

The development of temporal macrostructure in life narratives across the lifespan

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Abstract

In Western cultures, life narratives are typically expected to recount the narrator's life from birth up to the present. Disparate autobiographical memories need to be integrated into a more or less coherent story, which is facilitated by an overarching temporal macrostructure. The temporal macrostructure consists of elaborated beginnings that contextualize the self in pre-existent family and society, a linear temporal order, and elaborated endings. The present study longitudinally examines the development of temporal macrostructure in life narratives across the lifespan. In this cohort-sequential study, a total of 172 German participants ranging from 8 to 69 years of age narrated their lives over the course of eight years, resulting in up to four life narratives per person. The evidence substantially supports the hypothesis that temporal macrostructure in life narratives emerges in adolescence, with some continuing developmental change throughout adulthood. The evidence also strongly indicates that story structure and life story structure differ in their development.

Life narratives constitute a special narrative format, because they cover an extended time span with many different life events, and because they are told to better understand one's identity development (cf. Erikson, 1968; McAdams, 2013). In order to derive meaning and better self-understanding from a life narrative, narrators need to relate the different life events to each other in a meaningful way. One possible way of achieving this goal is through the construction of a *temporal macrostructure*. The temporal macrostructure of a life narrative, we suggest, consists of elaborated beginnings, including the life's contextualization in family and society, a linear temporal order, and elaborated endings. We suggest that such structures help to integrate the diverse events of a life. In order to explore the developmental course of how people use temporal macrostructure to relate diverse elements of a life narrative, we study life narratives longitudinally in a sample of individuals with a range of ages across the lifespan.

Narrative structures for single events vs. entire life narratives

In life narratives many different life events are expected to be included and to be related to other parts of life and to the narrator's personality development up to the present. Therefore life narratives are more complex than narratives of single life events. Single event narratives normally contain specific events happening in the time span of hours or days, or (rarely) weeks. Different underlying story structures have been suggested for such personal single event narratives. Labov and Waletzky (1967) described personal narratives as being structured around high points. They proposed an overall narrative structure consisting of an abstract announcing the story, an orientation to person, place, time and behavioral situation, a complication containing a series of events and actions, an evaluation emphasizing the importance of the experience and marking the high point, a resolution, and finally a coda which connects the past with the present. Other investigators have described stories as composed of episodes with an intentional structure (Stein & Glenn, 1979; Stein, 1982; Thorndyke, 1977): something happens to protagonists that motivates them to respond or to set up a goal. One complete episode contains the motivation of the protagonist's actions, the goal-directed actions themselves, and finally the attainment or non-attainment of the protagonist's goal (Stein & Glenn, 1979). To study the development of story structure, Peterson and McCabe (1983) applied the high point and the episodic analysis to personal single event narratives from three- to nine-year old children. Length, coherence, and overall narrative structure according to Labov and Waletzky's high point analysis developed with age. The ability to produce episodes with a complete intentional structure also increased.

Life narratives seem to develop differently. When Bohn and Berntsen (2008) asked children to write their life story, 28% of ten-year-olds reported an isolated single life event, but not an entire life narrative covering multiple distant life events or the lifespan. By age 12, all children but one related more than one life event chronologically, and by age 14 a substantial minority created life narratives with a chronological structure, appropriate beginnings and endings and an evaluation. Single event narratives were better structured than life narratives earlier on, and gained less in terms of structure across the age range studied. These findings indicate that the ability to narrate and structure personal single events develops earlier than the ability to tell and structure an entire life.

One probable reason for this difference in developmental timing is that life narratives do not follow a single plot with a high point or goal-orientated episodic narrative structure. Life narratives' overall narrative structure must connect the different plots of various single life events with long stretches of time between them. This leads to a complex nested structure, with chapters for life phases (Chen, McAnally, & Reese, 2013; Thomsen, 2009; 2015) containing multiple single or repeated event narratives as well as summarizing chronicles and evaluative argument sections (Habermas &

Diel, 2013). Habermas, Ehlert-Lerche, and de Silveira (2009) coined the term *temporal macrostructure* to designate the overall linear temporal structure of life narratives. It consists of elaborated beginnings, a basically linear temporal order, and elaborated endings. Because the temporal macrostructure is a quality of entire life narratives, it can only be studied in these kinds of narratives. Yet, most research on the development of the life story has used single event narratives like those of earliest memories (Josselson, 2000), key events (McAdams, 1993) or turning point memories (Grysmen & Hudson, 2010). These studies concerned important content, but not the structure of the life story.

To date, only two studies have explored the development of the temporal macrostructure of written and oral entire life narratives between ages eight and twenty (Bohn & Berntsen, 2008; Habermas et al., 2009). They show that the temporal macrostructure emerges in early adolescence and continues to develop until late adolescence. However both studies are cross-sectional, so that age differences may be due to cohort effects. Also, it remains unknown whether the temporal macrostructure undergoes further development in adulthood. Therefore we followed up Habermas and colleagues' sample (2009) after four and eight years to confirm developmental changes of temporal macrostructure longitudinally. Also we added a middle-aged and older adult group to explore possible later developments across the entire life span. Finally we refined the analysis of narrative beginnings by analyzing their use for providing a social context to the life. We now present the elements of the temporal macrostructure and suggest evidence regarding their development, both direct evidence based on entire life narratives and indirect evidence.

Development of the elements of temporal macrostructure

The structural elements of temporal macrostructure are beginnings, including social contextualization, endings, and overall linear temporal order.

Beginnings and contextualization

Narrative beginnings serve to provide orienting information about the context of the central events of a story, including persons, places, time and situation. In single event narratives, preschool children already include orienting statements, although their number and variety increase throughout childhood (Berman, 2004; Menig-Peterson & McCabe, 1978). Story openings may also contain general background information about the event, the family or the protagonists, which Berman and Katzenberger (2004) found to be provided only from late adolescence on.

The typical orientation for an entire life differs from that needed to understand a single event. Because life begins with birth, one common means of temporally structuring a life narrative is to begin no later than at birth (Brockmeier, 2001; Richardson, 2008). Life narratives' beginnings may contain time and place of birth as orienting narrative information and as information which formally identifies a person. In wave one of the present longitudinal study, most eight-year-olds did not mention their birth, but started at some time later in life. At age 12, most pre-adolescents began their life narratives at birth and also specified either place or date of birth (Habermas et al., 2009). Similarly in Bohn and Berntsen's study (2008) most 11- and 14-year-olds provided place or date of birth in their life narratives' beginnings. This indicates that in early adolescence individuals learn to begin their life story with birth including date or place.

Beside these formal biographical data, background information regarding familial and social background may further contextualize a life. For instance, providing information about the family members already present at birth, the parents' pre-history, and the socioeconomic or sociocultural situation may be provided (Habermas & Hatiboğlu, 2014). To the best of our knowledge, such

contextualization in life narratives' beginnings has never been systematically studied. The understanding of society develops only gradually during adolescence (Barrett & Buchanan-Barrow, 2005; Furnham & Stacey, 1991), and so the ability to contextualize one's life in family and society may develop later than the ability to provide time and place of birth.

Endings

Story endings often serve to resolve the complication or problem that made the story worth telling (McCabe & Peterson, 1984). In personal single event narratives, the resolution is the end of the plot. The coda serves to link the story to the present and may contain an evaluation of the resolution (Labov & Waletzky, 1967). The evidence shows that more than half of children include a high point by the age of five, but only at age seven to eight do a majority of children also include a resolution. Codas, however, are relatively rare in children's narratives, and they become more explicit and elaborate with age (Hudson & Shapiro, 1991; Peterson & McCabe, 1983). Codas that evaluate the resolution seem to occur only after childhood. Even ten-year-olds mostly finish their written personal single event narratives about an interpersonal conflict with a resolution, but without a coda that evaluates the event or its resolution. At age 16, individuals mostly finish with codas that evaluate the event as well as the events' impact on the narrator (Berman & Nir-Sagiv, 2007).

In contrast to narratives of single life events, endings of life narratives cannot serve to resolve a single problem in the narrator's past. As life has not ended at the time of telling, the present is still part of the story, and any resolution remains preliminary. Thus, a basic prerequisite for ending a life narrative may be to arrive in the present. The best structural equivalent to an evaluative coda that life narratives can achieve is a retrospective summary with a global evaluation reviewing the entire life (Rosenthal, 1995). Another possibility is to end with an outlook onto the future, which may result from a prior global evaluation. The more elaborated ending arrives in the present and contains both a global evaluation of the narrator's past and an outlook onto the future.

In the Habermas et al. (2009) study, most children by age eight finished their life narratives with an arbitrary end somewhere in the past. Most twelve-year-olds arrived in the present, but were still lacking a global evaluation of their life. Only at age 16 did a majority of life narratives end with either an outlook or a retrospective evaluation. In contrast, in Bohn and Berntsen's study (2008) of written entire life narratives half of the 14 year-olds already finished with a short retrospective global evaluation or an outlook onto the future. These results narrow the emergence of elaborated evaluative endings to some time between 10 and 16 years of age. Although both studies found a cross-sectional increase in the elaboration of endings with age, we do not know whether this is only a difference between groups or actually a development with age. Furthermore, the use of a retrospective evaluation and a prospective outlook were not studied separately. Thus, it remains unclear whether the two actually develop similarly.

Overall linear temporal order

One central property on which all definitions of narratives agree is that narratives imitate the sequence of events in time (e.g., Bal, 1999; McCabe & Peterson, 1991; Peterson & McCabe, 1983). According to Zwaan's (1996) *iconicity assumption*, listeners assume two sequentially narrated events reflect the order of the occurrence of these events. Preschool children already maintain the typical sequence of events in the form of "and then..., and then..." sentences (Nelson, 1986; Peterson & McCabe, 1983).

Recounting a life, however, requires bringing more than two events in correct temporal order, or at least marking deviations from a chronological order, to maintain recipients' understanding of the

timeline. Moreover, life is complex and events often overlap in time. This simultaneity of events may necessitate deviations from chronological order (Aksu-Koç & Stutterheim, 1994). Genette (1982) termed such deviations from chronological order *anachronies* and argued that they must be explicitly marked by temporal markers to keep the reader or listener temporally oriented. Marked anachronies maintain temporal orientation, whereas unmarked anachronies do not indicate when in a story an event happened and lead to temporal disorientation. Narratives with neither of them obtain a linear chronological order.

Besides allowing the creation of simultaneity of events, anachronies also serve to provide background information necessary to understand the story, such as explanations or comments from the narrator's point of view. Also, they may be employed as stylistic devices to evaluate, to entertain and to increase the listener's interest. In order to surprise, some background information may be provided only after the narrator has told the event or the complication. In order to maintain interest or to evoke curiosity, the resolution of the event may be anticipated before the event itself has been explained (Brewer & Lichtenstein, 1982).

Studying fictional narratives, Aksu-Koç and Stutterheim (1994) found that at the age of five children start to create simultaneity and to use anachronies. Both temporal markers and anachronies are increasingly mastered throughout childhood. This developmental trend seems to continue into adolescence. When asked to write a fictional story about someone with a problem, adolescents aged 17 years used more anachronies than 12- and 14-year-olds (McKeough & Genereux, 2003).

Studying entire life narratives, Habermas and colleagues (2009) found marked anachronies to increase in frequency from age eight to age 12 and to unexpectedly decrease again between ages 12 and 16. This finding may be a cohort effect and needs longitudinal clarification. Possibly, the skillful use of marked anachronies may be less a developmental achievement than a stylistic device. Once mastered, the use of marked anachronies may depend more on individual narrative style than on age.

To date, two studies indicate a continuous increase in artful deviations from linear order with age. First, older adults (mean age 61) integrated anachronies containing background information better into their personal single event narratives because of their more extensive use of orienting and temporal markers than two younger adult groups (mean ages 20 and 39; Pratt & Robins, 1991). Second, when writing in a diary, only older adults in their 70s and 80s, but not younger adults, employed anachronies and interrelated several stories (Kemper, 1990). Because both studies used single event narratives, it remains unclear whether in later life the frequency of artful deviations from a linear order also increases in entire life narratives.

In sum, previous cross-sectional work indicates that life narratives' temporal macrostructure emerges in adolescence. Yet several questions remain to be clarified. First, the familial and social contextualization of one's life has not been studied in life narratives, although developmental research indicates its possible emergence in adolescence. Second, it has been assumed but not tested whether endings with retrospective evaluation and a prospective outlook develop in parallel. Third, the frequency of the use of marked anachronies in entire life narratives has been shown to be discontinuous across adolescence but has never been studied throughout adulthood.

We aimed to fill these gaps by studying entire life narratives longitudinally in age groups distributed across the life span. We expected a linear temporal macrostructure to emerge in adolescence and to become more artful in adulthood. This may show in three hypothesized trends:

1. Elaborated beginnings at the time of birth, orienting social contextualization of one's life and elaborated evaluative endings become more frequent across adolescence.
2. A clear linear chronological order, expressed by a decrease of unmarked anachronies, emerges in early adolescence.

3. The frequency of artful deviations from a linear order, while maintaining temporal orientation through the use of marked anachronies, increases across adulthood.

Method

Participants

This longitudinal study started in 2003. Measurements were repeated in 2007 and 2011. In the beginning, a total of $N = 114$ participants assigned to four cohorts aged 8, 12, 16, and 20 years provided two entire life narratives two weeks apart, except for nine participants who narrated their lives only once (cf. Habermas et al., 2009). For various reasons four participants who had been excluded from the analysis of wave one published earlier were included in the present longitudinal analysis to maximize the number of participants. In 2007, 104 individuals participated again, of whom 94 participated a third time in 2011 (dropout rate 8.9% and 9.6%). For participants who had provided two life narratives in 2003 ($N = 105$), values were averaged. In 2007, two adult cohorts (40 and 65 years, $N = 28$ and 30) were added to examine lifespan development. Of these, 51 participated again in 2011 (dropout rate 12.1%). Gender was almost equally distributed in the six cohorts (Table 1).

In 2003, the youngest cohort was the higher achieving half of third graders from an elementary school, while cohorts 2, 3, and 4 were present or former students of a German higher-track high school. The sample's mixed social composition, mainly middle class with a substantial proportion of lower class backgrounds, was comparable to that of the elementary school population. Both adult cohorts 5 and 6 were recruited via flyers and among continuing education university students. In 2011, all six cohorts were well educated. The majority of participants (71%) were about to graduate or had graduated from school with the highest German school degree (Abitur), 18.8% had graduated after 10 years of school (Mittlere Reife), and 1.7% had no school diploma. Those who did not participate in 2011 and had still been in school when last tested made up the remaining 8.5%. Over a third (35.2%) of the participants had at least one parent born outside Germany. A migrant background was present in roughly half of the participants of each of the four younger cohorts, but in fewer of the participants of the two oldest cohorts. Participants spoke fluent German. They were compensated with 20 Euros in 2003, and 40 Euros in 2007 and 2011. Each time, we contacted participants up to three times by letter, then via email, phone, and social media, and obtained parental informed consent for minors.

Procedure

In 2003, the four youngest cohorts were tested twice, two weeks apart, by two different (out of three) female interviewers. In 2007 and 2011 all six cohorts were tested only once by new female interviewers unknown to the participants. Thus, participants in the four younger cohorts provided up to four life narratives, and participants in the two older cohorts provided two, resulting in a total of 531 entire life narratives.

Material

Seven most important memories and life narratives. Participants wrote their seven most important specific memories on index cards and put them in chronological order on the table in front of them. This served to make sure that life narratives also contained specific events and to reduce the memory load, especially for the youngest cohort. Participants were asked to narrate their life for about 15 min without being interrupted. They were instructed to include the seven most important memories and to tell their life such as to explain how they had become the person they were at present. Interviewers only encouraged to continue, but asked no questions (for verbatim instructions

see Habermas & de Silveira, 2008).

Transcription and division into propositions. Life narratives were audio recorded, transcribed verbatim, and divided into propositions, that is, into comprehensible main or subordinate clauses. For each wave, two coders independently divided 40 life narratives into propositions and agreed on 96.2% to 98.6% of propositions. Each of the two coders divided half of the remaining life narratives into propositions.

Coding. The first author coded beginnings, contextualization, and endings of life narratives and counted the number of marked and unmarked anachronies. (See Appendix A for illustrative excerpts from four life narratives of two participants with their complete coding). Interrater reliability was calculated by comparing these codings with the earlier coding of wave one (Habermas et al., 2009). Since contextualization had not been coded in wave one, interrater reliability was calculated with new codings by a graduate student. All reliabilities are based on the independent coding of 32 life narratives, balanced for age, gender, and measurement time. To guarantee consistent coding across all measurement times, all life narratives were coded anew, including the ones from 2003. This may have resulted in minor differences to the values published earlier for wave one (Habermas et al., 2009). To ensure that the first author did not deviate from the manual during the ensuing coding process, a second reliability analysis was calculated on the basis of additional 16 life narratives. Both interrater reliabilities are provided in Table 2 along with examples of coded statements; for more extensive descriptions of the coding scheme see Habermas et al. (2009).

Beginnings and endings. Elaboration of the beginning and ending of the narratives was measured on five-point (beginning) and four-point (ending) scales. They measured whether participants started their narratives at the beginning of life and ended in the present, and how elaborate the beginnings and endings were (Table 2).

Contextualization. We coded the presence or absence of three kinds of contextualization in the life narratives' beginning, i.e., whether there was any mention of the family composition, of the family's socio-economic status, or of the family history at the time of birth (Table 2). To reduce the number of tests, the different kinds were summed resulting in their absolute frequency per life narrative.

Temporal order. Overall temporal order was measured by summing all deviations, leaps or insertions from a linear chronological structure if they exceeded four propositions (Table 2). We distinguished marked anachronies, which maintained a temporal orientation, from unmarked anachronies, which did not indicate when in life an event happened.

Results

Before reporting findings from the longitudinal analyses, we provide descriptive data on the effects of age on the length of narratives. Then we explore correlations between the structural elements in order to test the theoretical conception of temporal macrostructure to finally investigate its development with age.

Length of Life Narratives

The length of life narratives increased with time and age. Life narratives of the youngest averaged about 150 propositions. The increase in length stopped at age 20 with about 280 to 300 propositions per life narrative. The narratives of the middle aged and older adults at time two were, on average, about 280 propositions long and at time three about 360 propositions long. To compensate for differences in length, the absolute number of marked and unmarked anachronies was multiplied by 100 and divided by the number of propositions (relative frequency).

Correlations Between Dependent Variables

To explore the relation between all dependent variables we calculated correlations across measurement times prior to the longitudinal analyses. Table 3 shows that beginnings, contextualization, and endings correlated with each other positively and with unmarked anachronies negatively. This confirms the conception of temporal macrostructure as consisting of beginnings, contextualization, linear temporal order (as indicated by the unmarked anachronies' negative correlation) and endings. Accordingly, marked anachronies did not correlate with beginnings, contextualization or endings.

Effects of Age on Temporal Macrostructure

We investigated the longitudinal development of temporal macrostructure with age via mixed models for repeated measures for each dependent variable by using maximum likelihood estimation in RStudio Version 0.98.994, procedure LMER. Outliers were corrected to the whiskers of respective boxplots for each cohort. In about 3% of cases (calculated across all measurement times and cohorts) outliers were corrected for marked anachronies, and in about 1.5%, for unmarked anachronies, but not in any of the remaining dependent variables.

Mixed models for repeated measures¹ were applied separately for younger (8-28 years) and older (40-69 years) participants because of their different number of measurement times. For the younger subsample age-related trends were modeled as linear and quadratic slopes to test for decelerating growth. For the older subsample, we only checked linear trends, because quadratic effects require at least three measurement times. For each of the two subsamples, different models were estimated to identify the best fitting one; that is, all possible combinations of the following effects of age were tested: (a) fixed or random intercept (located at 8 years for the younger and at 40 years for the older sample, respectively), (b) fixed or random linear slope, and (c) and, only for the younger subsample, an additional fixed quadratic slope being included or not. Of the resulting models, the one with the smallest Akaike Information Criterion was chosen and all random effects were tested separately by a comparison of model deviances with χ^2 tests. Due to the age overlaps in the four younger cohorts at ages of 12, 16, 20 and 24, we additionally checked for cohort and gender effects in each measure running univariate ANOVAs. Only significant results are reported.

Beginnings. The best model for age-related differences and change in the younger sample included a random intercept at age eight, a fixed linear slope and a fixed negative quadratic slope, indicating different initial values in participants and a common decelerating increase with age (Table 4). In the older subsample, a random intercept at age 40 and a fixed linear slope fitted the data best, although they were not significant, indicating no more growth throughout adulthood (Table 5). Figure 1 shows that elaboration of beginnings increased most between ages eight and 12, continuing up to age 16. At age eight, about a third of the participants started their life narrative anywhere in life, that is, with a temporally unclear beginning. From age 12 on, the large majority of participants started their life narratives at birth including at least one detail like birth date or place; this pattern was fully established by age 16. The univariate ANOVA revealed a gender effect among the 16-year-olds, with

¹ In mixed models, intercepts represent the initial status of participants, whereas slopes represent the increase or decrease due to age per measurement. Both intercepts and slopes can be fixed or random. Whereas a fixed intercept indicates the averaged initial value across participants, a random intercept is allowed to take on different values and is thus specific to a participant. The underlying assumption of the random intercept model is that the growth rate is the same for all individuals and thus rather unrealistic in developmental growth models. Therefore slopes were also allowed to vary. Such random intercept random slope models allow individual differences in both the level and the rate of change.

more elaborate beginnings among the boys.

Contextualization. The best model in the younger sample included a random intercept at age eight, a fixed linear slope and fixed negative quadratic slope, indicating again a decelerating increase with age (Table 4). In the older subsample, a random intercept at age 40 and a fixed linear slope fitted the data best, although they were not significant (Table 5). Figure 2 portrays the development of each social context separately. From age 16 on, almost a third (about 30%) contextualized their life narratives with family constellation; this pattern reached its peak at age 28 and decreased later on. Contextualization in family history started at about the same age, but increased less up to age 24, remaining fairly stable throughout adulthood. Last, socio-economic context emerged rather late by age 20, continued to increase throughout early adulthood and remained stable later on, even though it was mentioned less frequently than the two other kinds of contextualization.

Unmarked Anachronies. The best model for the younger subsample included a random intercept at age eight, a negative random linear age slope and a fixed quadratic age slope, which were all significant (Table 4). The negative slope and Figure 3 show that unmarked anachronies decreased steeply between ages eight and 12, remaining at an extremely low level thereafter. Correspondingly, the best model for the older subsample, which included a random intercept at age 40 and a fixed slope, showed no significant age trend (Table 5).

Marked Anachronies. The best model in the younger subsample included a significant fixed intercept at age eight indicating differing initial values in participants, but no development due to age as indicated by the non-significant fixed linear and fixed quadratic slopes (Table 4). Figure 4 portrays a heterogeneous growth pattern which did not vary systematically with age. The steep increase between ages eight and 12 continued to age 16 only in cohort one. The univariate ANOVA evidenced a cohort effect for cohorts three and four at age 24. The 24-year-olds of cohort three used more marked anachronies than the 24-year-olds of cohort four (Figure 4). Moreover, Figure 4 indicates that the use of marked anachronies decreased between 28 and 40 years, increasing thereafter in both older cohorts. Accordingly, the best model for age-related differences and changes in the older subsample included a significant fixed intercept at age 40 and a significant random linear slope displaying an increase throughout middle and late adulthood. Interestingly, both adult cohorts showed a very similar growth pattern and fairly the same frequencies (Figure 4).

To further explore whether the use of anachronies is more a characteristic of individual narrator style rather than of general development, we explored the stability of their use across measurement times. In the younger subsample, the use of anachronies did not correlate with their use at subsequent measurement times ($r_{12} = -.076, p = .441$; $r_{13} = .046, p = .648$; $r_{23} = .165, p = .112$). The correlation in the older subsample, however, indicated a tendency for participants who had used marked anachronies earlier to continue using them ($r = .264, p = .061$).

Endings. The best model in the younger subsample included a fixed intercept at age eight, a fixed linear and negative quadratic slope, indicating a decelerating increase with age (Table 4). In the best model of the older subsample, a fixed intercept at age 40 and a fixed negative linear trend were found significant, indicating a slight decrease in adulthood (Table 5). Figure 5 reveals that endings' elaboration increased between ages eight and 20, but decreased in late adulthood. To explore whether this decrease was specifically due to a decrease in outlooks onto the future, as might be suspected on the basis of the decreasing life expectancy, we inspected the relative frequencies of endings with prospect and with retrospect separately (Table 6). Most eight-year-olds ended their narratives at an arbitrary point in life. By age 12, the vast majority (77.5%) ended their life narratives in the present, as did most all participants by age 20. At age 16, a third added a retrospective evaluation to the ending in the present, which reached a level of two thirds between ages 28 and 65,

dropping to every second participant at age 69 (we are summarizing the sum of columns 3 and 5 in Table 6). An outlook onto the future was added to an ending in the present by 45% at age 20, and still by about every third participant up to the mid-forties, but dropping to 17% and 10% in the sixties (sum of columns 4 and 5). Thus the slight but significant decrease in the elaboration of endings across mid- and later adulthood is mainly due to a steady decrease in future outlooks down to less than a third (from 36% to 10%); a decrease of retrospects in the sixties (from 63% to 48%) only reinforced this decrease in the overall elaboration of endings.

Discussion

This study confirms longitudinally the development of life narratives' temporal macrostructure in adolescence and reveals further changes in adulthood.

Age effects for temporal macrostructure

Beginnings, contextualization, and endings. As predicted by the first hypothesis the elaboration of beginnings and endings increased mainly between ages eight and 16, continuing at a decreasing rate to age 20. Overall, beginnings and endings remained at a stable level of elaboration across adulthood, with some decline in later adulthood. From age 12 on, the large majority of participants started their life narratives at birth, including at least one detail such as birth date or place, and ended them in the present. Thus by age 12 the beginning and ending of a chronological structure are established, confirming earlier studies longitudinally.

This study provides the first evidence that the spontaneous social contextualization of life develops later. Some participants started mentioning their family constellation at age 12, some started mentioning family history at age 16. The mentioning of both increased up to the mid-twenties, with some variation across mid- and older adulthood. The family's socio-economic context was rarely mentioned before age 20. The sequence of contextualization starting from the present family, going back to its history, and widening the view to the wider socio-economic context, reflects the expanding range of awareness in terms of Bronfenbrenner's (1993) nested social ecosystem.

The endings of life narratives were increasingly elaborated by adding a prospect or retrospect between ages 12 and 28. From age 16 onwards, half or more of the participants added at least one of these elaborations. However the two kinds of elaborations developed somewhat differently. Outlooks onto the future peaked at age 20, remaining at a level of a third of participants up to the mid-forties. Evaluative retrospects increased in frequency up to age 28, remaining at a stable level up to the mid-sixties.

Age-typical identity issues and the participants' current life situation may explain the peak of outlooks onto the future at age 20. At this age, young German adults have just finished school or just started university, compelling them to choose long-term career goals in order to find and establish an adult role in society (Erikson, 1968; McAdams & Zapata-Gietl, 2015). The slight decrease of the degree of elaboration of endings across mid- to later adulthood is mainly due to a decrease in prospects. This might be motivated by the decreasing proportion of the life still to live relative to the life already lived. Finally we confirmed longitudinally Habermas and colleagues' (2009) speculation that endings including both retrospect and prospect remain an exception at all ages.

Linear temporal order, marked and unmarked anachronies. Our approach to define the temporal macrostructure of entire life narratives is based on the temporally sequential nature of any narrative. As expected in hypothesis two, the ability to establish a linear chronological order, reflected by the steep decrease of unmarked anachronies, is acquired by early adolescence. But this did not result in an exclusively linear chronological order, as indicated by the parallel substantial occurrence

of marked anachronies at the age of 12. To mark anachronies, a variety of abilities are required, such as an ability to correctly use linguistic temporal indicators (Blewitt, 1982), to estimate the temporal distance of events, and to order events. Further, to organize time in life requires calendar knowledge, which is acquired around ages 10 to 12 (Friedman, 2005). Then, as indicated by our results, it can be applied in entire life narratives to mark anachronies, which would explain the absence of unmarked anachronies at age of 12.

Our expectation (hypothesis 3) that the artfulness of the temporal macrostructure, as expressed by the use of marked anachronies, would increase across adulthood was not supported. Neither an age-related trend nor an individual narrative style in the use of marked anachronies was observed in the younger subsample. Thus, the earlier nonlinear cross-sectional development with age (Habermas et al., 2009) was not confirmed. Only in middle to late adulthood was an increase with age found. This increase depended also on the individual, as it was bigger for those who used more marked anachronies at time one. Our hypothesis regarding continuous development of artful narrating across adulthood via more marked anachronies could not be confirmed, because their frequency decreased between 28 and 40 years and both older cohorts did not differ in frequency despite their age-related individual growth. Just to count the numbers of anachronies does not seem to capture the artfulness of the temporal macrostructure.

Comparing life narratives' temporal macrostructure to single event narratives' structure

Clear beginnings introducing specific orienting information like time or place of birth developed first. Later in adolescence, beginnings were further elaborated by adding life's social contextualization. From age 12 on, life narratives were organized in a more or less linear chronological order, and temporal deviations were clearly marked. A clear ending in the present developed first. During adolescence and early adulthood endings were further elaborated by adding a retrospective evaluative.

The developmental order of the acquisition of these elements of the temporal macrostructure of life narratives seems to be similar to the development of the structure of single event narratives. In single event narratives, orienting beginnings emerge in preschool age as well as a basic linear order. Clear endings develop in late childhood and are further elaborated by adding an evaluative coda in early adolescence (cf. Berman & Nir-Sagiv, 2007; Berman, 2004; Hudson & Shapiro, 1991; Menig-Peterson & McCabe, 1978; Peterson & McCabe, 1983). The big difference, however, is that the development of the temporal macrostructure of life narratives takes place later in life; there is, in Piagetian (Piaget & Inhelder, 1958) terms, a *décalage horizontale*, a temporal shift between single event and life narratives. Apparently, the narrative competence to start, to contextualize, to temporally organize and to end personal single event narratives precedes the competence to do all this in entire life narratives.

We propose that the reason for this consecutive development of the two narrative structures is that the content requires different narrative structures. Older children succeed better in narrating events because they have learned to master the structure of narratives (Hudson & Shapiro, 1991). Accordingly, narrating an entire life requires knowledge of both the content of a life story and its corresponding structure. The cultural concept of *biography* or *life script* designates this knowledge of a standard life course and of normative transitional events and their timing (Bohn & Berntsen, 2008; Habermas, 2007). It helps to select and order events in life narratives and is more or less established by age 12. Apparently, as soon as knowledge of biographical time and of life narrative content is acquired, children acquire the competence to construct its overarching linear temporal order.

Limitations and implications

A major limitation of this study is that the participants were asked to recount their lives chronologically. This was based on the assumption of a temporally sequential nature of narrative and allowed exploration of the development of the ability to structure a life chronologically. We do not, however, know whether individuals would also spontaneously recount their lives chronologically. It would be interesting to explore whether there are other forms of macrostructure in more spontaneous life narratives. Individuals could structure their life narratives by important motives or by lessons learned. For example, a fundamental motive could be described in the beginning, which would then be used to color certain life events or motivate decisions, to then, in a second take, start again with another important motive and its impact on other life events. The proverbial red thread would then be provided by these motives instead of a chronological order. Another possibility is to structure life narratives according to life domains, for example, first narrating chronologically one's family life and then, going back, narrating chronologically one's work life (Rosenthal, 1995).

Another limitation of the study is that we did not study possible interviewer effects on the life narratives. Participants always told their lives in the form of a monologue to an unknown female interviewer. They responded to highly standardized instructions setting up the expectation that the listener was interested in getting to know the participants through their personal development. The effects of other expectations in other audience settings in which individuals narrate their development, such as in job interviews or romantic encounters, were not tested. In our study we controlled the interviewers' expectations by keeping them constant and by excluding verbal interaction, but more subtle nonverbal feedback from listeners was not captured by the audio recordings. Other research, however, indicates that listeners' attention influences autobiographical storytelling. Notably, when listeners are perceived as distracted or disagreeable, narrators tend to suppress both factual and interpretative information (Pasupathi & Hoyt, 2009; Pasupathi, Stallworth, & Murdoch, 1998) and to narrate less well overall (Bavelas, Coates, & Johnson, 2000). Because our interviewers were instructed to listen attentively and to encourage when necessary, they provided backchannel acknowledgement, which too may vary due to both interviewers' and narrators' individual needs to provide or receive such acknowledgement. Backchannels shape narratives in the moment of their unfolding differently depending on whether they are generic (such as "uh-huh" or "yeah") or context-specific (such as "oh," "wow," "gosh"). Context-specific backchannels provide new information for the narrator about, e.g., the listener's emotional response (Gardner, 2001), which can result in narrators' further elaborating content. Distracted listeners provide less specific backchannels than attentive listeners and consequently lessen the narrator's elaboration (Kuhlen & Brennan, 2010; Tolins & Fox Tree, 2014).

These consequences of listeners' behavior particularly seem to influence the selection of autobiographical narrative content and its elaboration (see Pasupathi & Billitteri, 2015 for an overview). Content and elaboration of life narratives may similarly change with age, context, audience, and perhaps also with communication modes (Schober et al., 2015), because sharing one's past serves different functions depending on the narrator's and/or listener's goals (Bluck, Alea, Habermas, & Rubin, 2005; Rasmussen & Habermas, 2011). To the best of our knowledge, there is no evidence on how much life narratives would change depending on different contexts and audiences. In this sample there is preliminary evidence that with age the stability of life narratives increases despite different interviewers (Negele & Habermas, 2010). Thus, we would propose that neither variations in the selection of life events and in the elaboration of life narratives nor variations in their stability across social contexts and listeners should influence their temporal macrostructure. To be

asked to recount one's personal development and to be listened to attentively seem to suffice to evoke a temporal macrostructure in the resulting life narrative.

One way to minimize socio-emotional effects of interviewers may be to ask people to narrate somebody else's life. We expect that the developmental trends found in such a study would remain identical. Narrating somebody else's life, one may not know enough to flesh out the narrative, leading to a more skeletal life narrative. We would speculate that under these conditions one has to rely even more on schematic life story knowledge such as the temporal macrostructure and the cultural concept of biography.

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Table 1
Age (Mean, Standard Deviation) and Number of Participants by Cohort and Gender for Each Measurement Time

Year	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Cohort 5	Cohort 6	N
2003	8.63 (0.23)	12.45 (0.34)	16.56 (0.41)	20.51 (0.53)			114
2007	12.90 (0.52)	16.57 (0.41)	20.70 (0.51)	24.93 (0.73)	41.39 (2.86)	64.38 (2.73)	162
2011	17.03 (0.48)	20.58 (0.39)	24.61 (0.41)	28.90 (0.67)	45.08 (3.02)	68.73 (2.65)	150
N	in 2003			in 2007			
Female	13	17	13	15	14	15	87
Male	14	14	15	13	14	15	85

Table 2
Temporal Macrostructure

Codes with examples
Timing and elaboration of beginning ($\kappa_1 = .988$, $\kappa_2 = .972$)
0 - Unclear: "It all started with me and my mother flying to my father to Oslo."
1 - After birth: "When I was quite small, I got up to a whole lot of mischief"
2 - At Birth: „ I was born, and at first I still knew very little“
3 - At birth with objective details: „ I was born in Frankfurt“
4 - At birth with details and story: "I have a twin sister. We were born on December 6 1990 by a Caesarian section."
Contextualization of life (all three $\kappa_1 = 1.000$, $\kappa_2 = 1.000$)
Socio-economic context: „We didn't have much money, and both my parents had to work to make ends meet.“
Family composition: „I was born in Frankfurt on the 16th of March 1942 as my parents' fourth child.“
Family history: „I was born in London in England. That's because my father worked there at the university, and my mother came along to Britain with him to go to University.“
Timing and elaboration of ending ($\kappa_1 = .882$, $\kappa_2 = .875$)
0-Arbitrary: "A sort of camera was found which didn't belong to us at all. That was big trouble and everybody was always in a bad mood for the rest of the time. That was stupid. And then we made Lasagne. And then we flew back again. Finished."
1-In present: "and today we want to bake biscuits again and go to the Christmas fair. "
2-Only with Retrospect: "I don't know, I have lots of friends whom I've known for a long time, and that just gives me more confidence, that I can talk to people. I think, there's nothing else to tell."
2-Only with Prospect: "What else is there? Well, I'd love to study Medicine and become a doctor, yeah."
3-With both Retro- and Prospect: "I've taken leave. I will go to Switzerland for skiing, have a lovely time for a whole month, then come back, then term starts again. Otherwise life here is still always monotonous as it was at the beginning; you have friends of course, but nevertheless I was used to something quite different. I'm a summer person. I need lots of lovely weather, sun, beach, laughter, simply lots of life, and for me here this is no life. I've made up my mind to do my diploma as quickly as possible and then to buzz off from here. My parents will stay here."
Anachronies: Relative frequencies (Leaps $\kappa_1 = .859$, $\kappa_2 = .940$; Insertions $\kappa_1 = .770$, $\kappa_2 = .872$)
Leap: "In 1994 I had my first boyfriend, but what I just forgot, in 1989 my father left my mother. I was really sad about that and cried so much"
Insertion: "And in 8 th grade we became best friends, but before in elementary school we had been like enemies. The others had to choose to be friends either with her or with me, that was rough. But in 8 th grade we made a school trip and somehow we became best friends then."
Unmarked anachrony: "That was in kindergarten, I slipped on the stairs. Once I was at home with my mum and I was on the chair, then I fell down with my head on the table, I fainted."

Table 3

Correlations between Variables of Temporal Macrostructure across all Measurement Times with Linear and Quadratic Age Effects Partialled Out

	Beginning	Contextualization Sumscore	Marked Anachronies	Unmarked Anachronies	Ending
Beginning	-----	.304*	.036	-.187*	.188*
Contextualization Sumscore	-----	-----	.043	-.075	.054
Marked Anachronies	-----	-----	-----	-.032	-.019
Unmarked Anachronies	-----	-----	-----	-----	-----
Ending	-----	-----	-----	-----	-----

Note. * $p < .05$

Table 4
Mixed Models for Age-Related Trends in Temporal Macrostructure and Contextualization in the Younger Subsample aging 8 to 28 years.

	Beginnings			Contextualization			Marked Anachronies			Unmarked Anachronies			Endings		
	Estimate	SE	t (df)	Estimate	SE	t (df)	Estimate	SE	t (df)	Estimate	SE	t (df)	Estimate	SE	t (df)
Fixed Effects															
Intercept	1.182*	0.142	8.31 (308.5)	0.151	0.131	1.15 (310.7)	8.383*	1.000	8.38 (3.0)	2.217*	0.271	8.17 (7.2)	0.279*	0.100	2.80 (300.9)
Age	0.157*	0.028	5.61 (277.9)	0.077*	0.025	3.07 (272.2)	4.633	2.131	0.22 (3.1)	-0.473*	0.062	-5.59 (6.4)	0.198*	0.021	9.41 (304.2)
Age ²	-0.004*	0.001	-2.67 (261.5)	-0.001	0.001	-0.96 (255.7)	-2.207	1.032	-0.21 (3.0)	0.012*	0.003	4.17 (6.4)	-0.006*	0.001	-6.11 (295.4)
	Variance			Variance			Variance			Variance			Variance		
		SD			SD			SD			SD			SD	
Random Effects															
Intercept	0.211*	0.460		0.246*	0.496					0.127*	0.356				
Age										0.072*	0.268				
Residual	0.560	0.748		0.433	0.658		0.3760	0.613		0.400	0.632		0.3571	0.598	
Model fit															
Deviance	-398.5			-370.7			-297.4			-346.6			-294.8		

Note. Random effects, if present, were tested sequentially with $\Delta\chi^2$ tests ($df = 1$) based on model deviance (-2Log-Likelihood), that is, it was tested whether the effect was significant when entered in addition to all effects above it. * $p < .05$.

Table 5

Mixed Models for Age-Related Trends in Temporal Macrostructure and Contextualization in the Older Subsample aging 40 to 69 years.

	Beginnings			Contextualization			Marked Anachronies			Unmarked Anachronies		Endings			
	Estimat or	SE	t (df)	Estimat or	SE	t (df)	Estimat or	SE	t (df)	Estimator SE	t (df)	Estimat or	SE	t (df)	
Fixed Effects															
Intercept	2.453*	0.154	15.92 (58.8)	1.102*	0.162	6.78 (63.4)	0.778*	0.134	5.80 (4.2)	0.054	0.040	1.33 (65.8)	1.960*	0.105	18.66 (62)
Age	0.006	0.008	0.76 (58.3)	0.013	0.008	1.57 (61.8)	0.009	0.007	1.30 (4.0)	0.001	0.002	0.88 (64.1)	-0.011*	0.005	-2.09 (61)
	Varianc e	SD		Varianc e	SD		Variance	SD		Variance	SD		Varianc e	SD	
Random Effects															
Intercept	0.275*	0.524		0.124	0.352					0.006	0.076				
Age							0.019*	0.138							
Residual	0.560	0.748		0.941	0.970		0.376	0.307		0.061	0.247		0.304	0.551	
Model fit															
Deviance	-141.9			-157.7			-92.3			-7.2		-103.9			

Note. Random effects, if present, were tested sequentially with $\Delta\chi^2$ tests ($df = 1$) based on model deviance (-2Log-Likelihood), that is, it was tested whether the effect was significant when entered in addition to all effects above it. * $p < .05$.

Table 6
Distribution of degree of elaboration of endings by age.

	Ending				
	Arbitrary	In Present	Only with Retrospect	Only with Prospect	With retro- and prospect
Value	0	1	2	2	3
Age					
8	<u>72.6</u>	25.5	-	1.9	-
12	22.5	<u>62.6</u>	7.5	14.9	1.4
16	5.45	<u>48.2</u>	27.4	15.0	4.0
20	1.9	28.9	24.3	<u>30.9</u>	14.0
24	1.9	<u>36.6</u>	32.7	21.2	7.7
28	-	21.7	<u>47.8</u>	17.4	13.0
40	-	25.0	<u>39.3</u>	14.3	21.4
44	-	22.7	<u>45.5</u>	22.7	9.1
65	-	33.3	<u>50.0</u>	3.3	13.3
69	-	<u>51.7</u>	37.9	3.4	6.9

Note. Most frequent ending per category in boldface. Most frequent category per age underlined.

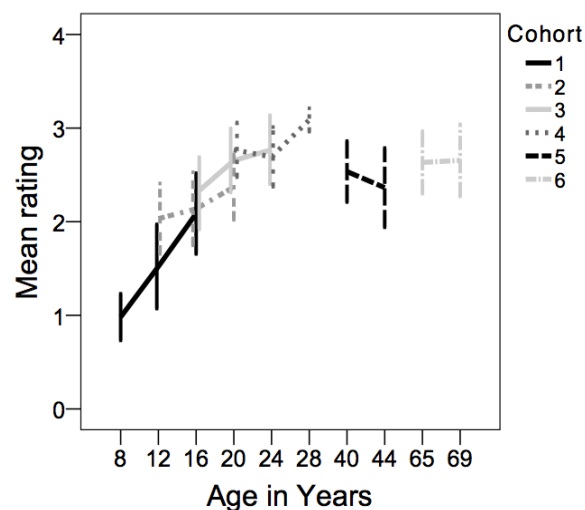


Figure 1. Mean rating and confidence intervals (95%) for beginnings.

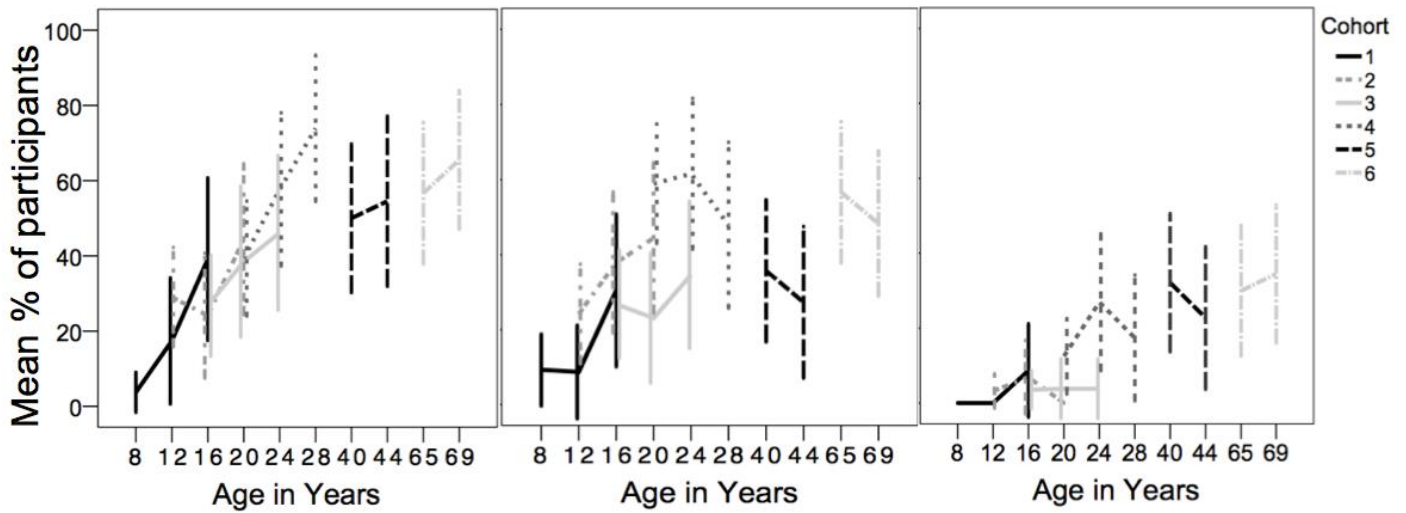


Figure 2. Mean occurrence and confidence intervals (95%) for family constellation (left), family history (middle) and socio-economic context (right).

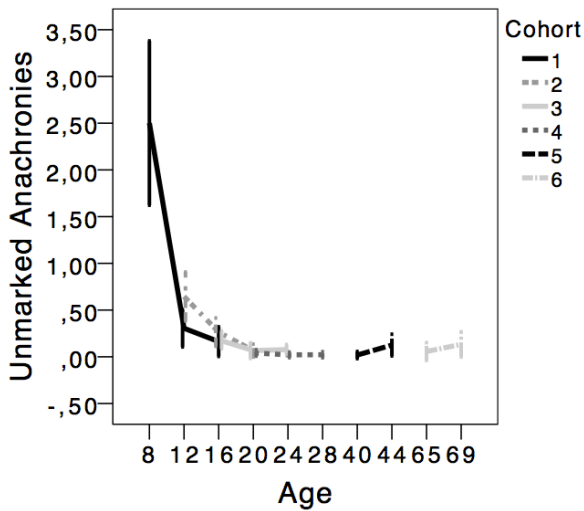


Figure 3 Mean percent and confidence intervals (95%) for unmarked anachronies.

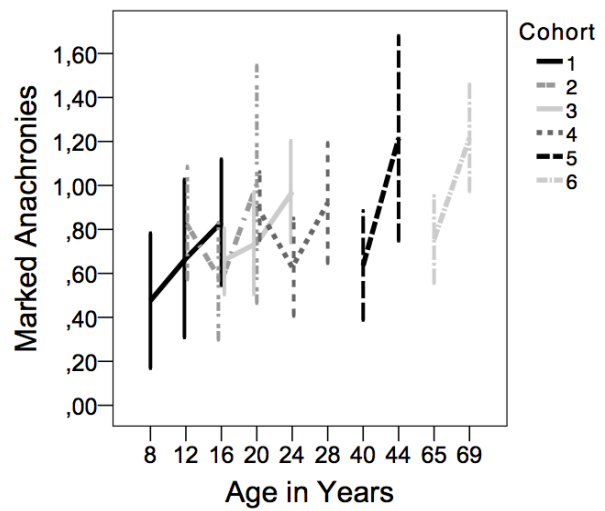


Figure 4. Mean percent and confidence intervals (95%) for marked anachronies.

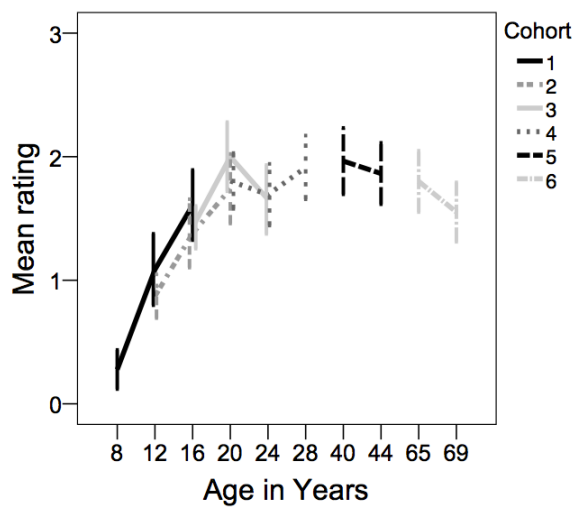


Figure 5. Mean rating and confidence intervals (95%) for endings.