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Gestural Limitation and Hand Preference in Children with Autism

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Abstract:

This on-going study has examined, to date, hand preferences and gestural imitation ability in 8 children with autism and 14 typically developing children. In a hand preference assessment involving object manipulation, the performance of the two groups did not differ significantly. The participants with autism did score significantly lower than the typically developing children in gestural imitation accuracy. An area of particular difficulty for the participants with autism was the production of the second movement in two-movement gestures, as they frequently omitted these gestures. These results are discussed with regard to recent findings on autism.

Introduction

Autism, as a syndrome, encompasses a broad range of deficits including impairments in language and communication, interpersonal relations, and behavioral flexibility. Recently, a growing body of research has provided support for the existence of an imitational deficit in autism (see Rogers & Williams, 2006, for a review). Furthermore, this impairment seems to be greater for intransitive gestures than for goal-directed, object-oriented actions (Williams, Whiten, & Singh, 2004). While intransitive gestures are labeled "nonmeaningful" in many studies, in the case of language, particularly signed language, such gestures may be meaning-laden. Indeed, there is now wide consensus that imitational skill is a necessary (though not sufficient) component of the language acquisition process in typical development (Nelson, 1996). Therefore, it is critical to explore the nature of the gestural imitation deficit in autism, as a greater depth of understanding of this issue will allow clinicians serving this population to select and modify AAC systems accordingly.

The present investigation examines the ability of individuals with autism to imitate manual gestures. These gestures were developed to resemble signs from genuine sign languages, such as American Sign Language (ASL). Like signs in sign languages, the manual gestures in this investigation differ from each other along the three dimensions of handshape, location, and movement quality; they differ as well in terms of the number of movements of which they are composed. We explore here how these aspects of manual gestures relate to the accuracy of children's performance, and analyze the types of errors that children with autism are more likely to make when imitating. Specifically, we hypothesize that:

1. All children will show a decrement in performance as the number of movements in a gestural sequence increases from one to two, but this effect will be significantly more marked in children with autism.

2. Children with autism will imitate the location of gestures as accurately as typically-developing children, but will demonstrate significantly less accurate imitation of handshape and movement quality.

3. Children with autism will make significantly more mirroring errors when imitating than will typically-developing children.

Additionally, because individuals with autism have been found to have a higher incidence of non-right-handedness than the general population (Bonvillian, Gershoff, & Seal, 2001), and this atypical hand preference may be related to atypicalities in hemispheric dominance and the lateralization of language, we also assess participants' hand preference. We hypothesize that children with autism will be less likely to demonstrate a distinct right-hand preference. We also intend to analyze, in an exploratory manner, connections between laterality and gestural imitation ability.

Methods

Participants

Two groups of participants were examined in this study. The participants with autism consisted of 8 individuals (7 males, 1 female) ranging in age from 3-16 years, with a mean age of 8 years 8 months. These participants were enrolled in a year-round school

for autism. The group of 14 typically developing children (7 male, 7 female) attended a local preschool. These children ranged in age from 2-5 years, with a mean age of 3 years, 6 months.

Procedure

The participants' hand preferences and gestural imitation abilities were examined in two sessions. Hand preference was assessed first. Ten different objects were placed by an experimenter one at a time in front of each of the participants. The experimenter then recorded which hand a participant used to pick up each object and which hand was used to manipulate each object. Gestural imitation ability was assessed second. Each participant was shown 16 gestures to imitate. Eight of the gestures had a single movement and 8 had two movements; 8 of the gestures were demonstrated by the experimenter with her right hand and 8 with her left. A trained observer coded the accuracy of each participant's gestural imitation. The participants gestural imitations were scored for their location, handshape, movement, the hand used, and whether mirroring or orientation reversals occurred. Intercoder percentage agreement averaged 94% for hand preference and 94.6% for gestural imitation.

Results

Hand Preference

There was no significant difference between groups with regards to hand use; both children with autism and typically-developing controls demonstrated a preference for the right hand in object interactions.

Gestural Imitation

As expected, children with autism were significantly less accurate than typically-developing controls in their imitation of handshape ($p < .005$) and movement ($p < .05$) aspects of gestures; however, contrary to our hypothesis, they were also significantly less accurate in their imitation of gestures' location aspect ($p < .05$).

In keeping with our hypothesis, an area of particular difficulty for the children with

autism was production of the second movement in two-movement gestures. Whereas only two of the 14 typically developing children did not attempt all of the two-movement gestures, all but one (7 of 8) of the autistic participants did not attempt the second movement of many two-movement gestures. Evidently, the participants with autism experienced great difficulty in their processing of gestural sequences.

We had expected that the participants with autism would make mirror imitations of the experimenter's gestures more often than the typically developing children because individuals with autism often do not show the same distinct hand preference as normally developing persons. Contrary to our expectations, however, the typically developing children made mirror errors 50.4% of the time and the participants with autism only 25.6%. Perhaps this discrepancy may be a product of the young age of the typically developing children in the present study.

Conclusions

While data collection is still underway, analysis of currently available data suggests not only that children with autism have imitational impairments that generalize to all aspects (handshape, location, and movement quality) of gesture formation, but also that they have significant difficulties with the completion of gestural sequences. Clinicians may wish to consider that manual signs with more than one movement are likely to prove difficult for individuals with autism to learn. Upon completion of data collection, we wish to analyze the degree to which individual differences are driving the observed imitational deficits, given the heterogeneity of symptom presentation and severity in persons with autism. In future work, we would like to explore the degree to which various child characteristics are related to gestural imitation and language acquisition success.

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