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"I love the cute caterpillar!" autistic children's production of internal state language across contexts and relations to Joint Attention and theory of mind

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ABSTRACT

Research on internal state language in autistic children reveals an uneven pattern. While some studies show that high-ability autistic children are impaired across a broad range of internal state term categories (e.g., desires, emotions and cognitive terms), other research shows that autistic children are more selectively impaired in their talk about cognitive states. Finally, some studies even demonstrate no impairments. The different findings have largely been explained by context effects. However, to date, studies have yet to compare the same children across different contexts to corroborate this interpretation. Further, studies involving contexts where autistic children's reactivity is actively triggered by providing clear joint attention cues or by exploiting autistic children's intense interest in objects are lacking. Thus, this study tested internal state language from different categories across three different contexts (narrative context, motivating mechanical toy context, elicited interactive joint attention context) and related it to joint attention skills and children's theory of mind. Results revealed that deficits in autistic children's internal state language were highly specific and relation to theory of mind varied by context. In sum, this research suggests that both theorists and practitioners need to take into account context when studying or promoting autistic individuals' psychological comprehension.

1. Introduction

Mental state language, emerging in the second and third years of life in typically developing children, is one of the first signs of an explicit psychological understanding. While mental state vocabulary may serve a variety of conversational functions in discourse and thus might not always indicate psychological comprehension, there is evidence for genuine references to mental states (desires, knowledge, beliefs, emotions) early in development (Bartsch & Wellman, 1995). Since in comparison to typical development, autistic children are impaired in their mental state representation, as assessed in theory of mind (ToM) tasks, it seems likely that their spontaneous mental state language production should also be impaired. Surprisingly, little research has addressed if mental state language in children with autism spectrum disorder (ASD) is an indicator of their mental state comprehension. For instance, there is a lack of studies separating internal state language in general, from internal state terms in reference to toys versus humans, self versus other and in reference to human behaviours versus intentions. Existing research yielded variable results.

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In typical development, at around 24 months of age, children first use desire terms, followed by their use of emotion and cognition terms around 30–36 months of age (cf. Kristen, Sodian, Licata, Thoermer, & Poulin-Dubois, 2012). While when compared to typically developing children, autistic children are temporally delayed in their use of internal state terms (Tager-Flusberg, 1992), some studies in ASD hint at outlasting impairments across a broad range of internal state term categories. However, other studies provide evidence for specific impairments or, dependent on the context, even no impairments.

More specifically, in a very motivating and stimulating context, namely when playing with their preferred toys, children with ASD produced volition and emotion terms and were specifically impaired in their use of cognitive terms (e.g., "think") (Tager-Flusberg, 1992). Studies using storybook narratives and memory narratives rather than preferred toys showed that children with ASD were less likely to include terms that referred to cognitive, emotional or perceptual states (Baron-Cohen, Leslie, & Frith, 1986; Brown, Morris, Nida, & Baker-Ward, 2012; Happé, 1994; Rumpf, Kamp-Becker, Becker, & Kauschke, 2012; Tager-Flusberg, 1992). Thus, in less motivating contexts (e.g., when children cannot play with preferred objects) impairments might be overrated. Another issue pertains to the fact that studies have yet to look into the function of internal state language in autistic children, while in typical development, children use internal state terms to communicate meaning. For instance, to make sense of past events and explain them to others (Fivush & Baker-Ward, 2005), research indicates that autistic children include fewer internal state terms when narrating personal events (Brown et al., 2012). This indicates that children with autism might not use internal state terms to truly communicate psychological meaning. This would be consistent with autistic children's non-social use of other socio-cognitive skills (e.g., imitation skills) (cf. see Ingersoll, 2008 for a review). Consequently, internal state language might not be indicative of autistic children's awareness of their own and other's psychological states. Further studies are needed to corroborate this assumption. Autistic children might use internal state terms more superficially, spuriously and imitatively than typically developing children and also with much less communicative intent.

One way to measure communicative intention is to analyze children's joint attention (JA) while they talk about internal states. Impaired development of JA is a cardinal feature of children with autism (e.g., Charman, 2003; Dawson, Toth, Abbott, Osterling, Munson, & Estes, 2004; Loveland & Landry, 1986; Mundy, Sigman, & Kasari, 1994). According to socio-constructivists, triadic interactions, which emerge at about the end of the first year of life and involve the infant, another person and an object, event, or mental states, are thought to be the basis of children's ToM development (cf. Carpendale & Lewis, 2004). Note that consistent with the socio-constructivist view of language development, longitudinal work in typically developing children showed that JA skills are developmentally related to children's internal state language vocabulary (Kristen, Sodian, Thoermer, & Perst, 2011). Specifically, children's declarative pointing skills are related to children's psychological understanding (Camaioni, Perucchini, Bellagamba, & Colonnesi, 2004). While autistic children are not impaired in regard to their production of imperative gestures, they show deficits in their production of declarative skills (Camaioni, Perucchini, Muratori, Parrini, & Cesari, 2003). To date, studies have yet to assess children's joint attention skills in regard to children's internal state talk. Interestingly, some studies failing to show deficits in autistic children's internal state language reported that, even when using as many internal state terms as controls, children with ASD used these terms more superficially and talked more to themselves instead of directing their talk towards others. Instead, they made less effort to explicate the causes of mental states in their narratives and they were also limited in their ability to monitor and sustain listeners' attention when compared to the narratives of mental age and language matched controls (Capps, Losh, & Thurber, 2000; Losh & Capps, 2003; Tager-Flusberg & Sullivan, 1995). Further, they were found to use fewer mental state terms to call for attention (Tager-Flusberg, 1992).

This could explain why promoting autistic children's mental state understanding in training studies is not related to their mere use of mental state terms when narrating a wordless picture-book (Hadwin, Baron-Cohen, Howlin, & Hill, 1997), while using internal state terms in a truly communicative way might be. However, some studies indicate interrelations between autistic children's cognition talk and their overall comprehension of the mind, including more complex emotion understanding. For instance, two studies found significant positive associations between autistic children's use of cognitive terms (while narrating stories to others) and their ToM abilities (Capps et al., 2000), as well as more specifically, their false belief abilities (Tager-Flusberg & Sullivan, 1995). In contrast, Losh and Capps (2003) found that autistic children's use of mental state terms in personal and storybook narratives (cognitive or affective) were significantly associated with their ability to define emotions, but not to ToM abilities. Recent work (Siller, Swanson, Serlin, & Teachworth, 2014) showed that autistic children's general ToM scores were related to their use of emotion terms during a wordless picture book interaction, but not to their use of cognition terms.

Differences across studies might have to do with context effects on internal state talk. In some contexts autistic children might communicate psychological meaning, in some contexts they might not. Note that internal state talk was assessed differently in each study. Further, as tasks tap into different facets of ToM, including children's comprehension of hidden emotion, morals and irony, developmental links between talk about psychological states and children's conceptual comprehension might also become increasingly complex. In order to provide a full-fledged picture of context effects on autistic children's internal state talk and to explore context-dependent relations to ToM, studies have yet to compare the same children across different contexts and different tasks. Further, it remains unclear if context effects on autistic children's internal state language follow the same pattern as in typically developing children. For instance, situations that prove motivating for autistic children are likely to be nonsocial in nature and might involve mechanical systems (e.g., mechanical toys) (Turner-Brown, Lam, Holtzclaw, Dichter, & Bodfish, 2011). These situations might provide autistic children with