Transition Theory: Evidence from Personal Transitions and Their Role in the Contents and Organization of Autobiographical Memories

by

Liangzi Shi

A thesis submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

Department of Psychology
University of Alberta

Abstract

The retrieval curve of autobiographical memories across the lifespan is not an Ebbinghaus forgetting curve; it peaks at adolescence and early adulthood. One mainstream theory of autobiographical memory uses "the self" to explain the reminiscence bump and other phenomena in the field. In this dissertation, we argue that autobiographical memory can be "self-less." There is only a small group of transitional events that may be important to the sense of "who I am." In most cases, especially when elicited by neutral words, autobiographical events are usually mundane anecdotes. We explore the reasons why people remember self-irrelevant events and use Transition Theory to predict when/where an increased retrieval of such events are most likely to occur.

Transition Theory assumes that major life transitions delineate lifetime periods and organize autobiographical memory. Three categories of life transitions have been identified (Brown et al., 2016): collective (e.g., wars), normative personal (e.g., childbirth), and non-normative personal (e.g., immigration). Experiment 1 tests participants' subjective beliefs about certain personal transitions regarding prevalence, age norms, emotional valence, transitional impact, and importance. To compare the effects of aging and personal experience, we recruited both younger and older adults and divided them into two conditions. Participants in the experienced condition assessed a list of possible transitional events based on their own experiences, whereas those in the hypothetical condition assessed the same list through the imagined life of an average Canadian. A series of events were identified as major life transitions, including both expected and unforeseen events in an idealized life. In general, participants' beliefs about the life transitions reflected their actual experiences. Compared with participants under the experienced condition, those in the hypothetical condition tended to consider events to be more important, impactful, and emotionally salient. We also found some age-related

differences in the contents of major life transitions, except relocation, which was one acknowledged major transition across age groups.

The second line of this dissertation is concerned with the characteristics and temporal distribution of word-cued autobiographical memories. We propose that transitional events, distinctive events, and mundane events are three subsets of autobiographical memory. Experiment 2 confirms the existence of non-transitional, self-irrelevant events. With a proper cue, participants could recall even more trivial events from the very recent past (e.g., two weeks ago). In this study, we asked undergraduates to explicitly provide their reasons for retention and quantitatively assess some properties of the word-cued events. Participants believed that they remembered the autobiographical events for various reasons (e.g., novelty, emotionality, rehearsal, and recency), and self-relevance was rarely the primary factor for memory consolidation and retention. Experiment 3 examines the organizational role of life transitions in autobiographical memories produced by middle-aged Chinese immigrants. During the think-aloud dating task, participants frequently made references to their major life transitions (e.g., immigration) when estimating the year for word-cued memories. We consider the bumps in the memory retrieval curve across the life span as a result of the "pile-up" of autobiographical memories around life transitions. Taken all together, these findings suggest that Transition Theory provides some comprehensive predictions on the mechanism of autobiographical memory.

Keywords**:** autobiographical memory, transition theory, life script, immigration, aging

Preface

This thesis is an original work by Liangzi Shi. The research projects, which this thesis includes, received research ethics approval from the University of Alberta Research Ethics Board:

Project Name of Experiment 1 “BELIEFS ABOUT LIFE-SCRIPT EVENTS AND SCRIPT-DIVERGENT EVENTS” (Pro00055119), OCTOBER 23, 2015.

Project Name of Experiment 2 “TOWARDS A BOTTOM-UP CONCEPTION OF AUTOBIOGRAPHICAL MEMORY” (Pro00042123), SEPTEMBER 17, 2015.

Project Name of Experiment 3 “ACCULTURATION AND AUTOBIOGRAPHICAL MEMORY” (Pro00050592), SEPTEMBER 29, 2014.

Part of Experiment 3 in this thesis has been published as L. Shi, and N. R. Brown, “The effect of immigration on the contents and organization of autobiographical memory: A transition-theory perspective”, Journal of Applied Research in Memory and Cognition, Vol. 5, Issue 2, 135–142.

Dedication

I would like to dedicate this thesis to my beloved mother.

Acknowledgments

I would like to express my deepest gratitude to my supervisor, Dr. Norman R. Brown, who continually conveyed a spirit of adventure regarding research and who has been a great mentor for all these years. Without his constant guidance and sponsorship, this dissertation would not have been possible.

I would like to thank my supervisory committee members, Dr. Peter Dixon, and Dr. Kimberley Noels, for their inspiring advice and generous encouragement. I also feel extremely grateful to my examining committee, Dr. Tanya Berry, Dr. Mike Carbonaro, Dr. Weimin Mou, Dr. Elena Nicoladis, and Dr. Dorthe K. Thomsen, for their sincere and valuable comments on this dissertation.

I wish to extend my appreciation to all the academic, administration, and technical staff of the Department of Psychology for their unceasing support and help. A special thanks to our graduate lab members, Dr. Oliver Schweickart, Dr. Connie Svob, and Cory Tam, who have been kindly tutoring me during the research processes. I also take this opportunity to acknowledge with gratitude the contribution and assistance of our undergraduate lab members: Phillip Reimer, Aala Abdullahi, Charlotte Becher, Palak Dadwal, Emily Keating, Maria Kim, Matthew Klapstein, Jason Lee, Sabrina Lorico, Sarah Nguyen, Karah Pegg, Christian Ream, Ben Sereda, Emily Sunwoo, Ruolin Wu, and Helena Zeng.

Finally, I am ineffably indebted to my family and my friends, who are the sources of my courage and strength to pursue my Ph.D. A heartfelt thank you to my husband, Zhao Li, who I am lucky to have as my life partner, my best friend, and my powerful supporter, and to my son, Dean Li, who always believes in me and makes me proud.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

People experience life transitions sometimes by following a predicable "life script," such as completing a degree, getting a job, and building a family, whereas some life transitions are encountered by accident, such as severe illnesses, bankruptcy, and divorce. Transitions are important not only because they change the "fabric of daily life" (Brown, 2016; Brown et al., 2016), but also because they influence the way we perceive the world and ourselves (Conway, 2005; Svob, Brown, Reddon, Uzer, & Lee, 2014). Moreover, researchers have found memorable personal experiences tend to cluster around important life transitions. For instance, adult immigrants usually report a larger number of vivid memories from the year of *immigration* than from other years (Esposito & Baker-Ward, 2016; Schrauf & Rubin, 1998; 2001), and alumni recall more events from the first month after *starting university* than from other times in the same school year (Pillemer, Goldsmith, Panter, & White, 1988; Pillemer, Rhinehart, & White, 1986). By asking people to "think aloud" while estimating the date for each elicited memory, Brown and colleagues found that a significant proportion of their date estimates are made with reference to certain life transitions (e.g., Brown, Hansen, Lee, Vanderveen, & Conrad, 2012; Brown & Lee, 2010; Brown, Schweickart, & Svob, 2016; Nourkova & Brown, 2015; Zebian & Brown, 2014). Therefore, they proposed that autobiographical memories "piled up" around major life transitions. They also used *Transition Theory* to explain this "pile-up" and to understand the relationship between life experience and autobiographical memory (Brown, 2016; Brown et al., 2012; Brown et al., 2016).

In this dissertation, we consider the empirical evidence in support of Transition Theory. Previously, the theoretical developments have been focused on the organizational role of public events, or *collective transitions*, such as wars and natural disasters, in autobiographical memory (Brown et al., 2009; 2012; 2016; Brown & Lee, 2010; Nourkova & Brown, 2015; Zebian &

Brown, 2014). However, in most cases, our memories are structured by *personal transitions* (e.g., graduation, marriage, and childbirth), which have a smaller scope (Brown et al., 2016), but are more common in individuals' lives. Hence, with a focus on personal transitions, this project aims (a) to clarify the nature and traits of life transitions, such as how they differ from non-transitional events and how they are distributed in a life span, and (b) to describe the temporal relationship between life transitions and elicited memories, and further, to understand when, where, and why autobiographical memories "pile-up" around major life transitions.

This dissertation consists of two studies. The first study (Chapter 2) investigates the fundamental nature of transitions and how the subjective assessments of transitional traits differ across event types and participant groups. We collect ratings (e.g., prevalence, age norms, valence, etc.) for a large set of potentially important transitional events. We also use the *Transitional Impact Scale* (*TIS-12*, Svob et al., 2014) to assess the changes brought by those personal life transitions. The rated event properties are compared between people who have experienced the events in question and those who have not. The effect of experience on the characteristic assessments for life transitions has been neglected in the literature. In the previous studies (e.g., Bertsen & Rubin, 2004; Bohn, 2010; Ece & Gulgoz, 2014; Erdogan, Baran, Avlar, Tas, & Tekcan, 2008; Grysman & Dimakis, 2017; Janssen & Rubin, 2011), participants nominated events that were most likely to occur in a prototypical life (i.e. life-scripted events), and then rated certain characteristics of each event. Their assessments might have been biased by participants' personal experiences as they did not differentiate the personally experienced events and the unexperienced events that were essentially nominated based on social beliefs.

The second study extends the focal problem from "when and where autobiographical events are most likely to be retrieved" to "why certain events are well remembered." In Chapter 3, we first illustrate the temporal relation between autobiographical memory and transitions, and

describe our assumptions about the role of transitions in the periodization of real-world experience and autobiographical memory. Experiment 2 demonstrates the prevalence of non-transitional events in autobiographical memories. The mainstream theories assume that all the accessible memories are important, either personally or culturally, whereas Transition Theory suggests that transitional events are only a small subset of autobiographical memories.

Experiment 3 reveals the role of major personal transitions in the organization of autobiographical memory. According to the current theories, three factors may potentially contribute to the bumped distribution of autobiographical memories across the life span: the developmental demands of self-goals (Conway, 2005; Conway & Holmes, 2004), culturally determined life scripts (Berntsen & Rubin, 2004), and major life transitions (Brown et al., 2012; 2016). Brown and colleagues have found evidence for the organizational role of life transitions in autobiographical memory by analyzing participants' dating protocols instead of elicited memory reports (e.g., Brown et al., 2012; 2016; Brown & Lee, 2010; Nourkova & Brown, 2015; Zebian & Brown, 2014; but see Berntsen & Rubin, 2002; 2004; Rubin & Berntsen, 2003; Thomsen & Berntsen, 2008; for examples of memory-report analyses). With the same approach, Experiment 3 demonstrates that people use important life transitions as temporal references to date reported event memories. Additionally, we confirm that life transitions do not necessarily change the specific features of autobiographical memories. For example, events of the "bump" period produce similar ratings on self-relevance, transition-relatedness, and emotional valence as the events that are retrieved from other time periods. As a conclusion, we argue that (a) autobiographical memory is not (just) about "the self," and (b) major life transitions delineate lifetime periods, which determine the organization of autobiographical memory.

To provide a background for the current project, the following sections summarize methodological and theoretical progress in the area and report recent relevant empirical findings.

The first section focuses on how we define and study autobiographical memory in the laboratory. Further, we describe the typical and atypical temporal distributions of autobiographical memories across the life span. These different patterns of temporal distribution reveal *when* and *where* autobiographical memories are most likely to be retrieved. The second and third sections are concerned with *what* organizes autobiographical memory and *why* certain autobiographical events are more accessible than others. Here, we describe two mainstream theories in the study of autobiographical memory — Conway's (2005) *self-memory system*, and the *cultural life-script* account (Berntsen & Rubin, 2004). By reviewing the literature, we highlight issues that these theories cannot account for, such as predicting an atypical bump in the retrieval curve of autobiographical memories. An overview of Transition Theory is further provided as a minimalist account for the organization of autobiographical memory. With regard to the unsolved issues, we present interpretations and empirical evidence in accordance with Transition Theory.

What is Autobiographical Memory

Autobiographical memory refers to declarative, explicit memory for specific episodes in one's own past (Nelson & Fivush, 2004; Tulving, 1972), which usually interacts with narrative processes (Bauer, Stark, Ackil, Larkina, Merrill, & Fivush, 2016; Brown & Schopflocher, 1998a; McAdams, 2001), temporal consciousness (Friedman, 1993), and reconstruction (Brown, 1990; Brown & Lee, 2010; Zebian & Brown, 2014). By contrast, general factual knowledge about experiences, opinions, and personalities (e.g., "I visit China every two years after having immigrated to Canada", "I like swimming," and "I am a person with a good sense of humor") is referred to as *autobiographical knowledge* (Conway, 1996; Renoult, Davidson, Palombo, Moscovitch, & Levine, 2012). In the laboratory, researchers typically restrict recall to *specific events* (defined as one-time events that have taken place at a specific time in a specific location and lasted for no more than a day, e.g., Brown & Schopflocher, 1998a; Conway & Haque, 1999;

Conway & Hormes, 2004; Enz, Pillemer, & Johnson, 2016; Linton, 1975; Uzer & Brown, 2017) rather than repeated or extended events (Barsalou, 1988; Conway & Pleydell-Pearce, 2000; Holland, Addis, & Kiesinger, 2011).

Understanding the organization of autobiographical memory may promote the development of both theoretical and applied psychology. It can help us recognize the related cognitive processes and thus direct, facilitate, and inhibit the search and retrieval of certain personal experiences. A basic theoretical issue, for instance, is why certain events are remembered better than others. Many studies have attempted to answer this question by investigating the retrieval curve of personal memories across the life span (e.g., Conway, 2005; Rubin, 1982; Berntsen & Rubin, 2004; Brown & Lee, 2010; Janssen & Murre, 2008). One widely-accepted view emphasizes the role of personal importance, or self-relevance, in event encoding (Conway, 1996; 2005; Conway & Pleydell-Pearce, 2000). Alternatively, enhanced memory has been attributed to the frequent rehearsal of first-time or unusual personal experiences, which are often encountered during an unstable lifetime period (Brown, 2016; Brown et al., 2012; 2016; Linton, 1975; Robinson, 1976; Rubin, Rahhal, & Poon, 1998). The significance of autobiographical memory research is also noticeable in the applied field. For example, theories of autobiographical memory play a critical part in determining the reliability of eyewitness testimony (e.g., Lindsay, 1990; Yuille & Cutshall, 1986) and memories of childhood sexual abuse recovered during therapy (e.g., Hyman & Loftus, 1998; Kuyken & Brewin, 1995; see Linday, 2007 for a review).

To investigate when and where autobiographical memories are most likely to be retrieved, researchers have been studying how the recalled events are distributed across the life span. A standard paradigm for generating a life-span retrieval curve for autobiographical memory involves two phases: In the first phase, memories for specific personal events are

elicited by a set of neutral cue words, such as tree, house, and pencil (e.g., Bauer, Burch, Scholin, Güler, 2007; Brown & Lee, 2010; Brown & Schopflocher, 1998b; Crovitz & Schiffman, 1974; Rubin, 1982; Rubin & Schulkind, 1997; Zebian & Brown, 2014), or a set of personal-event memories is recalled according to certain criteria, such as importance and emotional valence (e.g., Berntsen & Rubin, 2002; Berntsen, Rubin, & Siegler, 2011; Dickson, Pillemer, & Bruehl, 2011; Haque & Hasking, 2010; Holmes & Conway, 1999; Rubin & Schulkind, 1997; Thomsen, Pillemer, & Ivcevic, 2011). Then in the second phase, reported events are presented again for participants to estimate the date (or age) at the occurrence of each event. In addition, Brown and colleagues have developed a think-aloud dating approach (Brown, 1990; Brown et al., 2009), where during the dating phase, participants verbally describe their dating process and justify their date estimates.

When autobiographical memories collected from older adults, the temporal distribution of these memories usually shows a bump – the *reminiscence bump* (Rubin, Wetzler, & Nebes, 1986) – between the ages of 10 to 30 (defined as *formative years*, Berntsen & Rubin, 2004; Koppel & Berntsen, 2015; Rubin et al., 1998; Rubin & Schulkind, 1997; Svob & Brown, 2012). This phenomenon is regarded as a defining feature of autobiographical memory because it is an exception of Ebbinghaus's forgetting curve and it is robust across different memory sampling methods (Koppel & Berntsen, 2015) and diverse cultures (Conway, Wang, Hanyu, & Haque, 2005). Koppel and Berntsen (2015) compared the locations of the reminiscence bumps in the temporal distribution of memories prompted by importance and by cue words, and found that the bump in word-cued memories is located nearly ten years earlier than that of the most important memories (see also Rubin & Schulkind, 1997. This finding suggests that any acceptable account regarding the reminiscence bump must allow for the variation in the retrieval curves produced with different sampling methods.

Occasionally, the reminiscence bump is moderated and overshadowed by a secondary bump (Conway & Haque, 1999). For instance, immigrants were found to have increased memories from the year of immigration (Esposito, & Baker-Ward, 2016; Schrauf & Rubin, 1998; 2000; 2001). Likewise, people who have lived through a conflict-saturated historical period often report multiplied public-event memories from that period (Brown et al., 2016; Brown & Lee, 2010; Conway & Haque, 1999; Schuman, Rieger, & Gaidys, 1994). Further, when asked to estimate the dates for their personal-event memories, these people also tend to use the public events (e.g., wars and natural disasters) that they have lived through as reference points. This *living-in-history effect* (Bohn & Habermas, 2016; Brown et al., 2009; 2012; 2016; Brown & Lee, 2010; Nourkova & Brown, 2015; Zebian & Brown, 2014) is considered as evidence for the important role historical events play in the organization of autobiographical memory. This phenomenon is prevalent among the to-be-dated events that are temporally close to a historical event, regardless of whether the personal events and historical event are related or not (Brown et al., 2016). The increasing interest in the atypical retrieval curve of autobiographical memory demands a theory that is applicable in both the normative and non-normative situations.

For decades, researchers have been trying to explain the reminiscence bump and other atypical bumps in the retrieval curve of autobiographical memory with two complex concepts, "the self," and "life scripts." Conversely, Transition Theory provides a simply and universal account for the organization of autobiographical memory. The following sections review some key assumptions of the mentioned theories and assess the extent to which they are recognized in the literature.

Autobiographical Memory and the Self

The sense of the self is grounded in the narrative of personally important experiences (Bauer, 2015; Williams, Conway, & Cohen, 2008). The sense of the self includes the beliefs

about who "I" were in the past, who "I" am now, and who "I" can be in the future (i.e. individualized possible selves, Markus & Nurius, 1986), which is also close to the concept of *self-schemata* – "cognitive generalizations about the self, derived from past experience, that organize and guide the processing of self-related information contained in the individual's social experiences" (Marcus, 1977, p. 64). Conway and colleagues proposed a *self-memory system* (SMS) to explain the mechanism of autobiographical memory, where the self-goals play a major role in event encoding and retaining memories of personal events (Conway, 1996; 2005; Conway & Pleydell-Pearce, 2000). In this hierarchical model, autobiographical memories are subsets of the contents (or *themes*) of *lifetime periods* (Conway, 1992; 1996; 2005), which reflect various developmental demands of self-goals, such as identity, intimacy, generativity, and integrity (Conway & Holmes, 2004). Events from the adolescence and early adulthood are memorable because they are required for "self-coherence," or in other words, the pursuit of self-goals and maintenance of the sense of the self (Conway, 2005). In Conway and Holmes's (2004) study, reported memories were mapped onto Erikson's psychosocial stages. They elicited autobiographical memories with the key words pointing to different self-goals (e.g., "being concerned for your partner" was a cue for intimacy); they found that the number of memories cued by each self-goal peaked at the age of the corresponding stage.

SMS has been thought to provide plausible accounts for some phenomena of autobiographical memory. For example, the reminiscence bump might exist because self-defining memories cluster during the formative years (Conway, 2005; Conway & Pleydell-Pearce, 2000), and atypical bumps occur during unstable lifetime periods because these periods reflect the creation of new self-goals and the experience of many events relevant to them (Conway & Haque, 1999). "Self-relevance" has been regarded as a key feature of autobiographical memory as well as the primary reason that we remember certain events in our

lives. Put another way, enhanced memory has been associated with the high accessibility of goal-related and self-defining events. For instance, people tend to produce more accurate estimation for the exact dates of their own experiences than the dates of events from another person's life (Betz & Skowronski, 1997), presumably because personal-event memories are more likely to contribute to the sense of "who I am" than event memories of another person's life (e.g. a parent or friend, Pillemer et al., 2015). Generally speaking, memory for any information might benefit from the self-referencing encoding (Carson, Murphy, Moscovitch, Rosenbaum, 2016; Serbun, Shih, & Gutchess, 2011; see Symons & Johnson, 1997, for a review).

Nonetheless, the SMS assumptions are poorly supported in the literature. First, there is no direct evidence to suggest that self-relevant events are prevalent in the bump period. For word-cued memories, in particular, there appears to be no difference in self-relevance or personal importance ratings across the lifespan (Conway & Haque, 1999; Janssen & Murre, 2008; see Koppel & Berntsen, 2015, for additional comments on this issue). Second, SMS lacks an explanation for the particular coincidence between the reminiscence bump and the critical period for self-identity. Some later-adulthood developmental goals (e.g., "integrity," Conway & Holmes, 2004) are supposed to be equally important to individuals and yet do not lead to a bump in the retrieval curve of autobiographical memory. Third, in addition to personally important and self-relevant events, autobiographical memories also include a large number of mundane events (Berntsen & Rubin, 2006; Dreamboat & Van der Linden, 2008; Demblon & D'Argembeau, 2017; Janssen & Murre, 2008). Therefore, it seems that self-relevance is not the only reason for remembering what we remembered.

Autobiographical Memory and Life Scripts

Social expectations may influence the way that people evaluate their life stories (i.e. important events in their own lives). The *cultural life-script account* (Berntsen & Rubin, 2004)

highlights the role of cultural importance, rather than personal importance, in memory consolidation. A *life script* outlines the sequence of age normative, culturally important, transitional, and usually positive events that are expected to occur in a prototypical life (Berntsen & Rubin, 2002; 2004; Rubin & Berntsen, 2003; Thomsen & Berntsen, 2008); events like graduating high school, starting a first job, getting married, and having a child. Life-scripted events differ from autobiographical events because they exist as "culturally shared" semantic knowledge, whereas autobiographical memories represent personally experienced episodes.

According to the cultural life-script account, the reminiscence bump arises from the enhanced memory for life-scripted events in the formative years, through (pre-) rehearsal, social desirability, and self-expectation (Berntsen & Rubin, 2002; 2004; Rubin & Berntsen, 2003; Rubin, Berntsen, & Hutson, 2009; Thomsen & Berntsen, 2008). Furthermore, Berntsen and Rubin (2002) proposed an inhibitory effect of "social censure" on emotionally negative and traumatic experiences, and they argued that this explains why events from the formative years are dominated by important and happy memories (Berntsen & Rubin, 2002; 2004; Berntsen, Rubin, & Siegler, 2011; Bohn, 2010; Rubin et al., 2009; Rubin & Berntsen, 2003; Scherman, 2013; but see Janssen, & Murre, 2008, for an opposite finding for word-cued events; and Grysman & Dimakis, 2017, for negative later-adulthood events).

Evidence for the cultural life-script account rests solely on the overlap in the contents and temporal distribution of life-scripted events and important autobiographical memories (e.g., Alea, Ali, & Marcano, 2014; Collins, Pillemer, Ivcevic, & Gooze, 2007; Dunlop, Hanley, McCoy, & Harake, 2017; Ece & Gulgoz, 2014; Gluck & Bluck, 2007; Janssen & Rubin, 2011; Janssen & Haque, 2017; Haque & Hasking, 2010; Scherman, 2013; Rubin et al., 2009; Thomsen & Berntsen, 2008; Thomsen et al., 2011). By definition, the formative years (10 to 30 years of age) is the time for fulfilling education, settling on a career, and developing a family. Such

events can be mapped onto a normative life script (Berntsen & Rubin, 2004; Bohn, 2010; Ece & Gulgoz, 2014), and are also of high accessibility (Ece & Gulgoz, 2014; Thomsen & Berntsen, 2008). However, word-cued memories of the bump period often have dissimilar contents than cultural life scripts (Janssen & Murre, 2008). Moreover, when Habermas (2007) asked participants to (a) nominate "most salient" events for a prototypical life, and (b) recall "most important" memories from their own lives, he found that more than a half of the important personal memories were divergent from the life script generated by the same group of participants. It appears that the life-script account is only applicable to the reminiscence bump of important memories (Koppel & Berntsen, 2015). In addition, it overemphasizes the functions of anticipated, positive transitions while underestimates the life impact of the surprising and negative events and their contributions for the reminiscence bump (Dickson et al., 2011; Umanath & Berntsen, 2013).

Transition Theory

Transition Theory incorporates existing findings and provides a series of predictions that are fundamentally different from the mainstream theories discussed above. It provides a "minimalist perspective" (Brown, 2016) on the mechanism of autobiographical memory. For instance, what characterizes an important autobiographical event? On the individual level, an important life story could have been crucial for the construction and development of self-identities (Conway, 1996; 2005; Conway & Pleydell-Pearce, 2000); it could have influenced the individual's thoughts and feelings (Svob & Brown, 2012; Svob et al., 2014); and/or it could have changed "the fabrics of daily life" (Brown, 2016; Brown et al., 2012; Brown et al., 2016). From the sociocultural perspective, the significance of a personal event is determined in certain cultural contexts (Berntsen & Rubin, 2002; 2004; Rubin & Berntsen, 2003). Some life-scripted events (e.g., baptism, Berntsen & Rubin, 2004; Rubin et al., 2009) and historically significant

events (e.g., WWII, Brown, 1990; Brown & Lee, 2010; Brown et al., 2016) are important autobiographical events in this sense. In the present studies, we use "transitional characteristic" instead of "importance," because the measure of transitional impact is relatively objective and appropriately reveals the nature of important autobiographical events.

In contrast to the SMS and cultural life-script account, Transition Theory suggests that the determination of a major life transition does not necessarily involve self- or social expectations. It is true that transitional events are often self-relevant, but their transitional nature is based on the number and magnitude of life changes that are brought about by the event (Brown et al., 2012; Svob & Brown, 2012; Svob et al., 2014). Theoretically, the more aspects of individual life that an event has changed, the more important it should be considered. On one hand, a transition that has altered various aspects of individual life (e.g., immigration) is usually believed to be more important than an event that has only influenced one aspect of life (e.g., job promotion; Brown et al., 2012; Svob & Brown, 2012; Zebian & Brown, 2014). On the other hand, an event becomes a significant part of life stories when it has given rise to massive changes in both the material circumstances (people, locations, activities, etc.) and psychological status (Svob & Brown, 2012). It is assumed that the significance of a life transition would be reflected in the structure of autobiographical memory. Therefore, by assessing the impact of transitional events in one's life, we are able to predict the pattern (i.e. location and size of bulges) of the person's memory retrieval curve.

Self-relevance is not necessarily a defining characteristic for long-lasting autobiographical memories. Other than important events, people are also able to retrieve interesting and yet trivial anecdotes, especially when cued by neutral nouns. First, important life transitions determine the structure, rather than the contents, of autobiographical memories. The structured memories are not necessarily transition-related, transitional, or important to the sense

of self. Second, memory retrieval does not require a top-down judgment of personal importance, regardless of the method that is used to prompt the memories (Uzer & Brown, 2016; Uzer, Lee, & Brown, 2012). When instructed to recall the most important life stories, people will report their major life transitions based on the memory for past experiences; when cued with a neutral word, people will search for the most cue-related events and report the first one coming to mind (as per researchers' instructions).

Memory encoding and consolidation are biased in favor of distinctiveness. People often talk and think about the novel and emotionally salient events (Alea & Bluck, 2003; Neisser, Winograd, Bergman, Schreiber, Palmer, & Weldon, 1996; Skowronski & Walker, 2004; Walker, Skowronski, Gibbons, Vogl, & Ritchie, 2009), rather than monotonous episodes (e.g., eating a muffin for breakfast). Although such events are not particularly important, their uniqueness will attract more attention and enhance the initial encoding (Fine & Minnery, 2009; Mayer, Kim, & Park, 2011; Schmidt, Vogel, Woodman, & Luck, 2002), and post-event rehearsal will facilitate the memory consolidation (Lindeman, Zengel, & Skowronski, 2016; Linton, 1975; Neisser et al., 1996; Pezdek, 2003; Svoboda & Levine, 2009).

Rubin and colleagues ascribe the increased number of memories in a certain lifetime period (e.g., the reminiscence bump) to the frequent occurrence of novel events after a rapid life change, assuming that (a) people are likely to attend to new information during encoding, and (b) novelty may release an event from both proactive and retroactive interferences (Rubin et al., 1998). This *cognitive account* provides a plausible explanation for the *immigration bump* (i.e. increased memories from the years of immigration, Schrauf & Rubin, 2001), and it is also supported by the prevalence of first-time experiences in early life (Demiray, Gulgoz, & Bluck, 2009; Jansari & Parkin, 1996). Opponents of this account argued that the subjective ratings on distinctiveness were found no higher for the events of a bump period than those recalled from

other time periods (Conway & Haque, 1999; Janssen, & Murre, 2008; Koppel & Berntsen, 2015; Rubin & Schulkind, 1997). However, this argument is apparently wrong: Accessible or "candidate" events (Brown et al., 2016) can happen at any time and therefore there should be no difference between bump and non-bump memories in distinctiveness ratings. The issue really lies on the temporal distribution of these candidate memories.

Similar to the cognitive account, Transition Theory places an emphasis on the impact of life changes in the organization of autobiographical memory (Brown, 2016; Brown et al., 2009; 2012; 2016; Brown & Lee, 2010; Zebian & Brown, 2014). The theory has been proposed based on the finding that personal memories often "pile-up" around the major life transitions. Distinctive autobiographical events may occur at any time but tend to "pile up" around transitions (Brown, 2016; Rubin et al., 1998). This "pile-up" reflects the nature of the events that surround major life transitions — these events disrupt established routines and signal the onset of a "new life." Before/after the beginning of the new life, people would encounter an increased number of last-/first-time (i.e. novel) experiences. For example, students may remember their first time wandering around on campus, enrolling classes, and meeting classmates at the *beginning of a school year*; immigrants may remember their first time applying for visas and booking flights during *the year of immigration*, whereas they may also recall the last time seeing an old friend or selling their possessions. Some of the events that take place near a transition are directly related to that transitional event; some are not. Although distinctive events often accumulate around important life transitions, they can also happen at any time far from a transition (e.g., witnessing a car accident). Novel memories are likely to long-lasting regardless of whether they are from a transitional period or from a stable period. So, *what do memorable autobiographical events look like?* We predict that they are somewhat unique or emotionally salient, and tend to accumulate around certain life transitions.

Transition Theory provides a minimalist explanation for the reminiscence bump and non-normative bumps in the temporal distribution of both the important and word-cued autobiographical memories. These assumptions have partially supported by prior research.

First, the reminiscence bump is viewed as an accumulation of memories around predominantly normative transitions in the formative years. This explanation is applicable to both the important and word-cued samplings. When instructed to retrieve important memories, people with a prototypical life may recall transitional events. Such events are transitional due to their substantial impact on individual life (Brown et al., 2012; 2016). For instance, getting married can change the place a person lives (e.g., a new house), the activities a person engages in (e.g., new hobbies with the partner), and the people a person encounters (e.g., new friendship with another couple). By contrast, word-cued memories are not necessarily important (Janssen & Murre, 2008). For example, in response to the cue word "box", a participant may recall buying boxes from the post office a couple of years ago. The event, "buying boxes," itself brings few changes to this participant's life, and thus would not be considered as a transitional event. However, in a think-aloud dating protocol, the event memory report may be linked to an identified life transition, such as graduation, as the participant may mention that he bought the boxes to carry his belongings *when* graduating from college. This dating reference reveals the role of a transition in the organization of autobiographical memory.

Further, an atypical bump is interpreted as a "pile-up" of memories around a non-normative, temporally unrestricted transition (e.g., being homeless, divorce). For instance, people who migrate to another country may experience a massive increase of novel experiences and thus produce a second bump in the memory retrieval curve in accordance with the time of immigration (Esposito & Baker-Ward, 2016; Schrauf & Rubin, 2001). Likewise, the *Living-in-History effect* showed how an unforeseen public event structured lifetime periods and people's

memories (Bohn & Habermas, 2016; Brown & Lee, 2010; Brown et al., 2009; 2012; 2016; Zebian & Brown, 2014).

Therefore, we should be able to predict the location of the bulges in the memory retrieval curve based on participants' age at a selected transition. In order to observe a "secondary" bump, we need to identify a transitional event and recruit participants from the population who have experienced that event within a certain age range. However, even if we find an ideal sample, the "pile-up" may still not occur, because the magnitude of a transitional effect on autobiographical memory is determined by the transitional impact. Direct evidence of this argument is the absence of the Living-in-History effect in some of the studies (e.g., the Denmark and New York samples, Brown et al., 2009; the Russia, Azerbaijan, and Uzbekistan samples, Nourkova & Brown, 2015). Despite the historical (or cultural) importance, a public event must have changed a person's material circumstances (i.e. to what extent it changes one's "fabric of daily life"), in order to influence the person's autobiographical memory (Brown, 2016; Brown et al., 2016; Zebian & Brown, 2014). For instance, in Zebian and Brown's (2014) study, the Beirut sample whose daily life was directly impacted by the Lebanese Civil War produced a stronger Living-in-History effect than the Bi'qa sample that was less strongly affected. Such differences are sufficient to influence the transmission of memories between two generations (Svob, Brown, Taksic, Katulic, & Zauhar, 2016).

Brown and colleague used a think-aloud dating approach to examine the role of life transitions in the temporal distribution of autobiographical memories (Brown et al., 2009; 2012; 2016; Brown & Lee, 2010; Zebian & Brown, 2014), based on the fact that people reconstruct dates rather than directly recalling them from memory. When people do not remember the exact date of a word-cued memory, they can infer the date by reconstructing the temporal connection between the mundane event and one or more major life transitions through identifiable

information of the *event components*, such as a box one has bought for moving, or a shelter one was living in after the earthquake (Brown, 1990; Brown & Lee, 2010; Zebian & Brown, 2014). Hence, these event components are also referred to as *temporally-delineated event components* (Brown et al., 2012). The pervasiveness of event components in the dating protocols has demonstrated the existence of *transition-defined lifetime periods* (Bohn & Habermas, 2016; Brown et al., 2009; 2012; Brown & Lee, 2010; Zebian & Brown, 2014). A recent study indicated that "location" was a critical component, when compared with "people" and "activity" (Enz & Talarico, 2016). Indeed, numerous major transitions involve changes in residence and frequently visited places (Enz et al., 2016), which would potentially serve as a cue for dating non-transitional events. For example, memories for the old house might be activated as hints while constructing the event dates prior to the move.

Transition Theory has offered a unifying account for the organization of autobiographical memories elicited with different methods (word-cued *versus* important memories) in various participant samples (typical life *versus* atypical life). In addition to the living-in-history effect, Transition Theory is also supported by the immigration bump, the *calendar effect*— alumni reported more memories from the beginning of a school year (Pillemer et al., 1986; 1988), and the "relocation bump" — an accumulation of autobiographical memories at "the most important move" (Enz et al., 2016). Despite the empirical facts in consistent with Transition Theory, there are still misunderstandings of its core concepts and rationales. For instance, how are "life transitions" different from the "life-scripted events" in the prior theory? What is the fundamental distinction between transitional events and general autobiographical events? Why do memory reports tend to peak at major transitional life periods? Why do participants use a transitional event as a reference point to estimate the date for another event? These are some questions that we are trying to clarify in the next two chapters.

Chapter 2: Personal Experience and Beliefs about Life Transitions

Transition Theory assumes that autobiographical memory is organized by major life transitions (Brown, 2016). When a public event has severely changed individual daily life, it "creates" a *historically defined autobiographical period* (*H-DAP*, Brown et al., 2009; 2012; 2016; Brown & Lee, 2010; Nourkova & Brown, 2015; Zebian & Brown, 2014). An H-DAP is a memory structure that is associated with temporal knowledge and thematically (or causally) related to a historically significant event (Brown et al., 2016; Nourkova & Brown, 2015). Transition Theory suggests that the structure of autobiographical memory is an emergent property of experience and basic memory processes. A life transition, such as living through a war, changes the basic components of daily life events (i.e. people, locations, activities, possessions, etc., Brown, 2016; Brown et al., 2016) and delineates a certain lifetime period. As the Living-in-History project shows, we can identify an H-DAP by analyzing participants' verbal protocols with a think-aloud dating process. Participants would estimate the dates for events of an H-DAP by referring to the time of the public event that creates the H-DAP. The existence of H-DAPs demonstrates the role of historically significant events (or collective transitions) in the organization of autobiographical memory.

In this dissertation, we expect that personal transitions can organize autobiographical memory in the same way. However, we first need to clarify what personal transitions are, and how we differentiate transitional autobiographical events from non-transitional ones. In the present study, we (a) propose and test several assumptions regarding the definition and categorization of life transitions, (b) compare the distributions of script-consistent and script-divergent events in a life span, and (c) examine how people's beliefs about the transitional events may be influenced by their personal experiences.

Definition of Life Transition

A *transition* refers to an event that causes fundamental and enduring life changes. It is a similar but larger concept than the beginning and end of life-story chapters (Thomsen & Berntsen, 2008), landmark events (Shum, 1998), personal reference points (Brown, 1990; Friedman, 1993), turning points (Enz & Talarico, 2016), and so forth. Some transitions change one's living circumstances (e.g., having a serious financial problem), some transitions affect one's thoughts and feelings (e.g., religious conversion), and some alter one's daily life in both ways (e.g., immigration). The mnemonic significance of a transition can be predicted by the type and magnitude of changes it brings about. For example, compared with moving within the same city, migrating to another country will potentially cause more and greater variations in one's life, and thus, immigration may be viewed as a more important transition than within-city relocation.

Life transitions differ from "ordinary" autobiographical memories in two ways. First, life transitions are usually unique, landmark events that have fundamentally changed "the fabric of daily life" (Svob et al., 2014), whereas most autobiographical events are trivial in terms of their transitional impact. These ordinary events are still maintained in memory probably because they are novel (Rubin et al., 1998) or because they over-learned in everyday life (Brown et al., 2016). Second, people often have direct access to the dates of transitional events, whereas they may have to reconstruct the dates for non-transitional events (Brown et al., 2016; Brown & Lee, 2010; Zebian & Brown, 2014). According to the nature of life transitions, we may detect a life transition by measuring the type (i.e. material and psychological) and the magnitude of changes it brings about to participants' lives (Svob et al., 2014).

There are different types of transitions. Based on the scope of their impact, their prevalence or predictability, and their emotional valence, Brown and colleagues have identified three categories of life transitions (Brown et al., 2016).

The first category is collective, unexpected, and negative transitions, such as wars and natural disasters. A *collective transition* directly influences the "fabric of daily life" of a large population and organizes the autobiographical memories from that lifetime period (i.e. Living-in-History effect, Bohn & Habermas, 2016; Brown et al., 2009; 2012; Brown & Lee, 2010; Zebian & Brown, 2014). For example, people who have experienced WWII often use this public event as a reference point when dating their mundane personal memories.

The second category is normative personal transitions, which only have direct impact on an individual and the close ones. Most of the life-script events in Berntsen and Rubin's (2004) study appear to fall into this category (e.g., graduation, marriage, childbirth). For the current purposes, we refer to these normative personal transitions as *script-consistent events*. We do so, because events like these are anticipated, and usually temporally predictable. Most of script-consistent events that are expected to occur in the early adulthood and are positively valenced, whereas, those that typically occur later in life tend to be negatively valenced or associated with complex affects (e.g., parent's death, retirement, empty nest).

Conway and colleagues claim that the essential function of autobiographical memories created from script-consistent events is maintaining the self-goals (Conway, 1996; 2005; Conway & Holmes, 2004; Conway & Pleydell-Pearce, 2000). Accordingly, the reported autobiographical events should be either life transitions themselves or transition-related anecdotes. In contrast, Brown and colleagues suggest that autobiographical memories capture the features of real-world experience and "pile up" around major life transitions (Brown, 2016; Brown et al., 2012; 2016). Thus, the reported personal events are not necessarily transitional or transition-related in contents; instead, there should be bulges in the retrieval of non-transitional events temporally related to certain transitional events.

In addition to script-consistent transitions, people can and do experience unexpected but

impactful transitions (e.g., geographical moves, major illness, a close one's accidental death, divorce); we refer to such events as *script-divergent transitions*. Most script-divergent transitions are emotionally negative, temporally variable, and likely to involve a sort of loss (e.g. a job, a marriage, a person, or one's health). There are also script-divergent transitions that are associated with positive or complex emotions, such as winning a lottery and migrating to a new country.

Unfortunately, script-divergent transitions have not been well studied, though the few studies that have examined them have produced firm evidence of their transitional nature (Enz, et al., 2016; Svob et al., 2014). In contrast, the concept of life script was over-emphasized in the prior research (e.g., Berntsen & Rubin, 2004; Enz & Talarico, 2016; Rubin et al., 2009; Thomsen et al., 2011). In the current study, we argue that though relatively less prevalent, non-normative events can be as impactful as the normative ones.

Temporal Distribution of Transitions across the Lifespan

Since Holmes and Rahe (1967) identified a list of events that required "change in ongoing life adjustment" (pp. 213–214), studies have established the prevalence and age norms of important personal events, which provided exemplars for script-consistent and -divergent life transitions and showed the cluster of transitional events in the formative years (e.g., Alea et al., 2014; Berntsen & Rubin, 2004; Bohn, 2010; Bohn & Habermas, 2016; Dickson et al., 2011; Dunlop et al., 2017; Ece & Gulgoz, 2014; Erdogan et al., 2008; Greene, 1990; Greene, Wheatley, & Aldava, 1992; Habermas, 2007; Janssen & Haque, 2017; Janssen & Rubin, 2011; Rubin et al., 2009; Scherman, 2013; Settersten & Hagestad, 1996a; 1996b; Thomsen & Berntsen, 2008; Thomsen et al., 2011; Umanath & Berntsen, 2013). For example, based on Settersten and Hesta's (1996a; 1996b) sample of American adults, four "family transitions"— leaving home, returning home, marriage, and childbirth, and three "educational/work transitions" — graduation from full-time schooling, the first full-time job, and settling on career, were believed to be accomplished

between the ages of 20 and 30. Using a similar but younger sample, Dickson and colleagues (2011) recognized marriage, having a child, and college transition as three landmark events that contributed to the reminiscence bump in 16 to 30 years. These findings imply that people are capable of predicting whether an event is scripted and estimating the age norms for some (scripted) life events.

Several different versions of instructions have been used to produce cultural life scripts. Berntsen and Rubin (2004) created a detailed context to elicit scripted life events. In one of their studies, participants were instructed to imagine the life of a "prototypical infant" in their culture who will live an ordinary life. The task was to provide the most important events this prototypical infant would experience. "Prevalence" was defined as the number of people (out of 100) who would experience the to-be-investigated event at least once in their lives. Scripted life events were summarized based on their frequency in participants' reports and their prevalence estimates.

Interestingly, prior research appears to have overlooked the influence of experience on people's beliefs about life transitions. This is a problem because the estimation of prevalence and age as well as the assessment of transitional impact and importance might reflect both experience and cultural expectations. For example, Janssen and Haque (2017) examined the source of information that participants used to nominate and evaluate life-script events. They found that approximately 50% of the age estimates and importance assessments were made based on personal experience. Experiment 1 was designed to obtain evidence for the categorization of personal transitions, as well as to address the potential effects of real-life experiences and cultural life scripts. We found some the experience-related differences in the subjective evaluation of event properties.

Experiment 1: Younger and Older Adults' Beliefs about Script-Consistent and Script-Divergent Events

The main purposes of this experiment are: (a) to confirm common beliefs about script-consistent and script-divergent events regarding prevalence, temporal predictability, and emotional valence, (b) to demonstrate that script-consistent and -divergent events are roughly equivalent in terms of their importance and transitional impact, (c) to investigate whether and to what extent one's beliefs about these life events are affected by personal experience, and (d) to examine the possible age-related differences in autobiographical beliefs.

Based on the prior findings, we anticipated that script-consistent events and script-divergent events would vary along three dimensions: likelihood of occurrence (normative *versus* non-normative, Berntsen & Rubin, 2004; Bohn & Habermas, 2016; Enz & Talarico, 2016; Greene, 1990; Grysman & Dimakis, 2017; Habermas, 2007; Rubin et al., 2009), age of occurrence (temporally prescribed *versus*. less prescribed, Alea et al., 2014; Berntsen & Rubin, 2004; Habermas, 2007; Greene, 1990; Greene et al., 1992; Grysman & Dimakis, 2017; Rubin et al., 2009; Settersten & Hagestad, 1996a; 1996b; Thomsen et al., 2011), and emotional valence (positive *versus* negative, Alea et al., 2014; Berntsen & Rubin, 2004; Berntsen et al., 2011; Grysman & Dimakis, 2017; Rubin et al., 2009; Thomsen et al., 2011). People preferred to recall positive events over negative ones (Berntsen & Rubin, 2004). Given that events in the late adulthood and script-divergent events (e.g., severe disease, and divorce) are more likely to be charged with negative emotions (Ece & Gulgoz, 2014; Grysman & Dimakis, 2017), we had the participants assess events presented to them (Table 2.1) rather than recalled by them. This enabled us to obtain data on both the script-consistent and -divergent events across the lifespan. The event menu was grounded on some of the previous studies (Berntsen & Rubin, 2004; Habermas, 2007; Holmes & Rahe, 1967; Rubin et al., 2009; Svob et al., 2014; see Appendix A

for details).

We assumed that most of the events on the menu would have a transitional aspect to them. We used the *Transitional Impact Scale* (TIS-12), a reliable and valid tool for measuring the type and magnitude of changes a certain event brings about (Svob et al., 2014), to assess this assumption. With TIS-12, we are able to sort the to-be-tested events into four categories based on their transitional impact scores: *major transition* (high material score and high psychological score), *material transition* (high material score and low psychological score), *psychological transition* (low material score and high psychological score), and *non-transitional event* (low material score and low psychological score). We predicted that most of the to-be-tested events would fall into the first category, whereas a few might be material transitions (e.g., obtaining driver's license), and a few might impact people psychologically rather than materially (e.g., death of a parent). We did not expect any to be non-transitional.

Despite the complexity and vagueness of its definition, the importance rating has been widely used in the previous studies (e.g., Berntsen & Rubin, 2002; Conway & Bekerian, 1987; Enz & Talarico, 2016; Janssen & Murre, 2008; Rubin & Berntsen, 2003; Schrauf & Rubin, 2001; Thomsen & Berntsen, 2008). We included this rating in the current study to make our assessments comparable to others in the literature, and to further investigate the correlation of importance and transitional characteristic. If we find a strong positive correlation between the two, we might only use TIS-12 in the future studies.

In addition to event type (script-consistent, script-divergent), we also compared data from older and younger adults who were required to provide ratings for transitions they either did or did not experience. It is unclear how personal experience affects subjective beliefs. Few studies make a direct comparison on ratings given by people who have personally experienced certain transitional events *versus* ratings given by those who have not experienced the events. Real-life

experiences might produce intense emotions and enhance the feeling of importance (Ece & Gulgoz, 2014). Besides, people sometimes do not realize the importance of an event until a later time (Shum, 1998), and thus, the related ratings might increase after the fact due to the "effort after meaning" (Zaromb & Roediger, 2009). If this was the case, participants who have actually experienced a particular event might give higher ratings to it than those who have not. However, the *fading affect bias effect* (i.e. memory for negative emotions fades away faster than that of positive emotions; Charles, Reynolds, & Gatz, 2001; Gibbons, Lee, & Walker, 2011; Holmes, 1970; Ritchie et al., 2015; Ritchie, Skowronski, Hartnett, Wells, & Walker, 2009; Skowronski, Walker, Vogl, & Thompson, 1997; also see Mroczek, 2001; Walker, Henderson, & Bond, 2014, for reviews) could justify the opposite prediction. That is, the experience-based (or memory-based) ratings might fade away over time, whereas hypothetical (or knowledge-based) ratings would not, since personal and social expectations are not subject to forgetting. Likewise, older participants will provide lower ratings than younger participants on average, if personal experiences and memories indeed play a role in the assessment of certain event characteristics.

Method

Participants. Participants were 188 younger adults (18–25 years, *M*=18.95, *SD*= 1.21, 123 females), and 60 older adults (50–65 years, *M*=57.02, *SD*= 4.28, 34 females). The younger adults were undergraduates enrolled in an introductory psychological course at the University of Alberta, and the older adults were recruited from local communities in Edmonton. As an honorarium, each younger participant received partial course credits, and each older participant received $15. For the both groups, participation was restricted to Canadians who had been born or lived in Canada for more than 20 years and spoke English as the first language. These restrictions were added to eliminate the effect of language and culture-related differences. All of the younger participants received some postsecondary education; 17% of the older participants

had secondary school diplomas or lower level of education, 63% received some postsecondary education or had graduated from college, and 20% postgraduate had some postgraduate education or degrees. The participants were randomly assigned to *experienced condition* (94 younger and 29 older) and *hypothetical condition* (94 younger and 30 older). One older participant in the experienced condition withdrew during the last phase.

Materials. Thirty events were selected from the event reported in prior research (Berntsen & Rubin, 2004; Habermas, 2007; Holmes & Rahe, 1967; Rubin et al., 2009; Svob et al., 2014). Based on the Rubin et al.'s (2009) life script events nominated by the United States undergraduates (see Appendix A), we assigned the to-be-investigated events into script-consistent and script-divergent categories. As Table 2.1 shows, both categories contain events that might occur in the childhood and events that presumably take place in the middle and late adulthood.

Table 2.1

The to-be-tested event menu for Experiment 1

	Script-Consistent Events		Script-Divergent Events
1	Begin elementary school	16	Parent divorce one another
2	Graduate from high school	17	Immigrate to a new country
3	Begin university	18	Move to a distant city
4	Begin first serious romantic relationship	19	End a serious romantic relationship
5	Get first job	20	Sustain a serious injury
6	Have first sexual experience	21	Be diagnosed with a serious health problem
7	Leave parent's home	22	Be a victim of a criminal assault
8	Get married	23	Experience a religious conversion
9	Birth of the first child	24	Change to a new school
10	Obtain driver's license	25	Change careers
11	Settle on career	26	Be fired from a full-time job
12	Begin retirement	27	Experience the death of a close friend
13	Death of a parent	28	Deal with health problems of an aging parent
14	Have children move out of home	29	Undergo a serious financial problem
15	Birth of first grandchild	30	Get divorced

We used the TIS-12 (Svob et al., 2014) to assess the types and magnitudes of changes brought about by each to-be-tested event. This scale consisted of 12 items (see Table 2.2); 6 loaded on a material-impact subscale, and 6 on a psychological-impact subscale. The order of the statements was randomized for each participant. Participants rated their agreement with each statement using a 1(*strongly disagree*)-to-5 (*strongly agree*) scale. Hence, material-impact scores were calculated by averaging the ratings of the six material items and psychological-impact scores were the averages of the psychological ratings.

Table 2.2

Transitional Impact Scale (TIS-12, Svob et al., 2014)

Subscale	Item
Material Impact	This event has changed the places where I spend time.
	This event has changed the things I own.
	This event has changed my material circumstances.
	This event has changed the activities I engage in.
	This event has changed the people I spend time with.
	This event has changed where I live.
Psychological Impact	This event has changed my attitudes.
	This event has changed the way I think about things.
	This event has impacted my emotional responses.
	This event has changed my sense of self.
	This event has impacted me psychologically.
	This event has influenced my understanding of right and wrong.

Note: In the hypothetical condition, the statements begin with "This event is likely to change…", and use "person" and "the person's" in place of "I" and "my."

Procedures. During Phase 1, all the participants were presented with the 30 events, one at a time, and were asked whether they had experienced each. According to participants' responses, the computer program labeled each event as either "experienced" or "hypothetical" (i.e. not experienced), and randomly chose up to 8 script-consistent experienced (or hypothetical) events and up to 8 script-divergent experienced (or hypothetical) events for the subsequent phases, for a total of up to 16 events. If participants had endorsed more than 8 events for one event type (script-consistent or -divergent) during Phase 1, they would only be re-presented 8 in the subsequent phases; however, if participants had endorsed fewer than 8 events for one event type,

they would be re-presented all the endorsed events. Following Phase 1, participants in the experienced condition were only presented with the experienced events, and those in the hypothetical condition were only presented with events that they had not experienced. At the beginning of Phase 2, participants were randomly assigned to the experienced or hypothetical condition.

In Phase 2, participants in the experienced condition provided a brief description for each randomly re-presented event and estimated their own age at the time of the event. If a participant had experienced more than one event from a given category (e.g., marriage and remarriage), s/he was instructed to describe the first event.

During Phase 2, participants in the hypothetical condition were asked to imagine "the life of an average Canadian who is about your age and who is also your gender", and to estimate the likelihood (from 0 to 100%) that each of the presented events would occur in this average person's life. They were informed that an estimate *X* could also be interpreted as "*X* out of 100 average Canadians would experience this event at some point during their lives". Participants then indicated at what age (from 1 to 100 years) this average Canadian was most likely to undergo this event.

In Phase 3, the experienced (or hypothetical) events were presented again, one at a time, in a random order. Participants rated importance (1=*not important at all*; 5=*very important*), emotional positivity (1=*neutral*; 5=*very positive*), emotional negativity (1=*neutral*; 5=*very negative*), and transitional impact (TIS-12, Svob et al., 2014) according to their own experiences (experienced condition) or the life of an average Canadian (hypothetical condition).

In Phase 4, participants in the experienced condition were asked to imagine "the life of an average Canadian who is about your age and who is also your gender", and to estimate the likelihood (from 0 to 100%) of occurrence in the hypothetical person's life for each presented

event, and the person's age (from 1 to 100 years) at the time of the event, using the same instructions of the hypothetical condition in Phase 2.

Results

We summarized the data separately to show (a) the actual prevalence and temporal distribution of the investigated potential life transitions (the distribution curves are plotted based on the experienced group only), (b) the likelihood estimates for events in an average person's life, (c) beliefs about the age norms, (d) valence ratings, (e) TIS-12 ratings, and (f) importance ratings. ANOVA and liner-mixed-effect models were used to analyze the ratio and interval variables, such as likelihood estimates (from 0 to 100), age estimates (from 1 to 100), and TIS-12 total scores (from 1 to 5, continuous data). These methods are not applicable to ordinal variables, such as valence ratings (from 1 to 5, discrete data), individual TIS ratings, and importance ratings. In such cases, we used ordinal regression models instead. Chi-square tests were conducted to compare the frequencies of events endorsed across different age ranges.

The actual prevalence and temporal distribution of the events. We calculated the percentages of the "yes" responses given by all the younger and older adults during Phase 1, and obtained the actual prevalence of the script-consistent and script-divergent events in the present sample (Figure 2.1). Two events, starting university and changing to a new school, were removed from the figures. The younger participants were undergraduates and thus 100% of them had experienced starting university, whereas 63% of the older participants responded "yes" to this event. Approximate 74% of the younger participants responded "yes" to "change to a new school"; however, due to a possible misunderstanding, this might include changing to a junior-high/high school after graduation, which was presumably script-consistent instead of script-divergent. We modified this event for the older adults and 51% of them indicated that they had changed schools during the elementary school years.

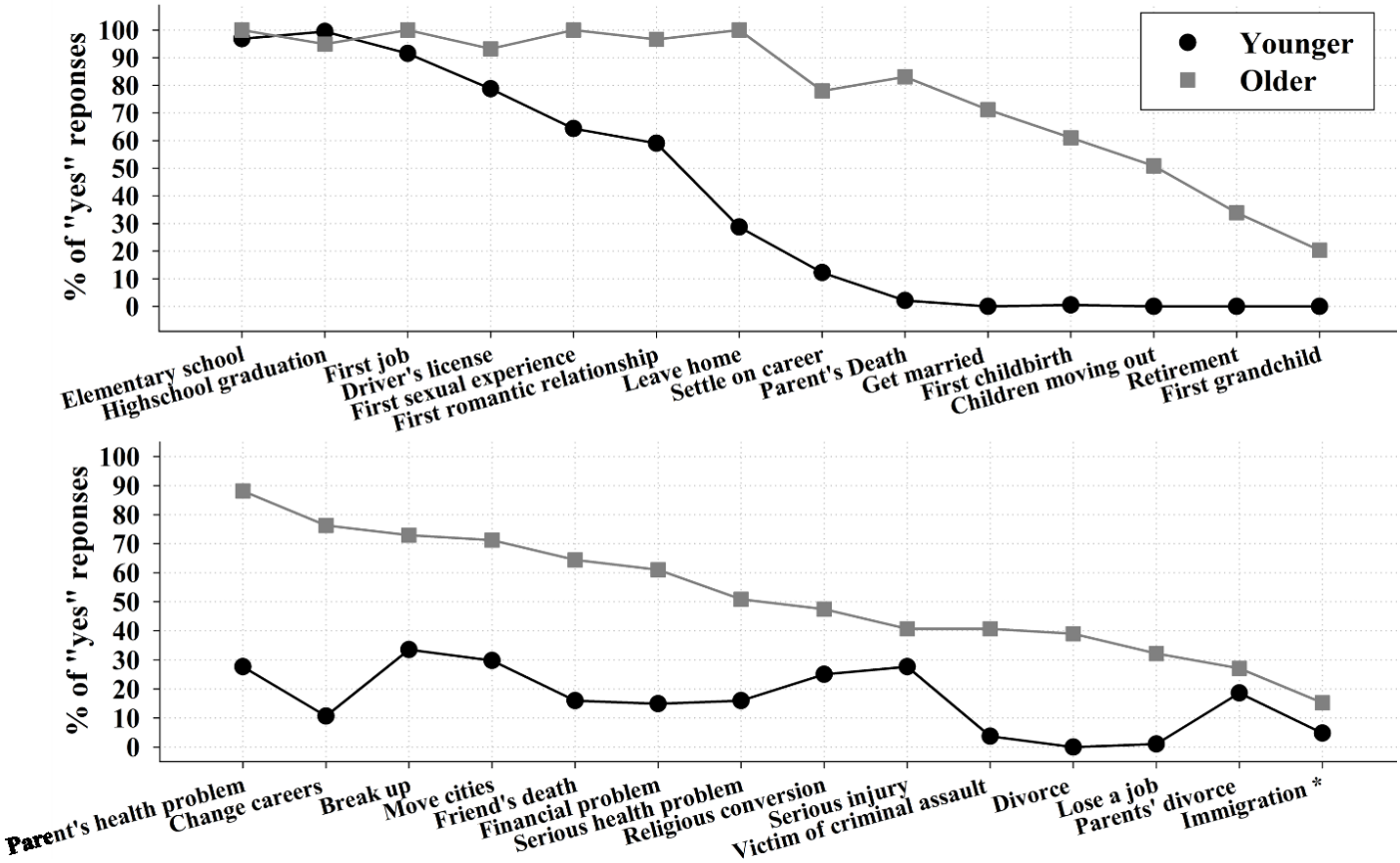

Figure 2.1 The actual prevalence of the script-consistent events (upper panel) and the script-divergent events (lower panel) across the actual age estimated by the younger and older participants. * The low percentage of immigration may be due to the participation restrictions.

As shown in Figure 2.1, the two types of events displayed different patterns. Assuming that the script-consistent events have been experienced by our (older) participants in a certain sequence, we may anticipate a significant negative correlation between the actual prevalence of these events and participants' age. Put another way, the longer one has lived, the more script-consistent events s/he has experienced. In line with this prediction, the rank order of script-consistent events based on their actual prevalence conforms to a cultural life script: start elementary school (mean estimated age at the occurrence = 5.65, *SD*= 1.95) → graduate from high school (mean age = 17.57, *SD*= 0.69) → get first job (mean age = 15.81, *SD*= 2.26) → leave home (mean age = 18.13, *SD*= 1.63) → settle on career (mean age = 20.59, *SD*= 3.95) → get married (mean age = 28.23, *SD*= 6.92) → have the first child (mean age = 23.86, *SD*= 9.51) →

have children moving out (mean age = 46.86, *SD*= 6.12) → get retired (mean age = 53.00, *SD*= 5.48) → become a grandparent (mean age = 52.00, *SD*= 4.24). The rank order correlation between actual prevalence and actual age estimates is -0.96 (p<.001) for the ten events mentioned above, and the correlation is -0.93 (p<.001) for all the fourteen script-consistent events shown in Figure 2.1. In contrast, the script-divergent events have been experienced in a random order and we cannot perceive any life scripts from the lower panel. The rank order correlation between actual prevalence and actual age estimates is -0.09 (p =.76) for the fourteen script-divergent events shown in Figure 2.1.

A two-way ANOVA showed that the older group generally produced a higher proportion of "yes" responses (*M*=64.65, *SD*= 26.83) than the younger group did (*M*=27.24, *SD*= 31.66), F (1, 52) = 26.35, p <.001, η_p^2 = .34. The script-divergent events (*M*=34.15, *SD*= 24.52) were less likely to be experienced in general than the script-consistent events (*M*=57.73, *SD*= 39.47), F (1, 52) = 10.47, p =.002, η_p^2 = .17. There was not an interaction between event type and age group, F (1, 52) = 0.06, p =.80, η_p^2 = .001.

To investigate the temporal distribution of these potential life transitions, we plotted the 5-year binned curves for the experienced events as a function of participants' estimated age (Figure 2.2). We used unconnected dots for the age ranges over the age of the youngest participants in the two age groups (i.e. 18 and 50 respectively), because the results did not represent all the participants. The experienced events of the younger participants, regardless of the event type, peaked at the age of 16 to 20. The reminiscence bump tended to be larger in the younger group than in the older group, probably because the younger group had "truncated" formative years. If we tested them after the age of formative years, the distribution of the experienced events would be less condensed.

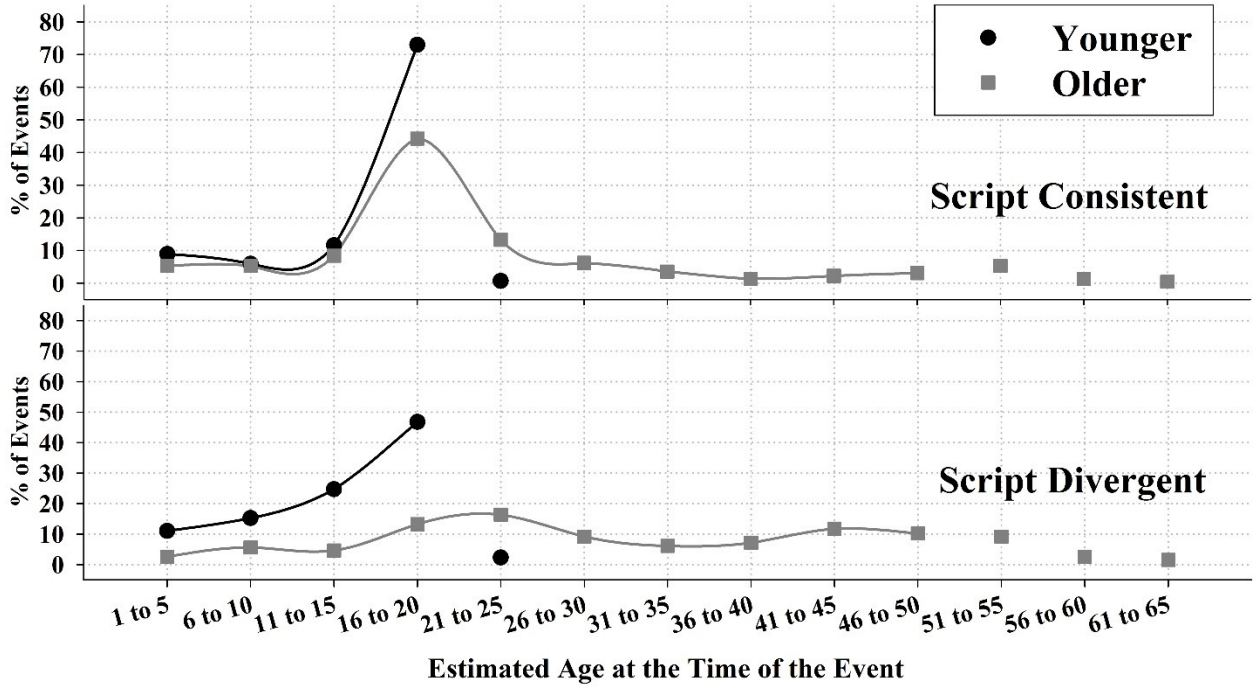

Figure 2.2 The distribution of experienced script-consistent events (upper panel) and the script-divergent events (lower panel) across the actual ages estimated by the younger and older participants.

To determine whether these 226 script-consistent events and 196 script-divergent events of the older participants were distributed equally across the estimated age, we divided the age estimates into four periods: 1 to 15 years, 16 to 30 years, 31 to 45 years, and 45 to 60 years, and conducted chi-square tests separately for each event type. Consistent with the prior studies (Berntsen & Rubin, 2004; Ece & Gulgoz, 2014; Rubin & Berntsen, 2003), there is a bump at the age of 16 to 30 in the distribution of the script-consistent events experienced by the older participants, χ^2 (3, N = 226) = 187.63, p < .001. Although it is less obvious in the figure, the frequencies of their experienced script-divergent events also peak at the age of 16 to 30, χ^2 (3, N = 196) = 26.82, p < .001.

Beliefs about the likelihood of occurrence. The mean likelihood estimates are shown in Table 2.3. It is apparent that both event type and experience affected these estimates. A liner-mixed-effect model was fitted to determine the reliability of these effects. Participant and event

were entered as random factors, and age group (younger, older), condition (experienced, hypothetical), and event type (script-consistent, script-divergent) were entered as fixed factors, -2 log likelihood = 27879.49, AIC= 27885.49, BIC= 27903.52.

Table 2.3

Likelihood estimates for script-consistent and -divergent events provided by younger and older adults under experienced and hypothetical conditions

Group	Condition	Event Type	*M* (*SD*)
Younger			
	Experienced		
		script-consistent	82.23 (18.15)
		script-divergent	66.00 (25.37)
	Hypothetical		
		script-consistent	72.06 (29.22)
		script-divergent	46.94 (25.36)
Older			
	Experienced		
		script-consistent	84.31 (18.52)
		script-divergent	63.80 (26.11)
	Hypothetical		
		script-consistent	76.14 (19.78)
		script-divergent	39.16 (25.27)

Personal experience increased participants' expectations for script-consistent events and script-divergent events, *B*=24.22, 95% *C.I.* = [19.47, 28.96], $p < .001$. This effect did not interact with age, *B* =-4.76, 95% *C.I.* = [-10.68, 1.17], $p = .12$. A significant difference was found between the age groups, *B* =5.55, 95% *C.I.* = [0.67, 10.42], $p = .03$. Both the younger and older participants believed that the script-consistent events were more likely to occur than the script-divergent events, *B* =41.03, 95% *C.I.* = [34.52, 47.54], $p < .001$. The between-type difference in younger adults was smaller than that in older adults, *B* =-11.25, 95% *C.I.* = [-17.78, -4.72], $p = .001$, and was also smaller in the experienced condition than the hypothetical condition, *B* =-14.32, 95% *C.I.* = [-22.07, -6.57], $p < .001$. The three-way interaction was not significant, *B* =7.30, 95% *C.I.* = [-1.53, 16.13], $p = .11$. In short, people believe that script-consistent events are

more prevalent in life than script-divergent events, and personal experience tended to increase their likelihood estimates.

The hypothetical age at the time of the events. Figure 2.3 shows the 5-year binned curves on the basis of the age estimates for an average Canadian under experienced condition and hypothetical condition. The overall age estimates for the investigated events resembled the actual age distributions in Figure 2.2. We found a bump again at the age of 16 to 20 years for the script-consistent events in the experienced condition (Figure 2.3 (a)), which was absent in the hypothetical condition (Figure 2.3 (c)). This is probably because in the hypothetical condition, events that were had not been experienced tended to be ones that happen later in life. By contrast, the distribution curves of the script-divergent events in Figure 2.3 (b) and (d) were relatively flat and smooth. Similar to their estimation on the probability of script-consistent and -divergent events, people's beliefs about the age norms of these life events also reflect their own personal experiences. Script-consistent events appear to be more temporally predictable than script-divergent events. We verified this observation by comparing the variabilities of the age estimates for the two categories of life events.

The standard deviations showed the variability of the age estimates. We calculated the deviations of the age estimates provided for each event, split by age group and condition. The average deviations of the age estimates from the younger participants under the experienced condition were 1.63 (*SD*=1.01) for the script-consistent events, and 7.45 (*SD*=5.35) for the script-divergent events, whereas average deviations produced from the younger participants under the hypothetical condition were 4.97 (*SD*=3.90) and 8.36 (*SD*=4.54), respectively. The average deviations of the age estimates given by the older participants in the experienced condition were 4.95 (*SD*=6.47) for the script-consistent events, and 8.26 (*SD*=3.71) for the script-divergent events, and those produced in the hypothetical condition were 5.51 (*SD*=4.07)

and 9.78 (*SD*=5.57), respectively.

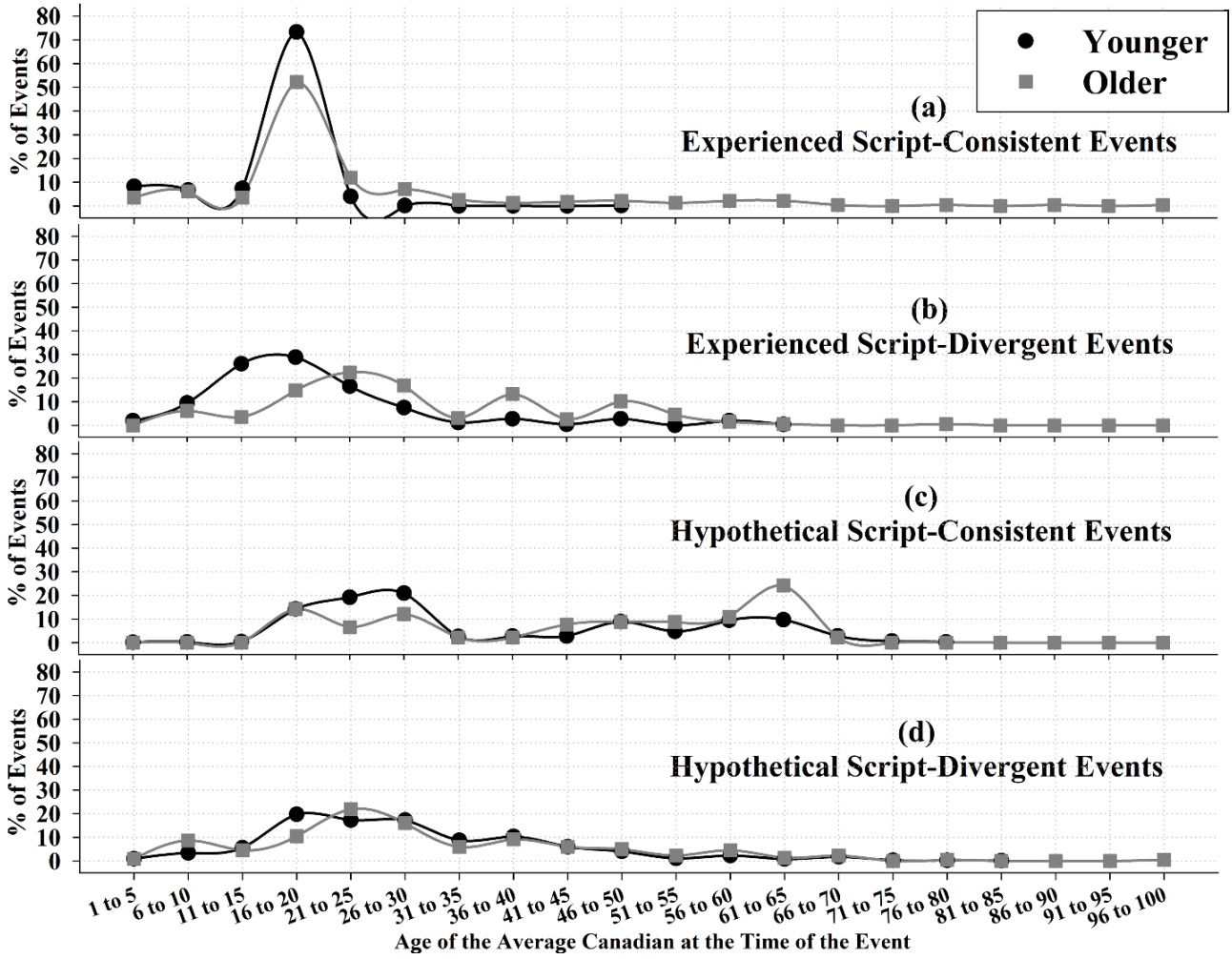

Figure 2.3 The distribution of (a) experienced script-consistent events, (b) experienced script-divergent events, (c) hypothetical script-consistent events, and (d) hypothetical script-divergent events across the ages of an average Canadian that were estimated by the younger and older participants.

A three-way ANOVA showed that participants produced age estimates with smaller deviations for the script-consistent events (*M*=4.35, *SD*=4.75) than the script-divergent events (*M*=8.52, *SD*=4.76), F (1, 410) = 18.047, p <.001, η_p^2 = .164. This effect did not interact with age or condition, all p >.1. In brief, these results indicated that compared with the script-divergent events, there was less variability in the age norms for the script-consistent events, regardless of experience and age.

Emotional valence ratings. Consistent with the common beliefs, the script-consistent

events were positive in general, whereas the script-divergent events tended to be negative. Table 2.4 summarizes the means and the standard deviations for positivity (1=*neutral*; 5=*very positive*) and negativity (1=*neutral*; 5=*very negative*) ratings given by the younger and older participants under the experienced and hypothetical conditions.

Table 2.4

Emotional valence ratings and their correlations for script-consistent and -divergent events provided by younger and older adults under experienced and hypothetical conditions

			Positivity *M* (*SD*)	Negativity *M* (*SD*)	Spearman's *r*
Script-Consistent			**3.87 (1.33)**	1.88 (1.20)	-0.52**
	Experienced		3.84 (1.31)	1.75 (1.12)	-0.40**
		Younger	3.96 (1.19)	1.65 (2.00)	-0.35**
		Older	3.56 (1.57)	2.00 (1.39)	-0.48**
	Hypothetical		3.89 (1.33)	2.01 (1.26)	-0.64**
		Younger	3.84 (1.36)	2.02 (1.29)	-0.65**
		Older	4.23 (1.07)	1.90 (1.03)	-0.54**
Script-Divergent			2.06 (1.34)	**3.51 (1.43)**	-0.61**
	Experienced		2.36 (1.52)	3.02 (1.50)	-0.51**
		Younger	2.26 (1.46)	2.92 (1.49)	-0.56**
		Older	2.48 (1.57)	3.19 (1.50)	-0.46**
	Hypothetical		1.91 (1.22)	3.74 (1.33)	-0.66**
		Younger	1.81 (1.16)	3.78 (1.32)	-0.65**
		Older	2.23 (1.35)	3.60 (1.38)	-0.66**

Note: ** $p < .01$, two-tailed.

We fitted the valence ratings with ordinal regression models to determine the variations between age group (younger, older) and condition (experienced, hypothetical). Since the positivity and negativity ratings were highly correlated, we only conducted analyses on the positivity ratings of the script-consistent events (M= 3.87, SD= 1.33) and the negative ratings of the script-divergent events (M= 3.51, SD= 1.43). The age group and condition were entered as the fixed factors, and participant and event were entered as random factors.

The script-consistent events were rated less positive by the participants with actual experiences than those who had no experiences with them, mean difference = -0.05, B = -2.00,

95% *C.I.* = [-3.28, -0.72], *p* =.002. There was an interaction between condition and age, *B* =1.82, 95% *C.I.* = [0.51, 3.12], *p* =.006. We fitted the ordinal regression models separately for each age group, using condition as the fixed factor, and found that the younger participants produced higher positivity ratings than the older group in the experienced condition, mean difference = 0.40, *B* = 0.35, 95% *C.I.* = [0.07, 0.62], *p* =.013, whereas under the hypothetical condition, their ratings were lower than those of the older adults, mean difference = -0.39, *B* = -0.49, 95% *C.I.* = [-0.91, -0.08], *p* =.021. Moreover, when fitting the models with age group as the fixed factor, separately for each condition, we found that the ratings of the younger adults did not differ between conditions, mean difference = 0.12, *B* = 0.06, 95% *C.I.* = [-0.14, 0.25], *p* =.59, but the older group in the hypothetical condition tended to overestimate the positivity of the script-consistent events, mean difference = -0.67, *B* = -0.70, 95% *C.I.* = [-1.16, -0.23], *p* =.003.

As for the negativity ratings of script-divergent events, we found that the ratings were significantly lower in the experienced condition than in the hypothetical condition, mean difference = -0.72, *B* = -0.50, 95% *C.I.* = [-0.89, -0.10], *p* =.013, but this effect interacted with age, *B* = -0.53, 95% *C.I.* = [-0.99, -0.07], *p* =.023. Further analyses revealed that the negativity ratings decreased in the presence of personal experience in both age groups, *p* <.05; the younger adults gave lower negativity ratings than the older adults in the experienced condition, mean difference = -0.27, *B* = -0.35, 95% *C.I.* = [-0.68, -0.02], *p* =.038, but not in the hypothetical condition, mean difference = 0.18, *B* = 0.23, 95% *C.I.* = [-0.05, 0.50], *p* =.10.

In summary, experience leads to a less extreme, more ambivalent rating of the emotional impact of these events, compared to a rating made in the absence of such experience. The age-related differences, on the other hand, might simply indicate that there were more positive life events during the early life periods than in the late adulthood. These findings once again demonstrate that the subjective ratings for the autobiographical events are not only part of

people's general knowledge and beliefs, but are also influenced by experience.

Transitional impact ratings. Figure 2.4 presents the TIS scores of the script-consistent events rated by the younger and older participants under the experienced and hypothetical conditions, and Figure 2.6 shows the TIS scores of the script-divergent events. Some events are missing in the figures. This is because none of the younger adults had experienced some later-adulthood events (e.g., birth of a grandchild, divorce), whereas all of the participants had experienced some early-age events (e.g., high school graduation, starting university, for younger adults; first job, leaving parents' home, for older adults).

By using 3.00 (neutral) as the reference scores in both subscales, we further sorted the experienced events into four categories: *major transition*s (material score > 3.00; psychological score > 3.00), *material transitions* (material score > 3.00; psychological score ≤ 3.00), *psychological transition*s (material score ≤ 3.00; psychological score > 3.00), and *non-transitional events* (material score ≤ 3.00; psychological score ≤ 3.00). Because it is difficult to tell whether some of these scores are statistically distinct from 3.00, we confirmed the assignment of event to category by conducting one-sample *t* tests for each individual event. Finally, we fitted the regression models to examine how the TIS scores in the hypothetical condition differed from those in the experienced condition.

For younger adults, the major experienced transitions were *leaving parent's home* (material: M=4.20, SD=0.62, t (30) =10.94, p<.001 based on 1000 bootstrap samples, Cohen's d= 1.97; psychological: M=3.74, SD=0.75, t (30) =5.50, p<.001 based on 1000 bootstrap samples, Cohen's d= 0.99) and *starting university* (material: M=3.57, SD=0.74, t (93) =7.43, p=.001, based on 1000 bootstrap samples, Cohen's d= 0.77; psychological: M=3.90, SD=0.65, t (93) =13.53, p=.001, based on 1000 bootstrap samples, Cohen's d= 1.40).

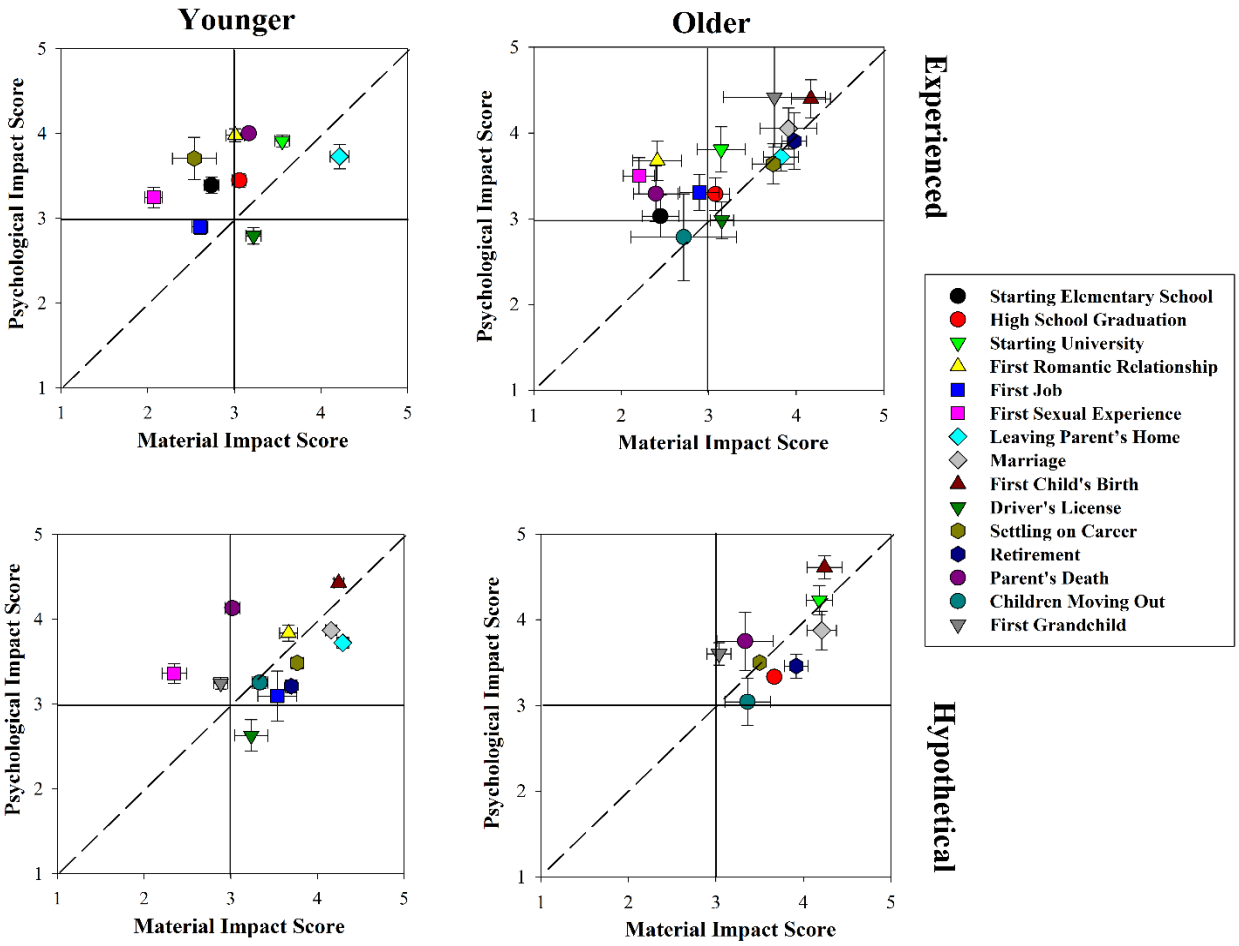

Figure 2.4 The transitional impact scores of *experienced* script-consistent events rated by the younger (upper-left) and older adults (upper-right), and the scores of *hypothetical* script-consistent events rated by the younger (lower-left) and older adults (lower-right). Error bars indicate ± 1 standard error of mean.

By contrast, the major experienced transitional events rated by older adults were: *birth of the first (grand)child* (material: M=4.05, SD=0.57, t (6) =4.89, p=.042 based on 981 bootstrap samples, Cohen's d=1.85; psychological: M=4.40, SD=0.53, t (6) =7.07, p=.008 based on 986 bootstrap samples, Cohen's d=2.67), *marriage* (material: M=3.91, SD=1.17, t (12) =2.82, p=.016, or p=.058 based on 1000 bootstrap samples, Cohen's d=0.78; psychological: M=4.05, SD=0.87, t (12) =4.37, p=.003 based on 1000 bootstrap samples, Cohen's d=1.21), *retirement* (material: M=3.98, SD=0.38, t (6) =6.83, p=.002 based on 493 bootstrap samples, Cohen's d=2.58; psychological: M=3.90, SD=0.88, t (6) =2.73, p=.034, or p=.056 based on 495 bootstrap samples, Cohen's d=1.03), *leaving parent's home* (material: M=3.83, SD=0.95, t (21) =4.09, p=.003 based

on 1000 bootstrap samples, Cohen's *d*=0.87; psychological: *M*=3.72, *SD*=0.75, *t* (21) =4.51, *p*=.001 based on 1000 bootstrap samples, Cohen's *d*=0.96), and *settling on career* (material: *M*=3.74, *SD*=0.82, *t* (11) =3.11, *p*=.013 based on 1000 bootstrap samples, Cohen's *d*=0.90; psychological: *M*=3.64, *SD*=0.81, *t* (11) =2.73, *p*=.020 based on 1000 bootstrap samples, Cohen's *d*=0.79).

The psychological transitions that were rated based on the younger adults' own experience included: *starting elementary school* (material: *M*=2.71, *SD*=0.79, *t* (87) = -3.39, *p*=.002; psychological: *M*=3.36, *SD*=0.89, *t* (87) =3.81, *p*=.001 based on 1000 bootstrap samples, Cohen's *d*=0.41), *high school graduation* (material: *M*=3.03, *SD*=0.76, *t* (92) =0.39, *p*=.70; psychological: *M*=3.39, *SD*=0.82, *t* (92) =4.58, *p*=. 001 based on 1000 bootstrap samples, Cohen's *d*=0.47), *first serious romantic relationship* (material: *M*=2.99, *SD*=0.76, *t* (53)= -0.09, *p*=.93; psychological: *M*=3.95, *SD*=0.58, *t* (53) =12.19, *p*=.001 based on 1000 bootstrap samples, Cohen's *d*=1.66), *first sexual experience* (material: *M*=2.07, *SD*=0.76, *t* (58) = -9.34, *p*=.001; psychological: *M*=3.26, *SD*=0.89, *t* (58) =2.21, *p*=.029 based on 1000 bootstrap samples, Cohen's *d*=0.29), and *settling on career* (material: *M*=2.58, *SD*=0.73, *t* (9) = -1.81, *p*=.10; psychological: *M*= 3.72, *SD*=0.71, *t* (9) =3.20, *p*=.012 based on 999 bootstrap samples, Cohen's *d*=1.01).

For participants in the older group, experienced psychological transitions include: *starting university* (material: *M*=3.14, *SD*=0.99, *t* (12) =0.51, *p*=.64; psychological: *M*=3.81, *SD*=0.95, *t* (12) =3.06, *p*=.023 based on 1000 bootstrap samples, Cohen's *d*=0.85), *first serious romantic relationship* (material: *M*=2.41, *SD*=1.21, *t* (18)= -2.11, *p*=.052; psychological: *M*=3.68, *SD*=0.99, *t* (18) =2.99, *p*=.021 based on 1000 bootstrap samples, Cohen's *d*=0.69), and *first sexual experience* (material: *M*=2.20, *SD*=0.86, *t* (22) = -4.47, *p*=.001; psychological: *M*=3.50, *SD*=1.01, *t* (22) =2.37, *p*=.030 based on 1000 bootstrap samples, Cohen's *d*=0.49).

According to the TIS ratings given by people with actual experience, some of the script-

consistent events fell into the "non-transitional" category. For example, although *obtaining driver's license* might be considered as a material transition for younger adults (material: M=3.21, SD=0.75, t (76) =2.44, p=.023 based on 1000 bootstrap samples, Cohen's d=0.28; psychological: M=2.78, SD=0.86, t (76) = -2.25, p=.028), its impact on the older adults was insignificant (material: M=3.15, SD=0.57, t (17) =1.11, p=.28; psychological: M=2.98, SD=0.91, t (17) = -0.09, p=.93). Similarly, *starting elementary school* (material: M=2.45, SD=0.99, t (21) = -2.62, p=.02; psychological: M=3.03, SD=1.16, t (21) =0.12, p=.90) and *high school graduation* (material: M=3.08, SD=0.77, t (21) =0.46, p=.65; psychological: M=3.29, SD=0.89, t (21) =1.52, p=.14) were not considered particularly impactful by older adults. In addition, both the younger and older adults indicated that neither *getting the first job* (material: M=2.67, SD=0.92, t (112) = -3.75, p<.001; psychological: M=3.00, SD=0.88, t (112) = -0.05, p=.97) nor *the death of a parent* (material: M=2.44, SD=0.99, t (16) = -2.32, p=.03; psychological: M= 3.33, SD=1.27, t (16) =1.08, p=.30) caused marked changes in their material or psychological lives. Surprisingly, the "empty nest" (Berntsen & Rubin, 2004) – *having children moving out of home* – was also a non-transitional event, both p >.65.

As Figure 2.5 shows, the TIS ratings of hypothetical script-consistent events were generally higher than the ratings obtained under the experienced condition. To evaluate the effect of personal experience on transitional impact ratings of the script-consistent events, we fitted a liner-mixed-effect regression model using the total TIS scores (i.e. the average of all TIS-12 items for each event) as the dependent variable, age group (younger, older) and condition (experienced, hypothetical) as fixed factors, and participant and event as random factors, -2 log likelihood = 3717.90, AIC= 3723.90, BIC= 3740.10.

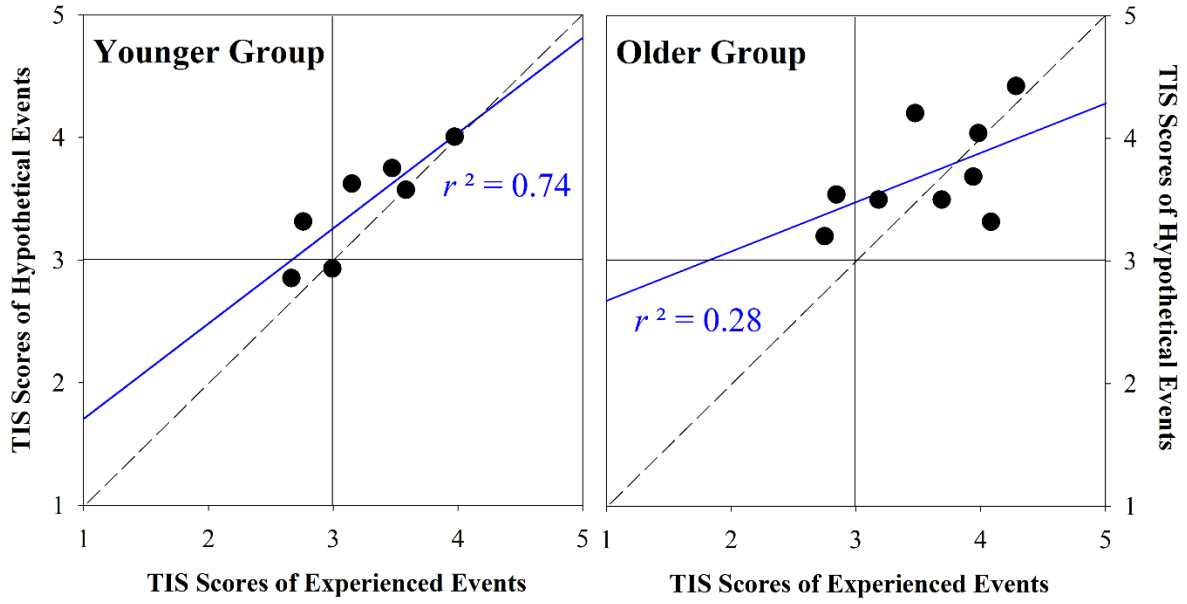

Figure 2.5 TIS total scores of hypothetical script-consistent events as a function of TIS scores of experienced script-consistent events, rated by the younger (left panel) and older adults (right panel). Each dot represents a specific event (e.g., settling on career).

The ratings were lower for the experienced events than the hypothetical events, *B*= -0.63, 95% *C.I.* = [-0.81, -0.44], $p < .001$, which did not interact with age, *B* = -0.05, 95% *C.I.* = [-0.25, -0.15], $p = .63$. The main effect of age group was not significant, *B* = -0.09, 95% *C.I.* = [-0.25, 0.07], $p = .28$. It is noteworthy that the random factor, event, had no reliable effect on TIS scores either, *B* = 0.002, Wald *z* =0.69, $p = .49$, implying that the transitional impact of these script-consistent events was generally overrated in the absence of personal experience.

The TIS scores were computed for each script-divergent event as presented in Figure 2.6. When experience-based assessments were available, both the younger and older participants indicated that *parents' divorce* (material: *M*=3.40, *SD*=0.93, *t* (23) =2.12, *p*=.045, or *p*=.051 based on 1000 bootstrap samples, Cohen's *d*=0.43; psychological: *M*=3.72, *SD*=0.71, *t* (23) =4.93, *p*=.001 based on 1000 bootstrap samples, Cohen's *d*= 1.01), *moving to another city/country* (material: *M*=4.21, *SD*=0.55, *t* (54) =16.45, *p*=.001 based on 1000 bootstrap samples, Cohen's *d*=2.22; psychological: *M*=3.69, *SD*=0.70, *t* (54) =7.38, *p*=.001 based on 1000

bootstrap samples, Cohen's *d*=0.99), and *changing to another school* (material: *M*=3.21, *SD*=0.89, *t* (66) =1.93, *p*=.049 based on 1000 bootstrap samples, Cohen's *d*=0.24; psychological: *M*=3.25, *SD*=0.98, *t* (66)= 2.11, *p*=.038 based on 1000 bootstrap samples, Cohen's *d*=0.26) were the major transitions. In addition, the older participants indicated that both of their material and psychological life aspects had been affected by *their own divorce* (material: *M*=3.98, *SD*=0.93, *t* (6) =2.78, *p*=.32, Cohen's *d*=1.05; psychological: *M*=4.07, *SD*=0.79, *t* (6) =3.60, *p*=.011, Cohen's *d*=1.36), and *a new career* (material: *M*=3.72, *SD*=1.02, *t* (17) =3.01, *p*=.019 based on 1000 bootstrap samples, Cohen's *d*=0.71; psychological: *M*=3.96, *SD*=0.62, *t* (17) =6.62, *p*=.001 based on 1000 bootstrap samples, Cohen's *d*=1.56).

The psychological script-divergent transitions that were indicated by both the younger and older adults included: *ending a serious romantic relationship* (material: *M*=2.74, *SD*=0.96, *t* (47) = -1.85, *p*=.07; psychological: *M*=3.94, *SD*=0.70, *t* (47) = 9.26, *p*=.001 based on 1000 bootstrap samples, Cohen's *d*=1.34), *being diagnosed with a serious health problem* (material: *M*=2.82, *SD*=0.99, *t* (30) =-0.97, *p*=.34; psychological: *M*=3.49, *SD*=1.07, *t* (30) = 2.58, *p*=.013 based on 1000 bootstrap samples, Cohen's *d*=0.46), *being a victim of a criminal assault* (material: *M*=2.47, *SD*=1.24, *t* (10) = -1.42, *p*=.19; psychological: *M*=3.86, *SD*=0.87, *t* (10) =3.29, *p*=.022 based on 1000 bootstrap samples, Cohen's *d*=0.99), *death of a close friend* (material: *M*=2.02, *SD*=0.86, *t* (26) = -5.91, *p*<.001; psychological: *M*=3.67, *SD*=0.72, *t* (26) =4.84, *p*=.001 based on 1000 bootstrap samples, Cohen's *d*=0.93), and *dealing with health problems of an aging parent* (material: *M*=2.23, *SD*=0.94, *t* (46) = -5.59, *p* <.001; psychological: *M*=3.34, *SD*=1.04, *t* (46) =2.25, *p*=.026 based on 1000 bootstrap samples, Cohen's *d*=0.33). *Religious conversion* (material: *M*=3.08, *SD*=1.01, *t* (10) =0.25, *p*=.81; psychological: *M*=4.06, *SD*=1.06, *t* (10) =3.31, *p*=.020 based on 999 bootstrap samples, Cohen's *d*=1.00) might be considered as a psychological transition for older adults only. In addition, *having a serious*

financial problem (material: *M*=3.46, *SD*=1.13, *t* (30) =2.26, *p*=.028 based on 1000 bootstrap samples, Cohen's *d*=0.41; psychological: *M*=3.38, *SD*=1.12, *t* (30) =1.87, *p*=.07) was at least a material transition across age groups.

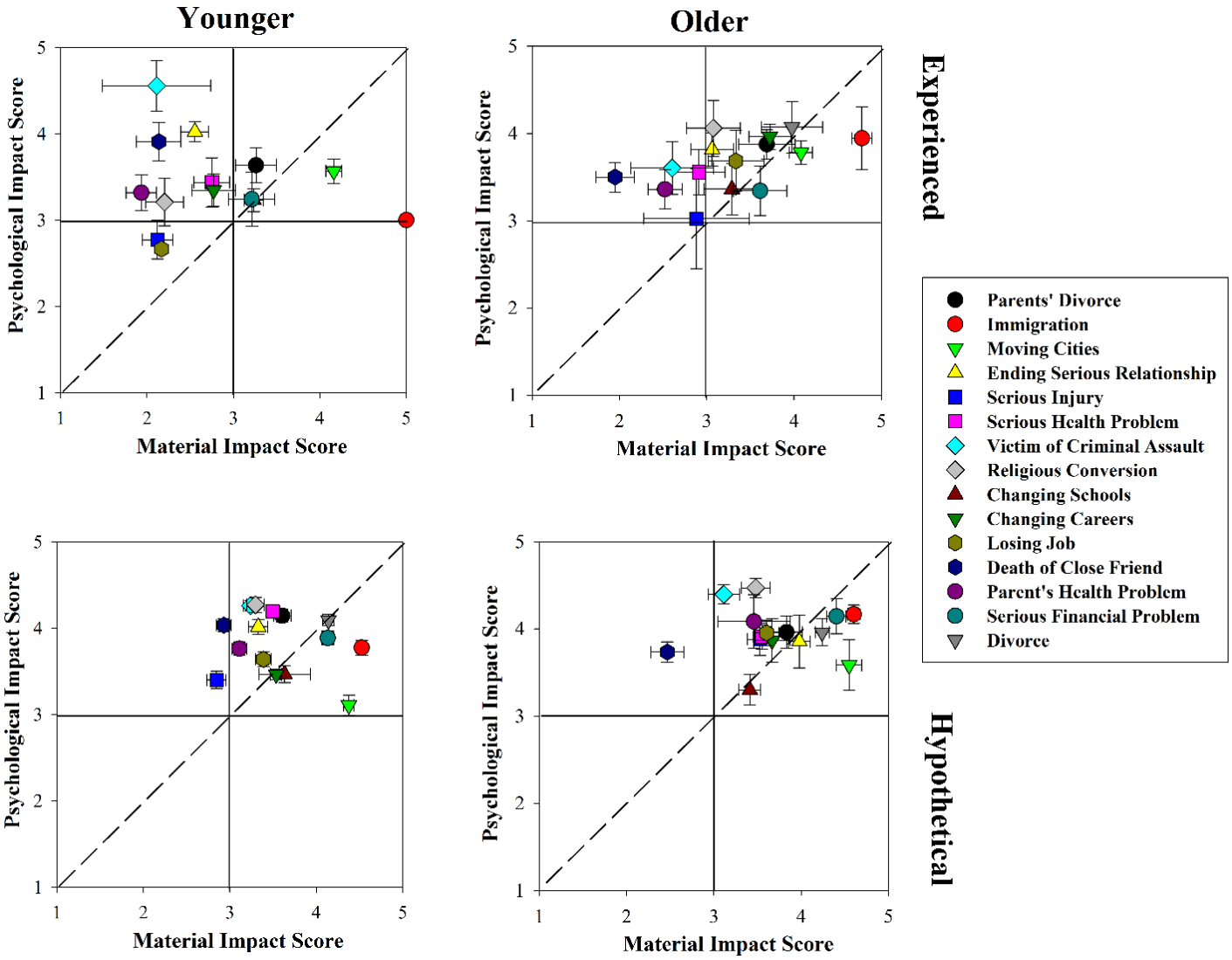

Figure 2.6 The transitional impact scores of experienced script-divergent events rated by the younger (upper-left) and older adults (upper-right), and the scores of hypothetical script-divergent events rated by the younger (lower-left) and older adults (lower-right). Error bars indicate ± 1 standard error of mean.

Two script-divergent events surprisingly fell into the "non-transitional" category for both age groups: *sustaining a serious injury* (material: *M*=2.21, *SD*=1.11, *t* (33) = -4.14, *p*<.001; psychological: *M*=2.75, *SD*=1.20, *t* (33) = -1.21, *p*=.23), and *losing a full-time job* (material:

M=3.33, *SD*=0.96, *t* (8) =1.04, *p*=.33; psychological: *M*=3.69, *SD*=1.06, *t* (8) =1.95, *p*=.087). Particularly for the younger adults, *religious conversion* (material: *M*=2.33, *SD*=1.12, *t* (24) = -3.02, *p*=.006; psychological: *M*=3.32, *SD*=1.33, *t* (24) =1.21, *p*=.24), and *changing careers* (material: *M*=2.77, *SD*=0.91, *t* (12) =-0.92, *p*= .38; psychological: *M*=3.35, *SD*=0.68, *t* (12) =0.35, *p*=.09) did not cause marked changes either materially or psychologically.

Would one's anticipated transitional impact of the script-divergent events be different, if experience-based assessments were not available? We plotted the TIS total scores rated hypothetically as a function of the scores obtained from participants with actual experience, and found that transitional impact was generally overestimated in absence of experience (Figure 2.7).

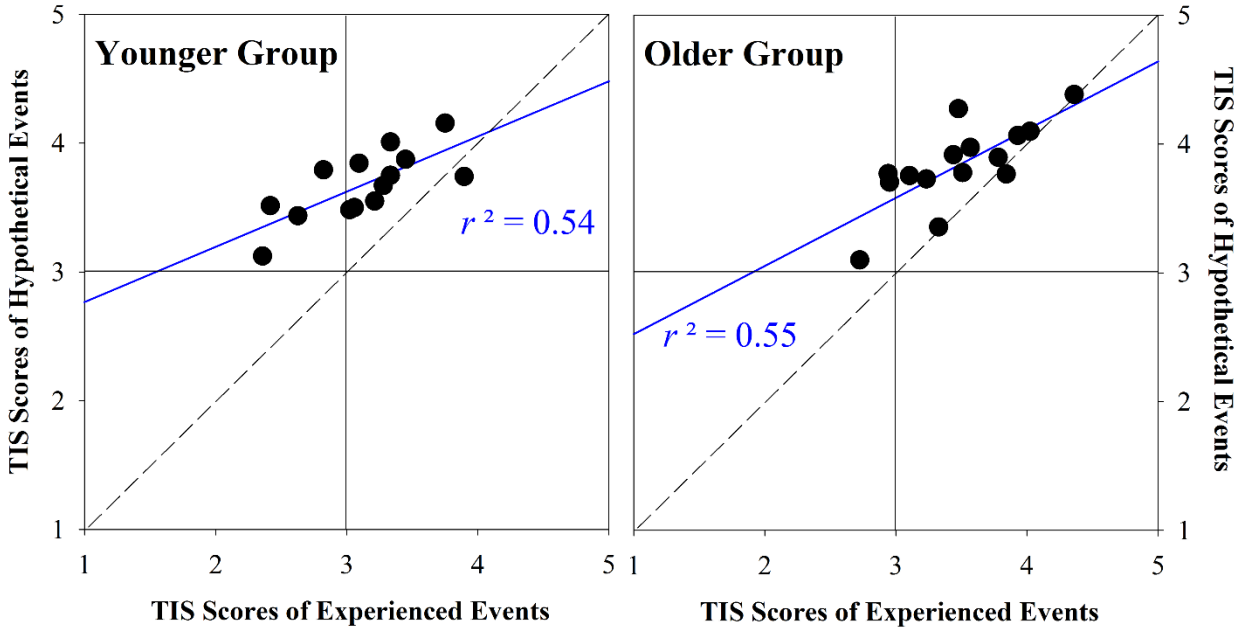

Figure 2.7 TIS total scores of hypothetical script-divergent events as a function of TIS scores of experienced scrip-divergent events, rated by the younger (left panel) and older adults (right panel). Each dot represents a specific event (e.g., immigration).

Moreover, the liner mixed effects of age group and condition on the total TIS scores, -2 log likelihood = 3027.86, AIC= 3033.86, BIC= 3049.62, showed that the ratings were lower for the experienced events than the hypothetical events, *B*= -0.43, 95% *C.I.* = [-0.57, -0.30], $p <$ .001. The effect of personal experience interacted with age, *B* = -0.18, 95% *C.I.* = [-0.35, -0.02],

p = .032. The younger group produced lower ratings than the older group did in overall, B=-0.14, 95% *C.I.* = [-0.25, 0.04], p = .008, and in separate conditions, both p <.01. Again, the experienced events received lower ratings than the unexperienced events did, regardless of age groups, both p <.001.

Importance ratings. As we predicted, both the script-consistent and -divergent events were regarded as important events. In the experienced condition, the average importance ratings for script-consistent and -divergent events provided by the younger adults were 4.03 (*SD*=1.14) and 3.75 (*SD*=1.35) respectively, and those provided by the older adults were 4.14 (*SD*=1.29) and 4.11 (*SD*=1.22) respectively. In the hypothetical condition, the ratings for the two types of events estimated by younger adults were 4.35 (*SD*=0.87) and 3.97 (*SD*=1.11) respectively, and those from the older adults were 4.39 (*SD*=0.86) and 4.12 (*SD*=1.09) respectively. An ordinal regression analysis with importance rating as the dependent variable, condition, age, and event type as fixed factors, and participant and event as random factors showed that: (a) compared with the hypothetical events, the experienced events were rated as being less important, B = -1.50, 95% *C.I.* = [-2.20, -0.79], p<.001, (b) compared with the older participants, the younger participants produced lower importance ratings, B = -2.23, 95% *C.I.* = [-2.93, -1.52], p<.001, and (c) the script-consistent and -divergent events did not differ in their importance, B = 0.02, 95% *C.I.* = [-0.87, 0.92], p =.96.

As stated previously, we anticipated the important events to (a) have brought about fundamental changes in the material life aspects, such as locations, people, and activities, (b) have influenced the individual psychologically, such as changing the individual's emotions, thoughts, attitudes, and the sense of self, or (c) have altered both aspects of daily life. In other words, the importance ratings would highly correlate to one or both TIS subscale scores. For the personally experienced events, the correlation between importance ratings and material-impact

scores was r (30) =0.59, p< .001, and the correlation between importance ratings and psychological-impact scores was r (30) =0.64, p< .001. The importance ratings also highly related to the overall TIS ratings, r (30) =0.67, p< .001. In contrast, for the hypothetical events, the correlations between importance ratings and TIS material scores, psychological scores, and overall scores were r (29) =0.28, p = .14, r (29) =0.39, p = .04, and r (29) =0.40, p = .03, respectively. To sum up, the importance ratings were highly correlated with TIS ratings when events were personally experienced. In the hypothetical situation, participants rated the significance of a life event based on its potential psychological influences rather than the material impact.

Discussion

It appears that the way we evaluate transitions is strongly influenced by experience. In the absence of experience, people tend to overestimate the emotional intensity, the transitional impact, and the importance of potentially impactful personal events. Theoretically, the events in question are all considered to be transitional, important, and either emotionally positive or negative. Indeed, we selected these events based on these same assumptions.

The results of the experienced condition imply that people adjust their beliefs in accordance to the past experiences (Janssen & Haque, 2017). Similar findings have been documented in the literature; people not only update their general knowledge based on feedback (e.g., *hindsight bias*, Hoffrage, Hertwig, & Gigerenzer, 2000), but also constantly change the sense of "the self" when it conflicts with the reality (Wagenaar, 1992). Moreover, younger and older adults produced varied evaluations for transitional impact and event importance. Intriguingly, the age-rated differences in the TIS ratings vary across individual events. However, the mechanism beneath the disparity remains obscure. The decreased TIS scores of the early-life events (e.g., starting elementary school, high school graduation, and starting university) might

occur because individuals forget, over time, how impactful a particular event was. Or it could be that the transitional impact of some events is overshadowed by the impact of other more recent transitions. For example, starting university was a milestone for those undergraduates, but compared with marriage and childbirth, the older adults tended to consider this event to be less influential. Last, the age-rated differences might be nothing but a simple cohort effect. Having been exposed to different historical and social circumstances, the older generation could hold dissimilar beliefs and attitudes from the younger generation on the events in their own lives and other people's lives.

The likelihood of occurrence was the only estimate that increased with personal experience. This finding suggests that people may rely on their own experiences to determine how probable an event is in another person's life. This tendency is more obvious for script-divergent events than for script-consistent events.

Taken all together, personal experience clearly influences the assessment of certain event properties. It seems then that these judgments reflect people's autobiographical knowledge, social beliefs, personal experiences, and their memories (Janssen & Haque, 2017). Undoubtedly, researchers need to consider the effects of experience when designing and reporting studies that assess subjective beliefs that people hold concerning common impactful events.

Chapter 3: The Characteristics and Organization of Autobiographical Memories

In the first chapter, we compared three positions: Self-Memory System, Cultural Life-Script Account, and Transition Theory, with regard to the organization of autobiographical memories. If SMS is correct, self-relevance should play a dominant role in autobiographical memories (Conway, 1996; 2005; Conway & Pleydell-Pearce, 2000); if cultural life-script position is valid, then autobiographical memory would be organized by positive, script-consistent transitions rather than script-divergent ones (Berntsen & Rubin, 2004; Rubin & Berntsen, 2003). Regardless, these two accounts only consider the temporal distribution of important memories. However, autobiographical memory does not only contain transitional or transition-related events. Rather, it is clear from the literature (Brown et al., 2016; Conway & Haque, 1999; Janssen, & Murre, 2008; Koppel & Berntsen, 2015; Rubin & Schulkind, 1997) that people have access to a large number of memories derived from relatively mundane (i.e. non-pivotal, non-life changing) experiences.

What factors are associated with the retention of event memories that do not play a role in defining "the self" or structuring a life? In this chapter, we have examined this question from a transition-theory perspective.

Periodization of Autobiographical Memory

Memorable personal events can happen at any time, but tend to pile-up around transitions (Brown, 2016; Brown et al., 2016). According to Transition Theory, the structure of autobiographical memory is an emergent property of experience and basic memory mechanism. The basic assumption of Transition Theory is that the organization of autobiographical memory mirrors the structure of experiences and thus is structured by "transition-delineated lifetime periods" (Brown, 2016; Brown et al., 2012; 2016).

Life transitions change the "fabric of daily life" (Brown, 2016; Brown et al., 2016). The

"threads" are the event components. Taking the event "I had dinner at a restaurant last night" as an example, the event components would be which restaurant, what "I" ate, and with whom. In other words, event components are people, locations, objects, and activities that we encounter on a daily basis.

The "fabric" is formed via Hebbian learning (Hebb, 1949). Personal experience in the real world not only lays down an episodic trace, but also builds and consolidates the associations between co-occurring and contiguous event components. The link between event components is generated and strengthened through direct experience (e.g., meeting a workmate at home), causal relation (e.g., going for celebration after passing the exam), and rehearsal (e.g., seeing in a restaurant and thinking about a friend I was dinning with here). This process can be considered as a type of Hebbian (or associative) learning. As a result of repetition and co-occurrence, individuals overlearn the links between components (e.g., workmate – home, celebrating – passing exams, and restaurant – friend), and construct an *event-component* network for the present lifetime period. In brief, the "fabric of daily life" is formed from interwoven event components through numerous associative learning trials.

The construction of the current event network, however, can be interrupted and/or updated by a life transition. Major transitions terminate exposure to a pre-transitional set of event components. For example, when migrating from one country to another, people may lose their contact with some old friends, as well as the familiar places, possessions, and activities. Meanwhile, a life transition brings about new "threads" (i.e. novel people, places, possessions, and activities), which will eventually become old and overlearned through repeated exposure. In the real world, lifetime periods consist of multiple stable periods and unstable (i.e. transitional) periods, which are delineated by major life transitions. Through the Hebbian learning, some event components interweave with others and form a complex event network for a stable period,

whereas ***transitional events define the start and end of the stable period as they cut off the threads of the old fabric of daily life while producing new materials for the current fabric***.

Apparently, the judgement for the same nominal transition can be influenced by individual differences. For example, "starting university" may be a more significant transition to students who move from the other side of a country to another than for students who commute between home and university on a daily basis. For the latter group, some old event components may still remain in their new life, such as living in the same house, or meeting old friends on weekends.

Because the organization of autobiographical memory mimics the structure of experience, participants' memory reports should reflect the features of "transition-delineated lifetime periods." On the event level, autobiographical memories tend to "pile up" around major life transitions; on the event-component level, the "fabric of daily life" is changed by major life transitions. These landmark events organize autobiographical memory in the same way as they periodize the real lifetime.

A Paradigm for Studying Autobiographical Memory

The think-aloud dating approach is a valid way to examine the role of transitions in the organization of autobiographical memory. Memory research has a long history of studying participants' verbal protocols (e.g., Williams & Hollan, 1981; also see Ericsson & Simon, 1980; Russo, Johnson, & Stephens, 1989; Wilson, 1994, for a discussion on the validity of verbal protocols). In concordance with the Living-in-History effect (Brown et al., 2009; 2012; Brown & Lee, 2010; Nourkova & Brown, 2015; Zebian & Brown, 2014), we define the organizational effect of a transition in autobiographical memories as the frequent use of the transitional event as a referent point when dating reported personal memories. A reported memory is considered to have a temporal connection with a life transition, if its date estimate is made with reference to

that transition. For instance, to measure the magnitude of *immigration effect*, we can calculate the frequency of "immigration" mentioned by participants in their verbal protocols.

To understand the mechanism underlying the "pile-up" of autobiographical memories around transitions, it is useful to consider two tasks commonly used to elicited autobiographical memories in the laboratory. The first requires people to recall the most important events in their lives (e.g., Berntsen & Rubin, 2002; Berntsen et al., 2011; Dickson et al., 2011; Haque & Hasking, 2010; Holmes & Conway, 1999; Rubin & Schulkind, 1997; Thomsen et al., 2011). The reported events compose the significant part of one's life story, and sometimes define or change one's sense of the self (e.g., dropping out of college). People usually have a clear memory for the precise date of such events (Auriat, 1993; Belli, 1998), and thus they often serve as reference points for dating mundane personal events (Brown, 1990; Brown et al., 2016; Brown & Lee, 2010; Friedman, 1993; Shum, 1998; Zebian & Brown, 2014).

The second task is word cueing (Crovitz & Schiffman, 1974). On each trial, participants are presented with a cue word and required to recall an autobiographical memory that is somehow related to it. The reported events are usually non-transitional, but somewhat unique, interesting, and emotionally charged (e.g., failing a course for the first time) (Conway & Haque, 1999; Janssen & Murre, 2008). Although people may not remember the exact date when these events have occurred, they are able to reconstruct the temporal information with the concurrent event components (Brown, 1990; Brown et al., 2016; Brown & Lee, 2010; Friedman, 1993; Thompson, Skowronski, Larsen, & Betz, 1996; Zebian & Brown, 2014).

We proposed that the autobiographical events retrieved in the laboratory may be a mix of important life transitions, distinctive life stories, and mundane events. Mundane events are accessible probably because they just took place or they have been rehearsed and revisited recently. Specially, the word-cued events often consist of a high proportion of recently-

experienced events (i.e. *recency effect*, Conway & Pleydell-Pearce, 2000). Here, we attempt to clarify the main difference between transitional and non-transitional events. Experiment 2 was designed to confirm the existence of non-life changing personal events and to test whether these mundane events and transitional events produce qualitatively different TIS-12 ratings.

We also considered the possible disparities between recently-experienced and remotely-experienced events. Participants were asked to explicitly indicate the reasons for remembering each reported event. We predicted that the retention of remote events would be associated with their distinctiveness and/or emotional salience (as a special form of distinctiveness; Alea et al., 2014), whereas the retention of recent events would reflect rehearsal and recency.

The last experiment of this thesis (Experiment 3) uses a think-aloud dating approach; we examined the effect of life transitions in the organization of autobiographical memories produced by a group of Chinese immigrants. We anticipated that they would frequently refer to the year of immigration to justify date estimates. Other than Transition Theory, we also tested the SMS and cultural life-script positions. The assumption was, self-relevance and positive script-consistent transitions would fail to explain the retrieval curve of word-cued memories.

Experiment 2: The Characteristics of Word-Cued Autobiographical Memories

In this study, we investigated how word-cued events and transitional events differed in term of their reasons for retention, event characteristics, and transitional impact. We used neutral concrete words to elicit autobiographical memories, assuming that participants were likely to recall trivial and non-transitional events rather than important life transitions (Brown et al., 2016; Conway & Haque, 1999; Janssen, & Murre, 2008; Koppel & Berntsen, 2015; Rubin & Schulkind, 1997). We had participants endorse reasons for why they thought they remembered each reported event. In line with prior research (e.g., Janssen, & Murre, 2008), we anticipated that they would choose distinctiveness, emotion, and rehearsal, as reasons for the retention of most reported memories, whereas few word-cued events would be believed to be retrained because they were transitionally impactful or particularly self-relevant. Importance, emotion, self-relevance, novelty, transitional impact, and other related properties were also measured in the subsequent phases.

To further verify that the high TIS ratings observed in Experiment 1 were not an experimental artifact, we needed a reasonable baseline for the impact of mundane, non-transitional events. If, as expected, word-cued events are substantially different from the events in the previous experiment, we should observe reliably lower TIS ratings (i.e. < 3.0 on each subscale) in the present experiment. In addition, Experiment 1 data suggested that people's beliefs about personal events may change over time. With time as a potential factor for subjective evaluations (e.g., emotion, Mroczek, 2001), we differentiated recently-experienced events and remotely-experienced events by instructing participants to retrieve a memory from a specified time period.

Finally, we interested in evaluating the potential impact of using an agreement scale rather than a magnitude scale with the TIS-12 questions. Thus, in the present study, we manipulated scale type (agreement *versus* magnitude) between subjects.

Method

Participants. We recruited 138 undergraduates at the University of Alberta who participated for partial course credits. Participants were randomly assigned to one of the two scale conditions during the TIS-rating task: One group, the *agreement group* (*N*=62, females=49; mean age=19.27, *SD*= 3.17) rated their agreement on each TIS statement using a 1 (*strongly disagree*)-to-5 (*strongly agree*) scale, and the other group, the *magnitude group* (*N*=65, females=44; mean age=19.22, *SD*= 3.67) rated the magnitude of impact on each TIS item using a 1 (*not at all*)-to-5 (*completely*) scale. The data of 11 participants was excluded due to their failure to follow the instructions regarding event age.

Materials. Eight neutral words served as cues: *book*, *car*, *telephone*, *tree*, *chair*, *computer*, *dog*, and *store*. Four words were randomly chosen by the computer to prompt recent memories and the other four were used to prompt remote memories. These cue words have been adopted in previous studies and are comparable in terms of word frequency, imageability, and concreteness (e.g., Brown et al., 2009; Brown & Lee, 2010; Zebian & Brown, 2014).

Table 3.1.

Reasons for Retention

#	Item
1	Because of this event, I experienced a strong emotion. (This was an emotionally arousing event.)
2	I don't know why I remember this particular event.
3	I encounter a physical reminder of this event as a part of my environment on a regular basis.
4	I talk about this event frequently.
5	I think about this event frequently.
6	This event changed my sense of who I am.
7	This event happened very recently.
8	This event has become an important part of my life story.
9	This event was a first-time experience for me.
10	This event was a turning point in my life.
11	This was an important event.
12	This was an unusual event.
13	Other, please specify

A list of potential reasons for retention explored why a particular event was retrieved (see

Table 3.1). We included several items in accordance with the SMS position and the cultural life-script position (Item 6, 8, 10, and 11). Based on Transition Theory, we assumed that some events might be remembered because of distinctiveness, emotional valence, and/or frequent rehearsal. We also added several trivial reasons, such as "this event happened very recently" and "I don't know." To maintain the validity of this test, we provided an option for participants to enter their own reasons for retention (i.e. "other, please specify").

A modified Autobiographical Memory Questionnaire (AMQ-11, Rubin et al., 2003) was also created. This questionnaire was designed to assess the characteristics of the reported events such as self-relevance, transitional impact, emotional intense and valence, vividness of current memory, and distinctiveness.

Table 3.2.

Modified Autobiographical Memory Questionnaire (AMQ -11)

#	Item
1	As I am remembering the event, my emotions are very intense.
2	At the time of this event, the emotions that I was feeling were very intense.
3	I consider this event to be a significant part of my life story.
4	My memory for this event is clear.
5	This event has changed my external material circumstances.
6	This event has impacted me psychologically.
7	This event reflects past personal motivations or goals.
8	This event tells a lot about who I am.
9	This event was a negative emotional experience for me.
10	This event was a positive emotional experience for me.
11	This event was a unique experience in my life.

We adapted two items from Autobiographical Memory Questionnaire: "as I remember the event, I can feel now the emotions that I felt then" (Rubin et al., 2003, p.901), and Centrality of Events Scale, "this event tells a lot about who I am" (Berntsen & Rubin, 2006, p. 229). The other items were created in line with the current purpose.

Procedures. This experiment consisted of five phases. During Phase 1, the cue-word task (Crovitz & Schiffman, 1974) was used to elicit a set of autobiographical memories. On each trial,

participants were presented with a word and required to retrieve a specific autobiographical memory that was directly related to it. After being recalled, each event memory was recorded by the participant using his or her computer keyboard.

A specific autobiographical memory was defined as an event that (a) directly involved the participant, and (b) occurred at a specific time in a specific place. Event type was manipulated within subject. That is, for each cue word, participants needed to recall either a *recent* event (i.e., one that was at least 2 weeks old, but no older than 6 months), or a *remote* event (i.e., one that was at least a year old). The retrieval sequence of recent and remote events was counterbalanced between participants. The presenting order of the four cue words within an event type was also randomized.

During Phase 2, participants were represented with the event descriptions reported in Phase 1, one at a time, in a random order. They were asked to check all the applicable reasons for remembering that event. The first 12 options in Table 3.1 were displayed in a random order for each participant, with the last option "*other, please specify*" always appearing at the bottom of the screen. Participants were required to type a description of their off-list explanation after they selected this option. In Phase 3, participants rated their agreement on each AMQ-11 statement using a 1 (*strongly disagree*)-to-5 (*strongly agree*) scale. The previously reported event descriptions were provided in a random order, with all the 11 statements listed at once. The listing AMQ statements was randomized between subjects. Transitional impact was assessed during Phase 4. Participants in the agreement-rating group rated the TIS-12 statements on a 1 (*strongly disagree*)-to-5 (*strongly agree*) scale, and the magnitude-rating group rated on a 1 (*not at all*)-to-5 (*completely*) scale. The twelve statements were displayed in the same way as the AMQ items. Finally, participants provided their best estimate for the date of each reported event, and then responded to an additional question, "Is this an important event in your life?" by

entering a number form 1 (*not at all important*) to 5 (*extremely important*).

Results and Discussion

We trimmed the data based on the date estimates provided by participants in Phase 5 and acquired a total of 475 recent events with the event age varying from 23 to 180 days prior to the test dates, and a total of 459 remote events aged between 366 and 10742 days. In the following sections, we compared the recent and remote events in three dimensions: reasons for retention, event properties, and impact on life.

Reasons for retention. We obtained the frequencies of each option endorsed as a reason for remembering an event. The factorability of the 13 items was examined. The 13-item analysis was deemed to be suitable because: (a) all the items significantly correlated (p <.001) with at least one other item, (b) the Kaiser-Meyer-Olkin measure of sampling adequacy was .68, and Bartlett's test of sphericity was significant, $\chi^2(78) = 1195.46$, $p < .001$), (c) the smallest result of the measure of sampling adequacy based on the anti-image correlations was 0.419, and (d) the communalities were all greater than 0.34, indicating that items shared some common variance.

The principle component analysis with varimax rotation suggested that four reasons loaded highly on *Self-relevance*: the loadings of "turning point," "important part of life story," "important," and "sense of who I am" were 0.75, 0.70, 0.66. 0.62, respectively. Further, two reasons loaded highly on *Rehearsal*: the loadings of "think" and "talk" were 0.78 and 0.75 respectively. Two reasons also loaded highly on *Novelty*: the loadings of "first-time" and "unusual" experiences were 0.77 and 0.64 respectively. Finally, two reasons, "physical reminder" and "happened very recently," could be combined as *Recency*: the loadings were 0.74 and 0.62 respectively. In addition, we considered three reasons separately: The "emotion" reason did not load above 0.40 on any factor. Both "I don't know" and "other" loaded on the fifth factor, and their loadings were 0.50 and -0.85 respectively, but "I don't know" also had a loading

of -0.53 on recency. We combined the frequencies of subset items for self-relevance, rehearsal, novelty, and recency. For instance, "novelty" was counted only once for a reported event if the participant endorsed both "first-time" and "unusual" as reasons for remembering the event. Based on the frequencies (or combined frequencies) of endorsements, we compared the five listed reasons endorsed for the recent and remote events.

Table 3.3 presents the percentages of endorsements on each reason for retention. The listed reasons could account for more than 90% of event reports. Approximately 6% of the events were remembered for no reason (i.e. only checked "don't know"). Less than 3% were solely attributed to an unlisted reason, such as last-time experience, taking place during a transitional time, being associated with particular people/places/ activities, and lack of alternatives (e.g., "the only thing I could think of upon seeing the word *store*").

Table 3.3.

Percentages of the reasons endorsed for remembering the recent and remote events

			Binary Logistic Regression	
Reason	**Recent**	**Remote**	***Odd Ratio***	**95% *C.I.***
Self-Relevance	18%	28%	0.56 ***	[0.41, 0.76]
Rehearsal	16%	18%	0.88	[0.62, 1.23]
Novelty	41%	58%	0.50 ***	[0.38, 0.64]
Emotion	22%	38%	0.46 ***	[0.35, 0.61]
Recency	67%	20%	7.72 ***	[5.74, 10.38]
Don't Know	15%	22%	0.64 **	[0.46, 0.89]
Other	17%	17%	1.05	[0.75, 1.48]

Notes. ** $p < .01$, *** $p < .001$.

Binary logistic regression analyses were conducted to test the main effect of event type. Recent events and remote events differed in their major reasons for retention. Remote events were remembered mainly due to their novelty; affect arousal was also a recognized reason for remembering the remote events. Conversely, most recent events were remembered due to *Recency* (i.e. recently occurred and/or encountered a physical reminder). However, we found that participants equally rehearsed the recent and remote events. Most importantly, self-relevance, or

importance, was not the primary reason for remembering an autobiographical event.

Event properties. We computed the mean ratings for the recent and remote events on each AMQ item. The factorial analysis suggested that there were only two principle components: Vividness ("My memory for this event is clear") did not load above 0.40 on either factor. Positive and negative valances highly loaded on one factor, and the loadings were 0.87 and -0.86 respectively. The rest items all highly loaded on the other factor, with loadings varying from 0.42 to 0.78. Therefore, we treated the AMQ statements as independent items. For the current purpose, we plotted some of the items together in one panel. Figure 3.1 shows that both types of word-cued events were self-irrelevant and non-transitional. However, the reported events tended to be vivid, unique, affect-laden, and somewhat positive.

We examined whether the two types of events differed in the event ratings by fitting an ordinal regression model. Event type (recent, remote) was entered as the fixed factor, and participant and cue were entered as the random factors. Consistent with our predictions, self-relevance ratings were low, especially for the recent events, which were 0.53 times less likely than remote events to be significant parts of life story, B= -0.63, 95% *C.I.* = [-0.89, -0.37], $p <$ .001, and 0.74 times less likely than remote events to define the sense of the self, B= -0.29, 95% *C.I.* = [-0.53, -0.05], p = .019. There was no reliable difference between the recent and remote events in goal-relatedness ratings, B= -0.12, 95% *C.I.* = [-0.31, 0.06], p = .189. Similarly, events were rated low in regard to their impact on life, and recent events were relatively less transitional materially and psychologically, both $p <.05$.

The word-cued events were associated with medium emotion at encoding, and decreased over time. Regardless, the recent events were less emotional than the remote events, both $p <.05$. We also found that the word-cued events were positive rather than negative. The valence ratings were lower for the recent events on positivity, B= -0.26, 95% *C.I.* = [-0.46, -0.06], p = .010, but

not on negativity, *B*= -0.20, 95% *C.I.* = [-0.42, 0.03], *p* = .084. Moreover, all the memories were vivid, especially for the recent events, *B*= 1.11, 95% *C.I.* = [0.78, 1.45], *p* <.001. The recent events were less unique than the remote events, *B*= -0.72, 95% *C.I.* = [-0.96, -0.47], *p* <.001.

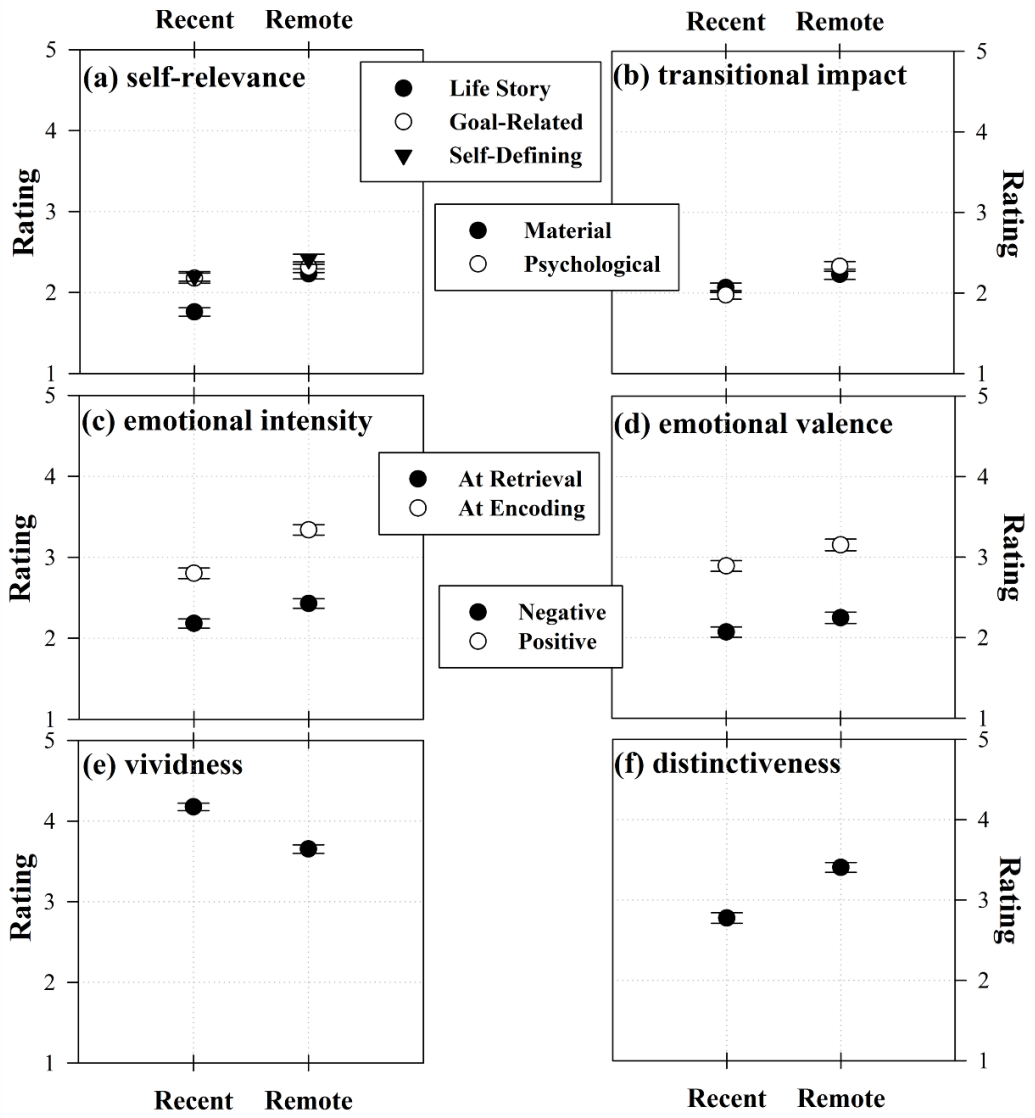

Figure 3.1 The mean ratings of (a) self-relevance, (b) transitional impact, (c) emotional intensity, (d) emotional valence, (e) vividness, and (f) distinctiveness for recent and remote events. Error bars indicate ± 1 standard error of mean.

In sum, there were some quantitative differences between the recent and remote events. Participants retrieved more distinctive and affect-laden events from the more distant past than from the past few weeks/months. To further investigate the distinction between word-cued events and important life transitions, we compared the TIS scores of current events with those of

the personally experienced events in Experiment 1.

Transitional impact and importance ratings. As shown in Figure 3.2, despite the event age and rating scale, the two types of word-cued events were not qualitatively distinct. They were both essentially non-transitional events. We fitted a liner-mixed-effect model with total TIS score (the average of 12 ratings) as the dependent variable, scale type (agreement, magnitude) and event type (recent, remote) as the fixed factors, and participant and cue as two random factors (-2 log likelihood = 2193.99, AIC= 2199.99, BIC= 2214.50). Both scales are acceptable for assessing the magnitude of transitional impact, B= -0.02, 95% *C.I.* = [-0.16, 0.12], p = .80, with no interaction with the event type, B= 0.13, 95% *C.I.* = [-0.06, 0.33], p = .20. Recent events brought fewer life changes than remote events did, B= -0.33, 95% *C.I.* = [-0.47, -0.19], p < .001.

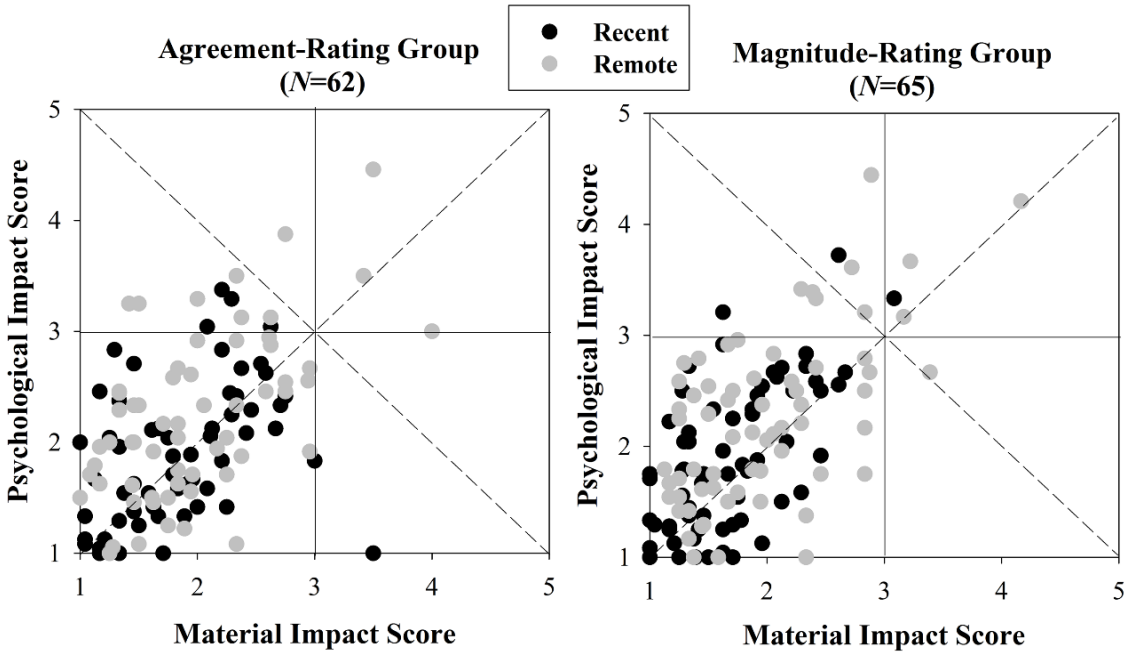

Figure 3.2 The material-impact scores as a function of the psychological-impact scores for recent and remote events given by the agreement-rating group (left panel) and magnitude-rating group (right panel). Each dot represents the mean rating for a type of events from a participant.

Figure 3.3 compares TIS scores of the personally experienced events in Experiment 1 (younger group) and the scores of the current events (agreement rating). A liner-mixed-effect model (-2 log likelihood = 4304.66, AIC= 4310.66, BIC= 4327.13) was fitted to test the

discrepancy between word-cued events and important life transitions, using total TIS scores as the dependent variable, event type (word-cued, transitional) as the fixed factor, and participant and cue as two random factors. There was a significant fixed effect between word-cued and transitional events, B = -1.00, 95% *C.I.* = [-1.15, -0.84], p <.001. This effect was not due to the differences among participants, Wald z =0.36, p =.72, or individual events, Wald z =0.63, p =.53.

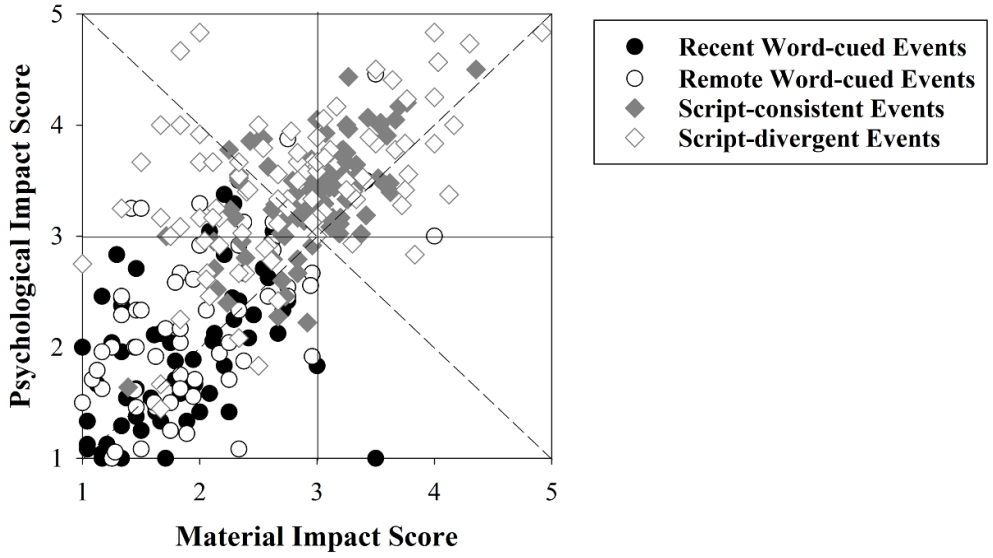

Figure 3.3 The material-impact scores as a function of the psychological-impact scores for the word-cued events (based on the agreement-rating group) and menu-selected events (based on the younger group in the experienced condition of Experiment 1). Each dot represents the mean rating for a single type of event given by a participant.

These results imply that word-cued events are non-transitional in nature. This conclusion was reconfirmed with the "importance" rating. The mean ratings for the recent, remote, script-consistent, and -divergent events were 2.30 (*SD*=1.21, *N*=475), 2.84 (*SD*=1.30, *N*=459), 4.03 (*SD*=1.14, *N*=595), and 3.75 (*SD*=1.35, *N*=263), respectively. An ordinal regression analysis showed that the word-cued events were considered less important than Experiment 1 events, B = -1.96, 95% *C.I.* = [-2.27, -1.65], p <.001. In brief, word-cued sampling tends to produce distinctive and emotionally charged memories rather than significant life transitions. These two subsets of autobiographical events differ in their impact on daily life and "importance."

Experiment 3: The Role of Life Transitions in the Organization of Autobiographical Memories

Previously we have demonstrated that (a) transitional events, including those rarely expected or experienced, can alter multiple aspects in an individual's daily life, and (b) other than transitional events, autobiographical memories include a respectable proportion of mundane events. Word-cued memories usually differ in content from events in the cultural life scripts (see also Janssen & Murre, 2008) and are typically low in self-relevance. At the beginning of this chapter, we also described the organizational role life transitions play in autobiographical memory. That is, they terminate the associative learning of prior event components and signal the onset of new event-network constructing. The ultimate purpose of this dissertation, as well as of the present study, was to reveal this connection between life transitions and more mundane autobiographical memories. Consistent with the living-in-history project (Brown et al., 2009; 2012; Brown & Lee, 2010; Zebian & Brown, 2014), we used a think-aloud approach to obtain participants' dating protocols and examined the information they contained. If Transition Theory is correct, the date estimates should be made with reference to major collective transitions, script-consistent personal transitions, and major script-divergent transitions. The frequency of a transitional event mentioned in participants' verbal protocols will serve as an index of the transitional effect.

In the literature, only a few researchers have paid attention to the effect of script-divergent transitions on the organization of autobiographical memory. Studies on bilingual memory (Esposito & Baker-Ward, 2016; Schrauf & Rubin, 1998; 2001) have documented an *immigration bump* in the retrieval curve of autobiographical memories —the location and magnitude of the bump appear to be related to participants' age at immigration. However, because both studies failed to include a substantial number of late-life immigrants, it was

difficult to separate the immigration bump from the standard reminiscence bump. In other words, we could not attribute the immigration bump to a single life transition. Besides, prior research did not confirm the transitional characteristic of immigration.

Pillemer and colleagues have demonstrated the "pile-up" of free-recalled autobiographical memories around "the most important move" between the ages of 40 and 60 (Enz et al., 2016). They also measured the transitional impact of relocation, and confirmed its transitional nature. These researchers found that the number of memories elicited from the ages of 40 and 60 peaked at the time of the most important move. Although their findings provide a more powerful support for Transition Theory, it is noteworthy that more than a half of those relocation experiences were related to other transitional events (e.g., job change, retirement, divorce, and marriage). Therefore, the "relocation bump" could be, again, a mixed effect of multiple life transitions.

We identified *migrating to another country* as one major script-divergent transition, and recruited a group of Chinese immigrants from the local communities in Canada. Immigration is temporally unrestricted and thus divergent from a prototypical life script (Brown et al., 2012; Brown & Lee, 2010). Because of the relocation, the Chinese immigrants had to adapt themselves to the new diet and life habits and re-build their social connections in Canada. Immigration might have also caused cultural assimilation (Berry, 1997) and intense emotions (e.g., Grinberg & Grinberg, 1989). If immigration was indeed a major transition in those immigrants' lives, they should have more candidate memories (i.e. frequently rehearsed, affect-laden, first-time, and/or unusual) from the immigration years than from stable personal periods that preceded or followed them. Therefore, we should be able to reproduce the immigration bump with the Chinese immigrant sample. In line with Transition Theory, we also anticipated that participants would frequently refer to the date of their relocation to date word-cued events.

To obtain a "pure" immigration bump, we modified the prior paradigm (Esposito & Baker-Ward, 2016; Schrauf & Rubin, 1998; 2001). First, our participants were Chinese immigrants who settled in Canada after the age of 30. We did this so that there would be little or no overlap between the immigration bump and the reminiscence bump. Second, at the end of the study, we asked each participant to assess the transitional impact of his or her own immigration experience. Resting on the well-established finding that immigration has a profound effect on people's lives (e.g., Aronowitz, 1984; Grinberg & Grinberg, 1989; Laosa, 1996; Li et al., 2015; Rumbaut, 1997; Suárez-Orozco & Suárez-Orozco, 2001; Svob & Brown, 2012), and the relevant results in Experiment 1 (Figure 2.6), we predicted that the TIS-12 ratings would be at or near ceiling. In addition, the analysis of verbal dating protocols enabled us to attribute the atypical bump in the immigration period to this transitional event. Other than the temporal overlap between immigration and the peak in memory retrieval curve, we could also observe how memorable events were related to life transitions.

To test the alternative account of the immigration bump, we also collected the qualitative ratings (i.e. AMQ-11) for the word-cued events. The SMS position implies that events from the period of immigration should be particularly memorable due to their high relevance to the new self-goals and self-identity after immigration (Conway, 2005). If this is true, then events that happened around the period of migration should score very high on self-relevance and importance, and potentially they should be rated as being more important and more self-relevant than events retrieved from other periods of life.

Method

Participants. Forty Chinese immigrants aged from 45 to 60 were recruited from Edmonton and compensated for their participation. Based on Otoya's (1987) bicultural criterion, restricted participation to individuals who were born in China and who had lived in Canada for at

least three years. To separate the immigration bump from the reminiscence bump, we also restricted the age at immigration to 30 years old or older. Demographic information, including gender, year and place of birth, year of immigration, years of education (both in China and Canada), was collected at recruitment. The average age of the participants was 48.95 (*SD*=3.00), including 13 males and 27 females. Their age at immigration ranged from 30 to 50 (M= 39.28, *SD*=4.77), and the median number of years of Canadian residence was 10. The average education year in China was 15.56 (*SD*=1.71), whereas the average education year in Canada was 2.35 (*SD*=1.58).

Materials. Eighteen cue words were used to elicit autobiographical memories: *ball, book, box, bread, chair, coat, dog, pencil, piano, pill, radio, river, snow, spoon, street, stone, tree*, and *window*, and two cue words were used for practice: *automobile,* and *bag*. These cue words have been adopted in previous studies and demonstrated comparable on frequency, imageability, concreteness, and meaningfulness across languages and cultures (Brown et al., 2009; Brown & Lee, 2010; Zebian & Brown, 2014).

We revised the wording of the TIS-12 (Svob et al., 2014) to assess the type and degree of change brought about by immigration. We replaced "this event" with "immigration" for all the statements in Table 2.2 (e.g., "Immigration has changed the places where I spend time"). The 11 statements of the modified AMQ were the same as in Experiment 2, except that we added two items for each word-cued event: "At the time of this event, I was using: *English*, *Chinese*, or *both*." "This event and my experience of immigration were *directly related*, *indirectly related*, or *unrelated*." These two items always appeared beneath the other statements.

All the materials were translated to Chinese and back-translated to ensure comparability to the original English versions.

Procedures. The entire study was conducted in Chinese. In Phase 1, the two practice

words, *automobile* and *bag*, were presented at first, followed by the 18 cue words. The cues were shown on the computer screen one at a time. Participants retrieved a specific event related to each cue from any time of their lives (i.e. from birth to the test day) and wrote a brief description of each event on a separate index card. Then, the researcher presented the index cards one at a time in a different order, and asked the participants to estimate the year when each event had occurred. They were told to "think aloud" while dating the events. Their verbal protocols were audio recorded by the researcher. To ensure that they understood the task, participants first generated dating protocols for the two practice trials. On the trials that were provided no verbal justification for the date estimates, participants were probed with the question: "How do you know that the event happened on that date and not earlier or later?" (Zebian & Brown, 2014, p. 201). In the third phase, participants rated the AMQ-11 statements along with the language and immigration-relatedness questions. Finally, they assessed the TIS-12 for "immigration" based on their own experience. On each trial of the last two phases, the cue word was provided at the top of the screen and the corresponding index card with the event description was also given to the participant. The presentation order of event cues was randomized by computers between phases, and the orders of the modified AMQ and TIS-12 statements were randomized between subjects.

Results and Discussion

The Chinese immigrants believed that immigration was an important transition in their lives. The material-impact scores (M= 4.54, SD= 0.41) were significantly higher than 4 (*agree*), t (39) =8.13, p =.001 based on 1000 bootstrap samples, Cohen's d = 1.28, and the psychological-impact scores (M= 4.04, SD= 0.68) were statistically equal to 4 (*agree*), t (39) =0.43, p = .67. A paired-sample t-test indicated that immigration had stronger material impacts than psychological impacts, t (39) =5.09, p =.001 based on 1000 bootstrap samples, Cohen's d = 0.88. By definition, *migrating from China to Canada* was a major life transition in participants' lives.

To minimize the effect of recency on our analyses, we excluded a total of 139 event reports because they occurred no more than two years prior to test year. The rest 581 remotely-experienced events were coded based on the verbal protocols collected during the dating phase. Each dating protocol was assigned to one of the 28 categories listed in Appendix B. Only five protocols were considered *unjustified*; in other words, they lacked information in support of the estimated date. The rest 576 protocols, with supporting information, were considered *justified*.

Occasionally, a single protocol would include more than one type of information. When this happened, consideration was first given to *immigration*, *historical event*, *and pop/sports/ weather*. For instance, a dating protocol, "I bought the coat for my mother who visited us (*having visitors from China*) in the second year after we immigrated to Canada (*immigration*)," was categorized to *immigration*. Historically significant events included political/economic-related events, wars, and natural disasters (e.g., the Tangshan Earthquake in 1976), which had been previously investigated in the LiH project (Brown et al., 2009; 2012; 2016; Brown & Lee, 2010; Zebian & Brown, 2014). We used a separate code for other public events, such as popular culture, sports, and unusual weathers. If neither immigration nor a public event were mentioned, the protocol was then assigned to a determinative event from the rest categories.

The interrater reliability between two independent groups of coders across the 576 non-recent justified protocols was Cohen's Kappa = 0.92, p <0.001, 95% *C.I.* = [0.90, 0.94]. In general, 16% of the 576 justified estimates fell into the immigration category, 6% were based on historical events, and 1% referred to other public events. Other than immigration, approximately 66% were linked to a specific personal event of participants' own. By contrast, only 11% of the verbal justifications were attributed to an event of another person, or a generic age range. To reveal the temporal connection between life transitions and mundane memories, we analyzed the proportions of the different protocol categories around the formative years and immigration.

The reminiscence bump. Figure 3.4 A displays the temporal distribution of recalled events. It also provides information about the nature (e.g., script-consistent *versus* script-divergent) and temporal dispersion of the various events and periods referenced in the dating protocols. Corresponding to the previous classification (see Table 2.2), the script-consistent events included beginning elementary school, beginning/ graduating from junior high/ high school, beginning/graduating from university, beginning/ graduating from graduate school, getting a car, settling on career (get a permanent job, major achievements and promotion), having a serious romantic relationship, getting married/remarried, birth of a child, and death of a parent; the script-divergent events composed of dealing with (grand) parent's health problem, sustaining a serious injury or health problem, moving to another city, moving houses, losing a job, change careers (not due to immigration), big trips (exclude trips to China), and getting/losing a pet. "Immigrant-specific events" consisted of immigration, post-immigration education (language or occupational training), post-immigration jobs, return trips to China, and having visitors from China (see Appendix B for the detailed examples). We used unconnected markers for the age bins, "46-49" and "50-51," because the youngest participant was 45 years old and those two dots did not represent all the participants.

This figure makes two things clear. First, the five-year binned retrieval curve of the word-cued memories showed a robust reminiscence bump covering the age of 6 to 15 years, with 32% of the event reports. Inconsistent with the cultural life-script prediction, this bump, which peaks in the mid-childhood, occurs much earlier than the formative years. Because we used a word-cue task to prompt these memories, the bump was earlier than those retrieved with other methods. This result is similar to those documented in the literature (Koppel & Berntsen, 2015).

Second, the reminiscence bump presented a closer association with the script-consistent events than script-divergent events. We divided the age estimates into three periods: pre-bump (1

to 5 years), bump (6 to 15 years), and post-bump (16 to 51 years), and conducted chi-square tests of goodness-of-fit to determine whether the 239 script-consistent references and 125 script-divergent references (excluding immigration and the related categories) were equally distributed across these three periods. The results indicated that the script-consistent references accumulated in the reminiscence bump period, χ^2 (5, N = 576) = 62.47, p < .001, whereas the script-divergent references were more likely to occur after the age of 15, χ^2 (5, N = 576) = 17.36, p = .004.

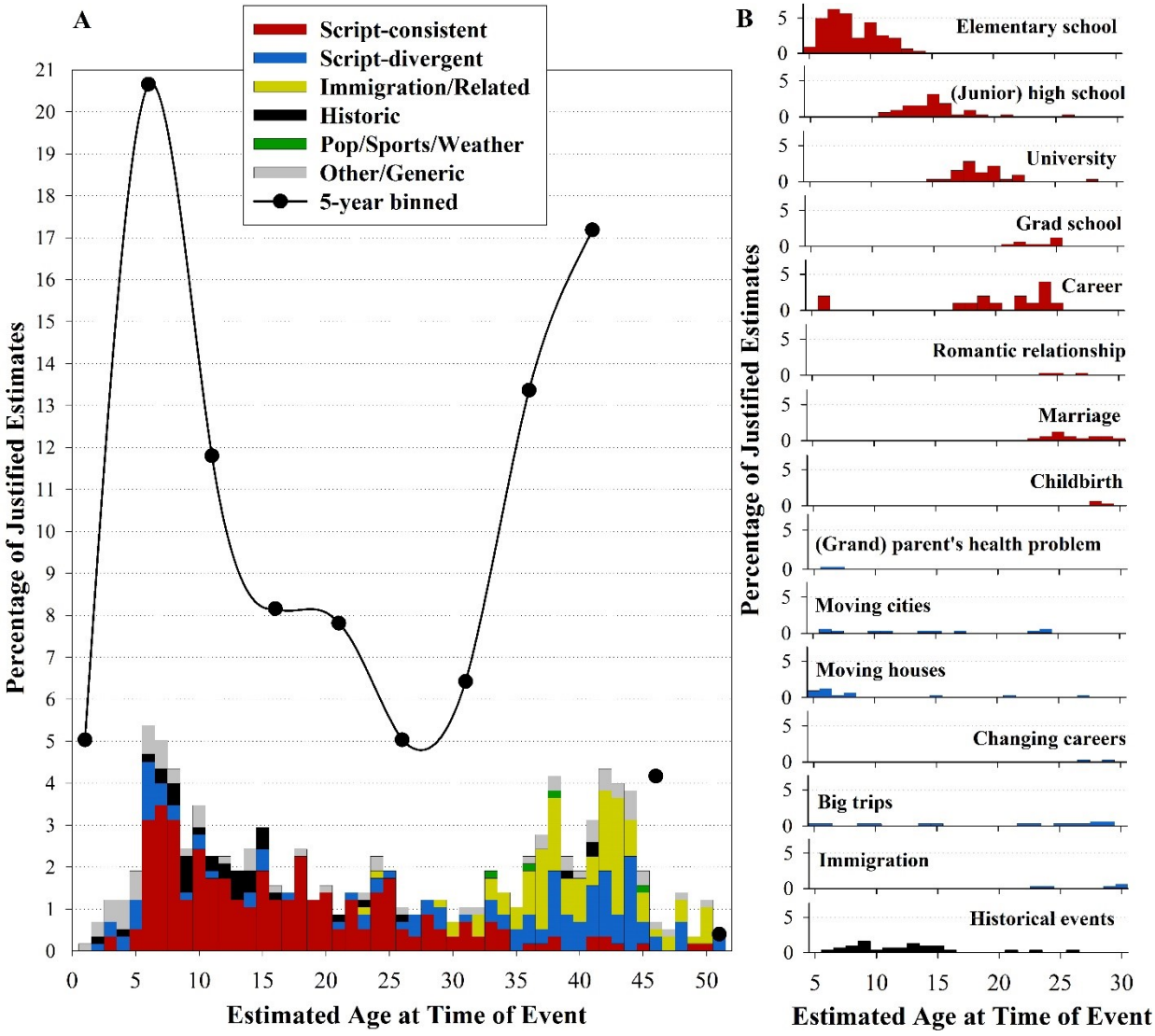

Figure 3.4 (A) The percentages of justified reports as a function of participants' estimated age categorized by the reference types, and the 5-year binned retrieval curve of the remote word-cued events. (B) The frequency of each type of life transitions that contributed to the reminiscence bump.

We also plotted the frequency of each specific event mentioned in the dating protocols across the age of 5 to 30 years. If autobiographical memories "piled up" around script-consistent transitions, we should observe a life script by separating the distribution patterns of the memory reports according to their reference types. As seen in Figure 3.4 B, the Chinese immigrant sample showed a clear life script in their dating protocols: elementary school → junior high/ high school → university → graduate school → career → romantic relationship/marriage → childbirth. An increase of childhood memories during the elementary school years was the primary reason for the remarkably early reminiscence bump. Among other specific events, relocation and historical events had a distinct effect on the organization of autobiographical memories. As these two effects have been already verified using TIS-12 in other studies (Brown et al., 2012; 2016; Brown & Lee, 2010; Enz et al., 2016), the current analyses would only focus on the immigration effect.

The immigration bump. In Figure 3.4., there is clearly a second bump between the age of 35 and 45, in accordance with participants' age at immigration (*M*= 39.28, *SD*=4.77). To disclose the immigration bump, we plotted the retrieval curve as a function of the estimated years away from the time of relocating to Canada (Figure 3.5).

As predicted, this study produced a robust immigration bump. Indeed, more events (approximately 10%) were recalled from the year of immigration than from any other year, and 17% occurred during the 5-year period centered on the relocation to Canada. Unlike the previous findings (Esposito & Baker-Ward, 2016; Schrauf & Rubin, 2001), this bulge was temporally separated from the reminiscence bump and thus could not be ascribed to strong presence of script-consistent events during the formative years.

With a focus on the role of immigration in the organization of autobiographical memory, we re-grouped the coded protocols into four classes: (a) *Immigration*. The dating protocols must

have explicitly mentioned the year of immigration or the relocation from China to Canada. (b) Other immigrant-specific events (*Immigration-related*). Participants referred to the time when they took a language or occupational training course, found a new job in Canada, returned to China to visit family and friends, or had a visitor from their hometown. (c) *Collective*. We combined the historically significant events and the "pop/sports/weather" category. (d) *Personal/Generic/Other*. We assigned all the personal events, generic events (age range), and events of other people to this last category. Finally, we computed the percentage of the justified estimates for each class.

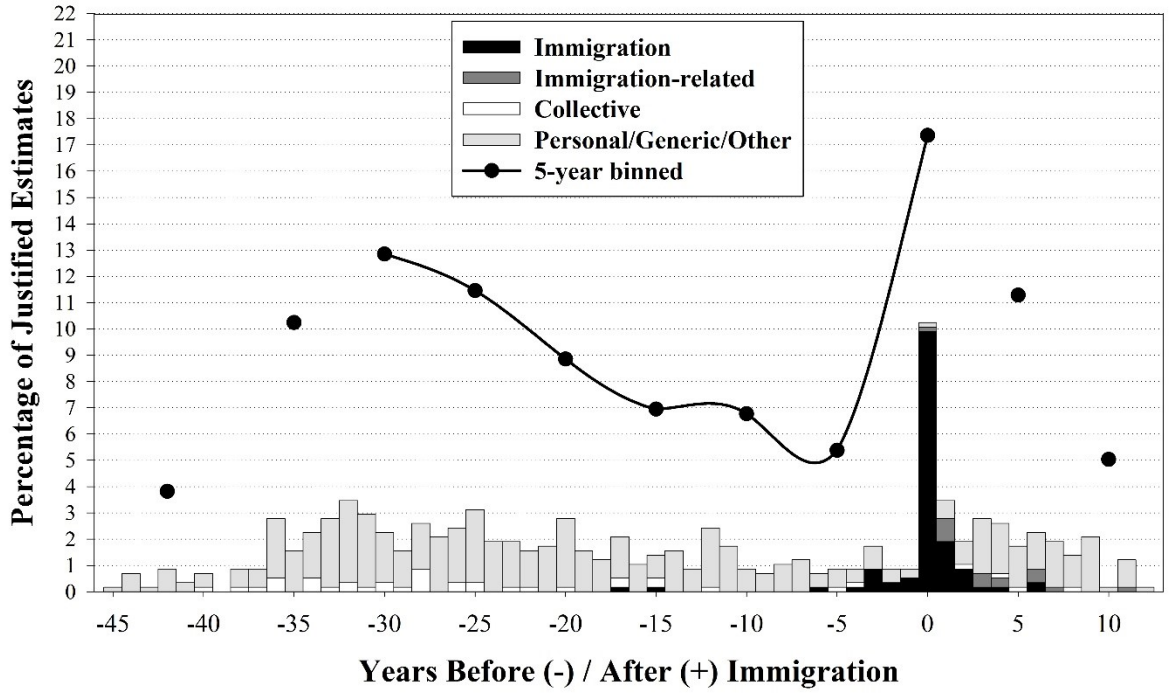

Figure 3.5 The percentages of justified reports as a function of estimated years away from the time of immigration categorized by the reference types and the 5-year binned retrieval curve of the remote word-cued events. Unconnected dots may only represent partial participants.

In line with our prediction, 16% of the justified estimates were made with reference to immigration (Figure 3.5). The percentages of immigration-related, collective, and personal/genetic/other references were 3%, 7%, and 75%, respectively. For the analysis purpose,

we separated the years into three periods: the year of immigration, one to three years before/after immigration, and four or more years before/after immigration. Approximately 97% of justified estimates in the year of immigration referred to this transitional event. The percentage decreased to 40% for one to three years before/after immigration, and less than 2% for four or more years before/after immigration. These observations were also confirmed by a chi-square test of goodness-of-fit that the immigration references were not distributed equally across these three periods, χ^2 (5, N = 576) = 398.42, p < .001.

This parallels the previous findings (Brown et al., 2009; 2012; 2016; Brown & Lee, 2010; Zebian & Brown, 2014), demonstrating that people use important transitions as temporal references to date the transition-proximate events but rarely mention them when dating transition-distant ones. In addition, prior research has demonstrated the existence of a *before/after effect* (Brown et al., 2016) — People often mention in the protocol that this event happened before (or after) a transitional event (e.g., the Bosnian civil war) even when these two events are unrelated. In the current case, the effect can be defined as a tendency for participants to use the year of immigration as a temporal reference point to date the immigration-unrelated events that occurred during around the time of relocation.

Figure 3.6 shows the relation between immigration references and immigration relatedness. The relatedness question was included as part of the modified AMQ. Event memories that were responded with “indirectly related” or “directly related” were considered immigration-related. It is worth noting that not all of the events from the year of immigration were related to this transition. More precisely, out of the 89 events that were dated with immigration references in this 13-year period, 26 events were considered by participants to be directly related to immigration, 31 events were indirectly related, and 32 were unrelated to immigration. A binary logistic regression was performed with reference type (immigration-

referred, non-immigration-referred) as dependent variable, and immigration relatedness (related, unrelated) as factor. The odds of mentioning immigration in a dating protocol were only 1.39 times greater for immigration-related events as opposed to immigration-unrelated events, which was not statistically significant, B=0.33, 95% *C. I.*= [-0.27, 0.96], Wald χ^2 (1) = 1.16, p = .272 based on 1000 bootstrap samples.

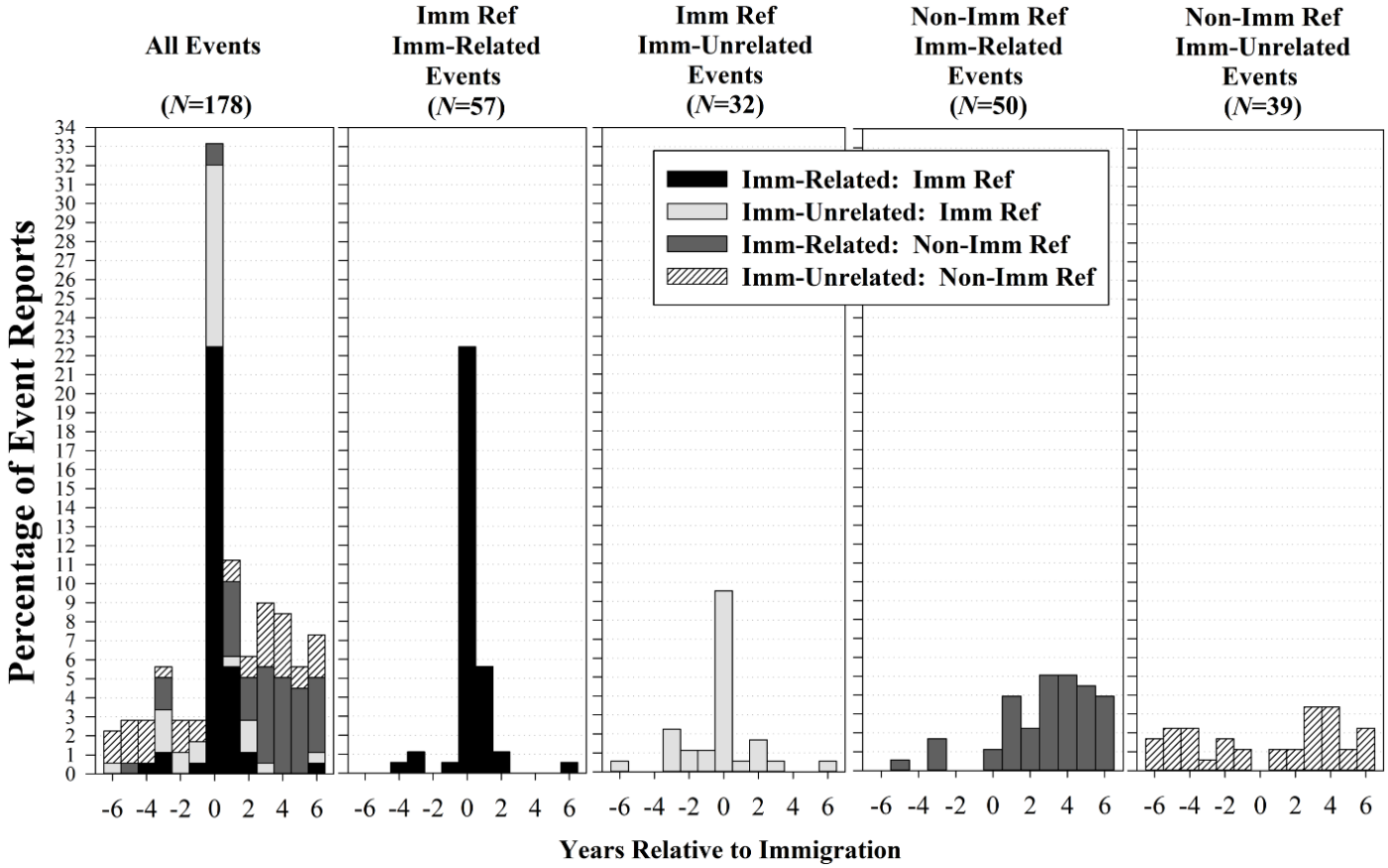

Figure 3.6 The percentage of justified events from 6 years prior to immigration to 6 years after immigration, as a function of protocol type (immigration references vs. non-immigration references) and immigration-relatedness (related vs. unrelated).

Event properties. First, we examined the factorability of the AMQ-11 items again with the current data. Preliminary analyses showed that (a) all the items significantly correlated (p <.001) with at least one other item, (b) the Kaiser-Meyer-Olkin measure of sampling adequacy was .87, and Bartlett's test of sphericity was significant, $\chi^2(55) = 4007.34$, $p < .001$), (c) the smallest result of the measure of sampling adequacy based on the anti-image correlations was

0.501, and (d) the communalities were all greater than 0.54, indicating that items shared some common variance.

The principle component analysis with varimax rotation suggested that four items, "emotional intensity at retrieval," "emotional intensity at encoding," "vividness," and "distinctiveness," loaded highly on *Salience*, and the loadings were 0.78, 0.74, 0.71, and 0.69, respectively. Further, "material impact," "goal-related," "self-defining," "psychological impact" and "life story" loaded highly on *Importance*, and the loadings were 0.82, 0.80, 0.71, 0.62, and 0.55 respectively. Last, same as the previous finding, there was another factor – *Valence*, which contained two items, "positive" and "negative," and the loadings were 0.90 and -0.93 respectively. These results confirmed the factorial validity of the modified AMQ.

We compared the characteristic ratings in parallel with Experiment 2. The AMQ ratings were summarized separately for the recent events (i.e. ≤ two years prior to the test year, including events occurred on the test day, N=139), and the remote events (i.e. > two years prior to the test year, N=581). The recent events were excluded previously to eliminate the recency effect in the lifetime retrieval curve. The mean ratings and the effects of event type (recent, remote) are displayed in Table 3.4.

The ordinal regression models were fitted with event type as the fixed factor, participant and cue as the random factors, and the AMQ ratings as the dependent variable. Although the recent and remote events were grouped with a criterion slightly different from the one used in Experiment 2, and the participants were middle-aged Chinese immigrants rather than Canadian university students, the results were very similar across experiments: The word-cued events tended to be positive rather than negative, and were vivid regardless of event age. Recent events were generally less important, less emotionally intense, and less unique than the remote events. However, both the recent and remote events were "ordinary" in terms of their self-relevance and

transitional impact.

Table 3.4
Modified AMQ ratings for the recent and remote events

		Recent	Remote	Ordinal Regression	
		***M* (*SD*)**	***M* (*SD*)**	***B***	**95% *C. I.***
Self-relevance					
	Life-story	2.74 (1.12)	3.41 (1.12)	-1.15 ***	[-1.56, -0.73]
	Goal-related	2.60 (0.98)	2.99 (1.12)	-0.69 ***	[-1.07, -0.32]
	Self-defining	2.72 (1.05)	3.23 (1.15)	-0.88 ***	[-1.28, -0.48]
Transitional Impact					
	Material impact	2.55 (1.01)	3.01 (1.16)	-0.89 ***	[-1.32, -0.46]
	Psychological impact	2.83 (1.09)	3.45 (1.09)	-0.94 ***	[-1.30, -0.57]
Emotional Intensity					
	At retrieval	2.81 (1.00)	3.27 (1.09)	-0.83 ***	[-1.22, -0.45]
	At encoding	2.75 (1.06)	3.40 (1.07)	-1.17 ***	[-1.58, -0.76]
Emotional Valence					
	Negative	2.16 (1.04)	2.32 (1.12)	-0.24	[-0.58, 0.11]
	Positive	3.59 (0.97)	3.64 (1.07)	-0.16	[-0.53, 0.21]
Vividness		4.21 (0.60)	4.17 (0.72)	0.02	[-0.35, 0.38]
Distinctiveness		3.06 (1.13)	3.62 (1.08)	-1.00 ***	[-1.42, -0.60]

Notes. ***$p < .001$.

Because we were interested in determining whether events that happened around the time of immigration differed from events that happened at other periods, we conducted an ordinal regression on the ratings of each AMQ item, for *immigration-proximate* events (i.e. events that happed occurred no more than two years before and after immigration; N=100) and *immigration-distant* events (i.e., events that occurred no less than three years prior to or following immigration; N=481). Participant and event cue were entered as the random factors again. Inconsistent with the SMS and cultural life-script predictions, immigration-proximate and -distant events did not differ in their significance in life story (M=3.29 vs. M=3.44), self-defining feature (M=3.07 vs. M=3.27), relatedness to motivations and goals (M=3.03 vs. M=2.98), material impact (M=3.13 vs. M=2.99), psychological impact (M=3.32 vs. M=3.48), positivity (M=3.60 vs. M=3.65), negativity (M=2.40 vs. M=2.30), or vividness (M=4.09 vs. M=4.19), all p

>.05. Moreover, the immigration-proximate events produced even lower ratings than immigration-distant events in the emotional intensity upon retrieval (M=2.98 vs. M=3.33, B= -0.58, p = .01) and at encoding (M=3.15 vs. M=3.45, B= -0.55, p = .01), as well as distinctiveness (M=3.40 vs. M=3.67, B= -0.48, p = .03). In sum, the memories retrieved from the period of immigration were not particularly important, impactful, self-relevant, unique, or affect-laden, at least not distinct from memories of other time periods.

Additionally, with regard to the language of encoding, we investigated the relation between the immigration bump and the language consistency in event encoding and retrieval. Out of the 458 Chinese-encoded events, only 21% occurred within 6 years around the time of relocation. By contrast, 63% of the English-encoded events and 70% of the bilingually-encoded events occurred in that period, which was significantly more common than the Chinese-encoded ones, χ^2 (2, N = 581) = 107.79, p < .001. Given the fact that all the instructions and ratings were fulfilled in Chinese, we had no reason to associate the immigration bump with the language use during event encoding or retrieval.

Chapter 4: General Discussion

An important message to be taken from the present findings is that autobiographical memory captures real-world personal experiences. While people may develop some autobiographical knowledge according to social expectations and self-goals, those thoughts and beliefs are very likely to be eventually modified by their actual experiences and related memories. For instance, the ratings that were made hypothetically tended to be higher than those obtained based on previous experiences (e.g., Figure 2.4 & 2.5). Moreover, we can infer from the immigration study that the structure and contents of autobiographical memory are subject to the amount and magnitude of changes and distinctive experiences that one may encounter in daily life.

The prior research does not rule out the possibility that autobiographical memory may exist independent of "the self." Although autobiographical memory appears to play a role in the development of the sense of "who I am" (Conway, 2005; Conway et al., 2005; Conway & Holmes, 2004; Nelson & Fivush, 2004), it seems to be novelty rather than self-relevance that motives memory consolidation and retention. Besides, we know that a large number of mundane event memories are available as a consequence of rehearsal and recency (Table 3.3). Compared with the mainstream accounts, Transition Theory provides a simple explanation for the characteristics and structure of autobiographical memory without using this complex and vaguely-defined concept, "the self."

Supporting Transition Theory

In the second chapter, we have distinguished two categories of personal life transitions: (a) script-consistent events, which are foreseeable in a normal life (see Experiment 1: likelihood estimates), prevalent in the formative years (Figure 2.2), and mostly positive (Table 2.4), and (b) script-divergent events, which are less likely to be part of a prototypical life script. The script-

divergent events are also temporal unpredictable and often associated with negative emotions. Nonetheless, script-divergent events can be (and are *believed* to be) as important and impactful as script-consistent events (Figure 2.4 & 2.5). It appears that life transitions organize autobiographical memories regardless of whether or not they are expected in an idealized life (Figure 3.4).

Indeed, we found evidence for the organizational importance of script-divergent transitions, by examining the dating references for the autobiographical memories of the reminiscence bump (Figure 3.4) and the immigration bump (Figure 3.5). Participants' verbal protocols reveal the connection between mundane events and life transitions. For the middle-aged Chinese immigrant sample, only a small proportion of script-divergent events could be temporally related to the reminiscence bump. We argued that this was because the participants had experienced these events at different ages. By restricting the age range for a script-divergent event (i.e. immigration), we observed a distorted memory retrieval curve, which consists of the reminiscence bump and a subsequent bump in accordance to the age at immigration (Figure 3.4). The substantial immigration effect in Experiment 3 (Figure 3.5) also implies that we could have shown the organizational importance of other script-divergent events using a similar analysis. Along with the findings of prior studies (Enz et al., 2016; Esposito & Baker-Ward, 2016; Schrauf & Rubin, 1998; 2001), we can infer that lifetime periods are delineated by not only the script-consistent transitions, but also the script-divergent transitions. The magnitude of transitional effect depends on its impact (i.e. to what extent this life transition alters the "fabric of daily life") rather than its prevalence, age normativity, or affect valence. Relocation and immigration were identified as major transitions in these studies, which all produced striking effects on the structure of autobiographical memories.

By analyzing the dating references and phenomenal ratings, we also demonstrated that

the "pile-up" of autobiographical memories around life transitions had little to do with the contents or properties of the retrieved memories themselves. The atypical memory curve cannot be explained by self-relevance, transition-relatedness, and language of event encoding and retrieving. The only factor that does predict the memory retrieval curve is real-life experience. More precisely, the temporal distribution of autobiographical memories depends upon the number of life transitions that individuals have gone through, and when (i.e. at what age). For instance, our Chinese immigrant participants experienced several historical events in 1970s (e.g., End of Cultural Revolution, Tangshan Earthquake), which serve as reference points for many of their early-aged memories (Figure 3.4). We also observed a large proportion of "elementary school" references. It seems that the start and end of elementary school are particularly important transitions to this Chinese sample. Although the reason for this phenomenon is unclear, the reminiscence bump is indeed consistent with the age range for elementary school (i.e. 6 to 12 years).

How do we determine the transitional characteristic of an event? As we pointed out in Experiment 1, major life transitions are events that represent the start and end of a permanent status (e.g., getting married, getting divorced, becoming a parent, settling on career, and getting retired), and events that involve significant changes in residence (e.g., moving countries or cities, and moving out of parents' home) and frequently-visited places (e.g., transferring schools, and starting university). Put another way, we can assess the transitional characteristic of an event through the number and magnitude of life changes brought by it. By contrast, the notion of a "life theme" (Burt, Kemp, & Conway, 2003; Conway, 1992; 1996; 2005; Conway & Pleydell-Pearce, 2000), cannot be used interchangeably with the notion of a life transition. This is because events that share the same theme might have different impact on daily life. For instance, despite the theme of "work," *having the first full-time job* were considered as a less significant life event

than *settling on career* by both the younger and older Canadians (Figure 2.4).

Further, Transition Theory also provides acceptable assumptions for word-cued memories. We have supported the notion that autobiographical memory does not only contain important life transitions. Non-self-defining, non-transitional events are prevalent among word-cued memories (Figure 3.1 & Table 3.4). Moreover, we have demonstrated that the organization of autobiographical memory mirrors the "transition-delineated lifetime periods" (Brown, 2016; Brown et al., 2012; 2016). In the last experiment, 89% of justified date estimates were made references to either personal transitions or collective transitions. In addition, the current findings show that long-lasting memories tend to be moderately distinctive and affect-laden (Figure 3.1 & Table 3.4), and that participants recognized that these properties are play a role in creating enduring memories (Table 3.3).

Limitations and Future Directions

We must consider several issues before generalizing the current conclusions. First, the event property ratings reflect a relative comparison between two types of events. Some psychometric studies have suggested that intervals between the two values on the 5-point scales cannot be presumed equal (Carifio & Perla, 2007; Jamieson, 2004; Wakita, Ueshima, & Noguchi, 2012). In the current study, we only used random grouping and statistical means to control the individual differences (i.e. fitting regression models with participant and event as random factors). Furthermore, even for a validated questionnaire, such as TIS-12, some cultural factors may interfere with participants' responses. For example, people from certain cultures (e.g., *Hispanic*, Marin, Gamba, & Marin, 1992; *Western*, Marshall & Lee, 1998; *Mediterranean*, van Herk, Poortinga, & Verhallen, 2004) may show a response bias towards the extreme values on a Likert-style scale. Therefore, the subjective ratings should be used for comparing events with a certain feature, rather than defining events. In this sense, our assignment of major,

material, and psychological transitions was tentative. The categories and contents of life transitions may change across age groups, cultures, and other participant factors.

Second, a transition, such as getting married, can be perceived as either a specific landmark (e.g., the wedding day) or a series of related events (e.g., the wedding ceremony, and moving in together). The word-cued events, on the other hand, are usually specific and non-extended. This disparity might potentially interact with the TIS scores for life transitions and word-cued events. It is necessary to include a specificity rating in future research, for events that are sampled with different methods.

Finally, Transition Theory predicts the location of the bump(s) in the temporal distribution of autobiographical memories, and it specifies what types of events may be major life transitions, but there are certain limitations of the theory. First, as mentioned, the measurement of transitional impact is based on meta-mnemonic beliefs. Such beliefs may vary across cultures. In a recent study, Bohn and Habermas (2016) showed that the German participants used "having children" as a dating reference point more frequently than the school-related events. By contrast, the Chinese immigrants in Experiment 3 spontaneously mentioned many of their early educational experiences in the dating protocols. Is this because the Chinese immigrants experienced the school-related transitions in a different way from the German group, or because they had distinct beliefs about these transitional events? Second, the various explanations regarding the reminiscence bump are non-exclusive. Transition Theory does not contradict the existence of self-defining memories in the formative years. In the present study, we found that most (remote) events were remembered due to novelty instead of self-relevance, and many long-lasting events were not particularly important and self-defining. Compared with the SMS, Transition Theory seems to be a better account because it does not require the retrieved events to have certain properties. However, some questions remain unanswered. For example,

why do people tend to remember their first-time and unusual experiences? Why are so many trivial events stored in memory? As a future direction, we may seek a way to reconcile the conflicts between mainstream positions and Transition Theory.

Conclusions

This dissertation has confirmed that Transition Theory provides a useful way of thinking about a few autobiographical memory phenomena. Depending on the sampling methods, autobiographical memories not only include important life transitions, but also consist of distinctive anecdotes and mundane everyday events. Among reasons for remembering a random event (e.g., novelty, emotionality, rehearsal, and recency), the relevance to "the self" plays, at most, a very minor role.

Major life transitions organize autobiographical memory regardless of whether it is script-consistent or script-divergent. These two types of personal transitions differ in terms of their prevalence in a prototypical life, temporal predictability, and emotional valence, but not their transitional nature or the potential changes they may bring into people's lives.

Distinctive and memorable events may occur at any time but tend to accumulate in an unstable, transitional period. Major life transitions delineate the starts and ends of lifetime periods. As a reflection of daily-life experience, autobiographical memory is organized by those important transitional events. The mechanism of autobiographical memory could be revealed by analyzing participants' verbal protocols in a think-aloud event dating phase.

References

Alea, N., Ali, S., & Marcano, B. (2014). The Bumps in Trinidadian Life: Reminiscence Bumps for Positive and Negative Life Events. *Applied Cognitive Psychology*, 28, 174–184. doi: 10.1002/acp.2975

Aronowitz, M. (1984). The social and emotional adjustment of immigrant children: A review of the literature. *The International Migration Review*, 18, 237–257. doi: 10.2307/2545949

Auriat, N. (1993). "My wife knows best": A comparison of event dating accuracy between the wife, the husband, the couple, and the Belgium population register. *Public Opinion Quarterly*, 57, 165–190.

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

Bauer, P. J. (2015). A complementary processes account of the development of childhood amnesia and a personal past. *Psychological Review*, 122, 204–233. doi: 10.1037/a0038939

Bauer, P. J., Burch, M. M., Scholin, S. E., & Güler, O. E. (2007). Using cue words to investigate the distribution of autobiographical memories in childhood. *Psychological Science*, 18, 910–916. doi: 10.1111/j.1467-9280.2007.01999.x

Bauer, P. J., Stark, E. N., Ackil, J. K., Larkina, M., Merrill, N., & Fivush, R. (2016). The recollective qualities of adolescents' and adults' narratives about a long-ago tornado. *Memory*, 1–13. doi: 10.1080/09658211.2016.1180396

Belli, R. F. (1998). The structure of autobiographical memory and the event history calendar: Potential improvements in the quality of retrospective reports in surveys. *Memory*, 6, 383–406. doi: 10.1080/741942610

Berntsen, D., & Rubin, D. C. (2002). Emotionally charged autobiographical memories across the lifespan: The retention of happy, sad, traumatic, and involuntary memories. *Psychology and Aging*, 17, 636–652. doi: 10.1037/0882-7974.17.4.636

Berntsen, D., & Rubin, D. C. (2004). Cultural life scripts structure recall from autobiographical memory. *Memory & Cognition*, 32, 427–442. doi: 10.3758/BF03195836

Berntsen, D., & Rubin, D. C. (2006). Emotion and vantage point in autobiographical memory. *Cognition and Emotion*, 20, 1193-1215. doi: 10.1080/02699930500371190

Berntsen, D., Rubin, D. C., & Siegler, I. C. (2011). Two versions of life: Emotionally negative and positive life events have different roles in the organization of life story and identity. *Emotion*, 11, 1190–1201. doi: 10.1037/a0024940

Berry, J. W. (1997). Immigration, acculturation, and adaptation. *Applied Psychology*, 46, 5–34. doi: 10.1111/j.1464-0597.1997.tb01087.x

Betz, A. L., & Skowronski, J. J. (1997). Self-events and other-events: Temporal dating and event memory. *Memory & Cognition*, 25, 701–714. doi: 10.3758/BF03211313

Bluck, S., & Alea, N. (2009). Thinking and talking about the past: Why remember? *Applied Cognitive Psychology*, 23, 1089–1104. doi:10.1002/acp.1612

Bohn, A. (2010). Generational differences in cultural life scripts and life story memories of younger and older adults. *Applied Cognitive Psychology*, 24, 1324–1345. doi: 10.1002/acp.1641.

Bohn, A., & Habermas, T. (2016). Living in history and living by the cultural life script: How older Germans date their autobiographical memories, *Memory*, 24, 482–495. doi: 10.1080/09658211.2015.1019890

Brown, N. R. (2016). Transition Theory: A minimalist perspective on the organization of autobiographical memory. *Journal of Applied Research in Memory and Cognition*, 5, 128–134. doi: 10.1016/j.jarmac.2016.03.005

Brown, N. R. (1990). Organization of public events in long-term memory. *Journal of Experimental Psychology: General*, 119, 297–314. doi:10.1037/0096-3445.119.3.297

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. Rubin (Eds.), *Understanding autobiographical memory: Theories and approaches* (pp. 160–180). Cambridge, UK: Cambridge University Press.

Brown, N. R., & Lee, P. J. (2010). Public events and the organization of autobiographical memory: An overview of the Living-in-History Project. *Behavioral Sciences of Terrorism and Political Aggression, 2,* 133–149. doi: 10.1080/19434471003597431

Brown, N. R., Lee. P. J., Krslak, M., Conrad, F. G., Hansen, T., 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. doi:10.1111/j.1467-9280.2009.02307.x

Brown, N. R., & Schopflocher, D. (1998a). Event clusters: An organization of personal events in long-term memory. *Psychological Science*, 9, 470-475. doi: 10.1111/1467-9280.00087

Brown, N. R., & Schopflocher, D. (1998b). Event cueing, event clusters, and the temporal distribution of autobiographical memories. *Applied Cognitive Psychology*, 12, 305-319.

Brown, N. R., Schweickart, O., & Svob, C. (2016). The effect of collective transitions on the organization and contents of autobiographical memory: A transition theory perspective. *American Journal of Psychology*, 129, 259–282. doi: 10.5406/amerjpsyc.129.3.0259

Burt, C. D. B., Kemp, S., & Conway, M. A. (2003). Themes, events, & episodes in autobiographical memory. *Memory & Cognition*, 31, 317–325. doi:10.3758/BF03194390

Carifio, J., & Perla, R. J. (2007). Ten common misunderstandings, misconceptions, persistent myths and urban legends about Likert scales and Likert response formats and their antidotes. *Journal of Social Sciences*, 3, 106–116. doi: 10.3844/jssp.2007.106.116

Carson, N., Murphy, K. J., Moscovitch, M., Rosenbaum, R. S. (2016). Older adults show a self-reference effect for narrative information. *Memory*, 24, 1157–1172. doi: 10.1080/09658211.2015.1080277

Charles, S. T., Reynolds, C. A., & Gatz, M. (2001). Age related differences and change in positive and negative affect over 23 years. *Journal of Personality and Social Psychology*, 80, 136–151. doi: 10.1037/0022-3514.80.1.136

Collins, K. A, Pillemer, D. B., Ivcevic, Z., & Gooze, R. A. (2007). Cultural scripts guide recall of intensely positive life events. *Memory & Cognition*, 35, 651–659. doi: 10.3758/BF03193303

Conway, M. A. (1992). A structural model of autobiographical memory. In M. A. Conway, D. C. Rubin, H. Spinnler, & W. A. Wagenaar (Eds.), *Theoretical perspectives on autobiographical memory* (pp. 167–194). Dordrecht: Kluwer.

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

Conway, M. A. (2005). Memory and the self. *Journal of Memory and Language*, 53, 594–628. doi:10.1016/j.jml.2005.08.005

Conway, M. A., & Bekerian, D. A. (1987). Organization in autobiographical memory. *Memory & Cognition*, 15, 119–132. doi: 10.3758/BF03197023

Conway, M. A., & Haque, S. (1999). Overshadowing the reminiscence bump: Memories of a struggle for independence. *Journal of Adult Development*, 6, 35–44. doi: 10.1023/A:1021672208155

Conway, M. A., & Holmes, A. (2004). Psychosocial stages and the availability of autobiographical memories. *Journal of Personality*, 72, 461–480. doi: 10.1111/j.0022-3506.2004.00269.x

Conway, M. A., & Pleydell-Pearce, C. W. (2000). The construction of autobiographical memories in the self-memory system. *Psychological Review*, 107, 261–288. doi: 10.1037/0033-295X.107.2.261

Conway, M. A., Wang, Q., Hanyu, K., & Haque, S. (2005). A cross-cultural investigation of autobiographical memory: On the universality and cultural variation of the reminiscence bump. *Journal of Cross-Cultural Psychology*, 36, 739–749. doi: 10.1177/0022022105280512

Crovitz, H. F., & Schiffman, H. (1974). Frequency of episodic memories as a function of their age. *Bulletin of the Psychonomic Society*, 4, 517–518. doi: 10.3758/BF03334277

D'Argembeau, A., & Van der Linden, M. (2008). Remembering pride and shame: Self-enhancement and the phenomenology of autobiographical memory. *Memory*, 16, 538–547. doi: 10.1080/09658210802010463

Demblon, J., & D'Argembeau, A. (2017). Contribution of past and future self-defining event networks to personal identity. *Memory*, 25, 656–665. doi: 10.1080/09658211.2016.205095

Demiray, B., Gulgoz, S. & Bluck, S. (2009). Examining the life story account of the reminiscence bump: Why we remember more from young adulthood. *Memory*, 17, 708–723. doi: 10.1080/09658210902939322

Dickson, R. A., Pillemer, D. B., & Bruehl, E. C. (2011). The reminiscence bump for salient personal memories: Is a cultural life script required? *Memory & Cognition*, 39, 977–991. doi: 10.3758/s13421-011-0082-3

Dunlop, W. L., Hanley, G. E., McCoy, T. P., & Harake, N. (2017). Sticking to the (romantic) script: an examination of love life scripts, stories, and self-reports of normality. *Memory*. Advance online publication. doi: 10.1080/09658211.2017.1316509

Ece, B., & Gulgoz, S. (2014). The impact of suppressing the typical life events on the reminiscence bump. *Applied Cognitive Psychology*, 28, 702–710, doi: 10.1002/acp.3056

Enz, K. F., Pillemer, D. B., & Johnson, K. M. (2016). The relocation bump: Memories of middle adulthood are organized around residential moves. *Journal of Experimental Psychology: General*, 145, 935–940. doi: 10.1037/xge0000188

Enz, K. F., & Talarico, J. M. (2016). Forks in the road: Memories of turning points and transitions. *Applied Cognitive Psychology*, 30, 188–195. doi: 10.1002/acp.3176

Erdogan, A., Baran, B., Avlar, B., Tas, A. C., & Tekcan, A. I. (2008). On the persistence of positive events in life scripts. *Applied Cognitive Psychology*, 22, 95–111. doi: 10.1002/acp.1363

Ericsson, K. A., & Simon, H.A. (1980). Protocol analysis: Verbal reports as data. *Psychological Review*, 87, 215–251.

Esposito, A. G., & Baker-Ward, Lynne. (2016). Immigration, language proficiency, and autobiographical memories: Lifespan distribution and second-language access, *Memory*, 24, 949-960. doi: 10.1080/09658211.2015.1061010

Fine, M. S., & Minnery, B. S. (2009). Visual salience affects performance in a working memory task. *Journal of Neuroscience*, 29, 8016–8021. doi: 10.1523/JNEUROSCI.5503-08.2009

Friedman, W. J. (1993). Memory for the time of past events. *Psychological Bulletin*, 35, 1–36. doi:10.1037/0033-295X.107.2.261

Gibbons, J. A., Lee, S. A., & Walker, W. R. (2011). The fading affect bias begins within 12 hours and persists for 3 months. *Applied Cognitive Psychology*, 25, 663–672. doi: 10.1002/acp.1738

Gluck, J., & Bluck, S. (2007). Looking back across the life span: A life story account of the reminiscence bump. *Memory & Cognition*, 35, 1928–1939. doi: 10.3758/BF03192926

Greene, A. L. (1990). Great expectations: Constructions of the life course during adolescence. *Journal of Youth and Adolescence*, 19, 289–306. doi: 10.1007/BF01537074

Greene, A. L., Wheatley, S. M., & Aldava, J. F. (1992). Stages on life's way: Adolescents' implicit theories of the life course. *Journal of Youth and Adolescence*, 7, 364–381. doi: 10.1177/074355489273006

Grinberg, L., & Grinberg, R. (1989). Migration as trauma and crisis. (N. Festinger, Trans.). In L. Grinberg & R. Grinberg (Eds.), *Psychoanalytic perspectives on migration and exile* (pp. 10–15). New Haven, CT: Yale University Press.

Grysman, A., & Dimakis, S. (2017). Later adults' cultural life scripts of middle and later adulthood. *Aging, Neuropsychology, and Cognition*. Advance online publication. doi: 10.1080/13825585.2017.1319458

Habermas, T. (2007). How to tell a life: The development of the cultural concept of biography. *Journal of Cognition and Development*, 8, 1–31. doi: 10.1080/15248370709336991

Haque, S., & Hasking, P. A. (2010). Life scripts for emotionally charged autobiographical memories: A cultural explanation of the reminiscence bump. *Memory*, 18, 712–729. doi: 10.1080/09658211.2010.506442

Hebb, D.O. (1949). *The organization of behavior: A neuropsychological theory*. New York: Wiley & Sons.

Hoffrage, U., Hertwig, R., & Gigerenzer, G. (2000). Hindsight bias: A by-product of knowledge updating? *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 26, 566–581. doi: 10.1037//0278-7393.26.3.566

Holland, A. C., Addis, D. R., & Kensinger, E. A. (2011). The neural correlates of specific versus general autobiographical memory construction and elaboration. *Neuropsychologia*, 49, 3164–3177. doi: 10.1016/j.neuropsychologia.2011.07.015.

Holmes, D. S. (1970). Differential change in affective intensity and the forgetting of unpleasant personal experiences. *Journal of Personality and Social Psychology*, 15, 234–239. doi: 10.1037/h0029394

Holmes, A., & Conway, M. A. (1999). Generation identity and the reminiscence bump: Memory for public and private events. *Journal of Adult Development*, 6, 21–34. doi: 10.1023/A:1021620224085

Holmes, T. H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research*, 11, 213–218. doi: 10.1016/0022-3999(67)90010-4

Hyman, I. E., Jr., & Loftus, E. F. (1998). Errors in autobiographical memories. *Clinical Psychology Review*, 18, 933–947. doi: 10.1016/S0272-7358(98)00041-5

Jamieson, S. (2004). Likert scales: how to (ab)use them. *Medical Education*, 38, 1212–1218. doi: 10.1111/j.1365-2929.2004.02012.x

Jansari, A., & Parkin, A. J. (1996). Things that go bump in your life: Explaining the reminiscence bump in autobiographical memory. *Psychology and Aging*, 11, 85–91.

Janssen, S. M. J., & Haque, S. (2017). The transmission and stability of cultural life scripts: a cross-cultural study. *Memory*. Advance online publication. doi: 10.1080/09658211.2017.1335327

Janssen, S. M. J., & Murre, J. M. J. (2008). Reminiscence bump in autobiographical memory: Unexplained by novelty, emotionality, valence, or importance of personal events. *The Quarterly Journal of Experimental Psychology*, 61, 1847–1860. doi: 10.1080/17470210701774242

Janssen, S. M. J., & Rubin, D. C. (2011). Age effects in cultural life scripts. *Applied Cognitive Psychology*, 25, 291–298. doi: 10.1002/acp.1690

Koppel, J., & Berntsen, D. (2015). The peaks of life: The differential temporal locations of the reminiscence bump across disparate cueing methods. *Journal of Applied Research in Memory and Cognition*, 4, 66–80. doi: 10.1016/j.jarmac.2014.11.004

Kuyken, W., & Brewin, C. R. (1995). Autobiographical memory functioning in depression and reports of early abuse. *Journal of Abnormal Psychology*, 104, 585–591.

Laosa, L. M. (1996). Research perspectives on constructs of change: Intercultural migration and developmental transitions. *ETS Research Report Series*, i–33. doi: 10.1002/j.2333-8504.1996.tb01684.x

Li, Y., Hofstetter, C. R., Wahlgren, D., Irvin, V., Chhay, D. & Hovell, M. F. (2015). Social networks and immigration stress among first-generation Mandarin-speaking Chinese immigrants in Los Angeles. *International Journal of Social Welfare*, 24, 170–181. doi: 10.1111/ijsw.12103

Lindeman, M. I. H., & Zengel, B., & Skowronski, J. J. (2016). An exploration of the relationship among valence, fading affect, rehearsal frequency, and memory vividness for past personal events. *Memory*. Advance online publication. doi: 10.1080/09658211.2016. 1210172

Lindsay, D. S. (1990). Misleading suggestions can impair eyewitnesses' ability to remember event details. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 16, 1077–1083. doi: 10.1111/j.1467-9280.1996.tb00377.x

Lindsay, D. S. (2007). Autobiographical memory, eyewitness reports, and public policy. *Canadian Psychology*, 48, 57–66. doi: 10.1037/cp2007007

Linton, M. (1975). Memory for real-world events. In D. A. Norman & D, E. Rumelhart (Eds.), *Explorations in cognition* (pp. 376–404). San Francisco: Freedman.

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

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

Marin, G., Gamba, R.J., & Marin, B.V. (1992). Extreme response style and acquiescence among Hispanics– The role of acculturation and education. *Journal of Cross-Cultural Psychology*, 23, 498–509. doi: 10.1177/0022022192234006

Marshall, R., & Lee, C. (1998). A cross-cultural, between-gender study of extreme response style. In B. G. Englis, & A. Olofsson (Eds.), *European Advances in Consumer Research* (Vol. 3, pp. 90–95). Provo, UT: The Association for Consumer Research.

Mayer, J. S., Kim, J., & Park, S. (2011). Enhancing visual working memory encoding: The role of target novelty. *Visual Cognition*, 19, 863–885. doi: 10.1080/13506285.2011.594459

McAdams, D. P. (2001). The psychology of life stories. *Review of General Psychology*, 5, 100–122. doi: 10.1037/1089-2680.5.2.100

Mroczek, D. K. (2001). Age and emotion in adulthood. *Current Directions in Psychological Science*, 10, 87–90.

Neisser, U., Winograd, E., Bergman, E. T., Schreiber, C. A., Palmer, S. E., & Weldon, M. S. (1996). Remembering the earthquake: direct experience vs. hearing the news. *Memory*, 4, 337–357. doi: 10.1080/096582196388898

Nelson, K., & Fivush, R. (2004). The emergence of autobiographical memory: a social cultural developmental theory. *Psychological Review*, 111, 486–511.

Nourkova, V. V., & Brown, N. R. (2015). Assessing the impact of "the collapse" on the organization and content of autobiographical memory in the former Soviet Union. *Journal of Social Issues*, 71, 324–337. doi: 10.1111/josi.12113

Otoya, M. T. (1987). A study of personal memories of bilinguals: The role of culture and language in memory encoding and recall. Unpublished doctoral dissertation, Harvard University.

Pezdek, K. (2003). Event memory and autobiographical memory for the events of September 11, 2001. *Applied Cognitive Psychology*, 17, 1033–1045. doi:10.1002/acp.984

Pillemer, D. B., Goldsmith, L. R., Panter, A. T., & White, S. H. (1988). Very long-term memories of the first year in college. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14, 709–715.

Pillemer, D. B., Rhinehart, E. D., & White, S. H. (1986). Memories of life transitions: The first year in college. *Human Learning*: *Journal of Practical Research & Applications*, 5, 109–123.

Pillemer, D. B., Steiner, K. L., Kuwabara, K. J., Thomsen, D. K., & Svob, C. (2015). Vicarious memories. *Conscious and Cognition*, 36, 233–245. doi: 10.1016/j.concog.2015.06.010

Renoult, L., Davidson, P. S., Palombo, D. J., Moscovitch, M., & Levine, B. (2012). Personal semantics: at the crossroads of semantic and episodic memory. *Trends in Cognitive Sciences*, 16, 550–558. doi: 10.1016/j.tics.2012.09.003.

Ritchie, T. D., Batteson, T, J., Bohn, A., Crawford, M. T., Ferguson, G. V., Schrauf, R. W., Vogl, R. J., & Walker, W. R. (2015). A pancultural perspective on the fading affect bias in autobiographical memory. *Memory*, 23, 278–290. doi: 10.1080/09658211.2014.884138

Ritchie, T. D., Skowronski, J. J., Hartnett, J., Wells, B., & Walker, W. R. (2009). The fading affect bias in the context of emotion activation level, mood, and personal theories of emotion change. *Memory*, 17, 428–444. doi: 10.1080/09658210902791665

Robinson, J. A. (1976). Sampling autobiographical memory. *Cognitive psychology*, 8, 578–595.

Rubin, D. C. (1982). On the retention function for autobiographical memory. *Journal of Verbal Learning and Verbal Behavior*, 21, 21–38. doi:10.1016/S0022-5371(82)90423-6

Rubin, D. C., & Berntsen, D. (2003). Life scripts help to maintain memories of highly positive, but not highly negative, events. *Memory & Cognition*, 31, 1–14. doi:10.3758/BF03196077

Rubin, D. C., Berntsen, D., & Hutson, M. (2009). The normative and the personal life: Individual differences in life scripts and life story events among USA and Danish undergraduates. *Memory*, 17, 54–68. doi:10.1080/09658210802541442

Rubin, D. C., Rahhal, T. A., & Poon, L. W. (1998). Things learned in early adulthood are remembered best. *Memory & Cognition*, 26, 3–19. doi: 10.3758/BF03211366

Rubin, D. C., & Schulkind, M. D. (1997). Distribution of important and word-cued autobiographical memories in 20-, 35-, and 70-year-old adults. *Psychology and Aging*, 12, 524–535. doi: 10.1037/0882-7974.12.3.524

Rubin, D. C., Schrauf, R. W., & Greenberg, D. L. (2003). Belief and recollection of autobiographical memories. *Memory & Cognition*, 31, 887–901. doi: 10.3758/BF03196443

Rubin, D. C., Wetzler, S. E., & Nebes, R. D. (1986). Autobiographical memory across the adult lifespan. In D. C. Rubin (Ed.), *Autobiographical memory* (pp. 202–221). Cambridge, UK: Cambridge University Press.

Rumbaut, R. G. (1997). Ties that bind: Immigration and immigrant families in the United States. In A. Booth, C. A. Crouter, & N. S. Landale (Eds.), *Immigration and the family: Research and policy on U. S. immigrants* (pp. 3–46). Mahwah, NJ: Lawrence Erlbaum Associates

Russo, J. E., Johnson, E. J., & Stephens, D. L. (1989). The validity of verbal protocols. *Memory & Cognition*, 17, 759–769.

Scherman, A. Z. (2013). Cultural life script theory and the reminiscence bump: A reanalysis of seven studies across cultures. *Nordic Psychology*, 65, 103–119. doi: 10.1080/19012276.2013.807667

Schmidt, B. K., Vogel, E. K., Woodman, G. F., & Luck, S. J. (2002). Voluntary and automatic attentional control of visual working memory. *Perception and Psychophysics*, 64, 754–763.

Schrauf, R. W., & Rubin, D. C. (1998). Bilingual autobiographical memory in older adult immigrants: A test of cognitive explanations of the reminiscence bump and the linguistic encoding of memories. *Journal of Memory and Language*, 39, 437–457. doi: 10.1006/jmla.1998.2585

Schrauf, R. W., & Rubin, D. C. (2000). Internal languages of retrieval: The bilingual encoding of memories for the personal past. *Memory & Cognition*, 28, 616–623. doi: 10.3758/BF03201251

Schrauf, R. W., & Rubin, D. C. (2001). Effects of voluntary immigration on the distribution of autobiographical memories over the lifespan. *Applied Cognitive Psychology*, 15, 75–88. doi: 10.1002/acp.835

Schuman, H., Rieger, C., & Gaidys, V. (1994). Collective memories in the United States and Lithuania. In N. Schwarz & S. Sudman (Eds.), *Autobiographical memory and the validity of retrospective reports* (pp. 313–334). New York, NY: Springer-Verlag.

Serbun, S. J., Shih, J. Y., & Gutchess, A. H. (2011). Memory for details with self-referencing. *Memory*, 19, 1004–1014. doi:10.1080/09658211.2011.626429

Settersten, R. A., & Hagestad, G. O. (1996a). What's the latest? Cultural age deadlines for family transitions. *The Gerontologist*, 36, 178–188. doi: 10.1093/geront/36.2.178

Settersten, R. A., & Hagestad, G. O. (1996b). What's the latest? II. Cultural age deadlines for educational and work transitions. *The Gerontologist*, 36, 602–613. doi: 10.1093/geront/36.5.602

Shum, M. S. (1998). The role of temporal landmarks in autobiographical memory processes. *Psychological Bulletin*, 124, 423–442. doi:10.1037/0033-2909.124.3.423

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

Skowronski, J. J., Walker, W. R., Henderson, D. X., & Bond, G. D. (2014). The fading affect bias: its history, its implications, and its future, In J. M. Olson & M. P. Zanna (Eds.), *Advances in experimental social psychology* (Vol. 49, pp. 163–218). Cambridge, MA, USA: Academic Press. doi: 10.1016/B978-0-12-800052-6.00003-2

Suárez-Orozco, C. & Suárez-Orozco, M. (2001). *Children of immigration*. Cambridge, MA: Harvard University Press.

Svob, C., & Brown, N. R. (2012). Intergenerational transmission of the reminiscence bump and biographical conflict knowledge. *Psychological Science*, 23, 1404–1409. doi: 10.1177/0956797612445316

Svob, C., Brown, N. R., Reddon, J. R., Uzer, T., & Lee, P. J. (2014). The transitional impact scale: Assessing the material and psychological impact of life transitions. *Behavior Research Methods*, 46, 448–455. doi: 10.3758/s1342801303782

Svob, C., Brown, N. R., Taksic, V., Katulic, K., & Zauhar, V. (2016). Intergenerational transmission of historical memories and social-distance attitudes in post-war second-generation Croatians. *Memory & Cognition* 44, 846–855. doi:10.3758/s13421-016-0607-x

Svoboda, E., & Levine, B. (2009). The effects of rehearsal on the functional neuroanatomy of episodic autobiographical and semantic remembering: an fMRI study. *Journal of Neuroscience*, 11, 3073–3082. doi: 10.1523/JNEUROSCI.3452-08.2009

Symons, C. S., & Johnson, B. T. (1997). The self-reference effect in memory: A meta-analysis. *Psychological Bulletin*, 121, 371–394. doi:10.1037/0033-2909.121.3.371

Thomsen, D. K., & Berntsen, D. (2008). The cultural life script and life story chapters contribute to the reminiscence bump. *Memory*, 16, 420–435. doi: 10.1080/09658210802010497

Thomsen, D. K., Pillemer, D. B., & Ivcevic, Z. (2011). Life story chapters, specific memories and the reminiscence bump. *Memory*, 19, 267–279. doi: 10.1080/09658211.2011.558513

Thompson, C. P., Skowronski, J. J., Larsen, S. F., & Betz, A. (1996). *Autobiographical memory: Remembering what and remembering when*. Mahwah, NJ: Erlbaum.

Tulving, E. (1972). Episodic and semantic memory. In E. Tulving & W. Donaldson (Eds.), *Organization of memory* (pp. 381– 403). New York, NY: Academic Press.

Umanath, S., & Berntsen, D. (2013). Personal life stories: Common deviations from the cultural life script. *Nordic Psychology*, 65, 87–102. doi: 10.1080/19012276.2013.807662

Uzer, T., & Brown, N. R. (2015). Disruptive individual experiences create lifetime periods: a study of autobiographical memory in persons with spinal cord injury. *Applied Cognitive Psychology*, 29, 768–774. doi: 10.1002/acp.3148

Uzer, T., & Brown, N. R. (2017). The effect of cue content on retrieval from autobiographical memory. *Acta Psychologica*, 172, 84–91. doi: 10.1016/j.actpsy.2016.11.012.

Uzer, T., Lee, P. J., & Brown, N. R. (2012). On the prevalence of directly retrieved autobiographical memories. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 38, 1296–1308. doi: 10.1037/a0028142

van Herk, H., Poortinga, Y. H., & Verhallen, T. M. M. (2004). Response styles in rating scales: Evidence of method bias in data from six EU countries. *Journal of Cross-Cultural Psychology*, 35, 346–360. doi: 10.1177/0022022104264126

Wagenaar, W. A. (1992). Remembering my worst sins: How autobiographical memory serves the updating of the conceptual self. In M. A. Conway, D. C. Rubin, H. Spinnler, & W. A. Wagenaar (Eds.), *Theoretical perspectives on autobiographical memory* (pp. 263–274). Dordrecht: Kluwer.

Wakita, T., Ueshima, N., & Noguchi, H. (2012). Psychological distance between categories in the Likert scale. *Educational and Psychological Measurement*, 72, 533–546. doi: 10.1177/0013164411431162

Walker, W. R., Skowronski, J. J, Gibbons, J. A., Vogl, R. J., & Ritchie, T. D. (2009). Why people rehearse their memories: frequency of use and relations to the intensity of emotions associated with autobiographical memories. *Memory*, 17, 760–773. doi: 10.1080/09658210903107846.

Walker, W. R., Vogl, R. J., & Thompson, C. P. (1997). Autobiographical memory: unpleasantness fades faster than pleasantness over time. *Applied Cognitive Psychology*. 11, 399–413.

Williams, H. L., Conway, M. A., & Cohen, G. (2008). Autobiographical memory. In G. Cohen, & M. Conway (Eds.), *Memory in the real world* (pp. 21–90). New York, NY: Psychology Press.

Williams, M. D., & Hollan, J. D. (1981). The process of retrieval from very long-term memory. *Cognitive Science*, 5, 87–119. doi:10.1207/s15516709cog0502_1

Wilson, T. D. (1994). The proper protocol: Validity and completeness of verbal reports. *Psychological Science*, 5, 249–252. doi: 10.1111/j.1467-9280.1994.tb00621.x

Yuille, J., & Cutshall, J. (1986). A case study of eyewitness memory of a crime. *Journal of Applied Psychology*, 71, 291–301. doi: 10.1037/0021-9010.71.2.291

Zaromb, F. M., & Roediger III, H. L. (2009). The effects of "effort after meaning" on recall: Differences in within- and between-subjects designs. *Memory and Cognition*, 37, 447–463. doi:10.3758/MC.37.4.447

Zebian, S., & Brown, N. R. (2014). Living in history in Lebanon: The influence of chronic social upheaval on the organisation of autobiographical memories. *Memory*, 22, 194–211. doi:10.1080/09658211.2013.775310

Appendix A

Experiment 1 events and sources

Present study	Berntsen & Rubin (2004)	Habermas (2007)	Holmes & Rahe (1967)	Rubin et al. (2009)	Svob et al. (2014)
Script-consistent Events					
Begin grade school	Begin school	Begin school		Begin school	
Graduate from high school				High school	
Begin University	College	College		College	Starting university
Begin first serious romantic relationship	Fall in love	Fall in love/first partner		Fall in love	
Get first job	First job	First job		First job	
Have first sexual experience	First sexual experience	First sex		First sex, first kiss	
Leave parent's home	Leave home	Leaving parent's home	Change in residence	Leave home	
Get married	Marriage	Marriage	Marriage	Marriage	
Birth of the first child	Having children	Having children		Having children	
Obtain driver's license		Driver's license	Purchasing a car	Begin driving	Getting a car
Settle on career	Settle on career	Settle on career		Settle on career	
Begin retirement	Retirement	Retirement	Retirement from work	Retirement	
Death of a parent	Parents' death	Parent's death		Parents' death	
Have children move out of home	Empty nest	Children leave home	Son or daughter leaving home	Empty nest	
Birth of first grandchild	Grandchildren			Grandchildren	
Script-divergent Events					
Parent divorce one another		Separation of parents			Parents' divorce
Immigrate to a new country		Migration			Immigrating to Canada
Move to a distant city		Relocation	Change in residence		Moving from one city to another
End a serious romantic relationship					Break-up of a serious romantic relationship
Sustain a serious injury		Major accident			Sustaining a serious injury
Be diagnosed with a serious health problem	Serious disease	Major illness			Being diagnosed with a serious health problem
Be a victim of a criminal assault					Being a victim of a criminal assault
Experience a religious conversion	Baptism				Religious conversion
Change to a new school			Changing to a new school		
Change careers			Changing to a different line of work		
Be fired from a full-time job			Being fired from work		
Experience the death of a close friend			Death of a close friend		
Deal with health problems of an aging parent		Illness or accident of significant other	Major change in the health of a family member		
Undergo a serious financial problem			Major change in financial state		
Get divorced	Divorce		Divorce		

Appendix B

Examples of reported memories, dating protocols, and their assigned categories

Cue	Reported Memory	Dating Protocols	Category
pencil	I got a pencil as a reward when I was taking the ESL course.	I took the ESL course after I came to Canada in 2007.	Immigration
dog	We gave our dog to a neighbor when we moved back to the city.	In 1979, Xiaoping Deng implemented the policy and my father was rehabilitated. We moved back to the city from the country.	Historical Event
snow	In Saskatoon, we had 1-meter snowdrift blocked our garage doors.	It was the 'blowing snow' in September, 2004.	Pop/sports/ weather
tree	I saw cypress trees in the Martyrs' Cemetery when I was young.	...when I was in Grade 4.	Elementary school
pill	I felt sick after taking a kind of pills that the school doctor gave me, and then I knew what allergy was.	It was my first year in high school.	(Junior) high school
coat	I bought a green coat.	…the year that I graduated from college. I went to Beijing and bought that coat.	University
window	The experimental building was locked up and I had to jump out from the window.	When I was in graduate school, I often studied late into the night. I went to graduate school in 1984, so it was 1985.	Graduate school
stone	I recalled seeing the stones on the Qinling Mountains.	After I started my first work, I travelled there for fun.	Career/ achievement
coat	I went to a blind date with my military coat.	It was the first time that I met my wife.	Serious romantic relationship
window	I saw the French windows for the first time, in my wife's parents' house.	...not long after I got married.	(Re) marriage
dog	My son wanted a dog but I refused him.	...when he was 3 years old. He was born in 1999.	Childbirth
chair	My father wanted a rocking chair for long but we did not buy one for him, which is still a regret for my mother and me.	...my father passed away that year.	Parent's death
ball	I watched a soccer game in my hometown. My brother kicked the ball and it fell on my head by accident.	...before my grandma was paralyzed. She took me to the game.	(Grand) parent's health problem
pill	I had lots of pills when I got appendicitis.	...in 2000. It was the severest sickness I had ever got since all those years.	Serious injury/ health problem
spoon	I lost our best spoon in my house, and I have been looking for it since then.	I must have lost it after I moved to Alberta, so it should at least be 2003.	Moving cities
chair	I assembled a computer chair for myself.	I moved in that place in 2008 and I needed a computer chair.	Moving houses
street	I made money by removing snow on the sidewalk.	I lost my job at that time. My landlord paid me for removing snow.	Losing a job

(Appendix B Continued)

Cue	Reported Memory	Dating Protocols	Category
chair	I had a "boss chair" in my office.	That was when I started my new career as a businessman in a Hong Kong company.	Change careers (not due to immigration)
street	I found the streets in Greece were similar to the streets in my home town.	I travelled to Greece in 2012.	Big trip (exclude trips to China)
dog	I lost my dog which I had had for seven years. I was looking for it everywhere, with my heart broken.	I will always keep in mind that it was in 2003. I would call it "the year when I lost my dog."	Pet
dog	I had a puppy in Chongqing.	...the year when I bought my first car.	Car
chair	I painted tables and chairs at Rosemount Technical School.	...when I was training at the school from March to November, 2005	Post-immigration education
bread	I started buying bread from a new bakery.	This bakery is close to my workplace so I bought bread from there. I started this job in 2011.	Post-immigration job
book	I bought the book *Walk My Own Path* and was impacted by this book a lot.	I bought the book when I returned to China in 2001.	Trip to China
pill	I called 911 because my mother-in-law had a shock due to Dihydralazine overdose.	My mother-in-law came to visit us (from China) in March, 2012.	Having visitors from China
pencil	I bought a set of color pencils for my daughter.	She began learning drawing when she was in Grade 6 in elementary school.	Other's life story
river	I used to catch snails in a river at my home town.	…when I was 9 or 10. I was born in 1967.	Generic/ age
box	When I mailed glass products, the post office required me to use their boxes instead of my own.	I actually cannot remember which year, but I guess it has been at least ten years.	Unjustified