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Not “WEIRD” but truly different: Cultural Life Scripts and autobiographical memory in Indigenous Australia

Annette Bohn, Center on Autobiographical Memory Research (CON AMORE), Department of Psychology and Behavioural Sciences, Aarhus University.

Rikke L. Bundgaard-Nielsen, University of Newcastle and MARCS Institute for Brain, Behaviour and Development, Western Sydney University.

Address for correspondence:
Annette Bohn
Department of Psychology and Behavioural Sciences
Center on Autobiographical Memory Research (CON AMORE)
Aarhus University
Bartholins Alle 11
DK 8000 Aarhus C
Denmark
Phone +45 87165864
E-mail anetboh@psy.au.dk
Abstract

This exploratory study examines the structure of cultural life scripts (CLS) and autobiographical memories in a group of thirteen non-WEIRD (Western Educated Industrialized Rich Democratic) Nunggubuyu from Australia. Participants provided a CLS and reported the events’ expected timing and valence; and their seven most important memories, the age at the events and their valence. The CLS and important memories consisted mainly of positive events happening in early youth, but there was also a notable bump with positive events later in life. Results provide evidence for the important role of grandmothers in the Nunggubuyu culture, as both in the CLSs and in autobiographical memories, many events related to learning about Nunggubuyu culture as a child, and grandmothers teaching the community and especially children. Importantly, the results highlight that societal and cultural structures that differ from those in WEIRD communities may result in differences in CLS and in autobiographical memory recall.
General Audience Summary

Cultural life scripts (CLS) are representations of a prototypical life within a culture, consisting of a shared understanding of culturally important transitional events and their timing. It has consistently been found that CLS contain a ‘bump’ for events in early adulthood, that is, people expect most events in a typical life to happen before the age of 30. At the same time, when asking older people for memories from their lives, they usually have a reminiscence bump for memories from their early adulthood. Therefore, it has been proposed that people remember more memories from early adulthood because they use CLS as a guideline to search for memories. Studies across different cultures have found evidence for this CLS account of the reminiscence bump. However, most studies have been conducted with participants from Western(ized) Educated Industrialized Rich Democratic, or WEIRD populations. Here, we explore the CLS account in the Non-WEIRD Nunggubuyu, a small Indigenous Australian people for whom grandmothers have a central role in childrearing, family and cultural life. Therefore, we expected the Nunggubuyu CLS and autobiographical memories to exhibit a bump not only in early, but also in later adulthood. Our results provided evidence for the important role of grandmothers in the Nunggubuyu culture, as both in CLS and autobiographical memories, many events related to learning about Nunggubuyu culture as a child, and grandmothers teaching their grandchildren. Accordingly, we found two bumps in life scripts and autobiographical memories: one early bump in childhood, emphasizing the importance of Nunggubuyu children learning about Nunggubuyu culture and way of life, and a smaller bump in later adulthood, emphasizing the grandmothers’ role in teaching their grandchildren. The results highlight that societal and cultural structures that differ from those in WEIRD communities may result in differences in CLS and in autobiographical memories.
The reminiscence bump (Rubin & Schulkind, 1997; Rubin, Wetzler & Nebes, 1986; for review, see Koppel & Berntsen, 2015), showing that people above the age of 40 recall more memories from their adolescence and early adulthood than from other periods in their lives is one of the most replicated findings in autobiographical memory (AM) research. It has been found both for cue-word memories and for most important memories (Rubin & Schulkind, 1997). One of the most prominent explanations of the reminiscence bump for important memories is the Cultural Life Script (CLS) account (Berntsen & Rubin, 2004; Koppel & Berntsen, 2015). Here, we explore the explanatory value of this account in relation to the location and content of the reminiscence bump in the Nunggubuyu, a Non-WEIRD people, who live neither westernized, (highly) educated, industrialized, rich nor democratically organized lives.

CLSs consist of culturally important transitional events expected to happen at specific times in a prototypical life course within a given culture. They are shared representations of an idealized life, because they consist of predominantly positive events expected to happen in a certain order (‘marrying’ before ‘having children’), while these events are neither necessarily positive nor occur in this order in real life. Thus, CLSs are semantic knowledge, not AM, and typically studied by asking participants to imagine a newborn child of their own gender and culture, to list the seven most important life events that participants think will happen in his/her life, and to estimate the valence and ages at which these events will happen (Berntsen & Rubin, 2004). Most CLS events are expected to happen during the reminiscence bump period.

CLSs have been studied in many cultures, including Denmark, Germany, Australia, Malaysia, the Netherlands, Japan, Qatar, Turkey, China, Mexico, and Greenland (Berntsen & Rubin, 2004; Bohn and Berntsen, 2008; Habermas, 2007; Janssen, 2015; Janssen & Haque, 2017; Janssen and Rubin, 2011; Janssen, Uemiya, & Naka; 2014; Ottsen & Berntsen, 2014; Tekcan, Kaya-Kızılöz,
& Odaman, 2012; Zaragoza Scherman, Salgado, Shao & Berntsen, 2017) as well as some subcultures (Clark & Daggett, 2015; Coleman, 2014). All studies found a majority of positive CLS events concentrated in the reminiscence bump period, whereas neutral and negative events were distributed evenly across the life span. According to the CLS account of the reminiscence bump (Berntsen & Rubin, 2004; Koppel & Berntsen, 2015), CLSs provide mnemonic guidance when people recall their most important memories. Thus, a substantial portion of important memories should match the content, valence and distribution across the life span of CLS events, consistent with the idea that CLSs are semantic knowledge guiding recall of important memories. Further, there should be some cultural variation in the type of events included in the CLSs and important memories.

Few studies have directly tested the CLS account of the reminiscence bump within or across cultures by collecting and comparing CLSs and important memories within the same group (Bohn, 2010; Hatiboğlu & Habermas, 2016; Ottsen & Berntsen, 2014; Rubin et al., 2009; Zaragoza Scherman et al., 2017). For example, Zaragoza Scherman et al. (2017) compared CLSs and important memories of middle-aged adults (mean ages 50-51 years) in Mexico, China, Greenland and Denmark. In all four cultures, CLS events and important memories overlapped substantially. The majority of CLS events and important memories were positive and formed a bump in early adulthood; and all CLSs included some culturally specific events. Thus, they replicated findings from studies with younger participants, and demonstrated that they are consistent with three further cultures (Greenland, China, Mexico). Importantly, the study included two samples that are culturally distinct, but citizens of the same country, namely Greenlandic Inuits and Danes. This makes their study the best comparison to the current study, as it was conducted with two linguistically and culturally distinct groups of middle-aged adults who share significant colonial history (as colonized and colonizing cultures) and who are institutionally framed by the majority culture and language. In sum, studies including different age groups and cultures
provide evidence for the relation between CLSs and the content, valence and life span distribution of important memories, including an early adulthood bump. Why then, is another study on CLSs and AM necessary? We can think of at least two reasons:

First, even though studies have been conducted in diverse cultures, participants were either university students, or recruited by students (e.g., Zaragoza Scherman et al., 2017), which increases the probability of these participants being at least moderately WEIRD, i.e. these participants are most likely more educated, westernized and richer than most people. In contrast, the Nunggubuyu are truly non-WEIRD. Second, the Nunggubuyu exhibit cultural patterns that might lead to a different distribution of CLS events and important memories across the life span, as we will describe below. Thus, this study might provide the first evidence that the location of the bump in CLSs and AM may not be universal.

The Nunggubuyu are a small Indigenous Australian people, predominantly living in the remote settlement Numbulwar on the coast of the Gulf of Carpentaria in Australia’s Northern Territory. They consist of four clan groups belonging to two different moieties (‘skin’ groups). Nunggubuyu are traditionally hunter-gatherers, with close cultural, ceremonial, and familial ties to other Indigenous groups in Eastern Arnhem Land. Numbulwar was established in 1952 as an Anglican Church mission, predominantly for the Nunggubuyu, who gradually became involved in 'White' community activities (school, paid labor, and church-based activities). Nunggubuyu traditionally spoke ‘Wubuy’ (Heath, 1984), but the community now speaks primarily Roper Kriol (Baker, Bundgaard-Nielsen, & Graetzer, 2015; Munro, 2000; 2011; Sandefur, 1986), which is the Lingua Franca in many Northern Territory communities.

At the last Australian Census (ABS, 2016), Numbulwar had 723 inhabitants in 187 family units. Of these, 635 identify as Indigenous Australian, and 243 as Wubuy speakers. Numbulwar’s
population is young with 70% inhabitants younger than 35 years (ABS). The Nunggubuyu are predominantly sedentary, and most are involved to some extent in ‘White’ community activities. Most children attend school some of the time. Educational attainment is low, and employment remains around 30% (ABS), reflecting both cultural norms different to those of mainstream Australian society and limited local employment opportunities.

The Nunggubuyu continue to practice traditional religious and cultural rituals, and traditional ceremonial life is very important. Ceremonial responsibilities typically fall to initiated older men and women, and command enormous respect. Many Nunggubuyu hunt, fish, and gather foods and materials in traditional ways, and cultural practices, such as basket weaving and spear-making continue to be important social activities. The community takes great pride in its traditional dancers and musicians, who are well-known across the region. Most daily activities are guided by traditional norms, and fulfilling cultural and social obligations is often considered more important than school and work attendance, and other practices that dominate Western culture.

Traditional extended family living is practiced in many households, and a complex classificatory kinship system is maintained (Heath, 1984). This means that all humans are potentially classifiable as ‘kin’, regardless of actual biological or affinal relationship. For example, if A calls C ‘mother’, and B calls C ‘sister’, then B is also A’s (classificatory) ‘mother’ because same-sex siblings ‘count’ as the same social being (Scheffler, 1978). Thus, aunts are obligated to take the role of mothers and grandmothers towards their nieces and nephews.

In relation to this, a hallmark of Nunggubuyu and some other indigenous Australian cultures is the central role of grandmothers in childrearing and family life. (Scelza, 2009). Grandmothers are often the primary caregiver for their grandchildren for extended periods. They are expected to teach children Nunggubuyu language, culture, knowledge and life-skills, as detailed for instance in an
Australian Government report (Lohoar, Butera & Kennedy, 2014): 'Many [...] spoke of the value of grandparents and elderly family members in providing care for their children, and described the opportunities for children to learn other important life skills.' Indeed, the reciprocal importance of grandparents to grandchildren is encoded also linguistically: the terms for grandparents and grandchildren are reciprocal: for example, ‘maternal grandmother’ and ‘maternal grandchild’ is the same, ‘gaagu’.

Based on studies reviewed above, we expect CLSs and important memories to consist mainly of positive events in young adulthood, and to contain culturally specific events, particularly in relation to the importance of traditional cultural practices such as hunting and gathering, and making of traditional tools/artefacts, and in relation to the role that grandmothers and elders play in the teaching of such Nunggubuyu practices to grandchildren (Lohoar et al., 2014). We further expect Nunggubuyu CLSs and important memories to exhibit a bump in early adulthood, and a second bump in later adulthood, reflecting the cultural importance of the contribution of grandparents to cultural maintenance and teaching.

**Method**

**Participants**

Thirteen Wubuy-speaking Nunggubuyu (10 women; age range 35-78 years; $M = 56.76$, $SD = 11.95$) participated in the study. One participant was in their 30s, two in their 40s, six in their 50s, one in their 60s and three in their 70s. All participants had received formal schooling in the community as children and teens, and some had gained further vocational qualifications as young adults. Generally, however, academic attainment is low in Indigenous communities, and in
Numbulwar, only 10% of the population has completed Year 12 (in some form) (ABS, 2016). There is limited access to tertiary education in the community.

Two participating women were half-sisters, and another woman a cousin to them; two of the men were half-brothers. Other more distant biological relationships are likely to exist between the participants, but these were not explored systematically, as such an endeavour cannot be undertaken while also protecting the identity of the participants. All participants would be related through the classificatory kinship system in some way (as mothers, sisters, brothers, grandparents, potential partners, mother- or father-in-laws etc, of which some configurations prohibit personal interaction). All would be familiar to each other from daily life in the community, and most would likely be friends, acquaintances or co-workers. Twelve participants had biological or adopted children. Most of the older participants are likely to have had (biological) grandchildren, but at least four of the participants did not (~30%; one individual in their 30s, one in their 50s, one in their 60s, and one in their 70s). Note, however that sisters, for instance, often participate in the rearing of each others’ children and grandchildren (and these children/grandchildren are classificatorily also their children/grandchildren as per the rule of same-sex sibling equivalence, discussed above). This means that biological relationship alone cannot necessarily be used to determine an individual’s childrearing roles, experiences or responsibilities. Twelve of the participants were interviewed by the second author, who has a long-standing research partnership with the participants, primarily for the purpose of linguistic fieldwork in the community (Bundgaard-Nielsen & Baker, 2016, 2019, 2020; Bundgaard-Nielsen, Kroos, Baker, Best, & Harvey, 2016; Bundgaard-Nielsen, Baker, Kroos, Harvey & Best, 2015; Baker et al., 2015; Bundgaard-Nielsen, Kroos, Harvey, Baker, & Best, 2012). One (of three) male participant was interviewed by a male linguist known to the participant, to conform to cultural norms in the community.
We acknowledge that the number of participants in this study is small but have a number of observations on the population and on data collection, which put this in perspective. Firstly, even though the number of participants seems small, across Australia, only 272 individuals list Wubuy as their native language in the 2016 Australian census, of whom 243 live in Numbulwar (see above). On the basis of years of fieldwork in the community, we suggest that this number is likely reflecting a range of different types of ‘speakers’, including a group of older (50+) fluent native speakers, and a range of younger speakers with more limited repertoire, who may speak Kriol as their first or dominant language (Baker et al., 2015; Davidson, 2016). We estimate the group of fluent Wubuy speakers to consist of approximately 60 individuals (Bundgaard-Nielsen & Baker, 2019, 2020) many of whom are advanced in age. If these estimations are correct, the present study includes approximately 20% of the actual speaking population, and 5% of the entire population that identifies as Wubuy speaking. We include the discussion of language competence here as significant because cultural, ceremonial and linguistic identities are tightly bound, though we do not suggest that low proficiency in the heritage language necessarily translates to differences in the enculturation process and outcome. However, we cannot exclude that reduced competency in and use of Wubuy, and increased use of Kriol or other traditional local languages reflects important, or even dominant, familial and cultural ties to other local communities and cultures. To err on the side of caution, therefore, all participants included in the present study were fluent speakers of Wubuy. However, irrespective of which of these proportionate calculations is applied in the assessment of the sample size of the present study, we highlight that the proportion of the linguistic/cultural community included is much larger than in other studies. Indeed, to match even the conservative estimate of 5% of the population, an Australian CLS would require 890,000 individuals to participate (based on a population of 25.5 million, of which 30% are born outside of the country and therefore excluded;
ABS 2016). Indeed, we would argue that the raw number of participants in any given study cannot be a guarantee of representability, and in the case of small populations, proportionality of the sample, rather than raw numbers, provide a more meaningful guide to the reliability of the study.

Secondly, data collection in remote communities, such as Numbulwar, presents a number of challenges, including community access that limit the number of research participants that can be recruited. Numbulwar is in a very remote location, and it takes two days to reach the community by road from Darwin (the capital of the Northern Territory). The road into the community is however not accessible from November through March during the monsoon, when the rivers flood and stop road traffic. Air travel to the community is costly and possible only via private charter from one of the larger regional airstrips (Nhulunbuy to the North, and Groote Eylandt to the East). These general challenges are currently compounded by the global COVID-19 pandemic, which has resulted in government bans on all non-essential travel to communities such as Numbulwar. It is unclear when such bans will be lifted as they are essential to protect extremely vulnerable older people in communities like Numbulwar.

In addition to difficulties from limited community access, research can also be restricted by the need to respect cultural ceremonies and norms in the community. For instance, very limited activities can take place while funerals or ceremonies are being held (such events can take weeks to complete, and can, of course, not be planned around). Activities can likewise be restricted as a result of perceived acts of witchcraft in the community, or by prolonged travel by groups of people to attend funerals, ceremonies, and other family business in other communities. Thus, this study provides insights from a very difficult to access, and therefore extremely seldom studied type of population in memory research.
Materials and Procedure

The 13 participants each completed two questionnaires. One was a seven-event CLS, requiring participants to list the seven most important events in the life of an imaginary newborn Nunggubuyu person of their own gender and provide the (approximate) age at the time of each event, as well as the valence of the event (bad – neutral – good). The instructions followed Berntsen and Rubin (2004, p. 435). To facilitate this rather artificial activity, the participants were presented with a culturally appropriate doll child, whom they had the option of imagining to be the person in question. Some participants directly addressed the doll to explain what she/he could expect in life, and then reiterated the predictions to the second author. The second questionnaire was a Memory Survey eliciting participants’ seven most important memories, their age at the time of the memory, and the valence of the memory (bad – neutral – good). The instructions for this part of the task followed Rubin et al. (2009, p. 59).

Seven participants completed the CLS survey first, and six completed the important memory survey first. All data were collected in private homes in Numbulwar, and all participants were recruited by word of mouth. Some participants had previously participated in research conducted by the second author, while others had not. The author’s previous research is overwhelmingly in the field of experimental psycholinguistics (Bundgaard-Nielsen & Baker, 2016, 2019, 2020; Bundgaard-Nielsen et al., 2016; Bundgaard-Nielsen et al., 2015; Baker et al., 2015; Bundgaard-Nielsen et al., 2012), not in traditional field-linguistics in the anthropological tradition, and we do not believe that previous research experiences with the author primed the participants to respond or focus their responses in any particular way as the topics included in the CLSs and the important memories are not typically addressed in the research of the second author. The interviews were conducted in English. All participants were given the option to write their answers to the questions themselves or
to have the researchers transcribe for them. All chose the latter option. We suggest that this pattern is due to the fact that the levels of English (or other) literacy varies greatly in the community, and many of the participants had very limited literacy in any language, and did not feel confident enough to write themselves. The second author did not provide examples of what the participants might wish to include as part of the explanation of the task, nor guide the participants in their selection during data collection. All recorded answers were read back to the participant and approved by the participant.

**Scoring**

**Cultural life scripts.** The CLS events were classified based on the categories of the Australian CLS published by Janssen (2015) and Janssen and Haque (2017). Events that did not fit into any of these categories but were mentioned at least two times were identified as new categories and labelled as specific Nunggubuyu CLS events. Events that were neither part of the Australian published CLS nor mentioned more than once were scored as ‘other’.

**Important memories.** Important memories were classified based on the categories of the published Australian CLS as well as on the categories of the Nunggubuyu CLS. Further, events that were mentioned at least twice in the life story memories, but did not fit into the Australian or Nunggubuyu CLS categories, were categorized as Nunggubuyu important memory categories. All events and memories were scored by the first author and a trained student assistant who was blind to the hypotheses of the study. Disagreements were resolved by discussion.

**Valence.** Negative events were scored as -1, neutral events as 0, and positive events as 1.
Order effects. The CLS and the life story task were counterbalanced across participants. There was no age difference between participants assigned to the two different task orders. Overall, those participants asked to do the CLS task first reported 75% memories matching life matching life script categories, whereas participants doing the important memory task first reported 69% memories matching CLS categories, which was not different from each other ($\chi^2(1) = .40, p > .52$). Still, a comparison for all culturally specific CLS events showed that those participants who reported CLS events first mentioned more often memories of culturally specific events such as Learn about family heritage (five vs. one) and Learn about Nunggubuyu culture (four vs. zero), but less often Learn fishing, hunting, food gathering (three vs. seven). This possible order effect agrees with earlier findings (Bohn, 2010), and supports the notion that CLS guide the recall of important memories.

Content of cultural life scripts and important memories. One participant did not provide a CLS, and one mentioned only four life story events, leaving a total of 84 CLS events and 88 important memories. Tables 1 and 2 show the categories and frequencies of CLS events and important memories mentioned, the (expected) age at the event, and both CLSs and important memories encompassed specific Nunggubuyu CLS event categories as well as categories from the WEIRD Australian CLS (Janssen, 2015; Janssen & Haque, 2017). In the CLSs, 41% (9/22) of the categories (including other) were specific to Nunggubuyu culture, and four of the five top categories were specific to Nunggubuyu CLSs. This number is considerably higher than what has been found in earlier studies. For example, Ottsen and Berntsen (2014; Study 3) found that at most one of the five top CLS events was culturally specific in a comparison of Qatar, Danish, US American, and Turkish CLSs. Further, Zaragoza Schermann et al. (2017) found that none of the top five CLS events in the Danish, Chinese, Mexican and Greenlandic samples were culturally specific. Indeed, in all four samples, the most often mentioned culturally specific event failed to rank in the top ten events
(from 13th in Greenland, to 20th in Denmark). In contrast to this, *Teaching grandchildren about Nunggubuyu culture* was the most frequently mentioned event in Nunggubuyu CLS, followed by *Learn about Nunggubuyu culture* and *Learn to take care of oneself*, which encompasses learning to lead a life in accordance with the norms and regulations of Nunggubuyu culture (see Table 1). With only 13 participants, it could be possible that only a few, possibly older, participants might have had a strong effect on the results by mentioning culturally specific events several times. Therefore, for the six most often mentioned event categories, we compared the number of participants mentioning the events to the number of total mentions. We only found that *Teaching grandchildren about Nunggubuyu culture* (total mentions: 12) was mentioned twice by two participants, aged 54 and 70 years, *Learn to take care of oneself* was also mentioned twice by two participants (ages 41 and 64), and *Learn about Nunggubuyu culture* was mentioned twice by one participant (age 35). Thus, the effect of many culturally specific CLS event categories does not appear to be driven by the responses given by only a few older individuals.

The observed prevalence of Nunggubuyu-specific categories in the CLSs was even more striking in the important memories of the participants. Here, 52% (11/21) of categories were specific to Nunggubuyu culture and life. In accordance with the dominance of Nunggubuyu-specific CLS event categories in important memories, 57% of all mentioned important memories per category were Nunggubuyu events. The most frequent Nunggubuyu events in the important memories were *Learning fishing, hunting and food gathering* (ten mentions); *Teaching children about Nunggubuyu culture* (six); *Learn about family heritage* (six); and *Learning about Nunggubuyu culture* (four; see Table 2). Other frequently mentioned events were universal CLS events also contained in the Australian and other CLSs (e.g. Janssen & Haque, 2017; Zaragoza Schermann et al., 2017), such as *Having children* (seven), *First full time job* (seven) and *Going to school* (six; see Table 2). Thus,
both the results from the CLS and the important memories suggest a strong anchoring of the participants in Nunggubuyu heritage and culture. The overlap between all CLS events (not only the culturally specific events) and important memories was 72%, which seems somewhat higher than the overlap (from 54% for China to 68% for Denmark) reported by Zaragoza Schermann et al., but on par with the 74% overlap reported for older Danish participants by Bohn (2010).

The relatively high overlap between the CLS and important memories invites the question of whether this overlap is due to participants not using scripted semantic knowledge when generating a CLS, but simply recalling important memories from their own lives. In order to test this possibility, we compared the content of each individual participant’s CLS with the content of each individual participant’s important memories. The comparison revealed that the overlap between the participants’ CLSs and important memories was 1.83 (SD = .72) events, i.e., about two of seven important memories where events that participants also had mentioned in their CLSs. This result replicates earlier findings in both young and old Danish and young US American samples (Bohn, 2010; Rubin et al., 2009) and supports the interpretation that CLSs are semantic knowledge guiding the recall of important memories also in this study.

In order to further investigate our hypothesis that grandmothers’ important role in Nunggubuyu culture significantly shapes the Nunggubuyu CLS and important memories, we counted the events that included the terms ‘grandmother’ or ‘gaagu’. Both in the CLSs and important memories, approximately 25% of events contained references to these terms (23.5% in CLSs; 26.4% in important memories). This number of events relating to grandmothers seems considerably higher than in other populations. For example, in the Australian CLS (Janssen & Haque, 2017), the frequency of events that can be considered as related to grandmothers (Death grandparents and Having grandchildren) was only 3.01 % (31 of a total of 1029 reported events). In Zaragoza
Schermann et al. (2017), the CLSs only contained the event *Having grandchildren*, which was not mentioned at all by the Chinese sample, and was the 14th most often mentioned event in Denmark (15th in Greenland, and 20th in Mexico). Thus, the focus on grandmothers and their active role seems to be unique to Nunggubuyu life, and has an impact on the structure of the Nunggubuyu CLS and the content and distribution (as we report below) of important memories.

**Valence.** In agreement with our hypotheses, both the CLSs and important memories consisted of a majority of positive events. CLSs consisted of 81.7% positive events. These results are comparable to those found for Denmark (80%), China (86%), Greenland (89%) and Mexico (90%; Zaragoza Schermann et al., 2017). Also, important memories consisted of 91.6% positive events.

**Distribution of events across the life span.** Figures 1 and 2 show the distribution of positive, negative and neutral CLS events (Fig. 1) and important memories (Fig. 2) across the life span in five-year-bins. In the CLS, there is a clear bump for positive events peaking between six and 15 years of age, followed by a sharp decline of events in the 20s, and a second but smaller bump peaking in the late 50s. This distribution of positive events differs from the distribution of events observed in the Australian CLS (Janssen & Haque, 2017) in that the number of positive Nunggubuyu CLS events declines in the typical bump period from 16-30 years of age. Indeed, only 15.2% of all positive Nunggubuyu CLS events are expected to happen during the bump period vs. 60.7% in the Australian CLS. It is possible that this striking difference might be due to the younger age of the Australian sample. We note, however, that Zaragoza Schermann et al. (2017)\(^1\) also found an – albeit less dramatic – bump for positive CLS events between age 15 and 30 in their samples (from 38% in

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\(^1\) Zaragoza Schermann et al. (2017) defined the reminiscence bump period to cover the years from 15-30 years vs. Janssen and Haque (2017), who used the 16-30 years interval. For the comparison with Zaragoza Schermann et al. (2017), we used the 15-30 year interval
Greenland to 56% in China versus 17% in the Nunggubuyu CLS). Thus, this finding supports our hypotheses that the Nunggubuyu CLS differs from other CLSs with a bump earlier in life and a smaller bump in later adulthood. However, we had expected the early reminiscence bump to occur in the typical bump period peaking in the 20s. Instead, we found an earlier bump peaking in childhood years (age 6-10), and a very distinct decline of events in the 20s.

The present study also found a clear bump in early adolescence (age 11-15) for positive important memories, followed by a distinct decline of memories in the typical bump period in the early 20s, and then a smaller bump later in adulthood (Figure 2). However, an inspection of Figure 2 suggests that the second bump seems to be smaller and to occur earlier in the important memories than in CLS. This difference is most likely due to the fact that only six of our participants were 55+ years old. Thus, seven participants were too young to remember events from the proposed second bump period. Even with only 46% of our participants being old enough to generate memories of later adulthood, however, the number of memories for this period contributes with 8.3% of all memories. To investigate whether memories dated past the age of 50 were related to the role of elders and grandmothers in Nunggubuyu life, we looked at the memory content. Two memories concerned Teaching grandchildren about Nunggubuyu culture and two Teaching children about Nunggubuyu culture. Both memories concerned teaching one’s adult children. One memory was about Being a role model for the community, one about Navigating in two cultures, and three concerned other events such as a change in occupation. Thus, a substantial number of these memories are related to the role of elders and grandmothers in Nunggubuyu life (Lohoar et al., 2014).

In summary, both the Nungguyubus’ CLSs and important memories consisted mainly of positive events in early youth, but there was also a smaller bump consisting primarily of positive events later in adulthood. The bump in early youth and the one in later adulthood provide evidence
for the important role of grandmothers in Nunggubuyu culture, both in the CLS and in autobiographical memories. Inspection of Tables 1 and 2 suggests that the early bump contains many events related to learning about Nunggubuyu culture as a child from grandmothers, and the bump in later adulthood emphasizes the role of grandmothers teaching the community, and especially grandchildren. Again, we highlight the codification of this reciprocal and circular relationship in the Wubuy terms for ‘grandparent/grandchild’ (gaagu for maternal grandchild and maternal grandmother).

Discussion

This study is the first to investigate CLSs and important memories in a truly Non-WEIRD population, the Indigenous Australian Nunggubuyu people of the Northern Territory. The results indicate that the CLS and important memories of the Nunggubuyu share some similarities with those from WEIRD cultures, while they differ in other aspects. Concerning similarities, the Nunggubuyu and WEIRD CLSs and important memories consist mostly of positive events, and of both culturally specific and universal events. Paralleling results with other cultures, predicted CLS events and reported important memories overlapped considerably both regarding content and lifetime distribution.

Results also indicate that the Nunggubuyu CLS and important memories differ from those of WEIRD populations. First, the Nunggubuyu exhibit a novel secondary bump in their CLSs and to some degree in important memories. Even though the memory bump was relatively small, it is consistent with our hypothesis of a second bump, because only six of 13 participants were 55+ years, and thus able to report memories from later adulthood. This most likely attenuated the size of the second bump in important memories. Further, the majority of memories reported after age 55 were
concerned with teaching adult children, grandchildren, and the community about Nunggubuyu culture and heritage. We believe this finding reflects a significant difference in the distribution of AM in Nunggubuyu culture, where grandparents (and elders) play important roles in the socialisation of children and the maintenance and practice of cultural life.

Second, the ‘classic’ reminiscence bump in youth/early adulthood (16-30 years) occurred in late childhood/early adolescence (6-15 years) in both the Nunggubuyu CLS and important memories, followed by a steep decline of events in the early 20s. This atypical distribution is most likely due to the accumulation of events related to learning culturally specific tasks (e.g., hunting, fishing) which take precedence over the usually most often mentioned events in other studies (school/formal education; marrying; having children). These events appear less important than teaching grand/children about Nunggubuyu life-skills and learning about these skills in childhood/adolescence, reflecting the Nunggubuyu community’s expectations to fulfil cultural and social obligations. Even though other studies have found childhood bumps in CLSs (Janssen & Haque, 2017; Ottsen & Berntsen, 2014; Tekcan et al., 2012) and important memories (Ottsen & Berntsen, 2014), none of these found the reminiscence bump to peak before the 20s.

While the results presented here provide insight into the effect of the specific Nunggubuyu CLS on the distribution of important memories, we do caution against over-interpretation. Years of fieldwork with older individuals in Numbulwar suggests some uncertainty regarding some individuals’ age, and many may not know their precise age for any particular event. Still, as our results show that CLSs are semantic knowledge independent of AM and thus, independent of a person’s knowledge about their own age, the earlier bump and the steep decline of events in the early 20s support the view that the early bump is a unique feature of Nunggubuyu culture.
Our results contribute to the theoretical understanding of AM and of life experiences of people with vastly different cultural and experiential backgrounds. In particular, the results suggest that the frequently observed single bump of positive life events in adolescence and young adulthood, expected and remembered in WEIRD populations, does not necessarily reflect a universal constraint on the number or location of bumps in the life span. Still, we propose that our results speak to the potential universality of the CLS account of the reminiscence bump. First, there was a considerable overlap between CLS events and important memories. Second, and more importantly, the distribution of important memories largely mirrored the distribution of CLS events. Finally, as proposed by the CLS account (Koppel & Berntsen, 2015; Rubin & Berntsen, 2004), there was a clear dominance of socially and culturally important events, and not biological events (adolescence, puberty), replicating earlier findings (Zaragoza Scherman, 2017).

The results might also point to the relevance of social, educational, and financial interventions in Numbulwar and, potentially, other severely disadvantaged non-Western communities in Australia and elsewhere. Even though some participants mentioned the importance of navigating in two cultures as a CLS event, both CLSs and important memories consisted mainly of Nunggubuyu cultural specific events. Importantly, events related to formal education were completely absent from the CLS. Considering that only about 30% of the community is employed (ABS), interventions aiming at integrating formal education as an element of the Nunggubuyu way of life, while retaining and supporting the traditional elements as denoted by the CLS described here, might be an additional way to support the Nunggubuyu community.
Author Statement

Annette Bohn (AB) and Rikke Bundgaard Nielsen (RBN) developed the idea and the research design for the study together. AB developed the questionnaires. RBN collected the data, and AB analyzed the data. Both authors contributed equally to the manuscript, and commented on each other’s contribution.

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REFERENCES


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Table 1: Overview over number of mention, mean age (SD) and valence (SD) of events in the Cultural life script.

<table>
<thead>
<tr>
<th>Event Category</th>
<th>Life Script ((n = 84))</th>
<th>Age at event (M (SD))</th>
<th>Valence (M (SD))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching grandchildren * about Nunggubuyu culture</td>
<td>12</td>
<td>56.25 (10.90)</td>
<td>.92 (.29)</td>
</tr>
<tr>
<td>Learn about Nunggubuyu culture*</td>
<td>8</td>
<td>17.25 (17.53)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Learn to take care of self *</td>
<td>7</td>
<td>10.21 (5.55)</td>
<td>0.86 (.38)</td>
</tr>
<tr>
<td>Having children</td>
<td>6</td>
<td>23.17 (6.39)</td>
<td>.50 (.55)</td>
</tr>
<tr>
<td>Learn about family heritage*</td>
<td>6</td>
<td>12.00 (13.89)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Marriage</td>
<td>5</td>
<td>21.40 (8.35)</td>
<td>.80 (.45)</td>
</tr>
<tr>
<td>Learn fishing, hunting, food gathering*</td>
<td>5</td>
<td>7.75 (1.71)</td>
<td>.60 (.89)</td>
</tr>
<tr>
<td>first full time job</td>
<td>3</td>
<td>29.33 (11.02)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Peer group</td>
<td>3</td>
<td>8.67 (3.69)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Navigate in two cultures*</td>
<td>3</td>
<td>13.00 (4.00)</td>
<td>.67 (.58)</td>
</tr>
<tr>
<td>Learning arts and crafts *</td>
<td>2</td>
<td>11.50 (2.12)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Accidents*</td>
<td>2</td>
<td>12.00(1.41)</td>
<td>-1.00 (.00)</td>
</tr>
<tr>
<td>Role model for community*</td>
<td>2</td>
<td>36.50 (12.02)</td>
<td>1.00 (1.00)</td>
</tr>
<tr>
<td>Learning to walk</td>
<td>2</td>
<td>3.0 (2.83)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Adolescence, Puberty</td>
<td>2</td>
<td>17.00 (1.41)</td>
<td>.00 (.00)</td>
</tr>
<tr>
<td>Fall in love</td>
<td>1</td>
<td>20.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Begin to talk</td>
<td>1</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Meeting future partner</td>
<td>1</td>
<td>14.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Event</td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>-----------------</td>
<td>----</td>
<td>------</td>
<td>-----</td>
</tr>
<tr>
<td>Own birth</td>
<td>1</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Own death</td>
<td>1</td>
<td>-</td>
<td>-1.00</td>
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<tr>
<td>Parent’s death</td>
<td>1</td>
<td>60.00</td>
<td>-1.00</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>31.50 (24.37)</td>
<td>.90 (.32)</td>
</tr>
</tbody>
</table>
Table 2: Overview over number, mean age (SD) and valence (SD) of events in Important memories.

<table>
<thead>
<tr>
<th>Event Category</th>
<th>Life Story (n= 88)</th>
<th>Age at event M (SD)</th>
<th>Valence M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn fishing, hunting, food gathering*</td>
<td>10</td>
<td>9.75 (4.13)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>first full time job</td>
<td>7</td>
<td>25.71 (8.14)</td>
<td>.71 (.76)</td>
</tr>
<tr>
<td>Having children</td>
<td>7</td>
<td>24.71 (8.86)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Teach children about Nunggubuyu culture**</td>
<td>6</td>
<td>47.00 (20.00)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Learn about family heritage*</td>
<td>6</td>
<td>11.90 (4.01)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Go to school</td>
<td>5</td>
<td>11.75 (2.75)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Learn about Nunggubuyu culture*</td>
<td>4</td>
<td>9.00 (4.69)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>University</td>
<td>3</td>
<td>25.33 (9.24)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Role model for community*</td>
<td>3</td>
<td>43.33 (10.41)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Teaching grandchildren * about Nunggubuyu culture</td>
<td>3</td>
<td>64.00 (8.49)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Learning arts and crafts *</td>
<td>2</td>
<td>12.00 (4.24)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Marriage</td>
<td>2</td>
<td>23.50 (9.19)</td>
<td>1.00 (.00)</td>
</tr>
<tr>
<td>Christianity**</td>
<td>2</td>
<td>26.25 (26.52)</td>
<td>1.00 (.00)</td>
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<tr>
<td>Respect elders**</td>
<td>2</td>
<td>37.50 (10.61)</td>
<td>1.00 (.00)</td>
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<td>Learn to take care of self *</td>
<td>2</td>
<td>17.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Navigate in two cultures*</td>
<td>1</td>
<td>70.00</td>
<td>1.00</td>
</tr>
<tr>
<td>high school graduation</td>
<td>1</td>
<td>12.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Grandchildren</td>
<td>1</td>
<td>50.00</td>
<td>1.00</td>
</tr>
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<td>Event Type</td>
<td>Count</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------</td>
<td>-----------</td>
<td>------------</td>
</tr>
<tr>
<td>Family holiday</td>
<td>1</td>
<td>42.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Adolescence, Puberty</td>
<td>1</td>
<td>12.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Other</td>
<td>19</td>
<td>28.97 (17.51)</td>
<td>.69 (.60)</td>
</tr>
</tbody>
</table>

* Nunggubuyu Cultural life script events;
** events mentioned at least 2 times in important memories
Figure 1: Distribution of cultural life script events by valence across the life span.
Figure 2: Distribution of important memories by valence across the life span.