RUNNING HEAD: CHILDHOOD MEMORIES

Adult recollections of childhood memories: What details can be recalled?

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Abstract

In a memory survey adult respondents recalled, dated, and described two earliest positive and negative memories that they were highly confident were memories. They then answered a series of questions that focused on memory details such as, clothing, duration, weather, etc. Few differences were found between positive and negative memories that on average had 4/5 details and dated to the age of 6/6.5 years. Memory for details about activity, location, and who was present was good, memory for all other details was poorer or at floor. Taken together these findings indicate that (full) earliest memories may be considerably later than previously thought and that they rarely contain the sort of specific details targeted by professional investigators. The resulting normative profile of memory details reported here can be used to evaluate *overly-specific* childhood autobiographical memories and to identify memory details with a low probability of recall.

Keywords: childhood amnesia, earliest memories, childhood sexual abuse, memory specificity, police interviews, witness memory.

Relatively little is known about what details, in particular what *specific* details, adults can recall of early childhood events that they claim to remember, and remember often with great confidence. Since Freud (1915) first introduced the term 'infantile' or 'childhood' amnesia, based on the results of one of the first surveys of autobiographical memories (Henri & Henri, 1898), there have been many investigations of adult recollections of earliest memories (if not of their details) and often of the first memory (Bruce, Robinson, et al., 2005; Hayne, 2004; Pillemer, 1998; Pillemer & White, 1989; Rubin, 2000; Wang, Conway, & Hou, 2004 – see Bauer, 2007, Howe, 2011, and Strange & Hayne, 2013, for recent reviews). In a meta-analysis Rubin (2000) found the mean age of the earliest memory to date to the age of 3.4 years. Of course there is a distribution around this mean with some remembering earlier memories and many, later memories. It is considered not possible to remember memories from below about the age of 2 years, i.e. from the preverbal period (Hayne, 2004). Typically these very early childhood memories are fragmentary, disorganized, and often enigmatic in the sense that the rememberer does not know why (or how) they remember them. Also these childhood memories can be accompanied by feelings of uncertainty/doubt that they are in fact memories and, occasionally there are aspects of the content of the memories – memory details – or other external evidence that clearly show them to be false (Mazzoni, Scoboria, & Harvey 2010). Even in the later case, however, the memories are experienced as memories, i.e. they are accompanied by *recollective experience*.

Set against this are findings that adults do report earliest memories dating to below the ages of 3 years, 2 years, even to the first 12 months of life. Indeed there are, admittedly a small number of, adults who claim to report remembering being born and provide detailed memories of their birth. In a corpus of over 6000 adult recollections of earliest memories

collected over a period of several years in our laboratory (Conway & Morrison, in preparation) 15% of all memories dated to below the age of 3 years with, remarkably, over 300 dating to below the age of 1 year. (Interestingly the mean age of the earliest memory from this large sample is also 3.4 years). As Strange and Hayne (2013) point out there are now a number of studies of earliest memories that feature these unexpectedly early memories, from 2 and below. Occasionally these are *overly-specific* containing details of how the person felt, what they thought, what others might have been thinking, the weather, time of day, calendar date, clothes worn, very specific activities, handedness, etc. To illustrate, consider two descriptions of very early first memories from our corpus of first memories:

"I was in a room, in my cot which was by a window (high up), it must have been sunny because my cot was light but outside the room, through an open door opposite my cot, looked dark. I was playing with a toy in my cot - which was fixed to the side of it, it had a tortoise and a hare on the bottom of it and a telephone dialler, I don't remember seeing it since. I heard a noise and turned round towards the door and tried to stand up but I think I must have been too young to stand. I remember trying to pull myself up with the railings on the cot and I could see my Mum, through the open door, out in the corridor. She appeared from the right and walked directly across the corridor and disappeared into a room and then came out and walked back to the right and disappeared again. I remember wanting to get her attention and wanted to talk but I don't think I could talk - I remember feeling really upset that I couldn't get her to notice me, I was frustrated and felt lonely because I had wanted her to see me. I have talked to my Mum once about it and she said it was at our old house and the stairs had been to the right and the bedroom was directly opposite, which is obviously where she went to and from. I have only told two other people of it since." (Age about 18 months).

"This is my first memory. This memory can be dated as it occurred in Nepal and I was 18-19 months old when we were there. My parents were speaking to some people in a meeting tent outside a small village and I was playing with my large red fire engine (my memory has it the same size as myself), which was my pride and joy. The meeting finished and I went to see my parents. I then returned to my fire engine to discover it had gone. I can describe the scene vividly and have a photo impression of the place and an emotional imprint of what the loss of my fire engine felt like. It was never recovered."

bviously a key question here is, are these overly-specific memories accurate? Some studies suggest that they might be. Usher and Neisser (1993) found that adults could recall early memories to the age of 2 and below if those memories were associated with other significant events in the child's life such as, for example, the birth of a sibling (see Eacott & Crawley, 1998, for similar evidence of adult recall of childhood memories below the age of 3 years). One problem here, however, is that although the date of the associated 'important' event can be verified, the memory itself cannot be, leaving open the possibility of error and even that of false memory. Given the near-impossibility of verifying adult recall of very early events one way to approach this problem is to examine what young children themselves can remember. The logic being that if children themselves cannot recall specific details and also have, at least the occasional, overly-specific memory then it seems highly unlikely that decades later, in adulthood, they would have such memories. Thus, Gross, Jack, Davis, & Hayne (in press) investigated the ability of 2 to 5-year old children to recall the recent birth of a younger sibling and compared this to adult recall of the birth of a sibling at about the same age. The central finding was that few children and adults were able to recall the birth of a sibling if that had occurred when they were aged 2. As their age at the time of the birth

increased they were gradually able to recall at least some details, but not overly-specific memories. Overall the findings suggest that these events were not encoded into long-term memory in the first place. If so it would not be possible to recall them in adulthood. In addition, further findings indicate that the adults had added in details to their memories. Possibly this may have been from accurate sources, i.e. conversation with the mother, family records, photographs, and so forth. Or, of course, these details may have been inferred and added in over a period of years becoming integral, if false, details of the memory.

In general the recall of events by children below about the age of five years is substantially different from adult recall of autobiographical memories (indeed it may not be until beyond the 10 to 15 years of age that a memory system approximating that of the adult autobiographical memory system begins to emerge, Conway, 2005, Van Abbema & Bauer, 2005, with yet further changes in latter adolescence and early adulthood, Bluck & Habermas, 2000). The memories of 5-year older children and younger tend to be much less detailed, it is difficult to elicit memory details from them, and the details they do recall are related to their interests and goals which rarely correspond to the interests and goals of adults (comprehensive reviews are available in Bauer, 2007, Howe, 2011). In a recent interesting study of child recall of details of an event Strange and Hayne (2013) had 5- to 6-year olds and 9- to 10-years take part in a surprise school visit to a local fire station. Later they were asked for a free recall of the event and then answered a series of questions about specific details such as the weather, time of day, duration, clothes worn by self and others, their emotions, how others felt, etc. In their free recall virtually none of the children, regardless of age, spontaneously recalled any of the specific details featured in the questions. In response to the questions the older children recalled more about time of day, duration, and own clothes.

Generally younger children although showing some improvement on the questions, which obviously contain very specific memory cues, showed impoverished memory for the event. All the children were poor, the younger children at floor, in recalling the date of the event (see too Orbach & Lamb, 2007). These findings suggest that adult recall of childhood events that feature such specific details - overly-specific memories – should be treated with considerable caution.

Adult recall of childhood events: Why is it important?

Autobiographical memory is a complex cognitive-affective system encompassing many types of knowledge including beliefs about memory (Conway & Pleydell-Pearce, 2000; Conway, Singer, & Tagini, 2004). It is mediated by a complex set of interconnected neural networks distributed throughout the neocortex and limbic system (Cabeza & St. Jacques, 2007). It is across these knowledge structures and in these networks that memories are constructed and in which false memories are created, erroneous details added, and in which beliefs can influence the construction process and mental representations we experience as memories. One such belief is that the more specific the details in a memory the more likely it is to be correct or accurate (Justice, Morrison, & Conway, under review). Interestingly, the study of flashbulb and other types of autobiographical memories shows this widely held belief to be wrong: there is no simple relationship between accuracy and the amount of details, of any type, that can be recalled (Conway, 1994, 2005; Hirst, et al., 2009; Luminent & Cucri, 2009). The power of the 'specific-details = memory-accuracy' belief was investigated by Bell and Loftus (1989) who found that adding very specific details to accounts of eyewitness memories increased their perceived accuracy - an effect they termed *trivial persuasion*. The overly-specific memories that adults recall from early childhood are,

possibly, prime examples of trivial persuasion operating in autobiographical memory. From this perspective such ‘memories’ and their functions (Bluck, 2003) are of theoretical interest and most probably relate to the need to create memories that are self-consistent (Conway, 2005) or which, in the examples above depict a positive childhood, one that can survive (minor) adversity.

There is, however, another very different depiction of childhood in which memories of abusive episodes define the remembered child as a victim. For at least the past two decades and currently, courts in North America, the U.K., and Europe, see many cases of alleged child abuse, usually sexual abuse, in which memories are the only evidence. Often the memories in such cases are quite remarkably overly-specific. Conway (2013) for example describes a typical case of a complainant, referred to as ‘B’, a 20-year old woman, who provided a witness statement consisting of a series of more and more specific memories of sexual abuse from the age of 3 to 13 allegedly inflicted on her by her father. B’s earliest memories from age 3 to 5 contained highly specific details such as the colour of wallpapers, patterns on carpets, objects in a room and their features, what B thought and felt, what the father apparently felt, use of the left and/or right hand, various sexual acts which a 3-year old would be unlikely to understand, and each episode which usually took place in a different location, was accompanied such details and others too. In a similar report Howe (2013) describes the case of ‘HR’, also a 20-year old female complaint who alleged sexual abuse on many occasions between the ages of 6 to 8 years but unlike B forgot about the abuse until she underwent counseling at the age of 15 to 16. At that point she suddenly recalled in detail 10 rapes, by the same person, in different locations. She was able to recall hands used, what side he lay on, and all the specific details of the environment as B had recalled, and her feelings,

verbatim conversation and so forth. These two cases are illustrative of fantastic overly-specific memories, the types of memories that in years of acting as memory expert witnesses both authors have seen in about 70% of the cases in which they have acted. Note too, that such memories are recalled by complainants in their 30s, 40s, and 50s over retention intervals measured in decades. Jurors and other triers of fact often respond positively to overly-specific memory evidence such as the above and in the UK at least, many convictions are made on the basis of this type of evidence. With sentences in years, sometimes a decade and more, the question of what adults can remember of childhood events that they claim to accurately recall is then critically important. Thus, there is a powerful forensic, as well as theoretical, imperative to establish whether or not it is possible to remember such details. We might at this point note that the earlier review of adults recollecting childhood memories and children, too, recalling recent events they had experienced, already suggests that such overly-specific childhood memories are probably not possible.

Assessing details in adult recollections of early childhood

As observed earlier it is rarely possible to verify the details of childhood memories recalled by adults. In fact, it is not possible to verify specific details of any memory unless there is some independent external evidence. Nonetheless it is possible to collect information about what adults claim to remember and that may provide a way, even if it is crude, to gage overly-specific memories. We suggest that what is needed are base-rate measures of recall of different types of memory details. In the present study, one of the first of its kind, we examine the details of adult childhood memories of the earliest positive and negative experiences participants were *certain* they remembered. (Note that his more stringent criteria can lead to the recall of later earliest memories as Bruce, et al., 2005, found). Of course the

relationship between confidence and accuracy is complex and the two do not always correlate, particularly in witness memory (see, for example, Talarico & Rubin, 2003). However, the reason for focusing on memories that adults were certain were memories, was to avoid the recall of earliest memories whose status as memories was questionable, i.e. more memory or episodic fragments than coherent autobiographical memories (see Conway, 2009, for more on this distinction).

In order to investigate the forensic aspect of recalling memory details we followed police interview procedures and first asked for a free recall and then asked a series of questions similar to those deployed by the (U.K.) police: What was the activity, location, who was present, how old they were at the time, time of the event, duration of the event, what were they wearing, what was the weather, and what did they think at the time. These questions are typically asked in most U.K. police interviews in cases of historic sexual abuse. Note that, we were not able to do what the police also systematically do and that is summarize the complainant's evidence at regular intervals during an interview. A procedure that must, in itself, have a powerful effect on memory. Based on the finding that children themselves remember relatively little in the way of specific details of events they remember from below the age of about 7 years, and also forget many of these as they age (Bauer, 2007), we did not expect high levels of recall in response to the specific detail questions. Nonetheless, it could be the case that adults do *remember* (rather than infer or add plausible details) more of early childhood events when they are adults compared to when they were children. This would be unusual and difficult to explain but if it were true then there might be a high level of recall of specific details in adult memories of childhood.

Method

Participants. There were 97 females, 27 males with a mean age of 26.62, SD 12.13 years recruited from the general population. Seventy-three were tested in small groups or individually in the laboratory and 51 were tested on-line. Participants received a small honorarium or if they were students, course credit.

Materials & Procedure. Participants completed a 7-page questionnaire either in the laboratory in printed booklets or on-line. No differences were found between the laboratory and web collected data and therefore the two are analyzed together. The questionnaire began with an information page outlining key instructions regarding the nature of the memories required. Participants were instructed to write about four earliest memories from childhood (two emotionally positive, and two emotionally negative). Each memory had to be one that the participant was certain they remembered and based on their direct experience at the time and not from, for example, a family photograph, story, or some source other than direct experience. Each memory had to be for a specific event that lasted no longer than minutes/hours, and could not be a frequently repeated event or routine. Participants were also informed that they would then be asked to answer some questions about each of the memories. Crucially, they were instructed not to guess or infer the answers and only answer a question if they truly remembered the answer. Following these instructions demographic information age, gender, whether they were a native English speaker, etc., was collected.

On the following page (page 2 in the booklet and web site) the first memory was cued according to the condition used with that participant. Order of recall of the valence of each memory was counterbalanced over participants and: Order 1 = Pos, Pos, Neg, Neg; Order 2 =

Neg, Neg, Pos, Pos; Order 3 = Pos, Neg, Pos, Neg; Order 4 = Neg, Pos, Neg, Pos. Participants were instructed to *'Recall a memory of an emotionally (negative or positive) experience from early childhood'*. They then provided a title for the memory, and below in a text box wrote/typed an account of their memory. The nine memory detail questions were then answered: 1. Who was present? 2. What was the location? 3. What was the activity? 4. The participants' age at the time of the memory? 5. What were they wearing? 6. What the weather was like? 7. What did they think at the time? 8. What was the time of day? 9. How long did the event last? Participants were reminded that they were not to guess or infer, and to answer only if they remembered the detail. This broadly follows police interviewing procedures, at least as evident in over 100 witness statement we have seen. It is not intended to simulate the cognitive interview (see Memon, 1999, for a review) or any other formal interview scheme. It simply follows a common aspect of police interviewing which we have noticed when acting as memory expert witnesses in actual cases.

Finally, various aspects of each memory were probed. Participants were asked to select their perspective in the memory: field (1st person) or observer (3rd person) (Libby, Eibach, & Gilovich, 2005; Nigro & Neisser, 1983). It was explained that in a 'field' perspective something similar to one's original perspective in the actual experience was preserved whereas in an 'observer' perspective one saw oneself in the memory. Emotional intensity, emotional valence (included as a manipulation check), vividness, frequency of rehearsal, and the personal importance of the memory were all then rated on individual 5-point scales where 1=low and 5=high. The next three pages were identical and collected the same information on the remaining three memories.

Results

Coding of memory details. Although participants had been instructed to provide specific answers to each of the nine detail questions, examination of answers showed that a number of responses were not specific. A set of rules were then developed and used to code participants' responses to each question as either a specific detail or not [coded as a 'yes' (answered) or 'no' (not answered)]. A second, more lenient coding system was also used, which counted any response as a 'yes' response. However, the strict coding system more closely reflected the instructions given to participants and also the aim of the study: to gage what adults can actually remember of childhood events they are highly confident they do in fact remember. We, therefore focus on the responses coded using the 'strict' system of scoring details that is shown in Table 1.

Table 1 about here

For all 496 memories the nine memory details were coded by the first author according to the rules outlined in Table 1. Inter-rater reliability was assessed using a subset of 100 coded memories from the database (50 positive and 50 negative). These were coded by an independent coder, who was not aware of any other aspects of the research, using the rules in Table 1. Correlating the coding produced by the first author and independent coder showed consistency across the details of who was present ($r = 0.71$, $p<0.001$), the location ($r = 0.74$, $p<0.001$), the activity ($r = 0.96$, $p<0.001$), and the time ($r = 0.92$, $p<0.001$). The remaining measures age, clothes, weather, length, and thoughts, had a mean correlation of $r = 0.82$,

$p<0.001$. These findings show that the rules in Table 1 can be consistently used to establish the specificity of memory details.

Qualitative aspects of the memories. The qualitative nature of the positive and negative memories differed most obviously in terms of the types of events that featured in the memories. Positive memories could be broadly classified into several categories, including: memories of achievements (e.g. first time riding a bike, 17.8% of memories), birthday/Christmas (e.g. presents received, 12.5%), and holidays/day trips (10%). Negative memories included categories such as illness/injury (e.g. breaking a bone, 24.5% of memories), being frightened/intimidated (e.g. bullying, 13.8%), and death (e.g. death of a family member or a pet, 11.4%).

Age at Encoding: positive and negative memories. Age at encoding of positive and negative memories were entered into one-year time bins from 0-11 years.

Figure 1 about here

The majority of positive memories (range, 1 to 10.92 years, mean: 6.44, SD 2.19) were recalled from a period of 5 years old and above, with the majority, 69%, falling between the ages of 5 and 9. By contrast, the majority of negative memories (range 2 to 10.50 years, mean, 6.17, SD 2.06) dated to an earlier period of 4 years and above, with the majority, 74%, of memories recalled from between the ages of 4 to 8 years. A 2 (memory type) x 11

(memory time bin) ANOVA revealed a main effect of memory time bin ($F_{6.62, 813.71} = 16.33$, $p < 0.001$, $\eta^2 = 0.12$), reflecting the clustering of the majority of memories between the ages of 4 to 8 years. There was also a significant interaction between memory type and memory time bin ($F_{6.74, 828.79} = 2.16$, $p = 0.02$, $\eta^2 = 0.02$), reflecting the earlier peak in the age of acquisition of negative memories compared to positive memories.

Figure 2 about here

Probability of recalling each detail type. Figure 2 shows the probability that participants could provide each of the nine memory details (as assessed by the nine questions) irrespective of the valence of the memories. The questions are presented in the order of the most- to least-likely to-be-remembered type of memory detail. Participants were most likely to remember specific details of the activity (what), location (where), and the people (who). Several other specific details, e.g. what did you think (thought), the weather (weather), age at the time (age at encoding, AaE), length of the event (duration) were less likely to be remembered. Finally, very few people remembered the time of an event (when) and what they and anyone else in the memory had been were wearing (clothes). This ordering of recall of details was identical for both positive and negative memories and was uninfluenced by the order (condition, see above) in which memories were recalled.

For the purposes of analysis memory detail scores were collapsed across the pairs of negative and positive memories resulting in one score for each of the nine types of memory detail. Thus, for instance, if a participant gave a satisfactory answer to the question ‘what

were you wearing?' for both of their positive memories, then they had a score of 2, if they only gave a satisfactory answer for one positive memory, they scored 1, and if they did not give a satisfactory answer to either then they scored zero. For each of the nine detail questions the 124 pairs (N=248) of positive and negative memories were entered into within-subjects t-tests. It was found that positive memories were reliably more likely to contain specific details about 'what', mean positive score, 1.81 (SD 0.45), mean negative score, 1.70 (SD 0.56), $t_{123} = 2.19$, $p = 0.03$, AaE, mean positive score, 1.09 (SD 0.81), mean negative score, 0.91 (SD 0.86), $t_{123} = 2.51$, $p = 0.01$] and what they were wearing, mean positive score, 0.24 (SD 0.50), mean negative score, 0.12 (SD 0.35), $t_{123} = 2.45$, $p = 0.02$. Childhood memories of emotionally positive experiences then contain more information about 'what' (activity), time of encoding, and clothes (worn) than negative memories from the same period.

Amount of details recalled: Total Detail Scores. The overall level of detail recalled for positive compared to negative memories was assessed by calculating the total number of details recalled for each memory (minimum = 0, maximum = 9, referred to as the 'total detail score').

Figure 3 about here

Figure 3 shows the distribution of total detail scores for positive and negative memories. A 2 (valence) x 2 (memory) ANOVA on the Total Detail scores revealed a main effect of valence, with positive memories having significantly higher scores than negative memories: mean positive score = 4.84 (SD 1.52), mean negative score = 4.56 (SD 1.45),

$F_{1,123} = 7.84$, $p = 0.01$, $\eta^2 = 0.06$). Although the difference was small in size, and only approached significance, positive memories were nonetheless found to consistently contain more details than negative memories.

Observer/field perspective and other memory ratings. There were no differences between the valence of memories ($X^2 < 0.1$) and memory perspective and for both sets of memories over 66% were judged to have a field perspective. (Note that a few of the memories were not given perspective ratings and there were 21 missing ratings for positive memories and 19 for negative memories, N=456). No differences were present in the ratings of vividness, etc. Ratings of emotional valence confirmed that the pleasant memories were moderate to high in positive emotion and the negative memories moderate to high in negative emotion.

Discussion

We started this research with the question: What details can adults remember from memories of events dating to early childhood, memories that are recalled with high confidence? The answer would seem to be: relatively little (see Figures 2 & 3). What, where, and who, in descending order were found to be reasonably well recalled, whereas thoughts, the weather, and age at encoding were poorly recalled. Event duration, time, and clothes were rarely recalled (see Figure 2). Examination of the memory descriptions did not identify any other class of detail that was systematically recalled across the corpus of memories and the

memory descriptions were generally short and of limited detail. Three typical examples, selected at random, from the corpus are:

> "One Christmas my parents came into my room in the morning, I was sleeping on the floor and my brother was in my bed. They came in which woke me up and brought in a black cocker spaniel dog."
>
> "I was in the park round the corner from my old house. My Dad had taken the stabilisers off my bike the previous weekend. I had fallen over several times that day. Persuaded by my Dad to give it another go, I can remember wobbling and thinking I was going to fall so peddled faster and stayed up, I cycled once around the park and came back to my Dad."
>
> "When I was 9yrs old I went on holiday to Pakistan with my family apart from my Dad. One day me and my cousin's brother argued for some reason which led to a fight and then I managed to make his tooth fall out. Strangely we became a lot closer after this so it is a positive memory for me."

It seems from these findings that systematically recalling a range of highly specific details such as what clothes one was wearing, the duration of an event, the time of day/week/month/year, one's age, the weather and other highly specific details is relatively rare and unusual. Recalling a few 'core' details, who, where, and what, some of which may be inferred rather than directly recalled, characterises adult recall of early childhood memories, of both emotionally positive and negative experiences. In some respects this is unsurprising, after all, and as noted earlier, children at the ages of 3, 4, 5, and above have been found to recall relatively few details even when explicitly and repeatedly cued by an adult, typically the mother, who shared the to-be-recalled event with them (see Bauer, 2008, Howe, 2011, for reviews). The present findings indicate that adult recall of childhood events is similar to child recall of childhood events as, indeed, might be expected. Also, and running counter to popularly held beliefs, there were no major differences in detail type between memories of positive and negative events, although negative events dated on average to

slightly earlier in childhood. Taken together these findings place in even sharper relief the question: How do highly detailed accounts of childhood events, such as the memories of abuse described in Conway (2013) and Howe (2013), ever emerge? (Note that no claim is made that the memories of negative events sampled in the present study approximate to memories of actual childhood abuse, sexual or otherwise. Although from their content they do appear to be typical of memories of negative childhood events experienced by most people).

Constructing Autobiographical Memories

We suggest that adult recall of early childhood events may entail much in the way of non-conscious and conscious inferences of details that 'scaffold' the few fragments that can be recalled or known, producing what appears to be a complex and detailed memory (Conway & Pleydell-Pearce, 2000; Conway 2005, 2009). Adult recall of fragmentary details of childhood events are 'filtered' through adult autobiographical memory to produce narrative accounts of early experiences that are only in small part 'remembered'. In other words memory 'fills in', by non-conscious inferences, specific details that have not in fact been remembered. Consider how this might operate for a childhood memory of a school related event. The rememberer may not recall what they were wearing but construction processes build in the inference to the memory that they were wearing their school uniform. Our suggestion is that much of the time this takes place non-consciously. The extensive patterns of brain activation that takes place when a memory is constructed (see Cabeza & St. Jacques, 2007, for review) and a wide range of behavioural and patient data (Conway &

Pleydell-Pearce, 2000; Conway 2005) all point to a complex, extensive, and largely non-conscious memory construction processes. An example we have often used to illustrate this is that, of the many memories a person can recall few contain details of what clothes were worn by self and/or others. Nonetheless, we are usually clothed in our memories. This is the type of detail that is automatically added in by memory construction processes. Importantly, by our account of autobiographical memory, this occurs for *all* memories. Thus, a question that then arises is: what is remembered and what is inferred or added in? The present findings (Figure 2) suggest that, for memories of childhood at least, some confidence can be placed in the recall of the who, where, and what of a confidently remembered childhood event, other specific details are however less likely to be recalled and, when present, we suggest they might more appropriately be regarded as contextual 'scaffolding' inferred spontaneously or elicited in response to direct questions.

How Can We Know That Specific Memories and Specific Details are Accurate?

One of the major conclusions of research into autobiographical memory is that notions of accuracy and truth are, when applied to memories, highly complex and there are no simple or straightforward formulations, (Conway, 2005). Memories are always time-compressed relative to the experiences they represent, which means that only a few details are preserved. Why certain details are preserved and not others is not known, nor are the processes and mechanisms that mediate retention of details. Moreover, memories are not of objective external events - 'reality' - rather they are of our *experience* of reality. Our experience is the mind's non-conscious and conscious construction of reality. Memory details are the product

of constructive and attentional processes active during the actual experience and also later during their consolidation in long-term memory when they become integrated with existing autobiographical memory knowledge structures. There may be some level of specificity of representation of autobiographical memory that is generally true and accurate and it has been suggested that this is most probably at the level of knowledge of periods of one's life rather than at the level of episodic details (Conway, 1993, 1996, 2005; see too Koriat, Goldsmith, Pansky, 2000). So, for example, it is true that a person had a certain school uniform, but whether it is also true that they were wearing that uniform during some specific memory they now recall as an adult, on the basis of the present findings (Figure 2), seems much less certain. It is in this sense that a detail from an autobiographical memory can simultaneously be both true and false. It is true that the rememberer had the uniform at the time from which a memory is constructed but it is not true that they were wearing it during the remembered event. The detail is non-consciously and automatically inferred and incorporated into the memory construction. Thus, truth and accuracy in autobiographical memory are complex. This is the message of what we term *the modern view of human memory* and it has proved to be a message that is extremely difficult for triers of fact to accept.

In the present study, as in the majority of studies of autobiographical memory, there was no way to check whether the memories and their details were true, either in that the remembered event actually took place or, assuming it did, that the details recalled from it are accurate. In the courts and other formal investigatory settings such truth is simply assumed, just as we assume that the majority of our participants diligently followed our instructions to only recall memories they very confidently believed to be memories. But even if they did our point is that there will always be a degree of inference and construction that individuals

cannot be aware of and cannot introspect upon. Thus, we can be certain that a percentage of the childhood memories collected in the present study are false (Mazzoni, et al., 2010) and, if anything, even more of the details, some from otherwise true memories, will be false too, even though they may be true of the time being remembered, i.e. that one had a school uniform and usually wore it when at school.

Currently it is not possible to derive base-line estimates of these types of constructive error, nor is there any way to accurately judge the truthfulness of reported memories and their alleged content. Facts overlooked by those in professional investigations where the only evidence is memory. What is currently possible, however, is the collection of what people *believe* to be memories and their details, in order to create a 'natural history' of recollections of various types of experience, i.e. adult recall of early childhood. This was the aim of the present study and part of its value lies in now being able to identify adult accounts of memories from childhood that differ from the normative profile of memories for this age (see Figures 2 and 3). Identifying unusual memories, such as the memories of abuse described in Conway, (2103) and Howe (2013), allows hypotheses about, and investigations of, in this case, of a class of memories that we have termed overly-specific memories.

Conclusions

In summary, the present findings show that early memories of both positive and negative events contain relatively few highly specific details. That investigators ask about such details in contexts in which they might, in all good faith, be erroneously generated is a

serious cause for concern. What one wore when one went to bed aged 4, e.g. a pink nightie, almost certainly cannot be recalled by most people. Note that, this specific detail is taken from an actual case and was emphasized by the prosecution in their summing up as powerful evidence that the adult complainant could in fact remember the incident from aged 4. Courts and other settings where memory is *the* evidence need to be made aware of what typically is recallable, what is rare and unusual, and what seems unlikely ever to be recalled.

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Table 1. Rules used to code participants' responses to the nine memory detail questions.

Question	Acceptable answers
1. Who was present?	Listing family members (no need to give names)yes Listing friends by name Don't need to name large groups e.g. assembly, sports teams.
2. What was the location?	'School' = yes (the name of the school wasn't required) Location within home (e.g. kitchen) = yes, 'home' = no (n.b. this detail could usually be found in the memory description). Holiday destinations – country is accepted as a yes
3. What was the activity?	Listing the activity
4. How old were you?	Answering years and months
5. What were you wearing?	Only accept answers when list individual items of outfit (e.g. 'school uniform' = no answer).
6. What was the weather like?	Naming a season, or writing 'inside/indoors' = no answer.
7. What did you think?	Participants must provide a description of a thought. Giving one-word answers naming emotions (e.g. 'sad') = no answer.
8. What was the time?	Participants must provide a specific time of day. 'Approximately/maybe' and morning/afternoon/evening = no answer
9. How long did it last?	Participants must state the length (e.g. 2 hours). Giving ranges (e.g. 1-2 hours) and events that lasted more than 24 hours = no answer

Figure 1. Retrieval curves for Age at Encoding of positive and negative childhood memories.

Figure 2. Probability of recalling memory details.

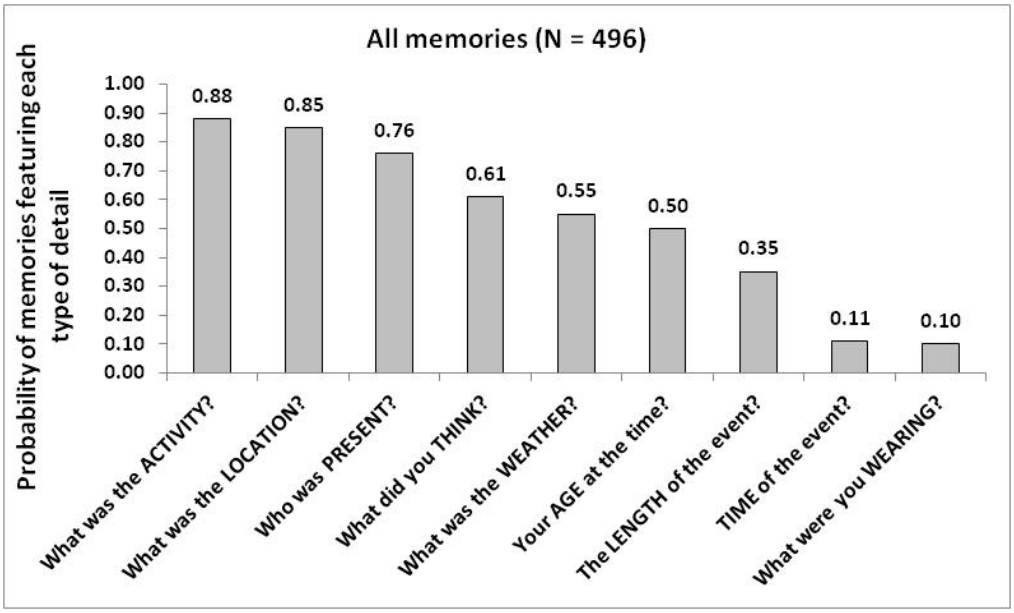

Figure 3. Probability of amount of details recalled for positive (N = 248, white bars) and negative (N = 248, black bars) memories**.**