Understanding of Metaphor, Irony and Sarcasm in High Functioning Children with Autism Spectrum Disorders: Its Relationship to Theory of Mind

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Introduction

•Autism is a genetically predisposed neurodevelopmental disorder that affects 1 in 100 to150 children in the USA.

•Autism Spectrum Disorders (ASD) include Autism Disorder, Pervasive Developmental Disorder - Not Otherwise Specified (PDD-NOS), and Asperger Syndrome (AS).

•ASDs are characterized psychologically by a triad of behavioral dimensions along which the children show impairments:

- •Social interaction problems, either social withdrawal or inadequate social relationships.
- •Language and communication problems.
- •Obsessive rituals (often motoric) and rigidity of behavior.

•Children diagnosed with Autism Disorder and PDD-NOS show delays in vocabulary and syntax acquisition in early childhood; children diagnosed with Asperger Syndrome do not.

• PDD-NOS and AS are defined by less severe social and behavioral impairments than those observed in children with Autism Disorder.

•About one third of children on the Autism Spectrum are characterized as high functioning because they score in the normal range on tests of their IQ and formal language skills.

•However, even though they may have normal or even superior syntax and vocabulary ability, these children experience impairments in their pragmatic language (functional use) and conversational skills.

•Researchers have suggested that the pragmatic language problems of children with ASD arise from their deficits in developing a well-articulated Theory of Mind (ToM) -- i.e. an understanding of other people's mental states, especially their states of knowledge/ignorance, their beliefs, and their communicative intentions (Tager-Flusberg, 2000).

•In particular, it has been reported that children with ASD have considerable difficulty understanding non-literal forms of communication -- metaphors, ironic statements, and figurative language -- because they are unable to distinguish the speaker's intended meaning from what they literally said. They tend to interpret these forms literally (Happe, 1995).

Research Question

This study explores the relationship between ToM reasoning and correct interpretation of metaphorical and ironic language in individuals with ASD.

Participants

•45 children and adolescents aged 9 to 18 (mean 12 years).

•All were participating in an NIH-funded study of pragmatic language skills in ASD being conducted at Yale University Child Study Center.

•All of the children had normal range verbal and non-verbal IQ scores on the Wechsler Intelligence Scales (>85), with a mean of 106.

•The participants were divided into three groups based on diagnostic category: 18 with high-functioning autism (HFA) or PDD-NOS; 13 with Asperger Syndrome (AS); and 14 with typical development (TD).

•Diagnosis of the ASD groups followed the DSM-IV criteria using the ADI-R and ADOS diagnostic protocols (Boucher, 2009).

•The three groups were matched for age and non-verbal IQ.

Procedure

•Participants were tested at Yale University Child Study Center on picture-supported pragmatic language assessment materials developed by Peter and Jill de Villiers (in preparation).

•Sessions were audiotaped and CDs were sent to Smith College for transcription, coding, and analysis.

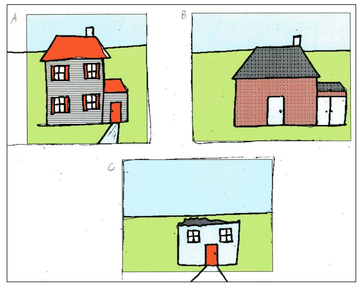
Materials

Theory of Mind: One narrative assessed the children's reasoning about people's states of knowledge and their understanding of false beliefs, including second order embedded beliefs.

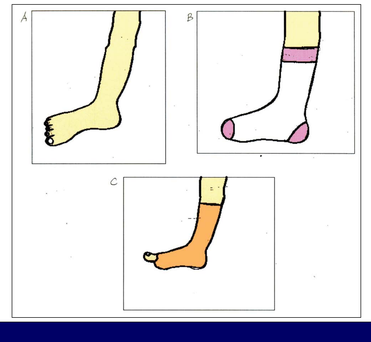
QuickTime™ and a
decompressor
are needed to see this picture.

Metaphor: A second task tested the children's understanding and explanation of metaphorical language.

Psychological metaphor: "Which one is the blind house?"
"Why is that one the blind house?"



Physical/Perceptual metaphor: "Which foot is a turtle?"
"Why is that one: The foot is a turtle?"



Materials (Continued)

•A third task assessed the children's understanding and explanations of **ironic and sarcastic utterances**.

•This included items testing interpretation of direct sarcasm with a negative meaning, ironic compliments, ironic questions, and hyperbole and understatements used for ironic discourse purposes.

•The children sometimes judged what the speaker would go on to do, what the speaker really thought, or what they meant by their utterance.

Interpreting Ironic Questions:

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are needed to see this picture.

Interpreting Hyperbole:

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Results

Group Differences in Theory of Mind (ToM) Understanding:

•The individuals with HFA/PDD-NOS performed significantly worse on the Theory of Mind test than the TD control group (77.2% vs 94.6%, p<.05).

•There was no significant difference between the Asperger Syndrome group and the TD group on ToM understanding (91.4% vs 94.6%).

Group Differences in Metaphor Understanding and Explanation:

•Individuals with HFA/PDD-NOS scored significantly lower on the metaphor test than either the AS group (73.2% vs 89.8%, p<.01) or the TD group (73.2% vs 90.5%, p<.01).

•Again there was no difference in level of performance between the AS and TD individuals -- both groups were near ceiling on these metaphor tasks.

•The individuals with HFA/PDD-NOS were equally impaired on physical/perceptual/behavioral metaphors as they were on psychological metaphors, even though the former type are acquired earlier in language acquisition in typically developing children.

Results (continued)

Group Differences in Irony Understanding and Explanation:

•The individuals with HFA/PDD-NOS performed quite well on the irony interpretation tasks, but they were more impaired on the meaning explanation questions (74.0% correct) than on the behavioral judgment or yes/no choice items (94.4% correct).

•Despite their good level of performance, the HFA/PDD-NOS group was significantly worse than the AS group (89.8% vs 97.6%, p<.05) and the TD group (89.8% vs 97.2%, p<.05) on the irony understanding test.

•The AS and TD groups performed very similarly to each other on this test, essentially at ceiling (97.9% vs 97.2%).

•For the HFA/PDD-NOS group, the direct sarcasm and sarcastic question items were significantly easier than the hyperbole and understatement items, in keeping with the much greater frequency of the former types in conversation.

Correlational Analyses:

•Partial correlations demonstrated that for the individuals with ASD (the Autism Disorder, PDD-NOS and Asperger Syndrome participants combined, N=31) there was a significant relationship between their ability to correctly interpret metaphors and ironic utterances and their Theory of Mind scores, even when the effects of Age and Non-verbal IQ were removed first.

	ToM
Metaphor	.489**
Irony	.611***

** = p<.01, *** = p<.001

Conclusions

- **The findings of this study confirm and extend previous research on the misunderstanding of non-literal language by individuals with autism.**
- **Over a wider range of measures of understanding as well as different types of metaphors and ironic utterances, the results demonstrate that individuals with HFA are significantly impaired in their interpretation of metaphorical and ironic language relative to TD controls of the same age and non-verbal IQ.**
- **This impairment in the pragmatics of non-literal language was observed in individuals with HFA even when they had good syntactic and vocabulary skills.**
- **As suggested by Happe (1995) and Tager-Flusberg (2000), the degree of impairment in metaphor and irony interpretation in the children with ASD was predicted by their Theory of Mind development, suggesting that impairment in ability to read the contents of other people's mental states contributes to problems with communication and conversation found in ASD.**
- **The failure to find any impairment in the ToM or understanding of non-literal language in the individuals with Asperger Syndrome in this study was surprising and may be explained by particularly high verbal skills in those individuals. Tager-Flusberg and Joseph (2005) suggest that children with high-functioning autism and AS may be able to use their superior language skills to explicitly talk themselves through ToM reasoning tasks.**
- **The difference between the HFA/PDD-NOS and AS groups may also be attributable to the lack of language delay in childhood in the AS individuals.**