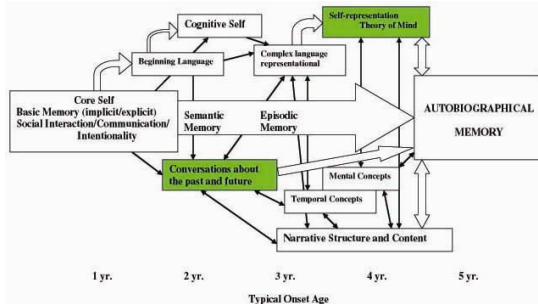


# Earliest Memories in Children with and without Asperger Syndrome



## Autobiographical Memory and Asperger Syndrome

- Developmental theorists postulate that theory of mind (ToM) and early opportunities to engage in conversations about the past and future are central to the emergence of autobiographical memory (Nelson & Fivush, 2004).



- If so, children with Asperger Syndrome (AS), an autism spectrum disorder characterized by ToM deficits and difficulties engaging in social interactions despite normal intellectual and language development, should differ from typically developing children (TDC) in the development of their autobiographical memory.
- Whereas narrative ability in children with AS has been previously examined (e.g. Losh & Capps, 2006), there appear to be no published investigations specifically examining these children's earliest memories.
- Examining first memories in this population may help shed light on the processes central to the emergence of autobiographical memory in typical populations.
- The present study tested the hypothesis that children with AS will subsequently be delayed or deficient in the emergence of their autobiographical memory.
  - ToM was also assessed in order to examine if these deficits can explain any differences seen in narrative measures.

## Participants

- 29 males with established diagnoses of Asperger Syndrome were recruited from the Canisius College/SUNY-Buffalo's Asperger Treatment Day Camp (the Connections Program).
  - All of these participants had IQ's in the normal range.
  - The participants ranged from 63-131 on the Asperger Syndrome Diagnostic Scale ( $M = 107.5$ ,  $SD = 15.6$ ), indicating a "likely" diagnosis.
  - The participants with Asperger Syndrome ranged from 6.8-14.0-years old ( $M = 10.1$ ,  $SD = 2.1$ ).
- 29 age-matched typically developing children (22 males and 7 females) were recruited informally by word of mouth. Researchers involved at the Connections Program approached families that were known personally by various collaborators.
- The sample of typically developing children was equivalent to the group of children with Asperger Syndrome to the extent possible on the dimensions of age (6.9-13.4-years old,  $M = 10.0$ ,  $SD = 1.9$ ), IQ, and SES.
- Both samples were predominantly white and of mixed socioeconomic status.

## Procedure

### Earliest Memory Task

- All children were interviewed about their earliest memories individually and their responses were recorded.
- All children were asked, "I want you to think way back and tell me the first thing you ever remember, something that happened when you were really little."
  - More prompts were given if needed.
- Participants were encouraged to give a few more earliest memories in case the first one reported was not the event that happened temporally earliest.
- All children were asked to provide an estimate of how old they were at the time of each remembered event.
- Interviewers followed-up the reports of children with Asperger Syndrome with:
  - several empty prompts (i.e. Can you tell me any more about that?)
  - wh-prompts (i.e. Who else was there? Where were you when that happened?)
- All interviews were transcribed for coding.

## Procedure (continued)

### Theory of Mind Tasks

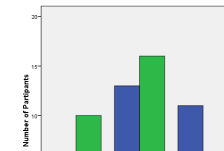
- The participants with AS were presented with a widely used measure of theory of mind, the **Sally/Anne False Belief Task** (Wimmer & Perner, 1983).
  - Although typically developing children by age 5 understand that Sally will look in the original location, 59% ( $n = 17$ ) of children with AS predicted that Sally would look in the altered hiding place.
  - Consistent with previous research, the children with AS thus demonstrated significant deficits in the development of theory of mind.
- The **Faux Pas Task** (Baron-Cohen, O'Riordan, Stone, Jones & Plaisted, 1999) was also administered to the participants with AS and TDC.
  - Each child was read a series of 10 vignettes, each of which involves two to three characters and at least two separate statements.
  - After each story, the child was asked a series of four questions:
    - A faux pas detection question ("In this story, did someone say something they should not have said?")
    - An identification question ("What did they say that should not have been said?")
    - A comprehension question to verify that the child understood the facts conveyed
    - And finally a false belief question to determine whether or not the child understood that the faux pas resulted from a character's false belief rather than from malicious intent.
  - Children were given 1 point for each faux pas they identified correctly.
  - To detect the faux pas for each vignette, the child had to answer all four questions correctly for that vignette.
  - Thus, each child received an overall score somewhere between 0 and 10, depending on their ability to identify the faux pas in each vignette.

## Coding

- Some aspects of the coding scheme were developed for the present investigation (e.g. pieces of information and reference to social interactions).
  - The structure, affect, type of experience, and social orientation codes were adapted from Peterson, Grant, & Boland (2005).
  - The specificity code was adapted from Wang (2004).
- Each memory was scored for the following codes:
  - Age at Event:** Child's self-reported age at the reported event in months.
  - Pieces of Information:**
    - Spontaneous Information per Prompt:** The number of unique pieces of information given spontaneously in response to an empty prompt divided by the number of empty prompts given.
      - Each proposition (subject/verb) counts as one piece of information.
      - The subject can be implied.
    - Prompted Information per Prompt:** The number of unique pieces of information given in response to a specific wh- prompt divided by the number of specific prompts given.
      - Each proposition (subject/verb) counts as one piece of information.
      - The subject can be implied.
  - References to Social Interactions:** The number of references to social interactions was tallied for each reported event.
  - Structure:**
    - Plotted Story:** There is a causal and temporal relationship between stated events.
    - Moment-in-Time:** Description of many aspects of one isolated episode.
    - Repeated Event:** Description of a type of event that occurred repeatedly.
  - Affect:**
    - Positive:** This could be explicit or clearly implied positive affect was included even without explicit positive emotion descriptors included, such as winning a big prize.
    - Negative:** This could be explicit or clearly implied negative affect was included, such as remembering breaking a leg or getting stung by a bee.
    - Neutral:** No positive or negative emotion was indicated.
    - Both:** Both positive and negative emotion were indicated.
  - Type of Experience:**
    - Trauma:** A shock, bodily injury, illness, or a painful emotional experience, e.g., "I was bitten by a dog." These traumas could be physical or emotional.
    - Transition:** A passage from one stage to another, e.g., first day of kindergarten or a third birthday.
    - Play:** These were descriptions of play sessions, or events that occurred during play.
    - Other:** These included any other miscellaneous content.
  - Social Orientation:**
    - Individual Orientation:** The memory exclusively concerned the self, or if other people were mentioned, the memory focused on the self's experience, role, or feelings.
    - Group Orientation:** The memory was about collective activities of the family, friends, or the school.
  - Specificity:**
    - General:** Events that took place regularly or on multiple occasions.
    - Specific:** An event that took place at a particular point in time.
- The temporally earliest memory reported by each child was selected for coding.
  - One rater marked the memory to be coded in each transcript.
  - Two raters independently coded 25% of the memories.
  - Inter-rater agreement ranged from 97-100% on all codes.

## Results

- Faux Pas Task (Theory of Mind)**
  - As expected, children with AS scored lower ( $m = 4.82$ ,  $SD = 3.17$ ) on the faux pas task than TDC ( $m = 7.08$ ,  $SD = 2.24$ )
  - Moreover, the expected age-related increase was observed, with a correlation coefficient of .514 ( $p < .01$ ) between months of age and faux pas task scores.
- Surprisingly, there was no difference in the age at earliest memory reported by the two groups of children.
  - There were also no difference by diagnosis observed in the dimensions of affect, type of experience, and specificity.
- However, the structure and content of the earliest memory reports by children with AS and TDC significantly differed on many characteristics.
  - Children with AS were more likely to report repeated events whereas TDC were more likely to provide plotted stories ( $\chi^2 = (df = 2, N = 58) = 6.55$ ,  $p < .05$ ; see Figure).



	Asperger Syndrome	Typically Developing
Age in Months of Earliest Memory	42.22 (23.21)	40.38 (22.15)
Faux Pas Score**	4.82 (3.17)	7.08 (2.24)
Spontaneous Pieces of Information**	6.03 (3.95)	12.55 (7.11)
Prompted Pieces of Information**	3.17 (2.22)	5.93 (5.24)
Mean References to Social Interactions**	.59 (1.02)	2.62 (2.88)

- Children with AS were more likely to provide self-narrated narratives whereas TDC were more likely to provide group-oriented narratives ( $\chi^2 = (df = 1, N = 58) = 3.11$ ,  $p < .05$ ).
- TDC provided more information (both spontaneously and prompted) than children with AS.
- TDC also described more social interactions than children with AS.
  - These differences by diagnosis could not be accounted for by narrative length, ToM, and/or verbal comprehension.

## Conclusions and Future Directions

- In contrast to our prediction, no age differences were found between the earliest memories of children with and without Asperger Syndrome.
  - However, this study did not examine the density of early memories, which has been shown to be reduced in deaf populations as compared to hearing populations (Weigle & Bauer, 2000).
  - It is possible that impairments in autobiographical memory in children with Asperger Syndrome would be manifested in reduced density of early memories.
- Children with AS provided less total information (both spontaneously and after prompting) and in their narratives.
  - Because verbal comprehension could not account for this difference, this suggests that children with AS have either a reduced access to their earliest memories or that these memories are more sparse than those found in TDC.
- Children with AS were more egocentric in their narratives, whereas TDC were more likely to focus on the larger social world in their earliest memory reports.
  - This would be expected, given the social deficits of AS.
- Children with AS also provided fewer references to social interactions in their narratives, even after controlling for narrative length and theory of mind.
  - These findings suggest the importance of early opportunities to engage in social interactions in the consolidation of early autobiographical memories.

## References

- Baron-Cohen, S., O'Riordan, M., Stone, V., Jones, R., & Plaisted, K. (1999). Recognition of faux pas by normally developing children and children with Asperger syndrome or high functioning autism. *Journal of Autism and Developmental Disorders*, 29(5), 407-418.
- Losh, M., & Capps, L. (2006). Understanding of emotional experience in autism: Insights from the personal accounts of high-functioning children with autism. *Developmental Psychology*, 42, 809-818.
- Nelson, K., & Fivush, R. (2004). The emergence of autobiographical memory: A social cultural developmental theory. *Psychological Review*, 111, 486-511.
- Peterson, C., Grant, V., & Boland, L. (2005). Childhood amnesia in children and adolescents: Their earliest memories. *Memory*, 13(6), 622-637.
- Weigle, T., & Bauer, P. (2000). Deaf and hearing adults' recollections of childhood and beyond. *Memory*, 8(5), 293-309.
- Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, 13(1), 103-128.