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**The Future is Bright and Predictable: The Development of Prospective Life Stories across
Childhood and Adolescence**

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Abstract

When do children develop the ability to imagine their future lives in terms of a coherent prospective life story? We investigated whether this ability develops in parallel with the ability to construct a life story for the past and narratives about single autobiographical events in the past and future. Four groups of school children aged 9 to 15 imagined their future lives and produced past life stories, as well as a cultural life script (i.e., culturally shared assumptions as to the order and timing of important life events). They also produced narratives about single autobiographical events to take place in the near future or recent past. Past and prospective life story coherences developed in parallel across ages, that is, older children told more coherent life stories than younger children, irrespective of temporal direction. However, children produced more coherent stories about single events in the past than in the future. Across age groups, prospective life stories were shorter, contained more life script events and were more positive than past life stories. Life script normativity increased with age and predicted the coherence of prospective, but not of past, life stories. The findings indicate that the ability to tell coherent life stories for the past and future develops in parallel and rely on similar processes. Life script abilities might be a major factor in the development of past and prospective life story coherences, but not for the development of single event story coherences.

KEYWORDS: future-past; life story development, cultural life script, mental time travel

The Future is Bright and Predictable: The Development of Prospective Life Stories across Childhood and Adolescence

“I will get older and become a teenager. And I want to study to be a hairdresser. I want to get married and have some sweet children and when I get older, grandchildren. And when I am 65 I will retire. And at some point I will die. That is what I think will happen in my future life.”

(Prospective life story by a 9-year-old girl)

Being able to imagine one’s future life is highly important for our ability to adjust to society, set personal goals and keep a direction in life (e.g. McAdams, 2001; Nurmi, 1991). Only in childhood are we allowed to “live in the present” and not worry too much about our futures. Yet, even children think about their future lives, as illustrated by the example above. When do children develop this ability to tell a coherent story about their futures? Does the ability to imagine a coherent prospective life story develop in the same way and at the same time as children’s ability to provide coherent past life stories? Are there differences in the development of the ability to remember and imagine single events, and the development of entire past and prospective life stories? These are the key questions of the present work. In order to address them, we examine children’s abilities to narrate about both their personal pasts and their personal futures. We do so because of the prevalent assumption that remembering the personal past and imagining the personal future are intertwined processes that rely on the same neurocognitive (brain/mind) system (Tulving, 2002), as studies with adults have shown (e.g. Addis, Wong & Schacter, 2007, 2008; Berntsen & Jacobsen, 2008; Botzung, Denkova & Manning, 2008; D’Argembeau & van der Linden, 2004, 2006; D’Argembeau, Raffard & van der Linden, 2008; Hassabis, Kumaran, Vann & Maguire, 2007; Okuda et al. , 2001; Szpunar, Watson & McDermott, 2007; Williams et al., 1996). Similarly, there is some evidence that the ability to remember autobiographical events and to imagine the personal

future develops around the same time in childhood (Atance, 2008; Atance & Jackson, 2009; Atance & Meltzoff, 2005 ; Busby & Suddendorf, 2005; Friedman, 2000; 2002; Hayne, Gross, McNamee, Fitzgibbon & Tustin, 2011; Suddendorf, 2010; Quon & Atance, 2010). However, little is known about the development of the ability to conceive of entire future life stories and thus narrate about a series of personally important and thematically related future events. We first review findings on children's abilities to tell their past life stories. We then describe studies on the development of remembering and imagining single events, and possible implications of this and related work for the development of prospective life stories.

Studies on the development of life story coherence

Habermas and Bluck (2000) proposed that life stories are not developed before adolescence. They stated that, to produce a coherent life story, children need to master four kinds of coherences: temporal, thematic, causal, and cultural coherence. The first three types of coherences are linguistic coherences inherent in all kinds of narratives, that is, these are measures of general narrative abilities, while cultural coherence is specific to the life story (Habermas & Bluck, 2000). The linguistic coherences can be measured within a life story, while cultural coherence is best measured separately from the life story by asking children to produce a cultural life script (Bohn & Berntsen, 2008). A life script consists of a series of culturally important transitional events that are expected to take place in a specific order in specific time slots in a prototypical life course within a given culture. Life scripts consist mainly of positive events which are expected to happen before age 30 (Berntsen & Rubin, 2004). Life *stories* consist of autobiographical memories, which are remembered, reconstructed and combined by an individual, while cultural life *scripts* are learned independently from personal experience, i.e. adolescents can nominate such events as “getting married” or “retirement” as life script events without having experienced these themselves. The

cultural life script is semantic knowledge about the expected life course in a culture, which is learned across childhood and adolescence (Berntsen & Bohn, 2009; Berntsen & Rubin, 2004; Bohn & Berntsen, 2008; Rubin & Berntsen, 2003; for similar results on the acquisition of knowledge about salience and age norms of life events, see Habermas, 2007).

Bohn and Berntsen (2008) investigated the claims that children cannot tell coherent life stories before adolescence (also see Habermas & de Silveira, 2008; Habermas & Paha, 2001), and that cultural coherence is specific to the life story, but not to other types of stories (Habermas & Bluck, 2000). They asked three groups of children (mean ages 9.5, 12.0 and 14.5 years) to write a) a story about a single autobiographical event from their lives, b) their life stories and c) a cultural life script as a measure of cultural coherence. By asking the children to write a story about a single autobiographical event from their lives, Bohn and Berntsen (2008) could test the children's linguistic coherences separately from cultural coherence. Thus, children's single event stories served as a baseline measure of their general narrative abilities separately from their life stories. By asking them to produce a cultural life script (Berntsen & Rubin, 2004), Bohn and Berntsen (2008) got a separate measure of cultural coherence. Cultural life scripts collected from adults served as an adult norm to which children's life scripts were compared. By asking the children to write their life stories, Bohn and Berntsen could test whether children's cultural coherence (measured by the cultural life script) was related to life story coherences. They found that the typicality of the life script (compared to an adult norm) increased across childhood and adolescence. Importantly, children with a more adultlike cultural life script wrote more coherent life stories, even when controlling for age, while there was no relation between the acquisition of a cultural life script and the ability to produce a coherent narrative about a single autobiographical event, i.e., evidence was found that children's general narrative abilities developed independently of their life story abilities.

Further, younger children were not able to produce coherent life stories, while they were able to produce coherent single event stories. Thus, the study provided empirical evidence that the acquisition of a cultural life script seems to play an important role for producing a coherent life story for the past (Bohn & Berntsen, 2008). Here, we will study whether these findings also hold for the development of prospective life stories.

Development of the ability to remember the past and to imagine the future

Findings in adults that remembering the past and imagining the future rely on many of the same underlying neural networks (e.g. Addis et al., 2007; Botzung et al., 2008; Okuda et al., 2001; Szpunar et al., 2007) have been taken to suggest that both operate on the same episodic memory system. According to one prevalent view (Addis et al., 2007, 2008; Schacter & Addis, 2007) future events are simulated by extracting and recombining details from memories of past events. However, research with adults has also shown that imagining the future draws more on semantic (e.g. schematic) knowledge than remembering the past (e.g. Addis et al., 2008; Berntsen & Bohn, 2010; D'Argembeau, Renaud & van der Linden, 2011). These findings have implications for the understanding of the development of children's ability to remember the past and to imagine the future: If remembering and imagining the future rely on the same episodic memory system, then these abilities should develop in parallel (i.e. around the same time) in childhood. Further, also children, just like adults, should rely more on semantic knowledge when imagining personal future events than when remembering the past. Indeed, studies have found evidence that the ability to remember the personal past and to imagine the personal future develops at about the same time during the preschool years (e.g. Atance, 2008; Atance & Jackson, 2009; Atance & Meltzoff, 2005; Busby & Suddendorf, 2005; Friedman, 2000; 2002). Further, the few studies that directly compared children's ability to remember past and to imagine future events found some important differences

between the two temporal directions, supporting the notion that semantic knowledge seems to be more important for imagining the future than for remembering the past. For example, Suddendorf (2010) asked groups of 3- and 4-year-olds to answer questions about what they had done yesterday, and what they would do tomorrow. While he found correlations between the ability to produce likely correct answers to both time conditions, regardless of age, he also found developmental differences, in that 4-year-olds were better at giving probable answers to questions about the future, but not about the past, compared to 3-year-olds. At the same time, reporting future events, but not past events, correlated with scores on a semantic knowledge task (e.g., children were asked to name all the things they could think of that have wheels). These results are consistent with the idea that semantic knowledge is more important for imagining the future than for remembering the past.

Cooper, Vargha-Khadem, Gadian and Maguire (2011) found that children with hippocampal damage were not impaired in imagining future events, but they had difficulties remembering events from their past, compared to a control group of healthy children. Cooper et al. (2011) propose that the participants with hippocampal damage rely on their intact semantic knowledge to construct future scenarios. Quon and Atance (2010) compared 3-, 4-, and 5-year-olds' use of semantic knowledge in relation to past events and future scenarios, based on earlier studies showing that the development of scripts and schemas is closely intertwined with the development of episodic memory (e.g. Hudson & Nelson, 1986; Hudson, Fivush & Kuebli, 1992; Nelson & Gruendel, 1981). They found that children in all age groups and all conditions were able to give very specific and accurate answers. However, they also found that children drew more on semantic knowledge when answering questions about possible future events than when answering questions about the past. In the same vein, Hayne and colleagues (2011) found that preschoolers were more likely to include semantic knowledge when imagining future events than when remembering past events. Taken

together, these studies provide evidence that also in children, imagining personal future events relies to a larger degree than remembering the past on semantic knowledge.

For children and adolescents, telling a single autobiographical event from their lives is different than relating their entire past life story coherently (Bohn & Berntsen, 2008). Likewise, we propose that imagining one's entire future life is a different and more demanding task than imagining a single specific event in one's future. Children who are asked to imagine their future lives cannot simply extract and recombine details from past experiences to construct representations of future events (Addis et al., 2007, 2008; Schacter & Addis, 2007), because the task requires them to imagine novel events with many elements that they have not experienced before. They also need to place these events in an appropriate and meaningful temporal and causal order. Given the findings that children rely more on semantic knowledge when imagining *single* future events, we propose that, in order to imagine their entire future lives, they will have to rely to an even larger degree on semantic knowledge and scripts. First, they need this in order to imagine events of which they have no (or very little) personal experience, as for example becoming a parent. Second, a cultural life script may be even more important for the development of a prospective than a past life story. In particular, it seems to be needed in order to provide a schematic outline of which events reasonably to expect in one's future within one's culture. Through the cultural life script, children learn how to organize their memories into life stories, but they also acquire semantic knowledge as to what to expect for their future lives and when (Bohn, 2010b; Bohn & Berntsen, 2008; 2011). Third, Trope and Liberman (2003) propose that people construe events imagined to lie further in the future on a higher level of abstraction, that is, events in the distant future are expected to be represented with only few general features, and that these events can be classified "into few broad categories" (p.405). Consequently, distant future events are construed to be more prototypical and

schematic. Therefore, asking children to imagine their entire future lives will most likely lead them to tap into the cultural life script which can be described in terms of “a few broad categories” covering the entire life span.

A fundamental difference between the past and the future is that the future has not happened yet. This trivial fact has important implications for possible differences between imagining one’s personal future and remembering one’s personal past. One such difference is the finding that people consistently imagine their futures to be highly positive and idyllic, compared to a less positive past (Berntsen & Bohn, 2010; Berntsen & Jakobsen, 2008; Newby-Clark & Ross, 2003). Studies have found that participants find it difficult – or avoid- to imagine negative events in their personal futures (D’Argembeau & van der Linden, 2004; Newby-Clark & Ross, 2003), and that they generally value future events more than equivalent events from their pasts (Caruso, Gilbert, & Wilson, 2008). One reason for having these uncorrected positive illusions about the future might be that people feel a sense of control over their personal futures (Heckhausen 1997), while they cannot change their personal pasts. In line with this, Quon and Atance (2011) found that even preschool children are better at remembering and imagining personal events that they had more control over than events that they had little or no control over.

The present study

The present study involved children and adolescents (aged 9-15 years). We chose these age groups for several reasons. First, life story abilities have been found to develop across these age groups (Bohn & Berntsen, 2008; Habermas & de Silveira, 2008; Habermas & Paha, 2001). Second, while we have some knowledge of past life story development in this age range, little is known as to how this compares to the development of prospective life stories. Third, little is known about the development of remembering and imagining single events in this age range (Cooper et al., 2011).

Based on findings that the ability to remember the past and to imagine the future seem to develop in parallel across the preschool years, we expect younger children to do worse on both temporal directions than older children, and, importantly, we expect no interactions between age group and temporal direction, following the idea of parallel development. We expect younger children to produce shorter and less coherent stories than older children, and we expect that their life stories will contain a lower percentage of life script events than older children's. Based on earlier findings (Bohn & Berntsen, 2008), we expect children's past and prospective life story coherences to be related to the degree of adultlike typicality in the life scripts, while we do not expect life script typicality to be related to single event story coherences.

Earlier work has shown that imagined future events are more schematic, prototypical and less detailed than remembered past events (e.g., Berntsen & Bohn, 2010; D'Argembeau & Mathy, 2011; Qoun & Atance, 2011). We therefore expect both single event future stories and prospective life stories to be shorter and less coherent than past stories. We expect prospective life stories to contain a higher percentage of life script events, compared to past life stories, while both past and future single event stories are expected to contain very few life script events, because these stories are about weekends close in time, which are unlikely to coincide with life script events. Based on findings that adults imagine the future to be more positive than the past (Berntsen & Bohn, 2010; Berntsen & Jakobsen, 2008; D'Argembeau & van der Linden, 2004), we expect prospective life stories to be more positive than past life stories.

Method

Participants

Participants were 162 Danish middle-class children with a culturally homogenous background from a Danish comprehensive school. There were 32 third graders (17 boys; M_{age}

=10.02 years; $SD=.50$), 42 fifth graders (17 boys; $M_{age}=12.01$; $SD=.31$), 48 sixth graders (27 boys; $M_{age}=13.09$; $SD=.35$) and 40 eight-graders (20 boys; $M_{age}=14.59$; $SD=.31$).

Procedure

Parents were notified through a letter by the school principal about the study, asking them to respond if they did not want their children to participate. None of the parents did. Data collection took place during regular Danish classes in each class grade. In five sessions of 45 minutes each, the following written data were collected over a four to five-week period: (1) A report about an event from the past weekend, (2) a past life story, (3) a report of an event imagined to happen in the upcoming weekend, (4) a prospective life story, and (5) a cultural life script. The future task instructions were modeled on an earlier study on life story development (Bohn & Berntsen, 2008). For the *report about an event from the past weekend* and the *report of an event imagined to happen in the upcoming weekend*, children were asked to write about an event that had happened during the last weekend and an event that they expected to happen in the upcoming weekend. This ensured that participants generally wrote about similar and relatively unemotional events happening at about the same distance in time. The single event stories were used to examine the development of autobiographical remembering and episodic future thinking in comparison to earlier studies (e.g. Cooper et al., 2011; Hayne et al., 2011; Quon & Atance, 2011) and as a baseline measure for the children's ability to coherently narrate a single autobiographical event and an imagined event in the personal future.

For the *past life story*, the instructions were: "Think about what has happened in your life since you were born and up to now. You can for example write about the most important things in your life, or what changes have happened in your life since you were born and up to now. Imagine

that you are writing the story of your life to someone who would like to know something about you and the things that have happened in your life.”

For the *prospective life story*, the instructions were: “Think about what could happen in your life from now on and until you’ll die. You can for example write about the most important things that will happen in your life, and what changes that will happen in your life from now on and until you’ll die. Imagine that you are writing the story of your future life to someone who would like to know something about you and the things that you think will happen in your future life.”

For the *cultural life script*, participants were asked to imagine a quite ordinary newborn of their own sex, and to write down the ten most important events that they thought would happen in the newborn’s life across the life span. Participants were also asked to estimate how old the newborn would be when these events occurred (Berntsen & Rubin, 2004). They were told that there were no right or wrong answers for this task, and that we were interested in their opinion.

For all five tasks, participants received a booklet with a cover page asking for their names, and, in the first task, their ages. Participants were informed that their names were used only to match their five data sets; their data would be anonymized; participation was voluntary, they could stop their participation at any time, and that they should not worry about spelling or handwriting. The experimenter read the instructions from the booklets to the class, and answered any questions.

Scorings

Cultural life scripts. Bohn and Berntsen (2008) established an adult norm for cultural life scripts consisting of ten events. They asked 111 Danish adults ($M_{age} = 28.33$, $SD = 6.72$; 34 males) for the 10 most important events that they thought would happen in an average newborn’s life across the life span, and to estimate how old the newborn would be when these events occurred (Berntsen & Rubin, 2004). Only events mentioned four times or more were identified as life script

events. All other events were scored as *non-life script events*. This resulted in a total of 41 event categories. The children's life script events were classified according to the 41 categories of this adult norm (Bohn & Berntsen, 2008). Events not fitting the categories were scored as *non-life script events*. Two raters scored 52 % of all life scripts and agreed on 95 % of events. Disagreements were resolved by an independent judge. The remaining life scripts were scored by one rater. A *typicality score* measured normativity of the cultural life script (Bohn, 2010a; Bohn and Berntsen, 2008; Rubin, Berntsen & Hutson, 2009). The typicality score was based on, how often an event had been mentioned in the adult life script described above (Bohn & Berntsen, 2008). For example, the event *beginning school* received the typicality score 97, because it had been mentioned by 97 of the 111 adult participants. Non- life script events received a typicality score of 1. Children's typicality scores were calculated by adding up the typicality scores of their life script events.

Coherence. Single event (weekend) stories and life stories were scored on general narrative coherence using a scale from 0 to 3. For single event stories, the scorings were: 0 = *Disoriented Pattern*: the narrative is too confused or disoriented for the listener to understand; 1 = *Chronological Pattern*: the narrative is a simple description of successive events ("and then, and then"); 2 = *Chronological, interesting pattern*: the narrative describes successive events in detail and interestingly (use of adjectives, adverbs, and subordinate clauses); 3 = *Classic pattern*: the narrative builds to a highpoint, evaluatively dwells on it, then resolves it (adapted from Peterson & McCabe, 1983; Bohn & Berntsen, 2008). Scorings 0,1, and 3 were taken directly from Peterson and McCabe. Scoring 2 was adapted to our data material, because it did not contain any stories with an "ending-at-the-highpoint pattern" (Peterson & McCabe, 1983, p.37). Instead, our data contained chronological stories that were clearly more sophisticated and more detailed than the chronological stories with a scoring of 1. For *life story coherence*, the scale was adjusted to take care of the fact

that life stories by definition consist of more than a single event. The scores were 0= *life story consists of a single episode*; 1= *several episodes, loosely ordered chronologically*; 2= *chronological order, episodes are tied together chronologically*; 3= *evaluative narrative*. Two raters coded all stories. Disagreements were solved by an independent judge. Rater agreement was high (intra-class correlations for weekend stories: past .87; future .77; for both past and future life stories: .93).

The number of life script events in all stories was scored by counting events that corresponded to one of the 41 adult life script categories. Also, all non-life script events in the stories were counted. Further, all events were rated on valence (positive, negative or neutral). Two raters scored all stories for all variables. Disagreements were solved by an independent judge. Agreement rates were satisfactory to high (intra-class correlations from .71 for number of non-life script events in past life stories to .96 for number of life script events in both past and prospective life stories). Interrater-agreement differed for life script and non-life script events, because raters agreed more easily on the number of life script events than on the number of non-life script events.

Results

Data were collected over several weeks. Therefore, not all children took part in all sessions, leading to differing *n*'s in our analyses. Ninety-six children filled in all 5 data sets. We ran all analyses with this number of participants, which yielded the same pattern of results as the ones presented here. Overall, there was stability in the number of participants within class grades. Therefore, we decided to use all data.

First, we describe the characteristics of weekend- and life stories in the past and future conditions. Next, we present findings on cultural life scripts and the relation between the acquisition of life scripts and the ability to produce coherent life stories. Lastly, we analyze the content of the different story types.

Characteristics of Weekend- vs. Life Stories in the Past and Future Conditions

We conducted repeated measures ANOVAs with time (past vs. future) as a within- subject factor and class grade (3, 5, 6, 8) and gender as between subject factors. We included gender as a factor because research in autobiographical memory development has consistently found that girls outperform boys (Buckner & Fivush, 1998; Fivush, Haden & Adams, 1995; Haden, Haine & Fivush, 1997). Table 1 shows the means and standard deviations of story variables by class grade for the past and future conditions. Table 2 shows main effects and interactions for time direction and grade. Gender effects are reported below.

Grade. As expected, there was a main effect for grade on the story variables length and coherence. Post hoc multiple comparisons (Bonferroni adjusted) showed that the two younger groups wrote significantly shorter and less coherent stories than the two older groups (all p 's < .0001). This replicates findings from an earlier study on past stories and extends them to future stories (Bohn & Berntsen, 2008). Third graders included a lower percentage of life script events in their life stories than older children ($p < .02$). There were no interactions except for life story length. The latter reflected the fact that the difference in length between past and prospective life stories increased in the older age groups compared to the youngest group ($F(3, 132) = 6.62; p < .001$).

Table 3 presents the life story coherence scores for all groups. As predicted, in both time directions, younger children (3rd and 5th graders) were more likely to produce life stories consisting of single episodes or of several isolated episodes ($\chi^2(1) = 28.93; p < .0001$). Chi-square tests comparing the pattern of past and prospective life story scores within each class grade found no significant differences (Table 3; all p s > .65). The results indicate that the majority of younger children were not able to produce coherent past or prospective life stories, unlike the older participants.

Future vs. Past. As expected, there were main effects of time on length and degree of positivity of the stories (Table 2). Both weekend- and life stories were longer in the past than in the future condition, and prospective life stories contained a lower proportion of negative events than past life stories. Also consistent with our predictions, prospective life stories contained a higher proportion of life script events (Tables 1 and 2). Counter to our expectations, past and prospective life stories did not differ in coherence, while past weekend stories were consistently more coherent than future weekend stories ($t(119)=6.12, p<.0001$ for weekend stories; $t(136)=179, p>.08$ for life stories). This finding supports the claim that producing life stories is different from-- and involves different processes than--producing single event stories (Bohn & Berntsen, 2008; Habermas & Bluck, 2000).

Gender. There were main effects for gender on story lengths. As expected, girls outperformed boys (from $t(127)=2.2, p<.05$ for past weekend story to $t(149)=3.2, p<.005$ for prospective life story). There was no main effect for gender for percent of life script events in past and prospective life stories, but an interaction of time and gender ($F(1)=5.56, p<.05, \eta_p^2=.04$). Post hoc t-tests showed no significant gender differences in percent life script events in past and prospective life stories (p 's $>.1$). However, paired t-tests within genders showed that girls had a significantly higher percentage of life script events in their prospective life stories than in their past life stories ($t(64)= 5.63, p<.0001$), while such differences were absent for the boys.

Cultural Life Scripts

The life script is an overall measure of the general understanding of normative expectations to the life course. It is therefore not meaningfully separated into a future versus past component (Bohn & Berntsen, 2008). An ANOVA with class grade and gender as factors and life script typicality as dependent variable showed main effects for grade ($F(3)= 8.66; p<.0001; \eta_p^2=.156$).

Tukey's post hoc comparisons showed that 3rd graders' life scripts were significantly less typical than all older age groups (M 's and SD 's for grade 3 to 8: $M=260.00$, $SD=146.88$; $M= 332.00$, $SD=98.46$; $M= 358.24$, $SD= 109.90$; $M= 391.35$ $SD=82.39$). Consistent with these findings, age correlated positively with the typicality score, $r(142)=.378$; $p<.0001$). A main effect was also found for gender ($F(1)= 4.33$; $p<.05$; $\eta_p^2=.03$), with girls scoring higher on life script typicality than boys ($M_{boys}= 327.42$, $SD=135.61$; $M_{girls}= 356.21$, $SD=92.75$).

Cultural life scripts and life story coherence

To investigate whether a more adultlike cultural life script was a better predictor of life story coherence than of weekend story coherence, we conducted standard regression analyses with life story coherences and weekend story coherences as dependent variables, and age, life script typicality and gender as predictors (see Table 4). Age consistently predicted story coherence, while gender did not. As expected, life script typicality did not predict weekend story coherences. Prospective life story coherence was predicted by life script typicality, while there was only a trend ($p=.07$) for past life story coherence. Overall, these analyses provide some evidence that life script typicality seems important for the development of coherent life stories – and especially prospective life stories, while it is unrelated to the ability to produce a coherent single event story.

Contents of Life Stories and Weekend Stories

Generally, the events in the past life stories reflected the children's lives in their families, at school, and in their spare time. Negative events were more prominent in the children's past life stories than in their prospective life stories (Table 1). There was no effect of age on the percentage of negative events mentioned in the children's life stories (Table 2). Tables 5 and 6 list the life script events mentioned in the children's past and prospective life stories by grade. Prospective life stories contained all positive events from the adult life script (Bohn & Berntsen, 2008) which were

within the children's future age range, that is, which they could not have experienced yet. These findings fit well with results in adults that it is more difficult to imagine a negative event in one's personal future than a positive event (Berntsen & Bohn, 2010; D'Argembeau & van der Linden, 2004; Newby-Clark & Ross, 2003) and that the future is seen as more idyllic than the past (Berntsen & Jacobsen, 2008; Berntsen & Bohn, 2010).

As expected, the contents of past and future weekend stories were very similar. Participants wrote about experiences with their friends (e.g. playing, going to the movies) and family activities (e.g. visiting relatives, doing chores together). Weekend stories contained very few negative events, and (with one exception) no life script events (Table 1). While past and future weekend stories were very similar, past and prospective life stories were different in at least two ways: Past life stories contained more negative events than prospective life stories, and prospective life stories contained more life script events than past life stories (Table 1).

Discussion

This study is the first to investigate the development of life story coherence for prospective life stories in children and adolescents, providing evidence that the ability to produce coherent past and prospective life stories develops in parallel across childhood and adolescence. Younger children were neither able to produce coherent past nor coherent prospective life stories.

There were important differences between past and prospective life stories. Prospective life stories consisted mainly of cultural life script events; and they were shorter and much more positive than past life stories. This supports the hypothesis that imagining the future relies more on scriptlike and semantic knowledge than remembering the past (Berntsen & Bohn, 2010; D'Argembeau & van der Linden, 2004; Liberman, Sagristano & Trope, 2002; Trope & Liberman, 2003). Even though most participants imagined the life lying before them to last at least sixty more years, the stories

about their, in comparison, rather short past lives were roughly twice as long as their prospective live stories. This difference was larger in the older groups, which could be due to the longer lives these children have lived, or to their growing interest in writing about themselves (Bohn & Berntsen, 2008). It seems that both the shortness and the extreme positivity of children's prospective life stories can be explained within the framework of the cultural life script. The prospective life stories consisted almost exclusively of positive life script events expected to occur before the age of thirty (Bohn & Berntsen, 2011), corresponding to key features of cultural life scripts, namely the dominance of positive events expected to occur in adolescence and early adulthood (e.g. Berntsen & Rubin, 2004). Thus, when imagining their futures, children seem to rely more on semantic knowledge in form of the cultural life script with its large proportion of positive events expected to happen before age thirty. This is in line with earlier research showing that older adolescents are focused on goals that they expect to achieve in young adulthood (e.g. Greene, 1990).

Interestingly, past and future weekend stories were equally positive, while past life stories contained much more negative events than prospective life stories. Participants wrote about negative experiences from their past, which have been maintained in memory through talking and thinking about them, and which probably had consequences for their lives (such as their parents' divorce), while the cultural life script seems to bias children towards imagining positive events in their futures. This fits with earlier findings with adults showing a marked positivity bias for the future (Berntsen & Bohn, 2010; Caruso et al., 2008; D'Argembeau & van der Linden, 2004). Here we extend these findings to children.

The finding that past and prospective life stories were equally coherent, while past weekend stories were consistently more coherent than future weekend stories within age groups, supports our

hypothesis that the acquisition of an adultlike cultural life script plays an important role for the ability to remember one's past life and to imagine one's entire future life, but not for the ability to remember single events from one's past or to imagine single future events. The cultural life script helps children to place past and expected life events in an appropriate and meaningful temporal and causal order. Especially older children imagined their future lives almost exclusively along the guidelines of the cultural life script, which almost automatically made these stories coherent. Thus, for prospective life story coherence, the important guiding role of the cultural life script and other semantic knowledge seems to outweigh the lack of episodic detail in these stories. Past life stories were also generated along the guidelines of the cultural life script, but here negative events often interfered with the life story outline given by the cultural life script. However, the more detailed description of these negative events might have boosted the coherence of past life stories, as earlier studies have found that children's narratives of negative events are more coherent than those of positive events (e.g., Ackil, van Abbema, & Bauer, 2003; Fivush, Hazzard, McDermott Sales, Sarfati, & Brown, 2003). In past weekend stories, children described activities with more episodic details than when writing about these same activities in future weekends, making past stories more coherent. Unlike in prospective life stories, the lack of detail in future weekend stories could not be compensated for by relying on a "story outline" as provided by the life script.

The percentage of life script events in prospective life stories was highest in 8th graders (Table 1). This result is interesting, because this group is in the midst of adolescence, a time when the major task is to find a mature psychosocial identity (Erikson, 1968), and young people develop their self-defining characteristics (e.g., Habermas & Bluck, 2000; Pasupathi & McLean, 2010) or "subjective selves" (Fivush, 2011). In other words, adolescents are thought to be tuned into defining their own unique identity. Our finding that adolescents imagine a future life that very

closely adheres to the cultural norm as represented by the cultural life script seems to contradict this notion. However, an inspection of the adolescents' prospective life stories shows that many of them refer to the process of finding their unique identity, but, at the same time, they express that they - at least at some point in the future - expect to become typical members of society. For example, many of them write about wanting to try out different jobs, but finish like this 14-year-old girl: "I want to travel the world, and work a little to make money to continue travelling. Otherwise, I just want to settle down and start a family, *when the time comes*" (italics added for emphasis by authors). Fivush, Habermas, Waters, and Zaman (2011) point out that adolescents, to find their place in their culture, "...need to construct personal continuity across change ... for being accepted as someone who assumes responsibility for past actions" (p.328). Our findings suggest that the development of this personal continuity in adolescents also includes taking responsibility for future actions. At the same time, adolescents seem to be more aware than younger children of how a life ideally should be lived in their culture (Berntsen & Rubin, 2004), but they are also more aware of their personal influence on controlling and deciding on their future "possible selves" (Markus & Nurius, 1986). According to Markus and Nurius, individuals are "free to create any variety of possible selves, yet the pool of possible selves derives from the categories made salient by the individual's sociocultural and historical context" (p.955). As the example above illustrates, adolescents might be juggling with different more or less stereotypical possible selves, but they seem to see the cultural life script as a safe norm that they always can settle into.

Thus, the high percentage of life script events in adolescents' life stories might indicate that the acquisition of a cultural life script is an important precondition for imagining and taking responsibility for one's personal future within one's culture. The cultural life script provides children with a frame of reference for the type and timing of events in a life within their culture and

a generic life story that members of a culture use when narrating their life stories, and when imagining their personal futures. Thus, our findings support the view that autobiographical memory development relies on socio-cultural factors (Fivush, 2011; Nelson & Fivush, 2004), and expands this to the development of imaging the personal future.

In summary, this study found evidence that children develop the ability to write coherent past and prospective life stories in parallel, while the ability to coherently remember and imagine single autobiographical events close in time seems to follow slightly different developmental paths, in agreement with earlier findings (e.g., Cooper et al., 2011; Quon & Atance, 2011). The acquisition of an adultlike cultural life script seems to be an important factor for the simultaneous development of past and prospective life story coherence. At the same time, important differences were found between past and prospective life stories with prospective life stories being shorter (and less detailed), and containing more life script events and fewer negative events, suggesting that prospective life stories are more influenced by schematic knowledge and uncorrected positive illusions (see Berntsen & Bohn, 2010). For children and adolescents, the future seems bright and predictable. Future research will have to show whether this finding also holds for children and adolescents with psychological disorders such as anxiety, and whether it also holds for children in less fortunate countries than Denmark.

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Table 1
Means and Standard Deviations for Story Variables by Grade and Time (Past-Future)

Dependent var.	3rd Grade				5th Grade				6 th Grade				8 th Grade			
	Past		Future		Past		Future		Past		Future		Past		Future	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Life length	108.9	50.1	58.7	41.1	141.4	68.9	65.0	39.3	259.4	106.4	135.5	72.9	263.5	139.9	123.5	70.1
Weekend length	96.1	55.2	53.7	35.7	116.9	58.8	59.6	29.6	155.8	52.9	94.5	40.4	181.7	88.2	93.4	45.6
Life coherence	.9	.8	1.0	.7	1.2	.7	.8	.7	1.9	.8	1.8	.9	2.0	.9	1.7	.7
Weekend coherence	1.3	.7	.9	.6	1.4	.7	1.1	.4	1.8	.6	1.3	.6	1.8	.6	1.5	.6
% LS in life	27.9	29.2	50.4	35.9	58.0	52.1	64.6	28.5	46.4	17.7	65.4	20.3	51.6	21.2	77.0	22.3
% LS in weekend:	.5	.2	.0	.0	1.1	5.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
% neg in life:	26.3	33.7	7.9	16.9	21.2	29.1	2.0	7.9	19.2	30.1	5.2	7.8	21.5	15.7	4.1	8.4
% neg. in weekend	3.3	7.5	4.5	13.3	3.7	8.6	0.7	4.3	1.5	5.7	1.6	5.9	1.9	5.6	.0	.0

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Note: % LS = percent of life script events in stories; % neg = percent of negative events in stories; n for life story variables: 3rd grade: n= 27; 5th grade: n= 32; 6th grade: n= 45; 8th grade: n=32; n for weekend story variables: 3rd grade: n= 28; 5th grade: n= 34; 6th grade: n= 40; 8th grade: n=18;

Table 2

Main Effects and Interactions for Story Variables

Dependent variable	Main effects				Interaction	
	Fu vs. Pa		Grade		Time x Grade	
	<i>F</i>	η_p^2	<i>F</i>	η_p^2	<i>F</i>	η_p^2
Life length	146.72**	.54	28.85*	.36	6.50**	.13
Weekend length	114.90**	.51	14.29**	.28	2.16	.05
Life coherence	2.59	.02	26.69**	.39	1.60	.04
Weekend coherence	33.49*	.23	7.12**	.16	.47	.01
% Life script in life	19.89*	.14	10.71**	.20	1.56	.14
% Life script in weekend	1.80	.02	1.00	.03	1.00	.03
% negative in life	47.20**	.27	.68	.02	.24	.01
% negative in weekend	.82	.01	1.68	.04	.90	.02

Note: % negative = percent of negative events in stories; **p* <.05 ** *p* <.0001

Table 3

Distribution of Past and Prospective Life Story Coherence Ratings (split up into scorings 0-3) by Class Grade (in Percentages)

	3rd grade N=27		5th grade N=32		6 th grade N=45		8 th grade N=32	
	Past	future	Past	Future	Past	Future	Past	Future
Life story coherence								
Single episode (0)	37.5	20.8	17.9	35.7	5.4	5.4	0.0	0.0
Several episodes, loose chronology(1)	41.7	58.3	53.6	50.0	24.3	29.7	26.7	26.7
Several episodes, chronological (2)	16.7	20.8	25.0	14.3	48.6	35.1	33.3	60.0
Evaluative narrative (3)	4.2	0.0	3.6	0.0	21.6	29.7	40.0	13.3

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Table 4

Standard Regression Analyses with Age, Gender and Life Script Typicality as Predictors and Coherence Measures as Dependent Variables

Predictors				

	Age	LS Typ.	gender	
Dependent variables	β	β	β	R^2

Past weekend story coherence	.290**	.053	.177	.125
Future weekend story coherence	.280**	.071	.056	.101
Past life story coherence	.418***	.161	.041	.250
Prospective life story coherence	.251**	.177*	.142	.151

Note: LS Typ. = Life Script Typicality; * $p < .05$, ** $p < .01$, *** $p < .0001$

Table 5

Life Script Events in Past Life Stories (in Percentages; Rank Ordered by 8th Grade Frequencies)

Life script event	3 rd grade (n=27)	5 th grade (n=32)	6 th grade (n=45)	8 th grade (n=32)
Own birth	25.93	56.25	86.67	81.25
Begin school	14.81	37.50	55.56	65.63
Begin hobby/sports	7.41	34.38	66.67	56.25
Other's death	-	15.63	13.33	40.36
First friend	3.70	21.88	28.89	43.38
Begin day care (3+)	22.22	31.25	46.67	31.50
Confirmation	-	-	-	31.50
Siblings	18.52	43.75	57.77	31.50
Parents' divorce	11.11	15.63	22.00	25.00
Begin day care (0.5+)	7.41	3.13	15.56	21.88
Fall in love	-	3.13	-	3.13
Long trip	-	3.13	13.33	-
Special birthdays	3.70	6.25	6.67	-
Parent's death	-	-	4.44	-
Baptism	3.70	6.25	4.44	3.13
Serious disease	3.70	6.25	8.89	12.50
Begin to walk	-	-	-	3.13
Begin to talk	-	-	-	3.13
Become grown-up	-	-	-	3.13

Table 6

Life Script Events in Prospective Life Stories by Grade (in Percentages; Rank Ordered by 8th Grade Frequencies)

Life script event	3 rd grade (n=27)	5 th grade (n=32)	6 th grade (n=45)	8 th grade (n=32)
Children	44.44	56.25	68.89	71.86
College/university	7.41	31.25	48.89	59.38
Get a job	62.96	84.38	68.89	43.75
Go to high school	7.41	6.25	17.78	40.63
Serious relationship	18.52	9.38	26.67	40.63
Leave home	7.41	-	11.11	37.50
Marriage	51.85	50.00	62.22	31.25
Continuation school	7.41	-	40.00	31.25
Own death	29.63	3.13	40.00	28.13
Finish 9 th grade	-	6.25	24.44	28.13
Retirement	7.41	6.25	31.11	15.63
Own house	17.15	25.00	44.44	15.63
Grandchildren	7.41	6.25	11.11	6.25
Career	-	6.25	-	6.25
Parent's death	-	-	-	3.13
Long trip	-	3.13	26.67	3.13
Second/last child	3.70	-	-	3.13
Begin hobby/sports	-	3.13	4.44	3.13
Finish high school	-	-	22.22	-
Confirmation	3.70	9.38	11.11	-
Empty nest	-	-	8.89	-
First job	-	6.25	6.67	12.50
Other's death	-	-	2.22	-
Divorce	-	-	2.22	-
Special birthdays	-	3.17	-	-
Puberty	3.70	-	-	-
Fall in love	3.70	-	2.22	-
Partner's death	3.70	-	-	-
Become grown-up	3.70	-	-	-