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BRIEF REPORT

Brief Report: Making Experience Personal: Internal States Language in the Memory Narratives of Children with and Without Asperger's Disorder

Benjamin T. Brown · Gwynn Morris · Robert E. Nida · Lynne Baker-Ward

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Abstract The development of the personal past is complex, requiring the operation of multiple components of cognitive and social functioning. Because many of these components are affected by autism spectrum disorders, it is likely that autobiographical memory in children with Asperger's Disorder (AD) will be impaired. We predicted that the memory narratives of children with AD, in comparison to typically-developing peers, would reflect less personal interpretation as evidenced by internal states language. Thirty children with AD and 20 typically-developing children aged 6–14 reported their earliest memories and two emotional experiences (one positive and one negative). Consistent with our predictions, children with AD included fewer emotional, cognitive, and perceptual terms than the comparison sample.

Keywords Asperger's Disorder · Autobiographical memory · Narratives · Internal states language

B. T. Brown (✉)
School of Liberal Arts, Georgia Gwinnett College, Lawrenceville, GA 30043, USA
e-mail: bbrown6@ggc.edu

G. Morris
Department of Psychology, Meredith College, Raleigh, NC, USA

R. E. Nida
School of Education, Canisius College, Buffalo, NY, USA

L. Baker-Ward
Department of Psychology, North Carolina State University, Raleigh, NC, USA

Introduction

Given its importance in establishing and maintaining social relationships, autobiographical memory (ABM) can be expected to play a role in Asperger's Disorder (AD), a developmental disorder characterized in part by difficulties in interactions with others (American Psychiatric Association [APA], 2000). The purpose of this investigation was to extend the analysis of the quality of event reports in children with AD. Although adults with Asperger syndrome show impaired memory performance, specifically recall for semantically-related word lists (Bowler et al. 1997), relatively little work examines the impact of the condition on autobiographical memory which is generally shared through personal narratives. Recent work by Goldman (2008) documented limited inclusion of high points in the narratives of children with high-functioning autism in comparison to language delayed and typically-developing children. We augmented this work by examining the inclusion of terms that connote the individual's interpretation of the experience, including words indicating emotion and cognitive processing. According to Fivush (2009), "it is such internal states language that gives an event its personal significance, linking the experience most closely to self and enabling linkages between self and other" (p. 292). Moreover, Spreng et al. (2009) found neurological evidence of a functional overlap in the processes of theory of mind and autobiographical memory. Less inclusion of internal states language is thus consistent with the limitations in theory of mind and emotion understanding that characterize autism spectrum disorders. Although Colle et al. (2008) did not report a difference in internal states language between adults with and without autism spectrum disorders, Crane et al. (2010) recently reported that adults with AD extracted less meaning from narratives of personal experiences than

did neurotypical adults, as reflected in part by their inclusion of fewer terms indicating insight.

At present, no investigation has examined internal states language in children with autism spectrum disorders. Indeed, little information is available about the development of internal states language in general (Pennebaker and Stone 2003). Research by Losh and Capps (2006) supports the prediction of less internal states language in children with AD in one category in particular, emotional terms. They presented groups of 7–13 year old children with and without high-functioning autism with emotion cues and asked them to describe experiences consistent with the emotion. The authors described the narratives of the participants with high-functioning autism as "script-like emotional accounts" (p. 816). We extended their investigation by examining specific inclusions of words from multiple categories of internal states language.

Method

Participants

Children with AD

Male children, ages 6–14 years, with AD were recruited from a treatment study for children with high-functioning autism spectrum disorders. Female participants with Asperger Syndrome were not available for recruitment, which is consistent with the finding that the incidence of Asperger Syndrome is four times greater in males than females (Ehlers and Gillberg 1993). Prior to treatment, all of the children met inclusion criteria using a multiple-gate screening process (see Lopata et al. 2008; Volker et al. 2010). First, written documentation of a formal diagnosis of Asperger Syndrome was provided by a licensed psychiatrist, physician, or psychologist. Second, parents were required to submit prior testing and evaluation records. A comprehensive records review by a licensed clinical psychologist took place to determine if the testing and evaluation results were consistent with the diagnostic criteria of AD, as specified in the DSM-IV. Children who met the requirements of the first two gates were then invited to participate in the third gate, which involved formal assessment of intelligence (WISC-IV short-form, Wechsler 2003) and social-emotional functioning (an Asperger symptomatology scale, a behavior rating scale, and an adaptive scale) by licensed psychological examiners. Parental permission was obtained for 42 children with a confirmed diagnosis of a high-functioning autism spectrum disorder (i.e., AD, autism [high functioning], or Pervasive Developmental Disorder–Not Otherwise Specified (PDD-NOS) [high functioning]), representing about 81% of the children in the treatment study.

While there is ongoing debate regarding whether AD can be reliably distinguished from other ASDs (see Klin et al. 2005), diagnostic criteria for AD require significant impairment in social interaction and restricted and repetitive behavior and interests, in the absence of significant cognitive or language impairment (APA 2000). Of the 42 potential participants who met inclusion criteria for the treatment study (i.e., prior diagnosis of an ASD, documented absence of a current language delay, IQ score >70, evidence of social interaction impairments [≥2] and restricted and repetitive behaviors and interests [≥1 per diagnostic criteria; APA 2000]), 11 were excluded due to developmental histories positive for early language delays. In addition to being consistent with diagnostic criteria for AD, this exclusionary criterion was instituted to minimize any potential influence of early language delays, which can affect ABM (see Nelson and Fivush 2004). An additional participant did not complete the interview. Thus, the final clinical sample consisted of 30 children. The scores of the participants with Asperger syndrome included in the final sample ranged from 63 to 131 ($M = 107.5$, SD = 15.6) on the Asperger Syndrome Diagnostic Scale (Myles et al. 2000), indicating a "likely" diagnosis. Based on parents' reports, the AD sample was 93% Caucasian, 6% Hispanic, and 1% biracial and consisted of children from middle and upper-middle income families.

Typically-Developing Children

Twenty typically-developing male children from middle and upper-middle class families were recruited from the same geographical area as the clinical group. There were no significant differences in the mean age, IQ, or verbal comprehension index (as measured by the WISC-IV short-form) of the sample of typically-developing children [Mean age = 8.95 (2.35) years, Mean IQ = 111.00 (11.53), Mean verbal comprehension = 112.69 (11.83)] and the AD group [Mean age = 9.73 (2.17) years, Mean IQ = 104.64 (11.76). Mean verbal comprehension = 104.71 (14.59)]. Based on parents' reports, the typically developing sample was 97% Caucasian, 2% Hispanic, and 1% Asian American and from middle and upper-middle income families.

Procedure

Children were assessed individually by a psychological examiner. After providing assent, the children with AD were administered two autobiographical memory interviews in a testing session lasting about 1 h. The emotional experiences interview was based on a procedure developed by Fivush et al. (1995). Children were asked to provide narratives for two autobiographical memories, one positive and one negative event, of their own choosing. To elicit

reports of their earliest memories, the 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. In both the emotional and early memory interviews, children's responses were followed up with empty prompts (e.g. "Can you tell me more about that?") until the child could spontaneously provide no more information about the event.

The typically-developing children received a battery of tests that included the IQ assessment and the Memory Interviews in a single testing session lasting 4–5 h, with frequent breaks. The IQ assessment was administered prior to other measures. The Autobiographical Memory Interviews were audio-recorded for subsequent coding, and the presentation of the emotional and earliest memory interviews was counterbalanced across participants. In addition, within the emotional memory interview, the order of request for positive and negative events was counterbalanced.

All memories were transcribed verbatim. Identical coding procedures were applied to the narrative accounts of the earliest and the two emotional memories. Internal states language was measured using the Linguistic Inquiry and Word Count software (LIWC, Pennebaker et al. 2001), which tallies the percentage of words per narrative in each designated category. We examined the emotional (e.g., happy, scared), cognitive (e.g., thought, believed), perceptual (e.g., saw, heard), physiological (e.g., cold, sick), and social content (e.g., we, our) of the children's narratives.

Results

Children provided narratives containing at least two unique pieces of information in response to 85.7% of the prompts, resulting in a total of 126 memory narratives for analysis. All 30 children with AD provided at least one narrative whereas one of the 20 typically-developing children provided no usable narrative. As examined in separate χ^2 analyses, diagnostic group was not associated with the frequency of reports to any of the prompts [$\chi^{2s}(1, N = 50) \leq .87$, $ps \geq .77$)]. A mixed model MANOVA with diagnosis as the between-subject factor and narrative type as the within subject factor demonstrated that all children talk more about recent rather than earliest events [Wilks' lambda $= 0.56$, $F(2, 102) = 12.34$, $p < .01$, $\eta^2 = 0.44$], and that narrative length of earliest, negative, or positive experiences did not differ between children with and without AD [Wilks' lambda $= 0.85$, $F(2, 102) = 2.70$, $p > .05$, $\eta^2 = 0.15$].

Figure 1 depicts the usage of internal states language terms by children with and without AD.

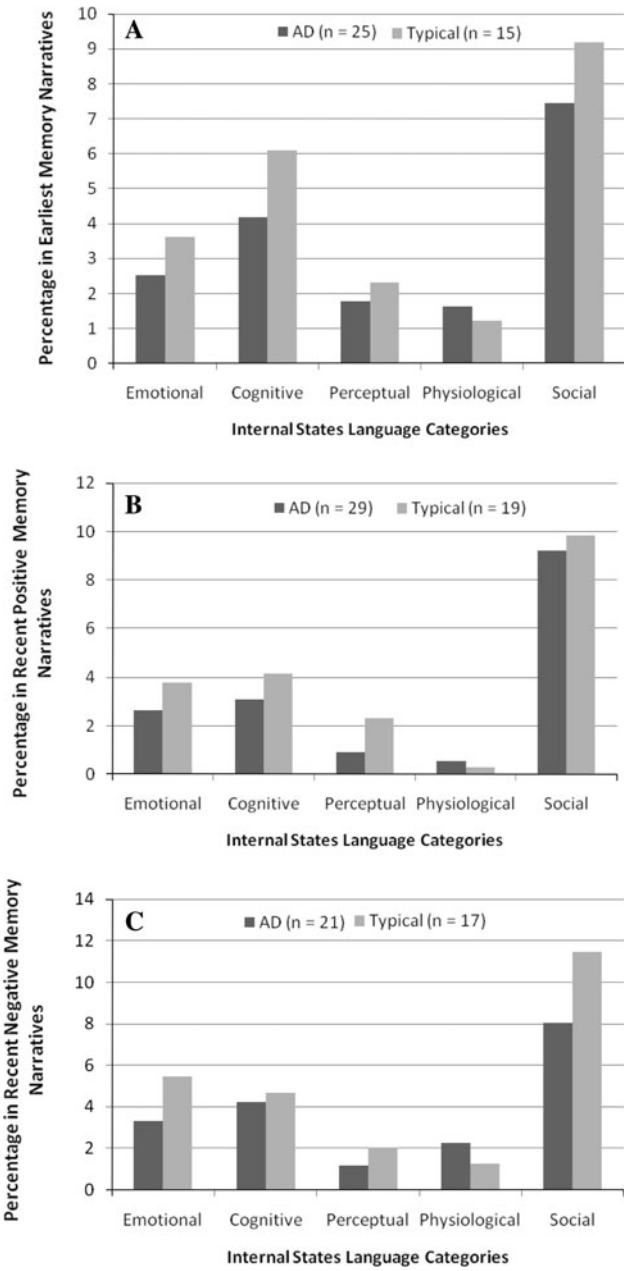

Fig. 1 Percentages of ISL terms by category in earliest (**a**), positive (**b**), and negative (**c**) memory narratives for children with and without AD

MANOVA was applied in order to assess differences in the percentages of words classified into each of several internal states language categories (emotional, cognitive, perceptual, physiological, and social) in the narratives of children with and without AD by memory prompt (earliest, positive, or negative). Two significant main effects emerged from this model: diagnosis [Wilks' lambda $= 0.86$, $F(5, 116) = 3.76$, $p < .01$, $\eta^2 = 0.14$] and Memory Prompt [Wilks' lambda $= 0.82$, $F(5, 115) = 2.48$, $p < .01$, $\eta^2 = 0.10$]. The interaction was not significant. Follow up

univariate tests localized the difference in ISL usage between children with and without AD to only the use of emotional, perceptual, and cognitive terms; typically-developing children included over one and a half times as many emotional words [$F(1, 126) = 9.11$, $p < .01$, $\eta^2 = 0.07$] and perceptual words [$F(1, 126) = 5.18$, $p < .03$, $\eta^2 = 0.04$] and slightly more cognitive words [$F(1, 126) = 4.12$, $p < .05$, $\eta^2 = 0.03$] in their memory narratives as children with AD. Univariate tests also localized the ISL differences between memory prompts to only the usage of physiological terms, with these terms being reported three times more frequently in earliest and negative memories than in positive memories [$F(2, 126) = 4.73$, $p = .01$, $\eta^2 = 0.07$].

Because it was not possible to determine if the main effect of memory prompt found above could be attributed to memory characteristics of very early childhood experiences or later affective experiences, a follow-up analysis was conducted in which we combined positive and negative memories into one group. MANOVA was again used to examine differences in the percentages of internal states language used by children with and without AD by memory type (emotional or earliest). The only significant main effect that emerged from this model was diagnosis [Wilks' lambda = 0.88, $F(5, 118) = 3.17$ $p = .01$, $\eta^2 = 0.12$]. No other main effect or interaction was significant, indicating that the use of internal states language was related to diagnosis but not the distinction between very early childhood memories and reports of later emotional events. Follow up univariate tests localized the difference in ISL usage between children with and without AD to only the use of emotional and cognitive terms; typically-developing children included over one and a half times as many emotional words [$F(1, 126) = 6.49$, $p = .01$, $\eta^2 = 0.05$] and slightly more cognitive words [$F(1, 126) = 5.20$, $p < .03$, $\eta^2 = 0.04$] in their memory narratives as children with AD.

Discussion

Our prediction that children with AD would include less internal states language in ABM narratives when compared to typically-developing peers was supported. More specifically, children with AD were less likely to include emotional, perceptual and cognitive terms in their memory narratives. Because the minimal inclusion of emotion characterized earliest memory reports as well as accounts of affective experiences, it appears that it reflects an overall deficit in narrative contents among children with AD.

Perhaps surprisingly, children with AD did not differ from their typically developing peers in their inclusion of social terms in their memory narratives. Social terms, however, are not a part of internal state language (Stone and Pennebaker 2002) and thus do not reflect interpretation of events. Instead, the high levels of social terms included in these narratives may reflect the extent to which the events that comprise children's lives are experienced in conjunction with other people, including family members and classmates.

Taken together, the limited inclusion of cognitive, perceptual, and emotional terms when describing autobiographical memories is consistent with the possibility that children with AD lack awareness of their own reactions to personal experiences. Future investigations should examine this possibility. Less cognitive term usage in children with AD is consistent with Crane et al. (2010) findings that adults with AD included fewer insight terms in their personal narratives than did a comparison sample of neurotypical adults. Similarly, Goldman (2008) suggested that high-functioning children with autism provide lists of facts but few interpretations of behavior when reporting personal experiences. This finding fits well with previous research demonstrating limitations that individuals with AD have in theory of mind development and perspective-taking (Baron-Cohen 1995; Baron-Cohen et al. 2005). Individuals with AD may lack an understanding of self in relation to others; instead, they may experience an intense egocentrism (Frith and De Vignemont 2005). Because of their difficulties taking the perspective of others, children with AD may not realize the importance of including information about their emotional, cognitive and perceptual experiences in their memory narratives. This interpretation is consistent with classic developmental research that established that egocentric children often engage in collective monologues (Piaget 1926) ineffectively communicating because of their difficulty in taking the perspectives of others.

Additionally, children with AD may be including fewer emotional terms than their typically-developing peers because of their previously documented difficulties with emotional understanding (Losh and Capps 2006). If children with AD do not fully comprehend their emotional experiences, they would likely encode and store less emotional information in memory.

Because of the nature of the present clinical sample, we can attribute the differences we found in children's early memory narratives to the social and emotional deficits characteristic of autism spectrum disorders rather than contributions of language development and IQ. In order to qualify for a diagnosis of AD, participants had to display typical intellectual functioning and no delays in language development. Previous research that has examined memory functioning in children with autism spectrum disorders (e.g., Bruck et al. 2007; Losh and Capps 2006; Millward et al. 2000) did not distinguish between the performances

of children with AD and other autism spectrum disorders. Both intellectual ability and language development contribute to the development of autobiographical memory (Nelson and Fivush 2004) and are thus both potential confounds in this previous research.

While the present investigation established differences in interpreting and sharing one's personal past in children with and without AD, several limitations warrant mention. One limitation involved the demographic characteristics of the sample. Future studies should increase the generalizability of findings by recruiting samples that include greater diversity with regard to gender, SES, and ethnicity. The present sample size also restricted the number of research questions that could be reasonably examined. Larger scale studies would allow for examination of additional aspects of autobiographical memory, the manner in which children with AD construct these memories, and factors that affect these constructions. Lastly, future studies should examine the manner in which the differences exhibited by children with AD impacts their social lives and/or influences their continuing development.

Individuals who provide memory narratives that include more discussion of their internal states tend to have more fully developed senses of self, more coherent understandings of their lives, and higher levels of physical and psychological health (see McLean and Pasupathi 2009). If children with AD do in fact use less internal state language in their memory narratives, it would be expected this limitation would have a negative influence on their identity development and general well-being. Thus, researchers may wish to explore potential interventions designed to increase the use of internal state language in children with AD.

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