



## Fictional First Memories

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3 RUNNING HEAD: First Memories  
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9 Fictional First Memories  
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55 *Monday, 9 April 2018*  
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## Abstract

In a large-scale survey 6641 respondents provided descriptions of their first memory, age-at-encoding (AaE), and completed various memory judgments and ratings. In good agreement with many other studies, where mean AaE of earliest memories is usually found to fall somewhere in the first half of the third year of life, the mean AaE here was 3.2 years. The established view is that the distribution around mean AaE is truncated with very few or no memories dating to the preverbal period, i.e. below about two years of age. However, we found that 2487 first memories (nearly 40% of the entire sample) dated to an AaE of two years and younger with 893 dating to one year and younger. We discuss how such improbable, *fictional*, first memories could have arisen and contrast them with more probable first memories, those with an AaE of three years and older.

Key terms: first memories, age at encoding, age at retrieval, childhood amnesia, fictional memories, narrative memories.

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3 In many studies of the recall of earliest memories the first memory is found  
4 to date to the 3rd year of life, typically about 3 years 4 months (Hayne, 2004;  
5 Kingo, Berntsen, & Krøjgaard, 2013a; Pillemer & White, 1989; Rubin, 2000;  
6 Wang, Conway, & Hou, 2004). However, also in many studies, there are always a  
7 few respondents who date their earliest memory to 2 years of age and below  
8 (Hayne, 2004; Wells, Morrison & Conway, 2013; see too Kingo, Berntsen, &  
9 Krøjgaard, 2013b). Indeed, there is some evidence that distinctive family events,  
10 e.g. the birth of a sibling, etc., might lead to the formation and long-term retention  
11 of unusually early first memories (Eacott & Crawley, 1998; Usher & Neiseer,  
12 1993, but see Gross, Jack, Davis, & Hayne, 2013, and Loftus, 1993, for a critique  
13 of the validity of such ‘memories’). Here we had the unique opportunity to sample  
14 a large group of adults across the age range and to examine first memories in  
15 groups not usually sampled, as previous studies typically have only used young  
16 adults.

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33 Interestingly the study of memory development similarly dates the  
34 emergence of first memories to the age of about 3 to 4 years. Howe, Courage, and  
35 Edison (2003) in their review of the area concluded that the processes underlying  
36 the ability to form autobiographical memories are functional by the 3<sup>rd</sup> year of life,  
37 but they also note that other factors, e.g. sociolinguistic development, may further  
38 lengthen the period during which full autobiographical memories form (see too  
39 Bauer 2007, 2015, and Howe, 2011, for recent reviews that reach similar  
40 conclusions). In one of the only experimental studies Simcock and Hayne, (2002)  
41 found that children exposed to an interesting and novel event below the age of 3  
42 years showed signs of preverbal memory yet failed to translate the memory into  
43 language both 6 months and 1 year later. Results suggest that no enduring  
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3 autobiographical memory of the target event was formed in the first place or,  
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5 possibly, no memory that could be declaratively reported was formed. The obvious  
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7 implication being that if children below the age of 2 to 3 years cannot form full  
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9 autobiographical memories then it is not possible for adults to recall such  
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11 memories from these ages.  
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13  
14 Consistent with the findings from the study of the development of memory  
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16 are the outcomes from studies of (young) adults recalling first memories. These  
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18 variously date the emergence of first full autobiographical memories to fall  
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20 somewhere between the ages of 3 to 5 years. Rubin (2000), in a meta-analysis of  
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22 over 11,000 early memories recalled by adults found the emergence of memories  
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24 to date to about 3.4 years of age, with virtually no memories falling below the age  
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26 of 3. Moreover, of the 770 respondents who contributed memories to this review  
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28 over 76% (590) were younger than 30, meaning that the findings are limited to a  
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30 comparatively young population (largely undergraduate university students). In  
31  
32 contrast, Bruce, Dolan, and Phillips-Grant, (2000), found full first  
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34 autobiographical memories to date to 5 to 6 years of age and term “memories”  
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36 below this age “fragments” that were not recollectively experienced when recalled.  
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38 But even with “fragments” very few dated to below the age of 3 years. The  
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40 overwhelming evidence and theory is then that full earliest autobiographical  
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42 memories do not emerge before about the age of about 24 to 36 months and, if  
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44 anything, the onset of full autobiographical memories may not be until later than  
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46 this.  
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52 In the present study we conducted the first large-scale web-based survey of  
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54 *first* memories (rather than the more general category of *early* memories used in  
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56 many previous studies, see Rubin, 2000). Thus, the key variable in the present  
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3 study was respondents' estimates of their age when their first memory was  
4 formed: age at encoding (AaE)<sup>1</sup>. Moreover, because this was a large-scale study  
5 we were able to sample across the full age range and draw on the general  
6 population. Uniquely, the survey was linked to a popular series of radio programs  
7 on memory produced and broadcast by the British Broadcasting Corporation  
8 (BBC) Radio 4 in the United Kingdom (2007). The programs can be listened to at  
9 <http://www.bbc.co.uk/radio4/memory/listenagain/>. The survey is no longer live but  
10 the questionnaire that was used is included in the Supplemental Materials.  
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### 20 *Method*

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22 In the first program of the radio series the fourth author introduced the idea  
23 that the program would conduct a memory survey of various types of memories  
24 (earliest, self-defining, and flashbulb memories) and report the results of the  
25 survey in a later program. The audience were invited to log into a memory web  
26 site hosted by the BBC that contained various sources of information about  
27 memory and separate questionnaires for each of the three types of memories-to-be  
28 sampled. The questionnaires always began with an information page outlining key  
29 instructions regarding the nature of the to-be-sampled memory, an informed  
30 consent box to be checked, and minimal demographic data was collected.  
31  
32 Respondents were also informed that after recalling their earliest memory they  
33 would be asked to answer some questions about the memory. For these questions  
34 they were instructed not to guess or infer answers but to only answer if they  
35 actually remembered the answer.  
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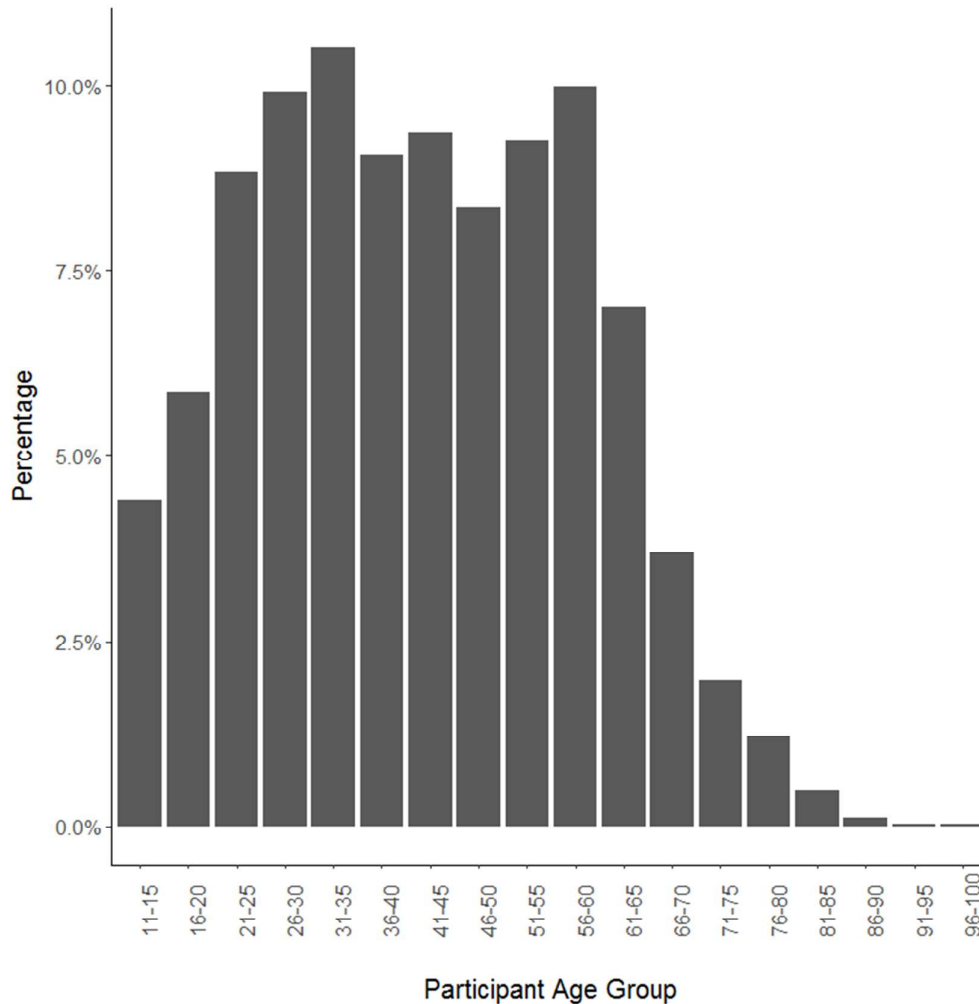
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51 <sup>1</sup> Other rating measures of vividness, emotional intensity and memory perspective were also  
52 collected but as these were secondary measures and not found to be systematically related to AaE.  
53 Consequently, they are reported in the Supplemental Materials.  
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5 Respondents then moved to the next page of the questionnaire proper. They  
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7 were instructed to recall and then type a title and description (in the box provided)  
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9 of their very earliest memory. The title was to be only a few words in length but of  
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11 sufficient specificity that if they read it again it would remind them of the memory  
12  
13 they had recalled. The memory description was to be about a paragraph or so in  
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15 length. The memory itself had to be one that they were certain they remembered. It  
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17 should not be based on, for example a family photograph, family story, or any  
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19 source other than direct experience. The memory had to be for a specific one-off  
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21 event that lasted no longer than minutes/hours. It was specifically emphasised that  
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23 the memory should not be of a routine or repeated event. After entering the title  
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25 and memory description respondents were then asked to enter, in years, the age  
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27 they believed they were in the memory. Following this, the respondents answered  
28  
29 a series of questions regarding the recollective qualities of the memory (see  
30  
31 Supplemental Materials for details).  
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### 34 35 *Results* 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51

52 Figure 1. Percentage of respondents across age groups  
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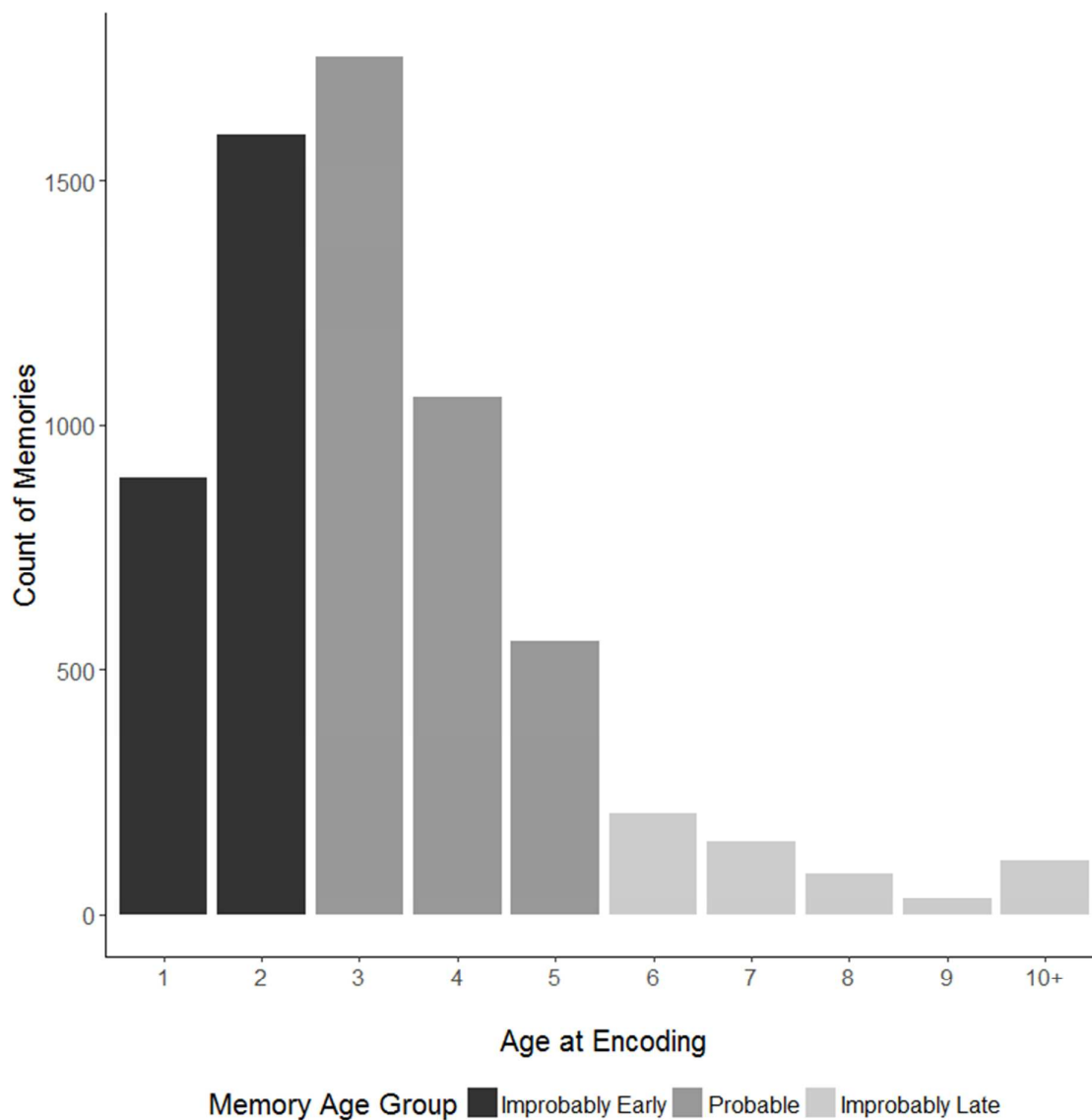
There were 6671 respondents who completed the survey. Inspection of the memory descriptions led to 166 responses being judged unusable because the memory description was vague and lacked (any) specificity or because it was explicitly stated to be based on a family story or photograph. Further, 39 memories with reported age at encoding over 15 years were not used due to their unusually late age at encoding and finally respondent age groups 0-5 ( $n=4$ ) and 6-10 ( $n=21$ ) were removed due to very low age of the respondent (which were likely typographical errors). Thus, a total of 6441 memories were used and of these 4115 were from female respondents (63.9%), with a mean age of 42.12 (95% CI = 41.61 – 42.63) and 2326 were from male respondents (36.1%) with a mean age of 41.56



(95% CI = 40.89 – 42.22). Eighty-two percent (5550) of respondents were UK nationals, with the remaining 13.8% (891) residing in other parts of the world.

Figure 1 shows the distributions of memories across age groups of respondents, and shows clearly that memories were sampled across the lifespan.

Figure 2. Frequency of Age at Encoding (AaE) grouped by memory type



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11 Figure 2 shows the frequency of AaE across the sample<sup>2</sup>. What is  
12 immediately evident in Figure 2 is that there were a large number of unexpectedly  
13 early memories with 38.6% (2487) of the sample having what we term *improbably*  
14 *early memories* dating to two years and younger (M = 1.64, 95% CI = 1.62 –  
15 1.66), 52.3%, (3371) of respondents reported what we term *probable memories*,  
16 falling between AaE of two and five years (M = 3.65, 95% CI = 3.62 – 3.67) and  
17 the remaining 9.1% (583) of respondents reported an AaE of six plus years (M =  
18 7.72, 95% CI = 7.55 – 7.90), which we term *improbably late memories*.  
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28 Thus, the AaE of most memories fell in the predicted range, two years to  
29 five years old, however, the second largest group of memories had AaEs that were  
30 unexpectedly early falling in the period of two years and less and these were  
31 greater in number than improbably late memories dating to 6+ years and older.  
32 Despite this unexpected distribution, the overall mean AaE of the whole sample  
33 was 3.24 (95% CI = 3.19 – 3.29) years comparing favourably with previous  
34 findings of the mean age of the earliest memory that place it in the first half of the  
35 third year of life.  
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46 Next, we investigated if AaE varied as a function of respondent age. In  
47 particular, we wanted to investigate whether the AaE reported in most earliest  
48 memory studies is somewhat skewed due to the sampling of younger adults. The  
49 sample was therefore split into two new groups: a younger group comprised of  
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55 <sup>2</sup> The full data set can be accessed at [city.figshare.com](https://city.figshare.com) with the DOI of:  
56 <https://doi.org/10.25383/city.6115676>  
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3 respondents within the 11-15, 16-20 and 21-25 age groups ( $n = 1228$ ), similar to  
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5 the majority of participant's sampled in Rubin's (2000 study) and an older group  
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7 comprised of all remaining respondents ( $n = 5213$ ). The mean AaE was 3.56 (95%  
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9 CI = 3.44 – 3.68) for the younger group and 3.16 (95% CI = 3.11 – 3.22) for the  
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11 older group. These means were reliably different ( $t(1695) = 6.02, p < .001, d = .19$   
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13 (95% CI = .13 - .25)), showing that the older group had reliably earlier first  
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15 memories than the younger group. The mean age of the younger group's earliest  
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17 memories was then more consistent with previous studies using young adults,  
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19 although we note that in the present study even some of this group had memories  
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21 dating to 2 years and below<sup>3</sup>.  
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#### 24 *Memory Content*

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26 It is hypothesised that early memories are “fragments” of memories (Bruce,  
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28 et al., 2000), lacking rich and detailed descriptions. This was tested in the present  
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30 study by, firstly, assessing the word count of the memory descriptions as a  
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32 function of memory group. A Poisson regression with planned comparisons (early  
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34 vs probable and early vs late) found no reliable difference in word count between  
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36 improbably early memories ( $M = 69.20, 95\% \text{ CI} = 67.02 - 71.38$ ) and probable  
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38 memories ( $M = 68.82, 95\% \text{ CI} = 66.87 - 70.76; p = .14, b = .007, 95\% \text{ CI} = -.002$   
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40  $- .017$ ) but improbably early memories had a reliably shorter word count than  
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42 improbably late memories ( $M = 70.33, 95\% \text{ CI} = 65.78 - 74.88; p < 0.001, b =$   
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44  $.025, 95\% \text{ CI} = .011 - .039$ ). Although reliably different, memories across all three  
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46 categories had negligible differences in word count ( $\pm 1$  words), thus, contrary to  
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54 <sup>3</sup> As far as judgments of recollective qualities were concerned all memories, regardless of group  
55 were of moderate vividness and were rated as being recalled moderately often. Interestingly  
56 improbably early memories were more strongly associated with an observer than field perspective,  
57 see the Supplemental Materials for full analyses.  
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the suggestion that early memories are “fragments”, the present findings show that they are similar in length to both probable and improbably late first memories.

Secondly, the corpus of memory descriptions was then further analysed using the Alceste Software for statistical analysis of textual data. This software bridges quantitative and qualitative methods, analysing natural language using multivariate statistical methods to identify groups of words i.e. phrases and sentences that reliably cluster together across different contexts. The resulting output provides categories of dominant themes in the corpus that are required to be named by the analyst.<sup>4</sup> Separate analyses were performed on the descriptions of improbably early, probable, and improbably late memories, yielding a linguistic profile for each memory group (Table 1).

Table 1. Percentage of memories within each semantic category across memory types

Memory Type	Category (% of memories)	Example
Improbably Early	Pram (baby carriage) (52%)	I was lying in my pram....
	Family relationships (30%)	My parents were going on holiday and me and my elder sister .....
	Feeling sad (18%)	I remember feeling very sad, my mum.....
Probable	Toy (20%)	...my uncle had bought me a loopy loo doll. It was almost as..
	Birth of a sibling (16%)	...the arrival of my baby brother. When has was born and my...
	Home (16%)	...the front door opened directly into the kitchen which had...
	School (15%)	...my first day at primary school, there was another little girl..
	Crying (11%)	...I remember crying hysterically...I would not be comforted..
	Holidays (11%)	...we travelled to a holiday camp in Sussex on the Small Hythe..
	Dreams (11%)	...being potty trained in my dream...
Improbably Late	Home (59%)	In the winter of 1940 we lived in south London...
	Activities (26%)	...playing football with my friends...
	School (15%)	I attended the local school. The school remained open...

<sup>4</sup> Full details can be found at: <http://www.image-zafar.com/Logicieluk.html>

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3 In Table 1 it can be seen that 100% of descriptions of improbably early  
4 memories fit into one of three categories, the dominant category being memory  
5 descriptions in which a pram (baby carriage) featured across various contexts. We  
6 also note that the category ‘birth of sibling’, that has previously been identified as  
7 an event likely to give rise to very early first memories (Eacott & Crawley, 1998;  
8 Usher & Neiseer, 1993,), did not feature in any of the improbably early memories  
9 analysed in the study corpus. In contrast, 100% of descriptions of probable  
10 memories were accounted for by seven categories, all of which clustered around  
11 words and phrases referring to aspects of childhood and many descriptions  
12 featured toys in a wide variety of contexts (see Table 1). Finally, 100% of  
13 descriptions of improbably late memories decomposed into three categories with  
14 the dominant category featuring descriptions that mentioned home in a wide  
15 variety of contexts. In summary, the linguistic analysis of the memory descriptions  
16 found them to be age appropriate; descriptions of improbably early memories  
17 referred to events and activities from infancy, i.e. being pushed in a pram/baby  
18 carriage, probable memories referred to events and activities from early childhood,  
19 e.g. playing with toys, and improbably late memories often referred to events in  
20 the home, e.g. family gatherings of various sorts, (examples of memories for each  
21 category are included in the Supplemental Materials).

### 22 *Discussion*

23  
24 The present findings pose a major conundrum: the child and (young) adult  
25 research, as reviewed earlier, all conclude that earliest memories cannot exist  
26 below about the age of two years and that there would be comparatively few  
27 memories below the age of three years. Yet the main finding of the present survey  
28 of earliest memories, the largest such survey ever conducted, is that 2487 (38.6%

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3 of the entire sample) of the earliest memories dated to when respondents were two  
4 years of age or younger, with, astonishingly, 893 (13.9%) dating to one year or  
5 younger. These are what we have termed improbable first memories and the  
6 question is how best to explain them? Below we evaluate three possible  
7 explanations: misdating, nature of the respondents, and the narrative and fictional  
8 nature of the 'life story' (Habermas & Bluck, 2000; Kober, Schmiedek, &  
9 Habermas, 2015).

### 17 *The Misdating Explanation*

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20 Dating of all autobiographical memories, including childhood memories, is  
21 predominantly inferential and specific calendar and age dates are rarely retained in  
22 long-term memory (Thompson, Skowronski, & Larsen, 1996). Thus, it is possible  
23 that some of the dates given for first memories in the present study are incorrect  
24 estimates, indeed it would be remarkable were they not. We assume, however, that  
25 such misdating is random rather than systematic and therefore represents noise in  
26 the AaE measure. Nonetheless, a plausible misdating account of the present  
27 findings might propose that, for unknown reasons, almost 40% of the sample  
28 systematically backward-telescoped their estimates of the AaE of their first  
29 memories (see Wang & Peterson, 2014, for evidence of forward telescoping in  
30 estimates of earliest memories).

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33 If the misdating account were correct then it would be expected that the  
34 improbable early memories would be about events similar to those that were dated  
35 to three years and older. But this was not the case and our content analysis found  
36 that improbable first memories were of events that related to infancy whereas  
37 memories dating to three years and older (probable first memories) were of events  
38 related to childhood (see Table 1). These findings of differences in the content of  
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3 improbably early and probable first memories effectively rule out the systematic  
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5 misdating explanation.

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7 *The Respondents: Self-Selection*  
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10 The present sample of respondents differed from most previous studies in  
11 that they consisted of individuals from across the lifespan. Given that they freely  
12 responded to the request to complete a web-based memory survey they were self-  
13 selected. Self-selection is common in most psychological research, after all even  
14 the student participating for course credit is self-selected. Random selection is  
15 typically not practically possible, particularly given resource constraints.  
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17 Nevertheless, a very large sample, even if self-selected, has the advantage of very  
18 high power. In the present study power approached 1 for all effect sizes, far higher  
19 than that in most psychology research and indeed in most social science research.  
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23 Yet, the possibility remains that there is some unique aspect of this sample.  
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25 One possibility is that this group have thought about, i.e. rehearsed, their past more  
26 than other groups and in the course of so doing have, perhaps implicitly or non-  
27 consciously, generated cues that allowed them to access far earlier memories than  
28 those accessed in previous studies. The present findings suggest that this may  
29 occur more frequently in older than younger adults. A problem for this  
30 explanation, however, is that there were no differences in rated rehearsal between  
31 the older and younger groups, both of who indicated equal moderate levels of  
32 rehearsal (see Supplemental Materials). Instead, it may be that middle-aged adults  
33 have a more developed life-story than younger adults – one that incorporates and  
34 constructs *knowledge* from, or about, infancy (their own, possibly others, possibly  
35 infancy in general) into the form of memories or what we here term *fictional*  
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*memories*.

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3 *The Life-Story and Fictional Memories*  
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5 If the improbably early memories, memories that research tells us cannot be  
6 formed at such young ages, are largely of imagined rather than experienced events  
7 how do these fictional memories arise? Note that we use the term “fictional  
8 memories” here rather than “false memories” or “illusory memories” for a number  
9 of reasons. One is that the term “false memories” has a pejorative aspect to it –  
10 false memories are negative and the term “illusory memories” suggests some sort  
11 of memory error. Although we note that more recent work has found positive  
12 aspects to false memories (see Howe, 2011; Howe, Wilkinson, Garner, & Ball,  
13 2016; Schacter, Guerin, & St. Jacques, 2011). Moreover there may be adaptive  
14 consequences of fictional memories more generally. For example, in adulthood  
15 preserving a positive and consistent self-narrative helps a person maintain a  
16 positive self-image that can foster positive social interactions with others, ones  
17 that arguably enhance the rememberer’s quality of life (see Ross & Wilson, 2000,  
18 2003). Fictional memories are then part of the life-story and may play a central,  
19 and positive, role in defining periods of life or lifetime periods (Conway, 2005;  
20 Conway & Pleydell-Pearce, 2000). It is particularly noteworthy that all the  
21 memories we sampled, improbably early, probable, improbably late, included age-  
22 appropriate events and viewed overall they give a picture of a life story with  
23 successive early periods each with a distinctive content.  
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46 Thus, in our analysis of the content of the descriptions of memories from the  
47 different AaEs, see Table 1, we found that accounts dating to two years and earlier  
48 contained details relating to infancy. Under the three broad categories of pram  
49 (baby carriage), family relationships and feeling sad, these were details such as  
50 “an image of my pram”, “being in my cot”, “in my push chair”, “having my nappy  
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3 changed”, and even more implausibly “the first time I walked”, “wanting to tell  
4 my mother something before I could talk”, “the first word I spoke”, and so on. On  
5 the basis of these descriptions we suggest that what people often have in mind  
6 when “recalling” these improbably early memories is an image (often visual) of an  
7 object or action possibly dating to very early childhood. This might be based on  
8 experience or derived from a photograph or a description (the rememberer may not  
9 be aware of the source of their image/s). Other sources of details for improbably  
10 early memories may derive from family stories/history, e.g. the first word you  
11 spoke was “X”, all you ever wanted to do when you were little was walk, etc.  
12 These facts of infancy, possibly along with some visual fragments, form the basis  
13 of remembering infancy: their source is believed to be, or even experienced as  
14 being from these very early ages and, accordingly, dated to those times. Thus, we  
15 suggest that what a rememberer has in mind when recalling fictional improbably  
16 early memories is an episodic-memory-like mental representation consisting of  
17 remembered fragments of early experience and some facts or knowledge about  
18 their own infancy/childhood. Additionally, further details may be non-consciously  
19 inferred or added, e.g. that one was wearing nappy when standing in the cot. Such  
20 episodic-memory-like mental representations come, over time, to be *recollectively*  
21 *experienced* (Gardener & Richardson-Klavehn, 2000) when they come to mind  
22 and so for the individual they quite simply are “memories”, memories that their  
23 content indicates date to a particular time: infancy.

24 We suggest that improbably early first memories fall in a larger class of  
25 fictional memories. Indeed, in the constructive view of memory all memories  
26 contain some degree of fiction. For example, all memories are time-compressed  
27 and, therefore, do not literally represent the experience from which they derive.

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3 Similarly, all memories contain details that are both consciously and non-  
4 consciously inferred. For example, Wells, et al., (2013) found that clothes in  
5 childhood memories were poorly recalled. Nonetheless, respondents in that study  
6 recalled that they had been clothed and the same applies to many other types of  
7 details, e.g. weather, time of day, conversations, etc., that are also (non-  
8 consciously) inferred rather than remembered. Memories, then, are part of a  
9 narrative of a person's life and the way in which they correspond to experience  
10 and cohere with other memories is complex and dynamic.

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20 Note that, we use the term narrative as it used by Goldie (2012) in his  
21 account of *narrative thinking* which is an internal mental representation rather than  
22 a publically presented account. In this conception the personal value and  
23 significance of a fictional memory resides in how coherent it is with other parts of  
24 autobiographical memory rather than with how well it corresponds to a previously  
25 experienced reality (see Conway, 2005, and Conway, Loveday, & Scott, 2016, for  
26 discussion of coherence and correspondence in autobiographical memory).

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35 Perhaps what is important when it comes to questions of accuracy of a memory,  
36 from any age, is the extent of fictionalisation of details. In the present study the  
37 data indicate that fictional very early memories are more common in middle-aged  
38 and older adults and about 4 in 10 of this group have fictional memories for  
39 infancy. To a lesser degree they are also present in some younger people. Perhaps,  
40 the life narrative/story, mainly for the middle-aged, needs to extend, (for reasons  
41 that are not yet understood, but possibly to do with coherence and completeness of  
42 the life narrative), to the very earliest years of life and hence the emergence of  
43 improbably early fictional first memories.

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## Authorship Section

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7 The first author worked as the fourth author's post-doctoral research assistant  
8 during this research and preparation of the paper. Although both made different  
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