

# Problems with Non-Literal Language in Children and Adolescents with Autism Spectrum Disorders



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## Introduction

- According to the DSM-IV 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 (sometimes motoric) and rigidity of behavior.
- Children diagnosed with Autism Disorder and PDD-NOS show delays in vocabulary and syntax acquisition in early childhood.
- PDD-NOS is 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 some of 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 (Happé, 1995; 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 (Happé, 1995).
- However, previous studies have tested only a limited range of types of metaphoric and ironic language forms, and few studies have tested theory of mind and non-literal language in the same children.

## Research Question

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

## Participants

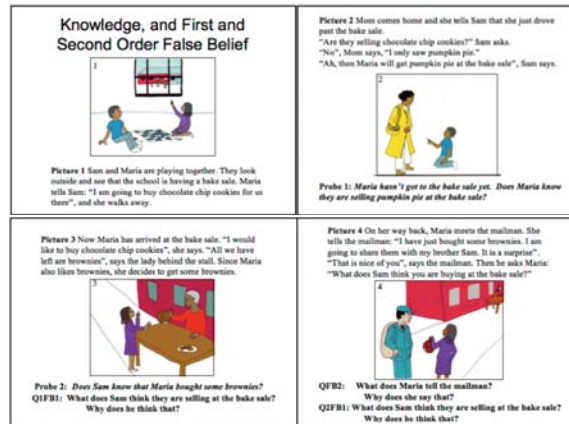
- 58 children and adolescents aged 9;1 to 18 years (mean 12;3 years).
- All were participating in an NIH-funded study of pragmatic language skills in ASD being conducted at Yale University Child Study Center.
- All of the children had normal range non-verbal IQ scores on the DAS or Wechsler Intelligence Scales (>76), with a mean of 103.6.
- The participants were divided into two groups based on diagnostic category: 30 with high-functioning autism (HFA) or PDD-NOS and 28 with typical development (TD).
- Diagnosis of the ASD groups followed the DSM-IV criteria using the ADI-R and ADOS diagnostic protocols.
- The two groups were matched for age (means: HFA 12;4, TD 12;6), non-verbal IQ (means: HFA 101.2, TD 106.1), and verbal IQ (means: HFA 104.4, TD 108.5)

## 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.

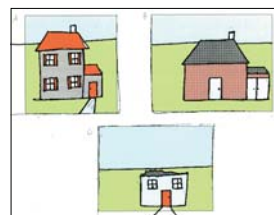
## Materials

**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.

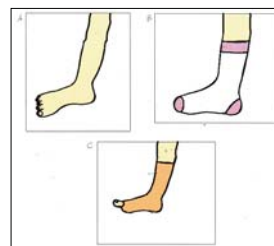


**Metaphor:** A second task tested the children's understanding and explanation of metaphorical language.

**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.

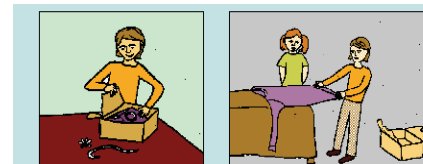
### Interpreting Ironic Questions:



**Picture 1:** It was snowing outside and the granny felt very cold in the living room.  
**Picture 2 (point):** The boy came in from playing outside. He left the door open and ran to get his sled in his bedroom. His granny said to him: "Why don't you open a window as well?" (in sarcastic intonation)

Q1: Did the granny want the boy to open a window?  
Q2: Did the granny want the boy to close the door?

### Interpreting Hyperbole:



**Picture 1:** Grandma gave Mary a new sweater for her birthday, but it didn't fit her very well.  
**Picture 2 (point):** Her sister Sally said to her: "The whole family could fit into your sweater at the same time."

Q1: What did Sally mean when she said that?  
Q2: Did Sally think that the whole family could fit into Mary's sweater?

## Results

### Group Matching:

- Children with HFA/PDD-NOS and TD were matched for age, non-verbal IQ and verbal IQ. There was no significant difference between the age (F(1,57)=0.059, p=0.81), non-verbal IQ (F(1,57)=1.47, p=0.231), or verbal IQ (F(1,57)=1.047, p=0.31) for the two groups.

### Group Differences on False Belief, Irony, Metaphor, and Indirect:

- Children with HFA/PDD-NOS performed significantly worse on false belief (F(1,56)=8.045, p=0.006), metaphor (F(1,57)=10.21, p=0.002), and irony (F(1,57)=9.43, p=0.003) tasks compared to TD children.
- However, there was no significant difference on indirect language questions (F(1,57)=1.93, p=0.17), indicating that the performance of children with HFA/PDD-NOS on the metaphor and irony tasks was not due to problems understanding indirect language.

## Results (continued)

### Correlational Analyses:

- Within the children with HFA/PDD-NOS, there was a positive correlation between verbal IQ and performance on false belief (r(27)=.385, p=0.039), metaphor (r(28)=0.405, p=0.026), and irony (r(28)=0.458, p=0.011) tasks, but not indirect language tasks (r(28)=0.214, p=0.256).
- There was also a positive correlation between false belief score and score on metaphor (r(27)=0.451, p=0.014) and irony (r(27)=0.615, p<0.001) tasks, but not on indirect (r(27)=0.35, p=0.063) tasks. This supports that these tests may be good measures of ToM.
- When controlled for age and verbal IQ, there is still a significant correlation between false belief score and irony (r(25)=0.525, p=0.005) but not for total metaphor score (r(23)=0.319, p=0.105).
- Breaking down the metaphor total score into its picture score and explanation score components reveals that there is a significant correlation between false belief score and the metaphor explanation score (r(23)=0.42, p=0.029) but not on the picture score (r(23)=0.13, p=0.525), suggesting that children with HFA/PDD-NOS can identify the metaphor, but have difficulty explaining it.

	False Belief
Metaphor Explanation	0.420*
Irony Total	0.525**

\* = p<.05, \*\* = p<.01

## 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 matched for age, non-verbal IQ and 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 Happé (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.

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