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Life Story Chapters, Specific Memories and the Reminiscence Bump

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Abstract

Theories of autobiographical memory posit that extended lifetime periods (here termed chapters) and memories are organized hierarchically. If chapters organize memories and guide their recall, then chapters and memories should show similar temporal distributions over the life course. Previous research demonstrates that positive but not negative memories show a reminiscence bump and that memories cluster at the beginning of extended time periods. The current study tested the hypotheses that 1) ages marking the beginning of positive but not negative chapters produce a bump and that 2) specific memories are overrepresented at the beginning of chapters. Potential connections between chapters and the cultural life script are also examined. Adult participants first divided their life story into chapters and identified their most positive and most negative chapter. They then recalled a specific memory from both their most positive and most negative chapter. As predicted, the beginning age of positive but not negative chapters produced a bump and specific memories tended to cluster at chapter beginnings. The results support the idea that chapters guide the search for specific memories and that the cultural life script contributes to the search process.

Life Story Chapters, Specific Memories and the Reminiscence Bump

Remembering encompasses recalling information abstracted from extended time periods as well as retrieving specific memories of events, located at a particular time and place. Both types of remembering are an important part of autobiographical memory (e.g. Brewer, 1986; Conway & Pleydell-Pearce, 2000; Schooler & Herrmann, 1992) and of people's life stories (Bluck & Habermas, 2000; Mackavey, Malley & Stewart, 1991; McAdams, 2001; Thomsen, 2009). According to several models of autobiographical memory, the abstract memory structures of extended time periods organize specific memories (e.g. Barsalou, 1988; Conway & Rubin, 1993) and play a central role in the voluntary recall of specific memories (e.g. Conway & Pleydell-Pearce, 2000).

Here we examine if extended time periods (here termed chapters) play a role in explaining the reminiscence bump. The reminiscence bump - older adults' enhanced recall of memories of events that occurred between ages 15-30 years (e.g. Rubin, Rahhal & Poon, 1998)--is one of the most robust findings in autobiographical memory research. The bump is especially pronounced for vivid, important and lifestory memories (Fitzgerald, 1988, 1992; Rubin & Schulkind, 1997). A key finding concerns emotional valence: the bump is present for positive but not for negative memories (Berntsen & Rubin, 2002; Rubin & Berntsen, 2003). When individuals are asked to recall specific memories from their life course, chapters may be activated first, which then direct the search for specific memories (Conway & Pleydell-Pearce, 2000). Since the beginning age of chapters show a bump (Thomsen & Berntsen, 2008) and specific memories are overrepresented around the beginnings of chapters (e.g. Pillemer et al.,

1986, 1988; Thomsen & Berntsen, 2005), a hierarchical search strategy should result in a bump for specific memories.

Previous research has not compared temporal distributions of positive and negative life story chapters. In the present study, we asked adults to identify discrete chapters in their life story; to name their most positive and most negative chapters; and to recall a specific memory from both their most positive and most negative chapter. We tested the hypotheses that only beginning age for most positive chapters would produce a reminiscence bump and that specific memories would cluster at the beginnings of chapters. In addition, we examined if cultural conceptions of the life course, here operationalized as the cultural life script (e.g. Berntsen & Rubin, 2002), would be related to the identification of chapters.

Chapters and Specific Memories

Chapters refer to abstract memory representations of extended time periods encompassing different activities and episodes that all relate to the same higher-order activity, such as relationships or education-work (based on Thomsen, 2009). Chapters are conceptually similar to extended-event timelines (Barsalou, 1988), lifetime periods (Conway & Pleydell-Pearce, 2000), extendures (Linton, 1986) and mini-narratives (Robinson, 1992). Chapters encompass both longer and shorter extended time periods, because there seems to be no logical cut-off that would distinguish between shorter mini-narratives (Robinson, 1992) and periods spanning longer time intervals (Barsalou, 1988; Conway & Pleydell-Pearce, 2000; Linton, 1986). However, chapters

are distinct from categoric memories, which refer to averaged memory representations derived from similar episodes (e.g. Neisser, 1981; Williams & Broadbent, 1986). In contrast, chapters are abstracted from episodes of varying content but which are related to the same higher-level activity and/or theme.

Chapters are thought to contain information about typical activities, people, places, goals and plans as well as the general emotional tone of the period (Conway, 2005; Conway & Pleydell-Pearce, 2000; Conway & Rubin, 1993). One prominent feature of chapters is their nested hierarchical organization (e.g. Barsalou, 1988; Neisser, 1986). This is also evident in the influential conceptual framework developed by Conway and Pleydell-Pearce (2000), where autobiographical memory is organized at several levels (Conway, 2005; Conway & Pleydell-Pearce, 2000; Conway & Rubin, 1993). At the top level is the life story (Conway, Singer & Tagini, 2004); at the second level are lifetime periods (e.g. “my marriage with Tim”); and at the third level are mini-narratives (e.g. ”our stay in New Hampshire”) and categoric memories (e.g. “eating dessert and watching cartoons on Friday evenings”). At the fourth level are specific memories of events lasting no more than 24 hours (e.g. “when we visited the Empire State Building and it was rather foggy”). In this model longer chapters nest briefer chapters as well as categoric and specific memories in a complex hierarchical network.

A specific memory represents “a circumscribed, one-moment-in-time event…including what was seen, heard, thought, and felt” (Pillemer, 1998, p. 3). Many specific memories are conceived as parts of chapters (Burt, Kemp & Conway, 2003) and

chapters are thought to influence the voluntary recall of specific memories (e.g. Conway & Pleydell-Pearce, 2000). Thus, when individuals are asked to recall a specific memory the search may start at the more general level of chapters, which constrains the search for specific memories. When individuals are asked to freely recall specific memories from an extended period, specific memories cluster around the beginning of the chapter. For example, Pillemer and colleagues found that college students more often recalled memories from the beginning of their first academic term compared to later parts of the term (Pillemer, Rhinehart & White, 1986; Pillemer, Goldsmith, Panter & White, 1988, see also Kurbat, Shevell & Rips, 1998; Robinson, 1986 and Thomsen & Berntsen, 2005 for similar findings). The effect is not due to students simply starting their memory search at the beginning of the academic term, as recall cued by the period February of senior year in high school to October of the first year in college also showed an increased recall of memories from September, the beginning of college (Pillemer et al., 1986, but see Anderson, 2005, for results supporting a bounded retrieval explanation). Neither is the effect due to systematic skewing of memory dating towards the end points of extended time periods (Kurbat et al., 1998). However, this effect has only been shown with predetermined time periods, most often the academic term, and not with self-selected life story chapters.

The increased recall of memories from the beginning of chapters may be due to the general high distinctiveness of beginnings of sequences. For example, recall from word lists (e.g. Murdock, 1962) and recall of presidents (e.g. Neath, 2010; Roediger & Crowder, 1976) is also higher for items from the beginning of the sequence.

Specific memories from the beginning of chapters may be better encoded and more frequently rehearsed, perhaps because such events are often first-time experiences or transitional events that help establish cause-effect relationships between related series of events (Pillemer et al., 1986; Robinson, 1992; Shum, 1998; Thomsen & Berntsen, 2005). In addition, memories from the beginning of chapters may also serve important directive and self functions by signalling changes in roles, goals and/or life stages (Conway, 2005; Fitzgerald, 1988; Pillemer et al., 1986; Robinson, 1992).

The idea that chapters may play a role in explaining the bump in specific memories was supported in a recent study, where it was found that chapter beginning year showed a bump mirroring the bump in specific memories (Thomsen & Berntsen, 2008). Also, specific memories from the beginning of chapters were overrepresented in the bump period. However, the study did not examine differences between most positive and most negative chapters. In addition, chapters were not used as cues for recalling specific memories, but were identified after the recall of specific memories.

Discovering that age of chapter beginnings show a bump and that memories cluster at the beginning of chapters would provide a potential explanation for the bump in specific memories. When people are asked to recall specific life story memories, they may first think of important chapters in their life, which would be likely to begin during the bump period and then recall important memories from within these chapters. Because memories at the beginning of chapters are more accessible, this strategy may result in a bump for specific memories.

Chapters, Specific Memories and the Cultural Life Script

Representations of culturally shared ideas about the life span may influence the formation of chapters (Berntsen & Rubin, 2004). There are several reasons to suspect this. First, in one of the first studies on the relationship between chapters and specific memories, it was noted that the content of chapters was fairly similar across individuals, perhaps because of cultural influences on the formation of chapters (Conway & Bekerian, 1987). Second, chapters function as sections of the life story and the construction of life stories are thought to be under influence of culturally transmitted knowledge (Habermas, 2007; Habermas & Bluck, 2000; McAdams & Pals, 2006).

Here, we focus on the cultural life script as an example of culturally transmitted knowledge (Berntsen & Rubin, 2002, 2004; Rubin & Berntsen, 2003). The cultural life script has been found to be related to autobiographical memory in other studies (Berntsen & Jacobsen, 2008; Berntsen & Rubin, 2002, 2004; Bohn, 2010; Collins, Pillemer, Ivcevic & Gooze, 2007; Rubin & Berntsen, 2003; Rubin, Berntsen & Hutson, 2009; Thomsen & Berntsen, 2008). The cultural life script is defined as: "culturally shared expectations as to the order and timing of life events in a prototypical life course" (Berntsen & Rubin, 2004, p. 427). It thus contains semantic, de-contextualized knowledge of events thought to take place during the typical life course in one's culture and the expected age when such events are likely to occur. Cultural life script events consist of both normative (e.g. wedding) and non-normative (e.g. divorce) events as well as transitional and non-transitional events (Habermas, 2007). The script is

not based on personal experience but is derived from culturally transmitted knowledge about the life course as for example through books, television or conversation.

Studies show that 1) many cultural life script events take place during young adulthood, 2) most of these culturally sanctioned events in young adulthood are conceived as positive and 3) individuals agree more on the timing of positive cultural life script events compared to negative events (Berntsen & Rubin, 2004; Erdoğan et al., 2007; Rubin & Berntsen, 2003). This has led to the suggestion that the cultural life script is biased toward positive events and as such may represent a somewhat idealized version of the typical life course (Berntsen & Rubin, 2004). Indeed, it has been suggested that a request for negative events (or periods) may not activate the cultural life script because negative events are often non-scripted (Berntsen & Rubin, 2002; Rubin et al., 2009). The cultural life script has been suggested to direct the recall of specific memories. Supporting this idea, studies have shown that the reminiscence bump is only found for positive and important memories (Berntsen & Rubin, 2002; Glück & Bluck, 2007; Rubin & Berntsen, 2003; see also Collins et al., 2007 for supporting evidence). Because the cultural life script contains more positive than negative events between ages 15-30 years, this finding is consistent with the notion that the cultural life script guides recall of specific memories (but see Demiray, Gülgöz & Bluck, 2009 for an alternative explanation).

The idea that the cultural life script may also aid the identification of chapters was supported in a recent study (Thomsen & Berntsen, 2008). Specific memories at the beginning of chapters were more likely to be of prominent cultural life

script events, suggesting that some chapter beginnings may be defined by the cultural life script. One interpretation of these findings is that the life script not only defines specific culturally expected events, which may aid the recall of specific memories, but also contains knowledge of periods of stability, which may aid the formation and identification of chapters in the life story. Thus, the cultural life script may contribute to the identification of chapters both prospectively, by helping individuals anticipate important periods in their lives, as well as retrospectively when recalling important life periods. Presently, the cultural life script does not explicitly distinguish between specific events and extended periods. Thus, several events in the cultural life script may subsume both specific events and extended periods (e.g. “marriage” may subsume both the wedding ceremony and the extended relationship following the wedding). Previous studies have focused on the role played by the cultural life script in recall of specific memories (e.g. Berntsen & Rubin, 2002; Rubin & Berntsen, 2003). However, the cultural life script is also likely to contain information about extended lifetime periods, because such periods would correspond to the roles and stages that are a central part of cultural expectations about the life course. When the cultural life script is engaged by a request for specific memories, it may first activate extended life story chapters (e.g., parenthood) which then guide the recall of specific memories (e.g., childbirth).

The Present Study

In the present study, we asked participants to identify chapters in their life story, to select their most positive and most negative chapter, and to recall an important specific memory from the most positive and most negative chapter. If chapters play a

role in explaining the bump for specific memories, then we should find: 1) a bump for the beginning age of chapters, 2) a bump for beginning age for the most positive but not the most negative chapter, 3) a heightened frequency of memories from the beginning of chapters and 4) a bump for specific memories recalled from the most positive chapter, but not for specific memories recalled from the most negative chapter. Support for hypotheses 1 and 2 would also be consistent with the notion that chapter identification is guided by the cultural life script because the cultural life script contains more transitional events in the bump period and more of these are positive. In addition, if the cultural life script aids the identification of chapters, we should find that 5) the most negative chapter is omitted from the initial identification of chapters more often than the most positive chapter, because the cultural life script emphasizes positive events and chapters, and 6) participants are less aware that they were beginning their most negative than their most positive chapter, because the cultural life script enables people to better anticipate positive events and because positive events are often normative.

Method

Participants

The participants were 92 adults between ages 49-75 years (M = 59.58, SD = 6.49), with 67 women and 25 men. Five were never-married/single, 59 were married or co-habiting, 20 were divorced or separated and seven were widowed (1 missing value). Regarding the highest achieved educational level, four indicated primary school, 11 indicated some practical education, 7 indicated high school education (or equivalent),

39 indicated college education (3-4- years of post high school education) and 31 indicated university education (5 years post high school, resulting in both a bachelor's and a master's degree). Among the participants, 2 were unemployed, 35 were working full time, 13 were working part time and 41 were retired (1 missing value).

Participants were recruited either through students who sent the questionnaire to their parents or parents-in-law or through distributing the questionnaires at evening lectures and courses at the university. They were ensured full confidentiality and were instructed that they could skip parts of the questionnaire that they felt were too personal. A total of 413 questionnaires were distributed and 92 (22%) were returned. This relatively low response rate may be due to the length of the questionnaire, which required approximately two hours to complete.

Materials

The first part of the questionnaire asked participants to identify chapters in their life story (inspired by McAdams, 1993). The instructions were as follows:

> Please think about your life story and divide it into "chapters." It is important that the chapters cover your whole life story – think back over your entire life. For each of your chapters, please write a title and a couple of key sentences. Chapters need not have a clear beginning or end. You can include parallel chapters, i.e. chapters may refer to the same period in your life. You also may include chapters that are not yet finished (mark "ongoing" below the chapter). *Some people describe their life story in just*

> *a few chapters, whereas other people describe their life story in many chapters. There is no right or wrong way to divide your life into chapters—it is up to you to decide how many chapters to include.* Please begin with chapter 1 and end whenever you are satisfied with your description of the chapters in your life.

For each chapter the participant was also asked to estimate the beginning and end age of the chapter or mark the option "ongoing". The participant was provided with lines for heading, content and age for twenty chapters and was asked to continue descriptions of chapters on the back page of the questionnaire if she/he had more than twenty chapters.

The second part of the questionnaire asked participants to select the most positive and most negative chapter in her/his life story in a counterbalanced order. The instructions were as follows:

> Please think back upon the chapters in your life story and select the most positive/negative chapter. If several chapters are equally positive/negative, please select the one that is most important to you. If your most positive/negative chapter is among the chapters you have just described on the previous pages, please write the number of the chapter you think is the most positive/negative here [a space was provided]. If you now realize that you did not describe your most positive/negative chapter on the previous pages, please give a new title here [space was provided for title, beginning year, end year or ongoing].

Participants were then asked two questions: “Which of the following categories best describes the emotional quality of the chapter?” (1 = mildly positive/negative, 2 = moderately positive/negative and 3 = very positive/negative) and “Think back upon the time in your life when your most positive/negative chapter was about to begin. Did you realize that you were about to begin a new chapter in your life?” (1 = not at all and 7 = very much).

The third part of the questionnaire asked participants to recall an important specific memory from her/his most positive and most negative chapter (the order of recall of specific memories followed the order of the selection of most positive/negative chapter and thus was also counterbalanced). The instructions were as follows:

> Your next task is to recall an important specific memory that belongs to your most positive/negative chapter. *Your memory should describe a specific episode that lasted no more than one day. The memory can come from any point in the chapter and can involve positive, negative, or mixed emotions.* Describe the specific episode on the lines below. You may include information on location, activities, other people, emotions and other information you feel is relevant. *Be sure to indicate your age at the time of the specific event***.**

The participant was then asked how old she/he was when the event took place (a space was provided for years) and was asked to give a description of the specific memory. The participant was next asked a number of questions regarding the quality of the event and

memory; these questions were not relevant to the central issues addressed in the present study. The participant was then given the following instruction: “The line below represents a time line for your most positive/negative life story chapter. Please mark with an X on the line when during the chapter the event took place.” A 10 centimetre line was provided marked with “chapter beginning” at the far left, “chapter end/present” at the far right and “chapter middle” between the two end points of the line (see Thomsen & Berntsen, 2005, for a description of this method).

The participants received the questionnaire along with an explanatory letter and a pre-paid envelope. It was explained that the questionnaire was about memories and the life story and that there were no right or wrong answers. Participants received a gift book for their participation.

Coding

The content of the chapters was coded into thematic categories. The categories were developed by the first author by reading through the questionnaire responses and were also inspired by a previous study on chapters (Thomsen & Berntsen, 2008). The categories included childhood, youth, adulthood, old age (age period theme), primary school, education, work life, retirement (education-work theme), being in love, marriage, divorce, family life, young children, older children, grandchildren, other social relations (relationship theme), illness, crisis and/or series of negative events, deaths (negative periods), spare time, foreign countries/travelling, living location, other (chapters that did not fit any of the above mentioned categories) and mixed (chapters

that contained two or more of the above mentioned categories with no clear priority). The chapters were coded by the first author and an independent coder. Agreement was satisfactory (Cohen's kappa = 0.80) and disagreements were resolved by discussion.

Results

To test whether the counterbalancing of selecting the most positive versus the most negative chapter first had any systematic effects on the results, a series of independent t-tests was carried out on all variables relevant to the predictions. They showed no systematic differences between the two groups and hence task order was collapsed in all analyses. To test for gender differences, we also conducted a series of independent t-tests. There were no statistically significant gender differences (ps > 0.05) except that women reported significantly more chapters (women M = 16.01, men M = 12.56, $t(90) = 3.67$, $p < 0.05$). We also examined correlations between participants' age and variables involved in the central analyses. Although there were scattered significant correlations, age effects were not consistent and hence age was not controlled in the analyses.

The average number of chapters identified was 15.08 (SD = 4.85) with a range from 5-26 chapters. The average length of chapters was 6.20 years (SD = 7.84) with a range from less than 1 to 64 years.

Chapters and Specific Memories

To examine hypothesis 1, that beginning ages of chapters produce a bump, we plotted frequency of chapter beginning year across the life span (see Figure 1). Because temporal distributions were similar for participants below and above 60 years

of age, the figures included all participants. The distribution shows a clear reminiscence bump. Chapter beginnings peaked during the bump period (ages 15-30), although chapters also frequently begun during childhood (chapter ends showed a similar pattern, Figure 2; see Thomsen & Berntsen, 2008 for similar results). The observed distribution for chapter beginnings differed significantly from an even distribution, ($X^2(8) = 105.52$, $p < .05$), as did the distribution for chapter ends, ($X^2(8) = 166.50$, $p < 0.05$). Because some participants were younger than age 50, statistical tests included 5-year age intervals up to 40-45 only.

Content analyses revealed that work life, living location, primary school, education, childhood, marriage, young children, social relations, youth and illness were the ten most common categories (see Table 1). In agreement with the bump in chapter beginning year, five of these had mean beginning ages during ages 15-30 years.

According to hypothesis 2, only beginning ages of positive chapters should show a bump. We plotted the beginning age of participants' most positive and most negative chapter (chapter end ages are less interesting for the present purposes because specific memories do not cluster prominently at chapter endings). Because there were no significant correlations between age of participants and beginning age of the most positive and most negative chapter, and the distributions were similar for participants below and above 60 years of age, the figures included all participants. As can be seen in Figures 3 and 4, only positive chapters showed a pronounced reminiscence bump between approximately 20-30 years, whereas negative chapters tended to cluster at older ages. The observed distribution of positive chapters differed significantly from an even

distribution, ($X^2(7) = 42.65$, $p < .05$), as did the distribution of negative chapters, ($X^2(8) = 27.30$, $p < 0.05$); because some participants were younger than age 50, statistical tests included 5-year age intervals up to 40-45 only; degrees of freedom differ for positive and negative chapters because there were no positive chapters between ages 11-15 years). The mean beginning year for the most positive chapter was younger ($M = 31.14$, $SD = 13.57$) than the mean beginning year for the most negative chapter ($M = 37.17$, $SD = 14.01$), paired $t(80) = 2.85$, $p < 0.05$.

Participants identified an important specific memory that belonged to their most positive and most negative chapter. Hypothesis 3 stated that specific memories should cluster at the beginning of chapters. We plotted participants' placement of their specific memories on the time line (measured as millimetres) on the x-axis and frequency on the y-axis. As can be seen in Figures 5 and 6, memories peaked at the beginning of both the most positive and most negative chapter. The observed distribution of specific memories from the most positive chapter was significantly different from an even distribution ($X^2(18) = 54.12$, $p < .05$), as was the distribution for specific memories from the most negative chapter, ($X^2(19) = 34.59$, $p < 0.05$); (degrees of freedom differ for positive and negative chapters because there were no specific memories from one interval in the most positive chapter). Because participants may not have been skilled at using the time line, we also examined the frequency of memories from the beginning years designated by participants on the written questionnaire. For the most positive chapter, 38 specific memories out of 82 (46%) were dated to the beginning year of the chapter. For the most negative chapter, 35 specific memories out of 83

(42%) were dated to the beginning year of the chapter. These results show that the increased recall of memories from the beginning of chapters extends beyond the limited types of extended time periods examined in previous studies (Kurbat et al., 1998; Pillemer et al., 1986, 1988; Robinson, 1986; Thomsen & Berntsen, 2005).

To examine hypothesis 4, that the activation of chapters may contribute to the bump for specific memories, we plotted the life course distribution of specific memories from the most positive and most negative chapter (Figures 7 and 8). Specific memories recalled from the most positive chapter displayed a bump between the ages 20-30 years, whereas specific memories from the most negative chapter did not show a bump during this period, but showed an increased frequency after age 35. The distribution of positive memories was significantly different from an even distribution, $X^2(8) = 51.27$, $p < .05$, as was the distribution of negative memories, $X^2(8) = 33.36$, $p < 0.05$. Because some participants were under age 50, statistical tests included only memories up to the 40-45 age interval.

In summary, the combined tests of these four hypotheses indicate that chapters may play a role in explaining the bump in specific memories. In addition, the finding that beginning ages for chapters show a reminiscence bump and that this bump is present only for positive chapters is consistent with the idea that the cultural life script aids the identification of chapters.

Chapters and the Cultural Life Script

To further examine potential relationships between the cultural life script and chapters, we tested hypothesis 5, that individuals are more likely to omit their most negative than their most positive chapter from their first identification of life story chapters. Participants were slightly but significantly more likely to identify a new chapter when asked for their most negative chapter (15 recalled new most negative chapters, whereas 70 selected previously identified chapters as the most negative, 17.65%) than for their most positive chapter (7 identified new most positive chapters, whereas 80 selected previously identified chapters as the most positive, 8.05%, McNemar test for correlated proportions, X^2 (1, N = 83) = 18.60, $p < 0.05$).

We then tested hypothesis 6, that individuals are more aware that they are beginning their most positive chapter than beginning their most negative chapter. A within-subjects t-test strongly confirmed this prediction (positive M = 5.37 (SD = 2.05), negative M = 4.17 (SD = 2.45), $t(81) = 3.47$, $p < 0.01$). Also, positive chapters were rated more highly on emotional intensity (positive M = 2.94 (SD = 0.24), negative M = 2.72 (SD = 0.58); $t(80) = 3.07$, $p < 0.01$) and were longer (positive M = 7.53 years (SD = 8.07) and negative M = 4.35 years (SD = 3.37); $t(48) = 2.45$, $p < 0.05$; the degrees of freedom are lower than the number of participants because several positive and negative chapters were still ongoing and therefore not included in this analysis).

Discussion

The results supported the idea that life story chapters play a role in the reminiscence bump for specific memories. Four findings pointed in this direction: 1) Chapters generally showed a bump in late adolescence/early adulthood, 2) positive

chapter beginnings were more frequent during the bump period, whereas this was not the case for negative chapter beginnings, 3) specific memories clustered at the beginning of chapters and 4) specific memories recalled from the most positive and most negative chapter followed the life course distribution found for positive and negative specific memories in previous studies (Berntsen & Rubin, 2002; Glück & Bluck, 2007; Rubin & Berntsen, 2003). The findings are also consistent with the notion that the cultural life script guides the identification of chapters since 1) chapters generally showed a bump, 2) positive chapters were more frequent during the bump period, whereas this was not the case for negative chapters, 3) positive chapters were more likely than negative chapters to be nominated as a part of the initial chapter identification task and 4) positive chapters were more strongly expected in advance than were negative chapters.

Finding a reminiscence bump for life chapter beginnings is consistent with the notion of hierarchically organized memory recall, where chapters guide the recall of specific memories (Conway & Pleydell-Pearce, 2000). The method in the present study mimicked a hierarchical recall process by asking individuals to first identify their most positive/negative chapter and then recall an important memory from that chapter. This process resulted in a bump for specific positive memories between ages 20-30 years whereas this was not the case for specific negative memories. Although our findings do not provide direct evidence that a hierarchical search process is used when individuals are asked to recall important, emotional and/or life story memories in other studies or in natural contexts, it does indicate that the bump in specific memories may involve the activation of chapters.

The results also supported the idea that the cultural life script guides the identification of chapters. The life script may first activate higher-order representations of extended events (such as a chapter about marriage) which then cues particular episodes within the chapter (such as a memory of the wedding ceremony). However, chapters and the cultural life script may also guide the recall of specific memories independently of each other. In some circumstances, the cultural life script may directly cue the recall of specific memories, without the necessity of first activating chapters. In addition, people have chapters that do not correspond to the cultural life script (see Table 1) and these may guide the recall of specific memories without the influence of the cultural life script.

How may the cultural life script influence the identification of chapters? First, the cultural life script may provide the individual with search descriptions for normative extended life periods (e.g., marriage). Second, the cultural life script may provide advance knowledge of which age periods are especially salient or important in a particular culture (e.g., the transition from adolescence to adulthood), thus helping the individual to connect events relevant to these periods with each other and thus influence the formation of chapters. However, peoples' life stories also contain chapters that are not a prominent part of the cultural life script, as evidenced by some of the content categories in Table 1 (e.g. spare time and living location as well as the categories of other/mixed that did not fit the common categories in Table 1). Evidently, chapter identification is not determined solely by the cultural life script.

Our findings suggest several modifications of the cultural life script theory. First, the theory may benefit from explicitly distinguishing between specific

transitional events and extended periods of stability (e.g. “first day in school” and “school years”). Second, life script theory proposes that requests for negative events should rarely activate the cultural life script, because negative events are often unexpected (Berntsen & Rubin, 2002; Rubin et al., 2009). However, when our participants were directly prompted to identify a most negative chapter, they often described extended life periods that paralleled events in the cultural life script. Negative scripted events identified by Berntsen and Rubin (2004, p. 436) included other’s death (mean age 34), parent’s death (age 49), divorce (mean age 39), and serious disease (mean age 51). These events parallel most negative chapter themes portrayed in Table 1: deaths, divorce and illness. Note that ages assigned to the negative life script events seem to fit with the apparent bump in most negative chapters between the ages 35-50 (although this could also be interpreted as a recency effect, Rubin & Berntsen, 2003). This would seem to suggest that the cultural life script may also aid in the identification of negative chapters and specific memories.

Although our results are consistent with the idea that the cultural life script guide the identification of chapters, other interpretations are possible. When chapters show a bump in young adulthood this may also reflect the development of a stable self and/or life story (Conway & Pleydell-Pearce, 2000; Demiray et al., 2009; Fitzgerald, 1988; Glück & Bluck, 2007). The life story is based on the individual’s unique chapters and specific memories, whereas the cultural life script is a de-personalized and culturally shared knowledge structure (Berntsen & Rubin, 2004). The finding that only positive chapters (and memories, Berntsen & Rubin, 2002; Rubin & Berntsen, 2003)

showed a bump, and that negative chapters were more often omitted from the initial chapter identification, may be explained with reference to the positive life story possessed by most people (Glück & Bluck, 2007). Thus, when people are asked to identify chapters in their life story they identify those that are most central and these are both from young adulthood and emotionally positive. Since the culturally sanctioned events in the life script may also be considered central to the life story (Berntsen & Rubin, 2004), the life story and the cultural life script may interact in producing the present results.

Alternatively, distributions of beginning ages of the most positive and most negative chapter could simply reflect the real life distribution of most positive and most negative periods in life, rather than the influence of the cultural life script and/or the life story. Table 1 shows that most positive chapters are about the periods of life where people marry and have children (consistent with this finding, the events "marriage" and "having children" are the most positive events among the ten highest ranking events in the cultural life script, Berntsen & Rubin, 2004, p. 436). This is a period with strong positive emotions, but it is also a period associated with lack of sleep, conflicts between work and family and many worries concerning the well-being of children. Hence the selection of this life period as the most positive chapter could reflect the influence of a cultural life script biased towards emphasizing positive events in young adulthood. Still, it is possible that people select this period because in retrospect all the worries and conflicts have lost their emotional intensity (Walker, Skowronski &

Thompson, 2003) while the positive emotions associated with this period are still vivid in memory. Thus, biases in emotion memory may also affect the present results.

Future Directions

More work examining the interplay between chapters and specific memories is needed in order to assess the role of chapters in the organization and recall of specific memories and how chapters are formed based on specific memories. It has been suggested that chapters are formed with reference to the individual's personal goals (Barsalou, 1988; Conway & Pleydell-Pearce, 2000; Robinson, 1992). Goals may influence how associations between memories are created, establishing cause-effect relationships between memories and allowing monitoring of progress towards the goal (e.g. Brown, 2005). In addition, chapters could be formed by bottom-up processes where specific memories with similarities in content are clustered together (Brown, 1990; 2005; Brown & Lee, 2010; Brown & Schopflocher, 1998a, 1998b; Burt et al., 2003; Kemp, Burt & Malinen, 2009).

The evidence for an association between the cultural life script and chapters in the present study is indirect. To obtain a more direct assessment of normative expectations for life chapters, research participants could be asked to imagine a typical older adult and to indicate which life chapters the adult will have experienced (see Rubin & Berntsen, 2003, for a similar method used to identify culturally scripted life episodes). Future studies also could examine connections between cultural life scripts and chapters by comparing chapter identification in two samples with measurably different cultural life scripts or by priming participants with cultural

life scripts presented in different formats and examining the effect on identification of personal life story chapters.

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Table 1

Frequency of chapter content for all chapters, the most positive chapter and the most negative chapter (mixed and other excluded).

Content	All Chapters (Mean age of beginning)	Most positive	Most negative
Work life	181 (30.61)	10	5
Living location	137 (27.22)	5	3
Primary school	99 (9.92)	1	2
Education	95 (22.76)	2	1
Childhood	90 (2.18)	2	1
Marriage	79 (29.25)	11	4
Young children	77 (28.95)	16	4
Social relations	63 (14.10)	2	2
Youth	46 (15.51)	1	2
Illness	38 (39.63)	1	12
Older children	44 (47.88)	3	0

Deaths	40 (37.79)	1	15
Foreign countries/travelling	38 (28.79)	1	0
Spare time	37 (19.50)	1	0
Family life	35 (28.46)	12	3
Divorce	25 (41.00)	0	13
Pension	28 (58.96)	1	0
Negative events	19 (40.16)	1	9
Being in love	19 (24.95)	1	0
Adulthood	11 (33.09)	2	1
Grandchildren	13 (48.92)	2	0
Old age	6 (61.33)	2	0

Figure 1: Distribution of chapter beginnings across the life span

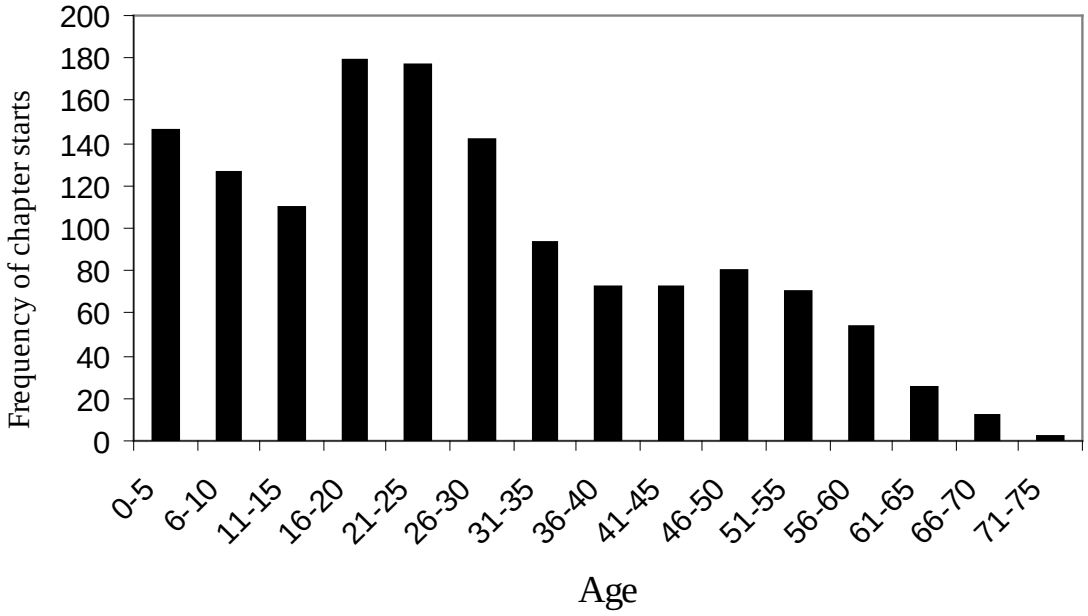

Figure 2: Distribution of chapter ends across the life span

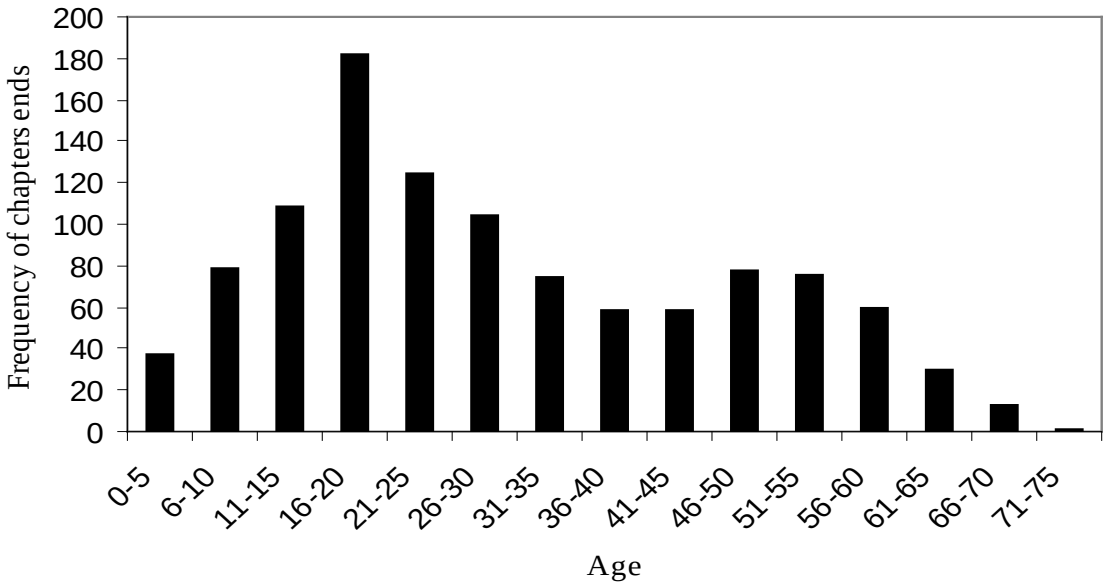

Figure 3: Distribution of beginning age for most positive chapter across the life span

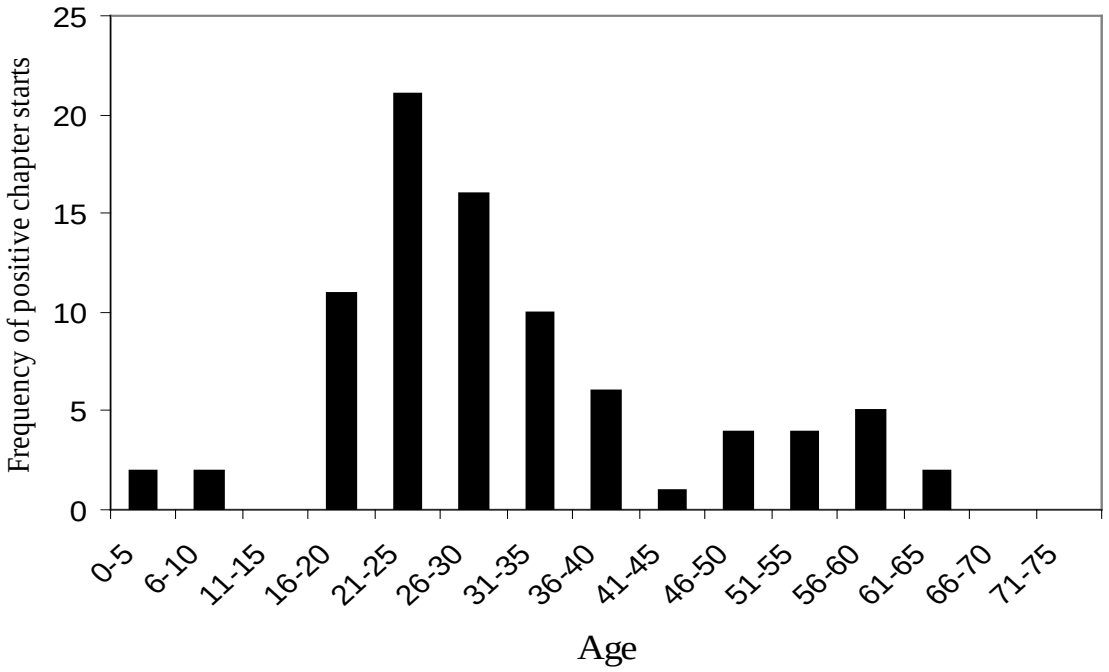

Figure 4: Distribution of beginning age for most negative chapter across the life span

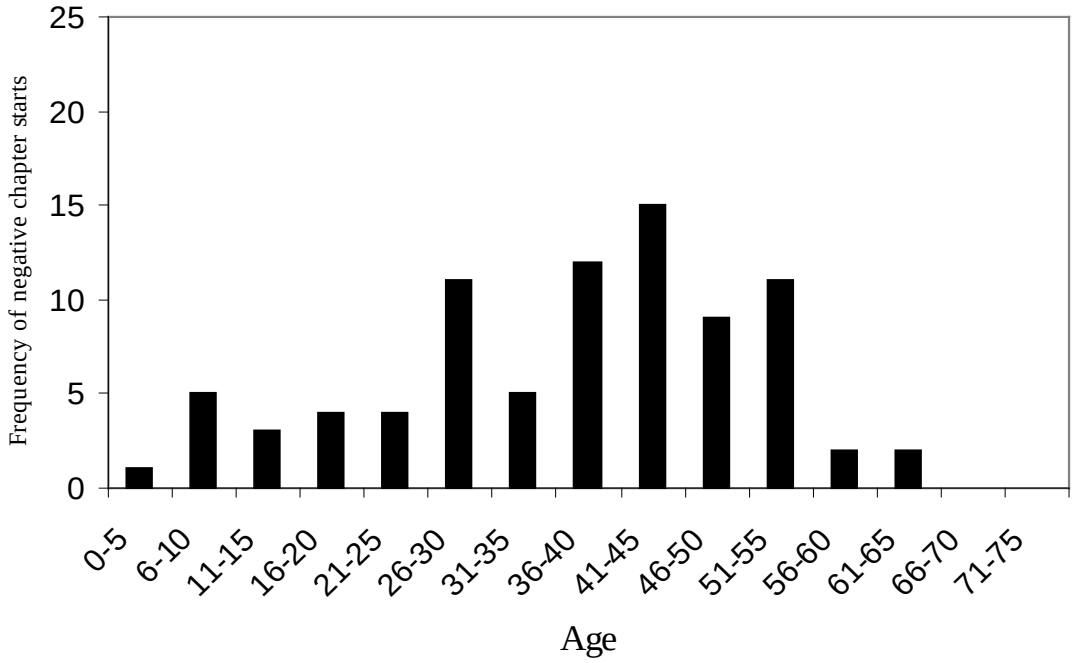

Figure 5: Distribution of specific memories within the most positive chapter

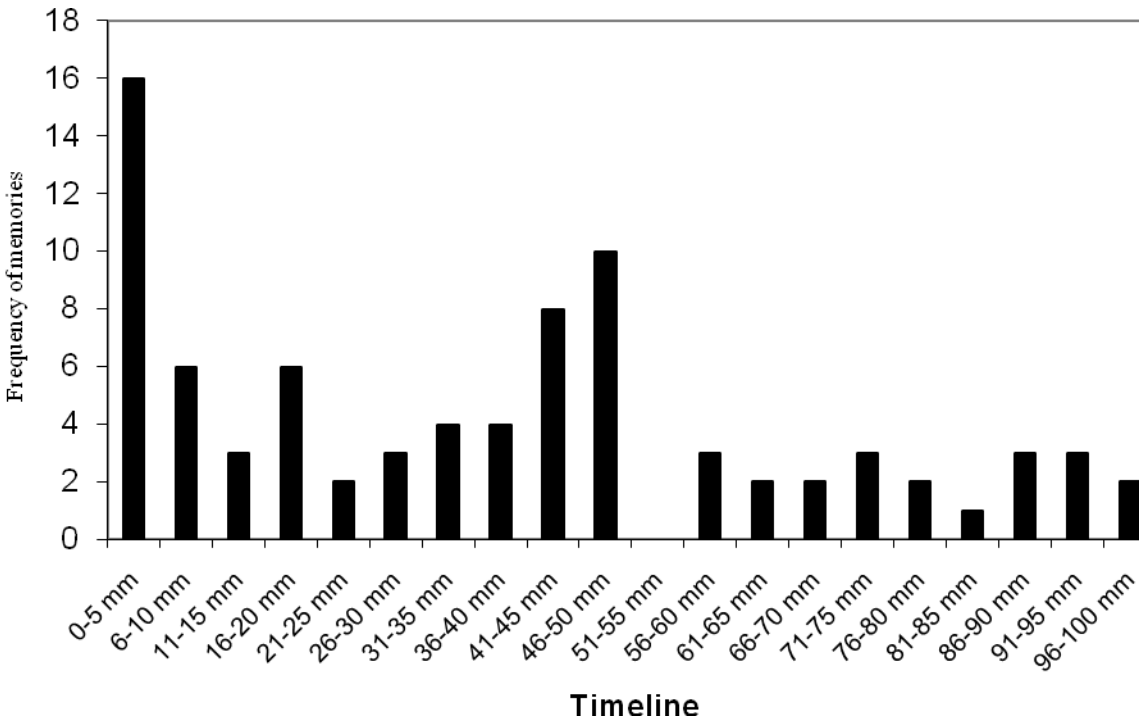

Figure 6: Distribution of specific memories within the most negative chapter

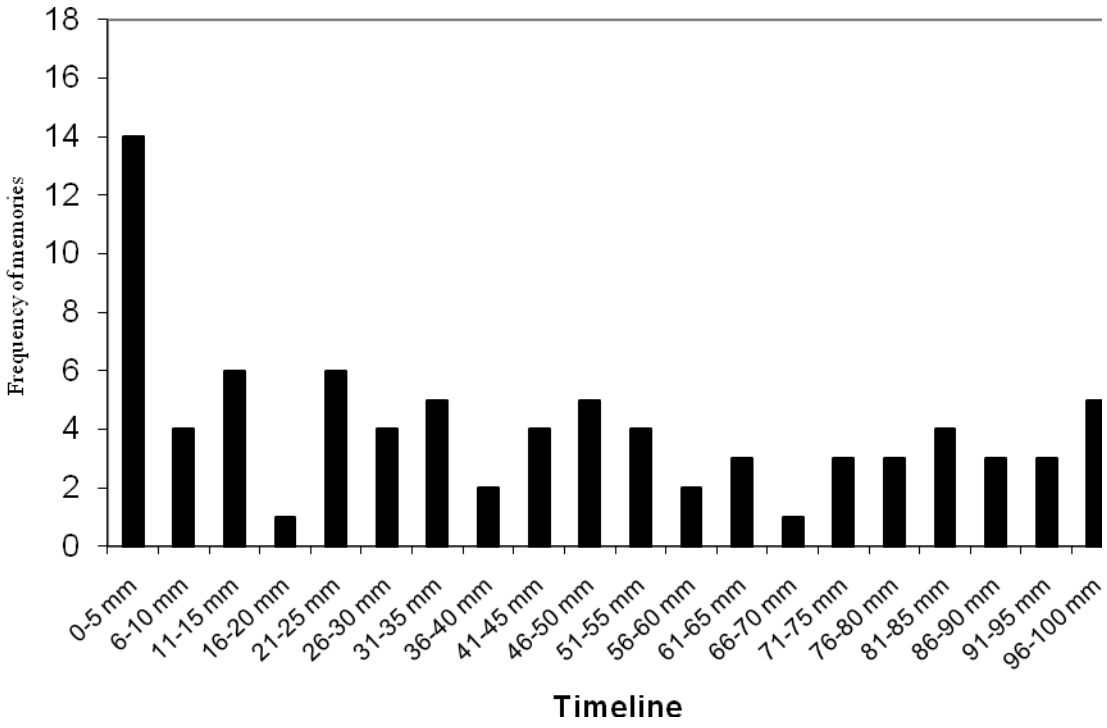

Figure 7: Distribution of specific memories from the most positive chapter across the life span

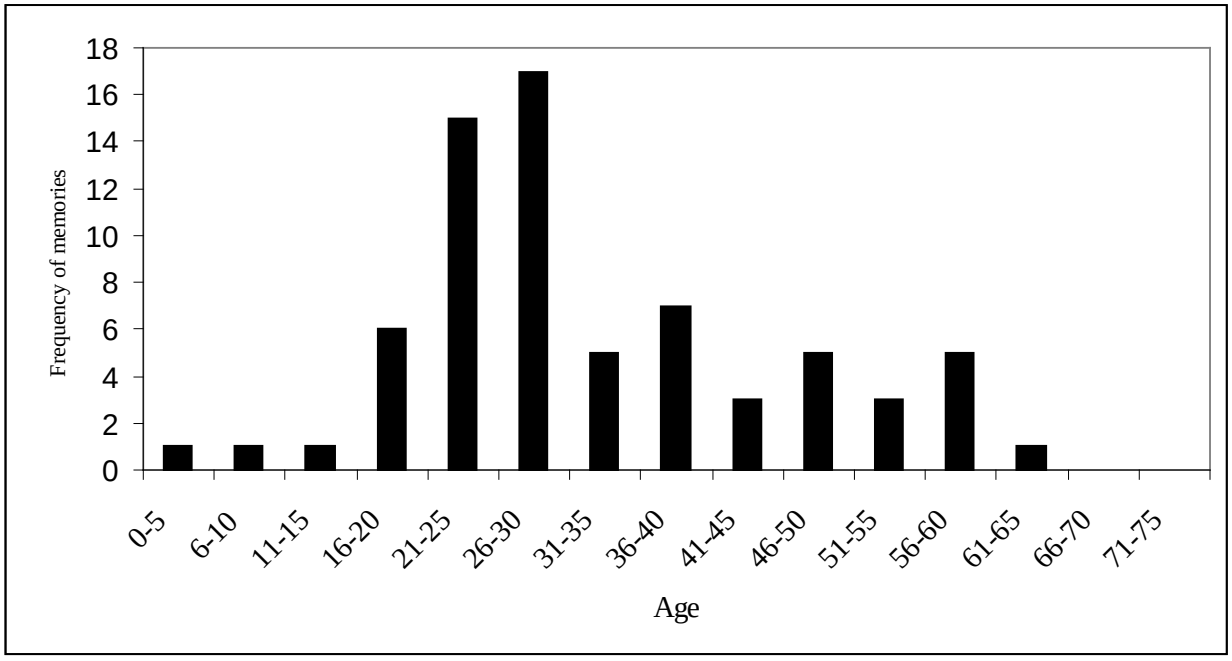

Figure 8: Distribution of specific memories from the most negative chapter across the life span