinical vs. control samples. *Journal of Abnormal Psychology*, *125*, 11-25.

Deffler, S. A., Brown, A. S., & Marsh, E. J. (2015). Judging the familiarity of strangers: Does the context matter? *Psychonomic Bulletin & Review*, *22*, 1041-1047.