

Lifespan Trends of Autobiographical Remembering: Episodicity and Search for Meaning

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Abstract

Autobiographical memories of older adults show fewer episodic and more non-episodic elements than those of younger adults. This semantization effect is attributed to a loss of episodic memory ability. However the alternative explanation by an increasing proclivity to search for meaning has not been ruled out to date. To test whether a decrease in episodicity and an increase in meaning-making in autobiographical narratives are related across the lifespan, we used different instructions, one focussing on specific episodes, the other on embedding events in life, in two lifespan samples. A continuous decrease of episodic quality of memory (memory specificity, narrative quality) was confirmed. An increase of search for meaning (interpretation, life story integration) was confirmed only up to middle adulthood. This non-inverse development of episodicity and searching for meaning in older age speaks for an autonomous semantization effect that is not merely due to an increase in interpretative preferences.

1. Introduction

The ability to remember learned verbal material decreases across adulthood. A similar decrease is apparent in autobiographical event memory. This trend has been described as autobiographical memory becoming less episodic and more semantic with age. In terms of Conway's model of autobiographical memory (Conway & Pleydell, 2001), this would mean that basic event-specific memories become less accessible, especially in terms of temporally sequenced actions and events. This in turn would lead to an increased use of higher level knowledge of repeated or extended events and life phases. There is a reverse age difference between young and old adults in interpretative efforts to render memories more meaningful. This increase might serve as an alternative explanation for the decrease of episodic memory. We present a study that attempts to replicate these two hitherto independent findings and to test their possible inverse interrelatedness in the same data set. Furthermore we compare instructions that maximize specific episodic narrating versus narrating with a focus on search for biographical meaning. Finally we go beyond the simple comparison of young and old adults by using two lifespan samples with four and six age groups respectively to explore the relationship between age, episodicity, and search for meaning in more detail.

1.1 Semantization of autobiographical memory

In laboratory studies of verbal learning, working memory and episodic memory decrease in older adulthood. In a large longitudinal study with 35- to 80-year-olds, Rönnlund, Nyberg, Bäckman, and Nilsson (2005) found that short-term episodic memory for verbal material and simple actions began to gradually decrease at age 60, accelerating after age 70. Cultural knowledge (semantic memory) decreased at a more moderate pace in the same age range.

Learning studies interpret the concept of episodic memory as originally conceived, i.e. as memory for experimental stimuli (Tulving, 1972). Episodic memory was later reinterpreted to cover autobiographical remembering of personal experiences. This more recent concept refers to the subjective experience of reliving past events in a vivid fashion, including details of the scene (Tulving, 2002). Several studies (reported below) demonstrated that this kind of episodic, i.e. autobiographical episodic memory, also decreases in later adulthood. A further claim is that with age, episodic memories are increasingly reduced to semantic memories, i.e. that remembering *how* events unfold is transformed into merely knowing *that* an event happened.

To compare remembering *how* to knowing *that* something happened, these studies interpret the amount of detail in a memory report as indicating the degree of re-experiencing, or of the episodocity of the memory. All information that does not regard the specific event is termed 'external' information and interpreted as resulting from semantic memory. Levine, Svoboda, Hay, Winocur, and Moscovitch (2002) asked 15 young and 15 older adults (24 and 74 years) to freely narrate an event from each of five life periods, followed by a series of probes to elicit more detail. The number of event-related details was counted for each narrative, including happenings, physical, temporal, and locational information as well as cognitive and emotional reactions. In addition, each of these aspects was rated on four-point scales, as were the overall episodic richness and the degree of integration of the episode into the wider context of life. Young adults reported more information internal to, and older adults more information external to the event. Additional probing reduced age differences, especially in the ratings. However older adults still provided more information about things other than the event itself, and still integrated the event more with other parts of life.

In related studies Addis, Wong, and Schacter (2008) and Addis, Musicaro, Pan, and Schacter (2010) asked young (early 20s) and older (70s) participants to think of a total of eight recent memories in response to cues and to generate as many details as possible within three minutes. Again, young adults produced more details of the episode itself and less information about anything outside the specific episode.

These findings were confirmed by Piolino, Desgranges, Benali, and Eustache (2002) in a sample of 52 40- to 79-year-olds. The more continuous age distribution age groups allowed a better location of age changes. Participants were asked for personal biographical knowledge and for detailed accounts of four specific episodes for each decade of their lives. Accounts were classified either as specific memories with detail, specific memories without detail, generic memories, or as vague answers. Beginning in the age range of 60 to 69 years, increasing age lead to a lower percentage of specific memories, both with and without detail. Piolino and colleagues (2006) replicated this finding with questionnaires in adults aged 25, 62, and 75 years. Again, specific memories, both with and without detail, showed a decrease between all three age groups. Corresponding age decreases in ratings of remembering versus knowing, and of visual field versus observer perspective confirmed a decline in the episodic quality of autobiographical event memories. Age differences were largest in memories from the past five years.

1.2 Exceptions to a decrease in episodicity

These studies claim that episodic memory for events from the personal past declines between early and late adulthood. Other than two studies which did not find differences in episodic autobiographical memory between middle aged and older adults (Berna, Schönknecht, Seidl, Toro, & Schröder, 2012; Howes & Katz, 1992), there are two major concerns with the scope of the semantization effect of aging. We briefly discuss the first concern and then turn to the second concern which motivated our study.

For one, some memories may be spared from the semantization effect. In some flashbulb memory studies that similarly ask for as many details as possible, older adults provided no less detail than younger adults. For example, Bluck, Levine, and Laulhere (1999) found no differences between 20- and 62-year-olds in the amount and accuracy of remembered information about the television news of the O. J. Simpson verdict. Also, older adults remembered historical events as well as younger adults in several studies of events of extraordinary significance (Kvavilashvili, Mirani, Schlagman, Erskine, & Kornbrot, 2010). Memories of highly significant historical events stabilize after about a year (Hirst et al., 2009) and retain a high level of accuracy and detail (Berntsen & Thomsen, 2005). The long-term stability and missing age differences in these memories are probably due to two factors. One factor is that cultural practices of commemorating stabilize memories (Berntsen, & Thomsen, 2005; Campbell, Nadel, Duke, & Ryan, 2011; Hirst et al., 2009). The other factor is the personal significance of events in terms of self-reference (Amami, Serbun, & Gutchess, 2011; Howes & Katz, 1992), social identity (Berntsen, & Thomsen, 2005), and emotionality (Kensinger, 2009; Kvavilashvili et al., 2010). Everyday practices of remembering often involve the repeated sharing of memories which are both personally significant and emotional (e.g., Boden, & Bielby, 1983; Kelly, Bohanek, & Fivush, 2008).

1.3 Increase of preference for search for meaning in autobiographical narrating

We now turn to the other major concern with the semantization thesis. An alternative explanation for the decrease in the episodic nature of autobiographical memory reports is the increase of the preference for searching for meaning. This shows in an increase in contextualizing and relating memories to other parts of life and oneself, and in a decrease of elaborating the unravelling of the episode itself.

Whereas the semantization explanation of the decrease in episodicity refers to a decrease in mnemonic abilities, the alternative explanation refers to an increase not in ability, but in a preference for remembering in a specific way. The best way to measure mnemonic abilities is to control encoding conditions and compare them to what is recalled. This is not possible for autobiographical memories, as their selection needs to be left to the participants. Therefore studies that attempt to measure autobiographical memory competence give participants ample time to reply (e.g., Addis et al., 2008; Piolino et al., 2002), and a first reply is followed up with probes for further detail (Levine et al., 2002; Piolino et al., 2002). With more time and probing, differences should be due more to ability and less to preference, to competence and not mere performance. Consequently, if the decrease in the episodic nature of memory reports is due to a loss of mnemonic abilities, age differences should be greater with probing. Surprisingly, in one study (Levine et al., 2002) probing tended to diminish, rather than increase, age differences. Furthermore, these methods do not access all memories, as evidenced by the phenomenon of hypermnnesia (Bluck, Levine, & Laulhere, 1999; Campbell et al., 2011). Therefore, it is unclear whether the findings on which the semantization thesis is based reflect changes of memory abilities or rather of preferences in style of remembering.

On the other hand, several studies point to a shift in preferential remembering from a more isolated and event-focussed style to valuing meaning by interpreting the significance of memories and by embedding them in life. For example, in Levine and colleagues' (2002) study, older adults related an event to other parts of life more so than did younger adults. Also, older adults provide more repeated and extended events than specific events (Piolino et al., 2002), possibly to provide memories that are more informative about who they are. The tendency of older adults to focus more on meaning than on detail was also evidenced in the retellings of two tales by 19- and 73-year-olds (Adams, Smith, Nyquist, & Perlmutter, 1997). In another study, comparable age samples described three pictures and talked about their family, their education, and about a holiday. Older adults produced more so-called 'off-topic speech' in the personal accounts than young adults (see also Ruffman, Murray, Halberstadt, & Taumoepeau, 2010), but not in the descriptions of pictures. A second group of young and older adults consistently rated the older adults' personal stories as more informative and interesting, and as better stories (James, Burke, Austin, & Hulme, 1998). This 'off-topic talk' may actually have served to contextualize events.

James and colleagues (1998) suggested that older adults communicate more in order to make meaning rather than to report accurately. Trunk and Adams (2009) could not confirm age differences in communicative intent. However older adults again provided more contextual information.

The activity of embedding past events within the context of one's life and personality development has been termed autobiographical reasoning in developmental literature (Habermas & Bluck, 2000). Autobiographical reasoning uses arguments such as learning lessons and insights (McLean & Thorne, 2003). It develops first between late childhood and early adulthood (Habermas & de Silveira, 2008). Beyond early adulthood, some studies find a further increase in the spontaneous use of autobiographical reasoning up to middle adulthood (Bluck, & Glück, 2004). A more simple way of embedding events in a life is by simply referring to other parts of life. For example, self-defining memories of older adults refer more to other parts of life than those of younger adults (Singer, Rexhaj, & Baddeley, 2007; for contradicting evidence see McLean, 2008). It is not clear whether there is any increase in autobiographical reasoning beyond middle adulthood or rather a decrease, as suggested by Pasupathi and Mansour (2006) based on their findings for crisis narratives. Autobiographical reasoning focussed more on personal stability in older and more on change in younger adults (Lilgendahl & McAdams, 2011; McLean, 2008; Rice, & Pasupathi, 2010). The only direct comparison between a focus on the remembered event itself and a focus on the meaning of memories found an inverse relationship in young adults (Gryzman & Hudson, 2011). To summarize, both a decrease in the ability for episodic remembering as well as an increase in the preference for searching for meaning in life may contribute to decrease of the episodic nature of memory reports with age.

1.4 The Study: Lifespan Age Trends in Autobiographical Narrating

1.4.1 Design. To better understand the relationship between episodic autobiographical memory ability and the proclivity to search for autobiographical meaning, we studied both episodicity and searching for meaning in autobiographical memory reports simultaneously. This allowed exploring whether they are in fact inversely related to each other. Secondly, we studied three adult age groups so as to study the constructs' relationship more continuously across ages. This allowed for curvilinear relationships with age, and offered a simultaneous view on how episodicity and searching for meaning change relative to each other across adulthood. We also added three younger age groups to explore the relation between episodicity and searching for

meaning in an age range when the ability for autobiographical reasoning is only emerging (cf. Bohn & Berntsen, 2008; Habermas & de Silveira, 2008). Third, to disentangle ability from preference, we contrasted a sample with instructions that favor narrating the unfolding of an event with a sample with instructions that favor searching for biographical meaning. The former condition is closer to measuring episodic mnemonic abilities and mere preference of searching for meaning, the latter to measuring the abilities to create biographical meaning and mere preference for remembering the unravelling of specific episodes.

We present a secondary analysis of autobiographical narratives from two samples. Narratives of Sample A had originally been collected to study neurological correlates of autobiographical remembering (Oddo et al., 2010). Narratives of the four younger age groups of Sample B were originally collected to study the development of global coherence in life narratives (Habermas & de Silveira, 2008). We thus compare effects of age on episodicity and searching for meaning under instructions that differ in their focus on either the unfolding of an episode or searching for meaning.

1.4.2 Dependent measures. The episodicity of memory reports was measured by three indicators. If the definition of episodic remembering stresses subjective reliving (Tulving, 2002), this suggests that the memory report is an “evocative, and/or vivid description that appears to emerge from a feeling of re-experiencing” (Levine et al., 2002, p. 680). If the definition of episodic memory stresses the specificity of the remembered event (Barsalou, 1988; Piolino et al., 2002; 2006; Williams & Broadbent, 1986), only reports of specific, datable events will count as episodic. If the focus is on the text type of the memory report, then it must contain narrative clauses, which imitate the order of events in the order of sentences, i.e. “and then ..., and then ...” (Labov & Waletzky, 1967). Narrative clauses correspond to what St-Laurent, Moscovitch, Tau, and McAndrews (2011) termed ‘temporally precise clustered details’. Any text that contains at least one pair of narrative clauses counts as narrative, as contrasted to chronicles that summarize events, descriptions of states of affairs, and arguments. All three indicators of episodicity were measured.

To measure searching for meaning we used two indicators. One was the degree of interpretation involved, the other the degree to which a local event is linked to other elements of life, thereby integrating the event with the life story.

While in earlier studies we were concerned with the development of global coherence in life narratives, using the relative frequency of single autobiographical arguments that embed events in a life as indicators of global coherence (e.g., Habermas, 2011), here we are not interested in global text coherence. Rather we adapt to the methodology of memory research by segmenting the text into units, each representing a memory. These segments serve as the unit of measurement. For each segment, we rated episodicity and searching for meaning.

1.4.3 Hypotheses. We expected that instructions asking for specific events would produce more episodic reports with less searching for meaning than would instructions asking for autobiographical interpretation and embedding. Age patterns yielded from the specific event instructions could then be interpreted as reflecting the ability to produce episodic memories, and age patterns yielded from the life story instruction as reflecting the ability to embed events meaningfully in a life.

To explore whether an increasing preference for searching for meaning may contribute to explaining the decrease of episodicity in memory reports, Hypothesis 1 expected that episodicity and searching for meaning would correlate negatively with each other. Hypothesis 2 expected a decrease of the episodicity of memories across adulthood. In the lower age range, episodic

autobiographical remembering should not be a problem and therefore not differ from young adulthood. Hypothesis 3 expected a linear increase in searching for meaning across the lifespan. We expected the increase to start in the lower age range, because children have not yet acquired a concept of life (Habermas & Bluck, 2000). We expected the increase to continue throughout adulthood due to the increasing preference for searching meaning.

If the two measures develop inversely with age, this adds to the probability that searching for meaning supports the trend for decreasing episodicity in memory reports in older adults. If, however, episodicity and searching for meaning show different, not strictly inverse developmental patterns, then the development of both can be studied separately, and findings of a decrease of episodicity may not simply reflect an increase in a focus on meaning, but indeed support the semantization effect.

2. Method

2.1 Participants

2.1.1 Sample A. A convenience sample of 62 female participants was divided into four age groups (16, 20, 40 and 65 years), with mean ages of 16.53 ($SD = .30$, $N = 16$), 20.90 (.67, 15), 40.69 (1.94, 16), and 65.48 years (3.11, 15). Adolescents were recruited from a West German Gymnasium, i.e. a secondary school leading to an A-level exam ('Abitur'), while young adults were students at a North German University. The two younger groups were interviewed by a female interviewer in her twenties, the two older groups by a female interviewer in her forties.

2.1.2 Sample B. A total of 168 females and males from a central German city was distributed across six age groups (8, 12, 16, 20, 40, 65 years) with mean ages of 8.57 ($SD = .28$, 14 girls, 13 boys), 12.38 (.36, 14 and 15), 16.61 (.43, 14 and 13), 20.52 (.53, 13 and 14), 40.79 (2.87, 14 and 14), and 64.53 years (2.27, 15 and 15). The youngest age group was the higher achieving half of third graders from a grade school, the adolescent and young adult groups were present or former students of a Gymnasium. Participants for the two oldest age groups were recruited with flyers distributed widely in local shops, at sports facilities, doctors' offices, and among continuing education University students. The younger age groups were heading towards an Abitur, whereas 23 of the middle-aged and 16 of the older adults had Abitur, and five and 10 respectively had finished school after 10 years ('Mittlere Reife'), while four of the older adults had left school earlier. In both older adult groups 15 participants held a College degree. Thus the four younger age groups were well educated, and given the steep historical increase in higher educational, the educational level of the two oldest groups was comparably high for their cohorts. Three female interviewers in their twenties were equally distributed across the four younger age groups, one of whom (Verena Diel) shared interviewing of the two older age groups with two different female interviewers again in their mid-twenties.

2.2 Procedure

2.2.1 Sample A - Memories. In a one to two hour long, semi-structured, audio-recorded interview at their homes or in the lab, participants were asked to recount personally significant positive and negative memories. These were then dated by the participants and assigned to a life phase (preschool, grade school, high school, adulthood, and last year). Then the interviewer probed for additional positive and negative memories aimed at eliciting up to nine positive and nine negative memories from each life phase. Frequently interviewers probed for the dates, valence, and other detail of events (Oddo, 2009).

2.2.2 Sample B – Life narratives. The three younger age groups were interviewed and audio-recorded individually in their schools, the three older age groups in the lab. Participants

were asked to write their seven most important memories on cards, date them, and put them in chronological sequence in front of them. Then they were asked to narrate their life in 15 minutes, integrating the seven memories and recounting how they have become the person they are today (cf. Habermas & de Silveira, 2008, for verbatim instructions). Participants were not interrupted except for a reminder of the time left after 10 minutes, and otherwise only encouraged to continue with nonverbal cues from the interviewer. The seven memories served to ensure that specific episodes were integrated into the life story. The four younger groups re-narrated the life story again after 2 weeks. Here we analyze only the first life narrative.

2.3 Segmenting

Verbatim transcripts from both studies were segmented and coded together by the same researchers. Transcripts were divided into thematic segments containing at least four clauses and extending in exceptional cases up to 3 pages (roughly 250 to 300 clauses; Diel, Elian, & Weber, 2007). The prototype of a segment is a narrative focussing on a specific, datable event. Ideally segments are explicitly introduced and ended (see Appendix for examples). Two research assistants independently segmented 6 entire narratives of Sample A, reaching an interrater reliability of Cohen's Kappa = .81 (totalling 421 and 440 segments respectively), and 16 entire life narratives of Sample B, $K = .82$ (231/241 segments). We counted segments as agreeing when a segment border was marked in the same or immediately neighboring clause. Then each coder segmented half of the remaining narratives, mixed from both samples.

In the psychological literature, usually only the initial interrater reliability is calculated and reported. To be exceptionally thorough, we added an extra check of the quality of the ensuing segmenting by calculating an additional interrater reliability (which we term 'control reliability') based on all segments of another randomly chosen 6 plus 16 narratives which were not known by the respective main coder, yielding $K = .90$ and $K = .92$ for 296/309 and 349/365 segments respectively.

2.4 Coding

Segments served as basic units for coding, each segment receiving a code or rating (see Appendix for examples). Ratings were made on 4-point-scales (0 to 3). For each participant, across all segments, mean ratings and relative frequencies of codes were used. First drafts of the coding manuals were written by the first and third authors with Johannes Schröder, while the second author wrote the final manual together with the respective coders (Diel et al., 2009). Single intraclass correlations were used for ratings, Cohen's Kappa for nominal codes.

2.4.1 Vividness. A value of 3 was given if the overall impression was very vivid and the segment included a dramatized narration of a specific event, a 2 if the segment was fairly vivid and contained a narrative of a specific and concrete event, a 1 if the segment was not vivid and resembled more a chronicle than an actual narrative, and a 0 if the segment appeared dry and monotonous. Interrater-reliabilities were $r_{ic} = .78$ (.80) in Sample A and $r_{ic} = .82$ (.81) in Sample B. Reliability calculations were based on 452 (209) and 260 (140) segments respectively.

2.4.2 Episode quality. We coded the episodicity of segments in two ways, as memory specificity and as narrative text type. Although the former aims at the content, the latter at the form of text, they should be highly related, because if specific events are talked about at length, they tend to be narrated. Following Barsalou (1988), we coded segments either as containing a specific memory of an event lasting up to a day, as a generalized event, i.e. repeated events or events extending between a day and a year, as a very extended event lasting longer than a year, or as a segment that does not refer to a temporal unit, such as a mere description or comment.

Interrater reliabilities were $K = .72 (.70)$ for Sample A and $.81 (.71)$ for Sample B, based on 452 (209) and 261 (140) segments respectively.

Additionally, segments were coded for text type. A segment was coded as a narrative if it contained at least two consecutive narrative clauses referring to consecutive events (Labov & Waletzky, 1967), as a chronicle if the main bulk of the segment summarized or described events without narrating them (Linde, 1993), or as an argument if it was not coded as a narrative and the main part of the segment contained arguments, comments, evaluations, or interpretations (Rosenthal, 1995). Interrater reliabilities were $K = .80 (.68)$ for Sample A and $.83 (.79)$ for Sample B, based on 435 (209) and 250 (140) segments respectively. For the testing of hypotheses, we only used the percentages of specific memories and narratives among all segments from each participant.

2.4.3 Search for meaning. We rated the degree to which each segment was related to and integrated with other parts of the life story, which is a much more basic measure of life story integration than specific autobiographical arguments identified in earlier studies (Habermas & de Silveira, 2008). Life story integration was rated 3 if the segment contained at least three references to other times or to other topics in life, 2 for two, 1 for one, and 0 for no such reference. The degree to which each event was interpreted was also rated. We assigned a value of 3 if the significance of the segment for one's life, a change in personality, or a profound change of attitude was described, 2 if the narrator described her or his own personality or justified significant emotional reactions to the event, 1 if an event was evaluated or emotions were mentioned, and 0 if events were only factually narrated, but not evaluated. Life story integration achieved an interrater reliability of $r_{ic} = .77 (.40)$ in Sample A and $r_{ic} = .81 (.31)$ in Sample B, interpretation of $r_{ic} = .75 (.55)$ and $r_{ic} = .82 (.60)$ respectively, based on 402 (209) and 260 (140) segments respectively.

3. Results

3.1 Data Analysis Strategy

As a manipulation check, effects of the two instructions will initially be compared in the four older age groups for women only. Hypotheses will be tested separately for the two samples, because they differ both in age and gender composition. We explore correlations between indicators of the same construct and test hypothesis 1 that episodicity and searching for meaning are negatively correlated. Hypotheses 2 and 3 will be tested with multivariate analyses of variance (MANOVAs) first with Sample A, then Sample B. Planned contrasts are calculated to test differences between neighboring age groups. Interpretation of results is based both on means and confidence intervals (see Figures) as well as multivariate and univariate tests with 5% level of significance and effect sizes.

Means and confidence intervals (95%) are provided in graphs, integrating findings from both samples to facilitate visual comparison. Thus graphs show means for Sample A and separate means for females and males of Sample B. Outliers in dependent variables were corrected to the whiskers of respective boxplots for each sample and age group.

3.2 Comparison between Samples/Instruction

Narratives in Sample A were longer than in Sample B (Figure 1), reflecting the different instructions. Not surprisingly, length also varied more in Sample A, because the duration of the interview was not as standardized as in Sample B. Length did not consistently differ by gender.

In Sample A, participants were asked to provide single memories and probed for evaluations and details of time and location. In Sample B the life narratives were instructed to inform the interviewer about how a person had become who she or he is at present, thus

encouraging participants to connect the personal past with later life developments and the present. Thus Sample A was expected to provide more concrete and less abstract elements, i.e. more detail, less interpretation, and more specific memories and narrative memory reports. Testing this expectation serves as a manipulation check. A multivariate test with only the female participants in the four older age groups confirmed the overall expectation. All univariate effects were also significant (Table 1; Figures 2 to 4).

3.3 Correlations between Dependent Measures

3.3.1 Zero-order and partial correlations. To explore whether the indicators of episodicity and of searching for meaning correlated positively with each other, and to test the first hypothesis that episodicity and searching for meaning correlate negatively, we correlated dependent measures separately for each sample (Table 2). Since age and number of segments correlated highly with dependent measures, and because these correlations differed between samples due to the differing age composition and much larger variation in length in Sample A, we partialled out age and number of segments, and used these partial correlations for data exploration and testing. Otherwise correlations were relatively similar in both samples.

3.3.2 Correlations between related dependent measures. Memory specificity and narrativity correlated highly and positively in both samples. However, vividness did not correlate with specificity and only weakly with narrativity, thus describing a different aspect of memory reports. Interpretation and references to other parts of life correlated moderately and positively with each other as expected.

3.3.3 Correlation between episodicity and searching for meaning. Of the eight partial correlations between the two indicators of episodicity and the two indicators of searching for meaning, all but one are negative, but only four out of eight are significant, and their size is only moderate (see Table 2). We averaged the two variables each for episodicity and search for meaning, resulting in partial correlations of $r_p = -.14$ (*ns*) in the memories condition and $r_p = -.34$ ($p < .000$) in the life story condition. Thus when instructions demand narrating specific memories, episodicity tends not to correlate negatively with searching for meaning. However when instructions demand making meaning, these two aspects tend to correlate moderately negatively. Thus when testing for memory ability, search for meaning does not substantially reduce episodicity of memory reports, speaking against the alternative explanation of the decrease in episodicity. Only when there is a demand for meaning making, does this reduce to some degree the episodicity of memory reports. Vividness showed unexpected values, in this case moderate to large positive partial correlations with indicators of search for meaning

3.4 Age Effects

3.4.1 Vividness. In Sample A (memories), age had a significant effect of moderate size (Table 3; Figure 2). In planned contrasts, there was only a significant decrease between ages 40 and 65 ($p = .000$).

In Sample B (life narratives), age again had a significant moderate effect. Also, females consistently narrated more vividly across age groups. Vividness increased between ages 8 and 12 (planned contrast, $p = .01$) and, in concordance with findings in Sample A, decreased between ages 40 and 65 ($p = .000$). Instead of the expected linear decrease across adulthood there was only a decrease in older adulthood.

3.4.2 Episodic quality. In Sample A (memories) the episodic quality of memories varied significantly by age, both for the relative frequency of specific memories and of narrative segments. Univariate age effects were even larger (see Table 3). The expected linear decline was monotonous (Figure 3). Planned contrasts between neighboring age groups were all significant

for specificity ($p = .16, .001, .049$ respectively), but for narrativity only between the two youngest groups ($p = .018$).

Sample B (life narratives) showed a highly similar picture, with age again significantly affecting episodicity. A barely significant interaction with gender resulted from the 16-, 20-, and 40-year-old males recounting more episodic segments than their female counterparts. The expected linear decline was monotonous, but limited to the three younger age groups, while the adult age groups did not differ from each other. Contrasts between neighboring age groups were significant for ages 8 and 12 ($p = .000$ and $p < .05$ for specificity and narrativity) and 12 and 16 ($p < .05, p = .000$).

Thus the effect of age on the episodicity of memories varied between instructions. There was a delay in the decrease of episodicity between instructions, which was evident in adolescence in response to the life story instruction, but only in adulthood in response to the memories instruction.

3.4.3 Searching for meaning. Life story integration and interpretation were used to indicate searching for meaning. In Sample A (memories), age had a significant multivariate effect on searching for meaning, based on a univariate effect for life story integration (Table 2). Contrary to predictions, interpretation did not increase across adulthood, whereas life story integration increased between adolescence and middle adulthood (Figure 4).

Also in Sample B (life narratives) age had a significant effect on searching for meaning, based on univariate effects for both life story integration and interpretation. Life story integration increased cross-sectionally between ages 8 and 12 ($p < .05$) and 12 and 16 ($p = .000$) to remain stable across adulthood. Thus for life story integration there was again a delay between instructions, but a reverse one, with an increase across adolescence under life story instructions, and an increase only between young and middle adulthood under the memories instruction. This suggests that the ability to relate specific memories to other parts of life develops during adolescence (Sample B), but that it is spontaneously used increasingly only from mid-adulthood onward (Sample A).

Interpretation also increased in Sample B across the entire age range (significant contrast only between ages 12 and 16, $p = .001$), with the exception of a drop between the two oldest age groups ($p = .001$). There was no developmental delay between instructions. Thus, overall there were clear developmental increases in searching for meaning, more age-limited in life story integration and more extensive in interpretation, confirming hypothesis 2 for ages up to middle adulthood only.

4. Discussion

The present study has the advantages of using multiple age groups between late childhood and older adulthood, multiple instructions, and multiple measures. It is the first study of lifespan trends in autobiographical remembering that includes both episodicity and searching for meaning.

4.1 Searching for Meaning Cannot Explain a Decrease of Episodicity of Remembering

The expected adult decrease of episodic memories was confirmed for specificity and narrativity of memory reports in the memories condition, whereas vividness showed a decrease only between middle and older adulthood. Thus the decrease of the episodic nature of autobiographical remembering with age was confirmed when the instructions asked for specific memories, testing for mnemonic ability. This finding confirms the semantization thesis.

The expected increase in the ability to search for meaning was confirmed for both indicators in the life story condition for adolescence. Thus the ability to embed events in life

develops across adolescence. Results also provide an important qualification of the apparent linear increase in meaning making in studies that only compared young with older adults (Adams et al., 1997; James et al., 1998). In the memories condition, preference for searching for meaning increased only between adolescence and middle adulthood, but not beyond. Thus the potential alternative explanation of the decreasing episodicity of event memories between middle and older adulthood, with an increasing preference for searching for meaning, can be refuted.

This conclusion from mean age differences was confirmed by the absence of significant negative correlations between episodicity and searching for meaning in the memories condition. The corresponding negative correlations in the life story condition do not contradict this conclusion, since the semantization thesis concerns not the preference for, but the ability for episodic autobiographical recall as approximated by the memories condition.

4.2 Lifespan Abilities and Preferences

The two different instructions led to an inverse developmental delay in narrativity and specificity on the one hand and life story integration on the other. The adolescent increase in life story integration and the simultaneous decrease of specific memories and narratives in the life story condition are most probably due to the gradual acquisition of autobiographical reasoning during adolescence (Bohn & Berntsen, 2008; Habermas & de Silveira, 2008; Friedman, Reese, & Dai, 2011). The decrease in episodicity in the memories condition between middle and late adulthood can be understood to result from a decrease of episodic autobiographical mnemonic ability, because it is not parallel to an increase in search for meaning.

The inclusion of child and adolescent age groups produced a more complete picture of the developmental path of the ability and preference for ways of autobiographical remembering. Older children tell many specific episodes and narratives relative to adults. Finally the cross-sectional increase in vividness between ages 8 and 16 suggest that although older children do possess the ability to narrate events (e.g., Peterson & McCabe, 1983); they continue to refine their narrative abilities up to mid-adolescence.

4.3 Limitations

This study is limited to culturally and educationally homogenous samples. Gender influenced only vividness. Participants were relatively free to select memories. Thus the findings do not reflect, like other studies of autobiographical memories, situations of remembering in which the aim is to remember a specified situation, such as when trying to remember where one parked the car the night before. The freedom in the choice of memories tends to result in findings that also reflect preferences and not only abilities.

Despite the generally high methodological standards, the reliability of the coding of search for meaning was not optimal. Thus these findings have to be interpreted with caution. On the other hand, reliability scores were calculated on the basis of segments, the ratings of which were averaged for each individual, thereby boosting reliability.

The age range was limited to age 65, which may have been too low to catch a similar age decline as in studies of verbal learning. Finally, these cross-sectional data on age trends need to be complemented by a longitudinal follow-up to ensure that group differences are actually due to age and not to other differences between groups. A longitudinal design would also permit studying the actual change or stability of specific memories over time. Thus the criticism of the semantization thesis, that some highly significant memories do not fade or become semantic (I.2), should in future be tested also for non-public, personal autobiographical memories selected by participants themselves.

4.4 Implications

Earlier findings of a decrease of episodic autobiographical remembering cannot be explained entirely by an increase in the preference for interpreting and biographically embedding memories. The use of a middle-aged adult group shows that the decrease of episodicity of memory reports does not only begin at age 60, as studies of short-term verbal learning would suggest, but is a continuous process throughout adulthood up to at least age 65. Without additional evidence it is difficult to tell whether this is due to a steady decrease of long-term autobiographical memory, as part of what Baltes, Staudinger and Lindenberger (1999) termed the mechanics of cognition such as fluid intelligence, or whether it is a combined effect of an increasing preference for searching for meaning in early and middle adulthood and a later decrease of mnemonic abilities. Future studies should simultaneously study verbal learning ability, episodic autobiographical memory ability, and preference for searching for meaning across the adult lifespan to determine both possible differences between verbal learning and autobiographical memory (cf. Berna et al., 2012), and mnemonic ability versus interpretative preferences.

The low correlation of vividness of memory reports with their specificity and narrativity shows that also the phenomenological aspects of episodic autobiographical memories merit further study. We rated vividness as perceived by the listener/reader, which should be compared to self-reports of the rememberer's subjective experience. It could well be that reader/listener-vividness is determined not only by the specificity of the memory, and not necessarily by the amount of situational detail as is sometimes suggested, but also by the form of verbal representation, such as the narrative and dramatic quality of the memory text. This is suggested by the higher correlation of readers' vividness with narrativity than with memory specificity.

This study points to the necessity of studying the relations between different aspects of autobiographical remembering: abilities and preferences, memorizing and recollecting, accuracy and coherence. Also we need studies that include the oldest age without neglecting adolescence, middle and early older adulthood. Furthermore studies need to consider not just single measures of the episodicity of memory narratives, but should encompass multiple measures that cover both traditional memory measures of phenomenal qualities and the more narrative aspects of remembering such as text type and the argumentative aspects of remembering like autobiographical reasoning. Finally, theories of the development of narrative abilities and narrative preferences are rudimentary regarding ages beyond the first decade of life. The present study needs to be complemented by non-autobiographical narratives in varying contexts to arrive at a more general picture of how narrating develops in the adult years.

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Table 1

Multivariate and Univariate ANOVAS of Mean Differences between the Two Samples (Memories versus Life Narratives) for Females in Four Older Age Groups (Ages 16, 20, 40, 65)

	df	F	. ²
Multivariate	(5, 112)	24.72***	.53
Univariate			
Vividness	(1, 116)	25.41***	.18
Memory specificity	(1, 116)	62.45***	.35
Narrativity	(1, 116)	86.50***	.43
LS Integration	(1, 116)	36.15***	.24
Interpretation	(1, 116)	22.02***	.16

Table 2
Zero-Order Correlations (1st row) and Partial Correlations (Age, Number of Segments, 2nd Row in Italics)
between Dependent Measures of Episodicity, Search for Meaning, and Number of Segments in Sample A (Lower
Left Triangle) and Sample B (Upper Right Triangle)

	1	2	3	4	5	6	7
1 Vividness		.09	.23**	.13	.37***	.12	-.21**
2 Specificity	.22	.05	.16*	.21**	.45***	--	--
3 Narrativity	-.01		.54***	-.32***	-.17*	-.28***	-.38***
4 Lifestory	.38**	.80***		-.35***	-.38***	-.16*	-.40***
integration	.21	.66***		-.26***	-.32***	--	--
5 Interpretation	.03	-.66***	-.42***		.34***	.12	.30***
6 N segments	.42***	-.27*	.04		.29***	--	--
7 Age	.55***	-.16	-.02	.34**		.06	.23**
	.53***	-.22	-.09	.53***		--	--
	.38**	.21	.34**	-.27*	.38**		.37***
	-.35**	-.73***	-.63***	.72***	-.03	-.45	

Table 3
Multivariate and Univariate ANOVAs with Factor Age for Vividness, Episode Quality, and Search for Meaning in Memories
(Sample A, Ages 16, 20, 40, 65) and Life Narratives (Sample B, Ages 8, 12, 16, 20, 40, 65)

Multivariate	Memories (Sample A)			Life Narratives (Sample B)								
	df	F	. ²	df	F	. ²	df	F	. ²	df	F	. ²
<i>Univariate</i>												
Vividness	(3, 58)	1.77***	.28	(5, 156)	2.59***	.14	(1, 156)	1.52***	.09	(5, 156)	.70	.04
Episode quality	(6, 116)	8.17***	.30	(10, 312)	10.43***	.25	(2, 155)	.12	.00	(10, 312)	2.16*	.07
<i>Specific memory</i>	(3, 58)	25.57***	.57	(5, 156)	18.66***	.37	(1, 156)	.03	.00	(5, 156)	2.03	.06
<i>Narrative</i>	(3, 58)	14.34***	.43	(5, 156)	17.55***	.36	(1, 156)	.14	.00	(5, 156)	2.04	.06
Search for meaning	(6, 116)	12.03***	.38	(10, 312)	8.89***	.22	(2, 155)	.19	.00	(10, 312)	.67	.02
<i>Lifest. Integr.</i>	(3, 58)	29.89***	.61	(5, 156)	11.92***	.28	(1, 156)	.31	.00	(5, 156)	.89	.02
<i>Interpretation</i>	(3, 58)	2.44	.11	(5, 156)	12.17***	.28	(1, 156)	.03	.00	(5, 156)	.36	.01

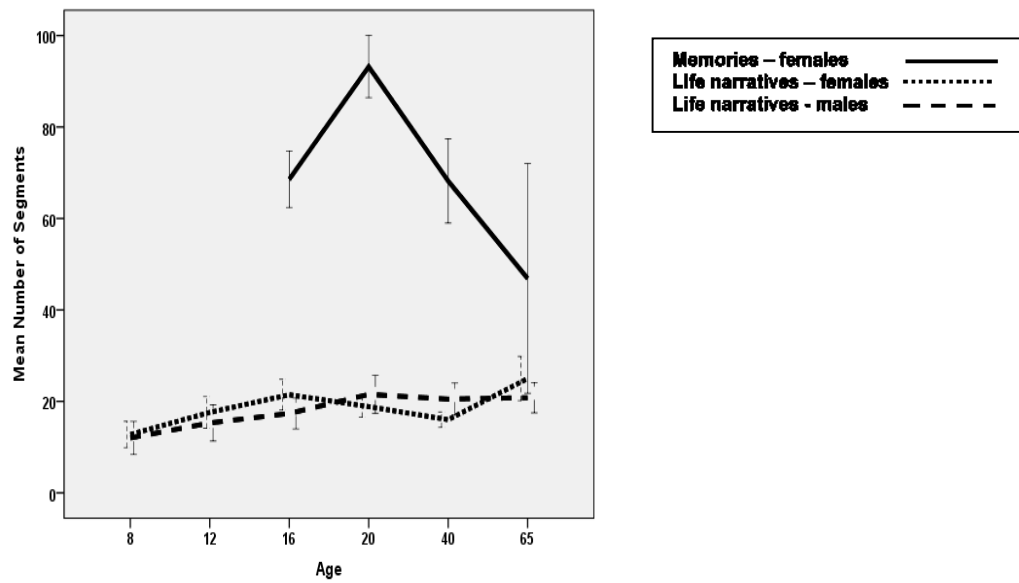


Figure 1. Length: Mean number of segments and error bars (95%) of memories (Sample A) and life narratives (Sample B) by gender and age group.

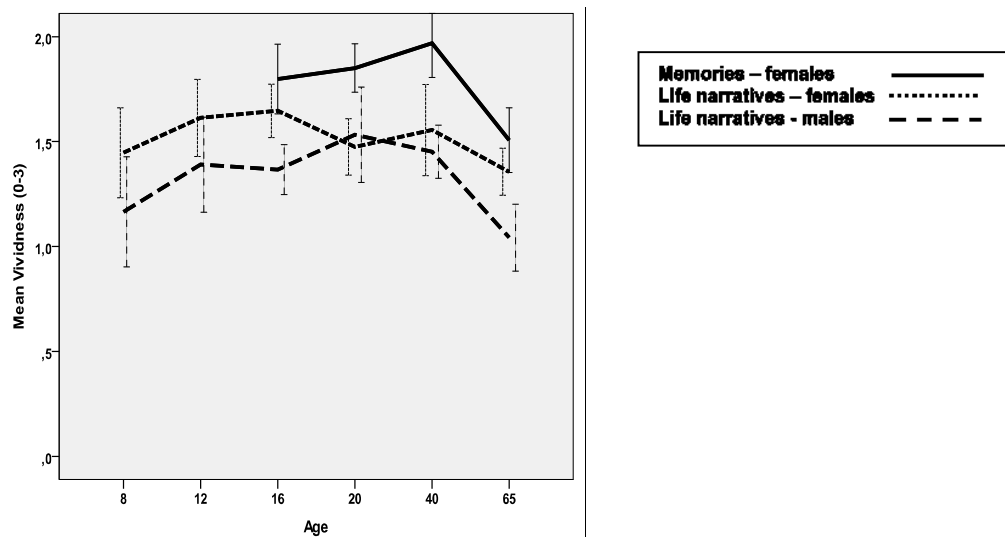


Figure 2.: Mean differences and error bars (95%) for vividness in memories (Sample A) and life narratives (Sample B) by gender and age group.

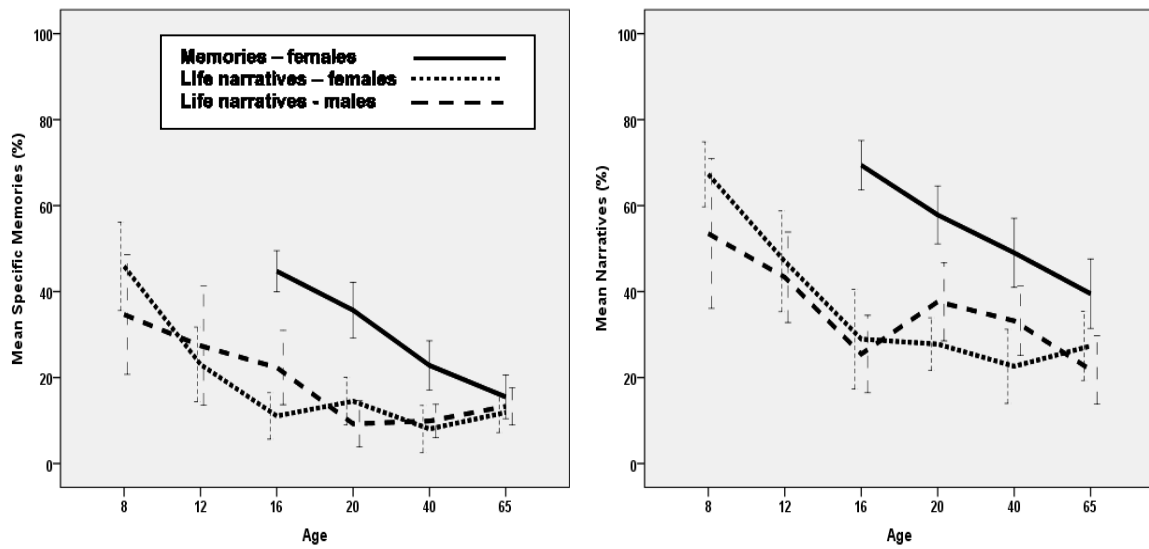


Figure 3. Episodicity: Mean percentage of segments and error bars (95%) for specific memories (memory specificity) and narrative segments (text type) in memories (Sample A) and life narratives (Sample B) by gender and age group.

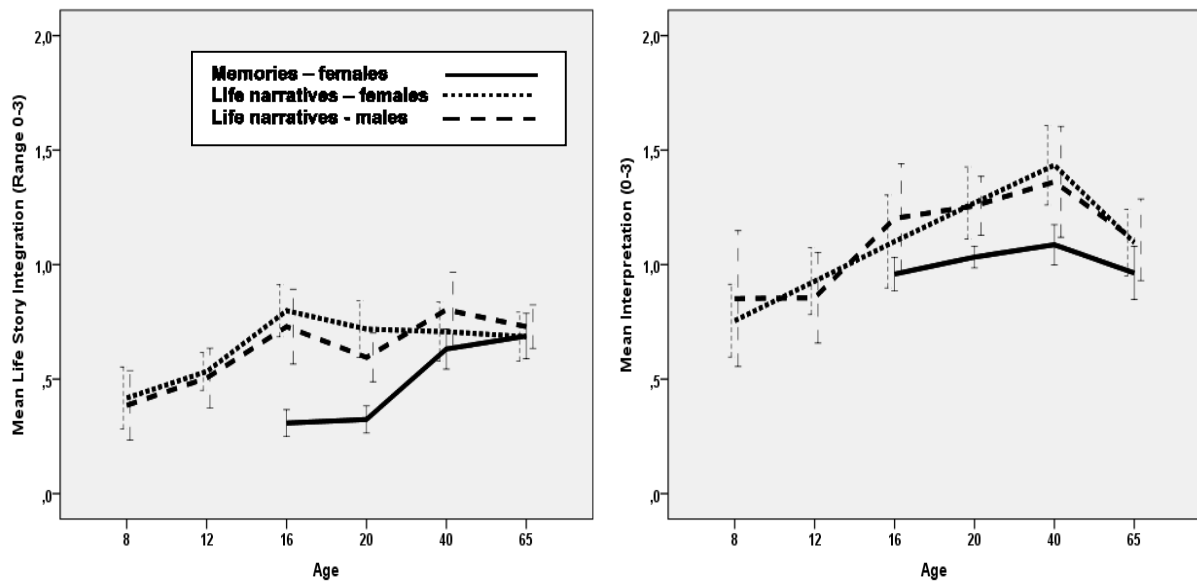


Figure 4. Searching for meaning : Mean ratings and error bars (95%) for life story integration and interpretation in memories (Sample A) and life narratives (Sample B) by gender and age group.