

## **Memory Across Puberty and the Reminiscence Bump**

Childhood amnesia describes the near-total absence of memory from the first years of life. It is the most pronounced of several developmental boundaries in autobiographical memory, but it is not the only one. A second, far subtler boundary sits around puberty. On one side of it, the years of adolescence and early adulthood become unusually well represented in memory — a robust phenomenon called the reminiscence bump — while the pre-pubertal years are recalled comparatively sparsely. Underlying this is a reorganization of the brain's memory systems driven by puberty itself. This paper, a companion to the paper on childhood amnesia, explains the lifespan distribution of autobiographical memory, the reminiscence bump and its apparent anchoring at puberty, and the developing neuroscience of memory across adolescence, before turning to what is — and is not — yet established enough to bear weight in court. It assumes no background in psychology and describes general patterns, not the memory of any particular person.

### **The Lifespan Distribution of Autobiographical Memory**

When older adults are asked to recall personal memories from across their lives, the memories are not spread evenly over time. In a foundational analysis, Rubin, Wetzler, and Nebes (1986) described a characteristic three-part distribution. The earliest period is childhood amnesia, from birth to roughly age five, from which almost nothing is retrieved. The most recent period shows the ordinary pattern of better memory for more recent events. Between them, and standing out against that ordinary forgetting, is a pronounced excess of memories from approximately ages ten to thirty — adolescence and early adulthood. That middle elevation is the reminiscence bump, and its lower edge falls in the vicinity of puberty.

### **The Reminiscence Bump**

The reminiscence bump is one of the most reliable findings in autobiographical memory. Across many studies and methods, middle-aged and older adults recall a disproportionate share of personal memories from their second and third decades, with peaks variously placed between the mid-teens and mid-twenties depending on how memories are elicited (Munawar, Kuhn, & Haque, 2018). The effect is not an artifact of those years being merely more eventful or emotional; careful work has shown that the bump persists even after such factors are accounted for (Janssen & Murre, 2008). It also appears across cultures, which points to something general about this stage of life rather than to any particular society's circumstances (Janssen, Chessa, & Murre, 2005).

The leading explanations connect the bump to the formation of identity. On the self-memory account, autobiographical memory is organized around the self, and the period in which a person forms an enduring identity — adolescence and early adulthood — generates memories that are especially well encoded and well integrated, and therefore especially accessible later (Conway & Pleydell-Pearce, 2000). A complementary account points to the "cultural life script": the shared cultural expectation that life's defining transitions (first love, leaving home, education, marriage, career) cluster in young adulthood, which structures how those years are remembered and retold (Koppel & Berntsen, 2015). On either account, the bump marks the years after puberty as a period of unusually durable memory.

### **A Boundary at Puberty**

Several lines of evidence suggest that this boundary is anchored to puberty rather than to chronological age alone. The most direct is a sex difference in the timing of the bump's onset: large studies place the early peak of recalled memories somewhat earlier for women (around ages thirteen to fourteen) than for men (around fifteen to eighteen) — a difference that mirrors the

earlier average onset of puberty in girls (Janssen, Chessa, & Murre, 2005). That the memory boundary tracks the timing of pubertal development, and shifts between the sexes in step with it, is what makes puberty, and not merely a round-numbered age, the natural marker for this transition.

The practical shape of the phenomenon is an asymmetry rather than a wall. Memories from the years just after puberty are comparatively rich and durable, while memories from the pre-pubertal years immediately before are sparser and less well retained — the subtle "barrier" that the lifespan distribution reveals. Unlike childhood amnesia, this is not an absence of memory but a shift in its density and durability across the pubertal transition.

### **Pubertal Reorganization of the Memory System**

A developing body of neuroscience offers a biological correlate for this boundary, though it should be read as an emerging rather than a settled account. Puberty is not only a hormonal and physical transition but a neural one, and pubertal development exerts effects on the brain that are partly independent of chronological age. Using large samples, researchers have shown that pubertal stage, measured separately from age, predicts the developing volume of subcortical structures central to memory and emotion, including the hippocampus and the amygdala (Goddings et al., 2014). The hippocampus in particular continues to be remodeled through adolescence, and the coordination between the hippocampus and the prefrontal cortex that supports precise, well-organized episodic retrieval is not fully mature until the mid-to-late teens (Selmeczy, Fandakova, Grimm, Bunge, & Ghetti, 2019; Ghetti & Bunge, 2012).

Because the very systems that encode and retrieve personal memories are being reorganized during this window, some studies report a temporary unevenness in episodic and associative memory performance across adolescence before it settles into its mature adult form. This reorganization is a plausible mechanism for both the relative sparseness of pre-pubertal memory and the durability of memories formed once the system stabilizes after puberty. It is important to be candid that this neurodevelopmental story, while grounded in solid imaging research, is still being worked out, and it is less firmly established than either childhood amnesia or the reminiscence bump themselves.

### **How This Differs From Childhood Amnesia**

It is worth marking clearly how this boundary differs from the one treated in the companion paper. Childhood amnesia is a near-complete absence: adults retrieve essentially no genuine episodic memories from before about age three, and very few from before age seven. The pubertal boundary is not an absence at all but a change in gradient — a relative enhancement of memory for the years after puberty, set against comparatively thinner memory for the years just before, accompanied by a reorganization of the underlying brain systems. Both are developmental seams in the fabric of autobiographical memory, but they are different in kind: one marks where reliable personal memory begins, the other marks a shift in how richly and durably it is laid down as a person passes through adolescence.

### **Memory Across Puberty and the Law**

This boundary is more subtle than childhood amnesia, and its legal implications should be drawn with corresponding care. The well-established points are two. First, by the reminiscence bump, memories formed in adolescence and early adulthood are, as a group, unusually well retained and over-represented in later recall — relevant when an adult testifies, often after long delay, about events from the teenage years, as in many delayed-disclosure cases. Second, memories from the pre-pubertal years are comparatively sparser than those from adolescence, so an adult's detailed recall of early-childhood events remains subject to the constraints described under childhood

amnesia. Neither point licenses a strong inference about any particular memory: the durability of adolescent memory as a class does not guarantee the accuracy of a given adolescent memory, which remains susceptible to the ordinary distortions that affect all recall.

The emerging neurodevelopmental findings — pubertal reorganization of the hippocampus and a possible transient unevenness in adolescent memory — are best presented to a court as what they are: an active area of research that contextualizes, but does not yet support, fine-grained claims about the reliability of any individual's memories from around the time of puberty. These matters reach the trier of fact through expert testimony governed by the usual standards for expert evidence — *Daubert v. Merrell Dow Pharmaceuticals* (1993), as extended by *Kumho Tire Co. v. Carmichael* (1999), or the *Frye* general-acceptance test still used in some jurisdictions (*Frye v. United States*, 1923) — and a witness may testify only to matters within personal knowledge (Fed. R. Evid. 602). As always, these are population-level patterns that inform, rather than determine, the evaluation of a particular account.

### **Special Issues in Legal Practice**

The principles described above apply with equal force to every party in a legal proceeding. Memory operates the same way regardless of who is asking the questions, and the science summarized here favors no side. What differs between the parties is not the science but the vantage point — the particular places where memory issues tend to surface, and the particular errors each party is best positioned to guard against. The two summaries below identify those recurring issues. They are offered for orientation, not as litigation strategy; in every case the controlling question is what the evidence in that case will, and will not, support, and the expert's role is to inform the trier of fact rather than to advocate for either side.

#### **Special Issues for Prosecutors**

For the State, this material is most likely to surface when an adult testifies about events from adolescence, frequently after a long delay. The reminiscence bump supports the unremarkable point that memories from the teenage years tend to be comparatively well retained, which can help explain why a witness recalls such events at all after many years. The error best guarded against is overextending that point — treating the general durability of adolescent memory as if it guaranteed the accuracy of a specific recollection, when adolescent memories remain subject to the ordinary processes of reconstruction and suggestion. Where the testimony concerns the pre-pubertal years, the constraints of childhood amnesia continue to apply, and the same care described in that paper is warranted. Presenting the established findings plainly, and resisting reliance on the still-developing neurodevelopmental literature for fine-grained claims, keeps the State's use of this science defensible.

Understood this way, the science is a context rather than a crutch. It can make a long-delayed adolescent memory more intelligible to a jury, while honest acknowledgment of its limits — that durability is not accuracy, and that the pubertal neuroscience is still emerging — protects the credibility of the case.

#### **Special Issues for Defense**

For the defense, the recurring task is to keep claims about memory across puberty proportionate to what the science supports. The issue most likely to surface is reliance on the general robustness of adolescent memory, or on the emerging neurodevelopmental findings, to argue more than the data warrant in either direction. The error best guarded against is overclaiming — for instance, asserting that a memory must be accurate because it falls within the reminiscence bump, or, conversely, that pubertal brain reorganization renders adolescent memories unreliable, when the

evidence does not establish either proposition about an individual. The sounder course is to situate the particular memory within the established patterns: comparatively durable if formed in adolescence, comparatively sparse if formed before puberty, and in all cases subject to the ordinary sources of error.

The corresponding safeguard is to ensure the trier of fact understands both the strength and the limits of this science: that the reminiscence bump is a robust, replicated pattern about the distribution of memories, not a guarantee of accuracy; that the pre-pubertal years are recalled less richly than adolescence; and that the underlying pubertal neuroscience, though real, is still developing and cannot yet ground precise claims about a single person's memory. Where admissible, measured expert testimony can help the factfinder weigh an adolescent or pre-pubertal memory without overstating what the research can deliver.

## References

- Conway, M. A., & Pleydell-Pearce, C. W. (2000). The construction of autobiographical memories in the self-memory system. *Psychological Review*, 107(2), 261–288. <https://doi.org/10.1037/0033-295X.107.2.261>
- Ghetti, S., & Bunge, S. A. (2012). Neural changes underlying the development of episodic memory during middle childhood. *Developmental Cognitive Neuroscience*, 2(4), 381–395. <https://doi.org/10.1016/j.dcn.2012.05.002>
- Goddings, A.-L., Mills, K. L., Clasen, L. S., Giedd, J. N., Viner, R. M., & Blakemore, S.-J. (2014). The influence of puberty on subcortical brain development. *NeuroImage*, 88, 242–251. <https://doi.org/10.1016/j.neuroimage.2013.09.073>
- Janssen, S. M. J., Chessa, A. G., & Murre, J. M. J. (2005). The reminiscence bump in autobiographical memory: Effects of age, gender, education, and culture. *Memory*, 13(6), 658–668. <https://doi.org/10.1080/09658210444000322>
- Janssen, S. M. J., & Murre, J. M. J. (2008). Reminiscence bump in autobiographical memory: Unexplained by novelty, emotionality, valence, or importance of personal events. *Quarterly Journal of Experimental Psychology*, 61(12), 1847–1860. <https://doi.org/10.1080/17470210701774242>
- Koppel, J., & Berntsen, D. (2015). The peaks of life: The differential temporal locations of the reminiscence bump across disparate cueing methods. *Journal of Applied Research in Memory and Cognition*, 4(1), 66–80. <https://doi.org/10.1016/j.jarmac.2014.11.004>
- Munawar, K., Kuhn, S. K., & Haque, S. (2018). Understanding the reminiscence bump: A systematic review. *PLOS ONE*, 13(12), e0208595. <https://doi.org/10.1371/journal.pone.0208595>
- Rubin, D. C., Wetzler, S. E., & Nebes, R. D. (1986). Autobiographical memory across the lifespan. In D. C. Rubin (Ed.), *Autobiographical memory* (pp. 202–221). Cambridge University Press.
- Selmeczy, D., Fandakova, Y., Grimm, K. J., Bunge, S. A., & Ghetti, S. (2019). Longitudinal trajectories of hippocampal and prefrontal contributions to episodic retrieval: Effects of age and puberty. *Developmental Cognitive Neuroscience*, 36, 100599. <https://doi.org/10.1016/j.dcn.2018.12.001>

## Legal Authorities

- Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993).  
Federal Rule of Evidence 602.  
Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).  
Kumho Tire Co. v. Carmichael, 526 U.S. 137 (1999).

**Related topic papers:** [Childhood Amnesia](#) · [Autobiographical Memory](#) · [The Hippocampus](#) · [Reconstruction and Recall](#) · [Forgetting](#) · [Recovered and Repressed Memory](#)