

Understanding Figures of Speech in Children with Autism Spectrum Disorder

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ABSTRACT

Children with autism spectrum disorder (ASD) are said to interpret language literally. If so, they would have trouble understanding figurative language, independent of their language level. Idioms (e.g. “skating on thin ice”) are a type of figurative language that are used frequently. In this pilot study, we investigated comprehension of figurative language in cognitively-able children with ASD between the ages of 6 and 14 years old to see if their ability to correctly interpret the figurative meaning of idioms (a) increases with age and (b) is better when the idioms are presented in context rather than alone. We assessed idiom comprehension by administering 3 tasks, using the same 10 unfamiliar idioms in each. Each task provided a different level of contextual support. In the first task, participants were asked to define the idiom when it was presented in isolation. In the second task, they were asked to define the same idioms, but after hearing the idiom used in a story. In the third task, participants selected the correct option from three pictured alternatives after hearing the same story. Our hypothesis was that understanding idioms would be better in older children and would be better when the idioms were presented in context rather than in isolation. The results of this study supported our hypotheses and showed that the average number of idiomatic responses increased across age groups on all three tasks, and increased within age groups as the amount of context was increased. These results would suggest that context plays an important role in understanding of idioms regardless of a child’s age.

INTRODUCTION

According to the Diagnostic and Statistical Manual-Version IV, Text Revision (DSM-IV-TR) of the American Psychiatric Association, (APA, 2000), Autism Spectrum Disorder (ASD) is a developmental disability characterized by impairments in communication and social interaction, along with repetitive or stereotyped behaviours and/or interests. It is described as a spectrum disorder because even though all individuals with autism will have some difficulty in the same three areas, profiles in each individual area vary greatly between individuals. For example, in the area of communication, some children with ASD are nonverbal while others have fluent language but exhibit difficulties in using their language appropriately. ASD is presently thought to affect 1 in 110 children (Lord & Bishop, 2010) making the disorder hard to ignore.

It's important to note that ASD includes a communication disorder, not necessarily a language disorder (Paul, 2007). Even those who have the ability to construct fluent sentences, have difficulties in using their language appropriately in social situations. One element that is relevant to success in the social use of language (i.e., pragmatics) is the understanding of sarcasm, jokes, tone of voice and figurative language (The National Autistic Society, 2011). It is widely accepted that children with autism make overly literal interpretations of figurative language (MacKay & Shaw, 2004). Idioms (e.g., "skating on thin ice", "raining cats and dogs"), a type of figurative language, are phrases that have a known figurative meaning but may also be interpreted in a literal manner (Norbury, 2004). For example, the idiom "skating on thin ice" has the figurative meaning of doing something dangerous but could also be interpreted literally as actually skating on thin ice. Idioms are a very common language form and are used frequently

in everyday communication (Kerbel & Grunwell, 1997). Children encounter idiomatic, and other figurative language forms in multiple environments, such as school, home, and social situations, and an inability to understand idioms can have a significant impact on their learning and social interactions (Kerbel & Grunwell, 1997). In particular, Kerbel and Grunwell (1997) looked at idiom use in the classroom and found that teachers of children with language disorders used an average of 1.73 idioms per minute. This frequent use of idiomatic language in a school environment marks it as an important part of language development that should be included in research.

For typically developing children, Levorato and Cacciari (1995) proposed a four stage developmental pathway to figurative language competence, including comprehension and production of idioms. They suggested that in Phase I, children interpret idiomatic language literally irrespective of context and inconsistencies within the language. Children remain in this stage until approximately seven years of age. In Phase II, children abandon a piece-by-piece construction of meaning and use context to search for clues that could lead to the idiomatic meaning, and begin to make inferences regarding the communicative message. Children in this stage use their growing world knowledge to help them understand that a discrepancy between what is said and what is expected is not necessarily a communication error. When a child reaches Phase III, he/she comes to the realization that message meaning can be effectively achieved through different sentence forms (e.g., literally, hyperbolically, ironically). At this stage, the child is able to consider the internal state of the speaker, that is, his or her intentions and knowledge when determining the meaning of the statement within a particular context. Full comprehension of figurative language, and idioms, is achieved in Phase III. Finally in Phase

IV, the child is not only able to understand the idioms, he/she is able to produce them as well (Levorato and Cicciari, 1995). Of note, in a multiple choice task, where a supportive contextual environment was provided for the children and where they were only required to recognize the appropriate interpretation, many of the younger children who were presumed to be in an earlier stage, were able to select the correct idiomatic answer. This result indicates an ability in children, no matter what their level of figurative competence, to increase their capacity to interpret language in a more comprehensive manner, given the proper supports (Levorato and Cicciari, 1995). Our hypothesis purports that understanding of idioms will increase when more context is provided, even in children with ASD.

In one study looking at figurative language in children with ASD, MacKay and Shaw (2004) compared figurative language comprehension in a group of 19 high-functioning boys with ASD between the ages of 8;0 to 11;5 to a group of 21 boys without ASD between the ages of 9;0 to 10;11. The researchers found that children with ASD made overly-literal interpretations of figurative expressions in comparison to their age matched controls (Mackay & Shaw, 2004). This study looked at six kinds of figurative language (i.e., hyperbole, indirect requests, irony, metonymy, rhetorical questions, and understatements), but did not investigate comprehension of idioms. In addition, while MacKay and Shaw (2004) found that the children with ASD had more trouble understanding the figurative expressions, the developmental progression of figurative language competence in children with ASD remained unclear. The present study investigated how increasing age and increasing context affects comprehension of figurative language, specifically idioms, in children with ASD.

Norbury (2004) also conducted a study looking at understanding of figurative language, but looked specifically at idioms. She investigated whether children with ASD had a poorer understanding of idioms than age-matched peers, regardless of their language skills (within normal limits, or impaired). All children in the study were between the ages of 8-15 and had a nonverbal IQ that was within normal limits. The study included 93 communication-impaired children who were put into one of the following groups: language impairment, pragmatic impairment, ASD with language impairment, or ASD without language impairment. These children were compared to a control group of 39 typically-developing children who were matched to the communication-impaired children on age and nonverbal IQ. All participants were presented with 10 unfamiliar idioms in 2 different tasks; in the first task, they were asked to define the idiom in isolation and in the second task they were asked to define the idiom after it had been presented within a short story. Norbury's (2004) study found that all children benefited from context in interpreting idioms, however, those with language impairments did not benefit as much from context as their age-matched peers. Interestingly, participants in the study who were diagnosed with autism but who had language skills within normal limits, benefited from context to the same degree as the control group (Norbury, 2004), failing to support the idea that all children with ASD have a poorer understanding of idioms. Norbury (2004) reported that a limitation of this study was that the children were required to answer verbally to each of the questions, raising the possibility that their inability to answer appropriately could have been due to their expressive language difficulties rather than their impaired understanding of the idiom. Given this limitation, the present study will examine idiom comprehension in children with ASD using the same two tasks as Norbury (idiom

definition in isolation, and idiom definition in the context of a short story) but will also include a third task which will involve presenting the same short story and asking the child to respond to what they think the idiom means by pointing to a picture. Allowing the child to respond by pointing to a picture reduces the chance that incorrect answers could be due to expressive language difficulties.

PURPOSE AND RESEARCH QUESTIONS

The purpose of the present pilot study was to investigate comprehension of idioms across age-groups in children with ASD, as well as the effect of context on understanding idioms within age-groups. Specific research questions to be addressed included:

1. In children with ASD who are both cognitively- and linguistically-able, do older children interpret more idioms correctly than younger children?
2. Does the provision of context (i.e., in a story or multiple choice task) assist in correct interpretation of idioms across ages?

If our hypotheses are upheld, this study will provide some preliminary evidence that children with ASD do indeed acquire idioms along the same developmental pathway as typically developing children relative to their overall language knowledge. It is expected that comprehension of idioms will increase both with participants' age and with increased contextual support.

METHODS

Participants

A total of 10 participants took part in this study. Participants were recruited from the *Autism Research Centre* at the *Glenrose Rehabilitation Hospital* in Edmonton. Inclusion criteria included a diagnosis of Autism Spectrum Disorder (provided by the *Glenrose Rehabilitation Hospital*) and a nonverbal IQ that was measured to be within normal limits by administration of the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). Particular subtests of the Clinical Evaluation of Language Fundamentals- Version 4 (CELF-4; Semel, Wiig, & Secord, 2003) were also administered to ensure that structural language skills (i.e., syntax, morphology, and semantics) were within normal limits. Two girls and eight boys participated in this study; the age range of the participants was 6 years; 2 months to 13 years; 11 months. The participants were classified into one of following three age brackets: 6 years; 0 months – 8 years; 11 months (n=4), 9 years; 0 months – 11 years; 11 months (n=3), 12 years; 0 months – 14 years; 11 months (n=3). A summary of the participants, including their chronological age, nonverbal IQ, and their Core Language score on the CELF-4 (if obtained) is provided in Table 1 below.

Table 1:

Participants

Participant	Chronological Age	Nonverbal IQ	CELF Core Language Score (Mean = 100, Standard Deviation = 15)
DAVISE	6 years, 2 months	116	118
POHLDE	6 years, 8 months	125	Not obtained
EINSMA	7 years, 2 months	106	Not obtained
DAVIBE	7 years, 10 months	126	100
ROURDE	9 years, 8 months	80	98
ELLIDO	10 years, 2 months	118	Not obtained
RYLANG	11 years, 4 months	106	114
CHOMCA	13 years, 0 months	101	120
MCAREL	13 years, 5 months	119	123
ALONRY	13 years, 11 months	89	79

Structural language skills were assumed to be within normal limits if participants obtained a Core Language Score between 85-115. If participants received a score higher than 115, their structural language skills were measured as being above average for their age. One participant, ALONRY, received a Core Language Score of 79, placing him below average for his age. However, he performed similarly to other participants in his age group on the idiom protocol and therefore was still included in this pilot study. In addition, a Core Language Score was not obtained for three of the participants, therefore their scores on the Recalling Sentences and

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Formulated Sentences subtests were used to indicate whether their structural language was within normal limits. The three participants' scores on the Recalling Sentences and Formulated Sentences subtests placed their structural language skills within normal limits or above average for their age.

The participants' average nonverbal IQ within age groups and overall is presented in Table 2, and the average Core Language Score within age groups and overall is presented in Table 3.

Table 2:

Average Nonverbal IQ

Age Group (Years; Months)	Average Nonverbal IQ (WASI)
6;0 – 8;11	118.25
9;0 – 11;11	101.3
12;0 – 14;11	103
Overall	108.6

Table 3:

Average Core Language score (CELF)

Age Group (Years; Months)	Average Core Language Score (CELF)
6;0 – 8;11	109 (Based on 2 out of 4 participants in this age bracket)
9;0 – 11;11	106 (Based on 2 out of 3 participants in this age bracket)
12;0 – 14;11	107.3 (Based on 3 out of 3 participants in this age bracket)
Overall	107.4 (Based on 7 out of 10 participants)

Subtests of the Test of Word Knowledge (TOWK) were also administered to measure semantic competence, but participants' results on these subtests were not analyzed for the current pilot study. Each of the participants' standard scores on the subtests are displayed in Table 4 below. Each of these subtests has a mean standard score of 10 and a standard deviation of 3. Therefore, if participants' scores were between 7 and 13, they were assumed to be within normal limits for their age. If their score was below 7, they were below normal limits for their age, and if their score was higher than 13, they were above average for their age.

Table 4:

Subtest Standard Scores (TOWK)

Participants	Receptive Vocabulary	Word Opposites	Expressive Vocabulary	Word Definitions	Figurative Usage
DAVISE	13	14	9	3	N/A
POLHDE	10	17	13	8	N/A
EINSMA	11	15	12	9	N/A
DAVIBE	9	17	10	12	N/A
ROURDE	13	11	9	5	8
ELLIDO	13	15	16	12	15
RYLANG	11	9	10	8	11
CHOMCA	N/A	N/A	N/A	N/A	10
MCAREL	15	14	8	10	9
ALONRY	7	4	4	5	5

Procedure

Each participant was seen individually at Corbett Hall, in the University of Alberta, for two sessions. The second session was scheduled at least 24 hours after the first session. Each session was between 1-2 hours in length. Participants were seen by Rikki Beriault, Melanie Ditmars, and Jodi Klatt, Speech and Language Pathology (SLP) graduate students involved in this research study. The graduate students were trained in the administration of each of the standardized tests and idiom protocol discussed below, and were supervised by Dr. Joanne Volden, the principal investigator in this research.

Each participant completed three standardized tests to assess language level and nonverbal cognition. Idiom comprehension was assessed by the administration of an idiom protocol involving three tasks. Half of the standardized tests were administered in Session 1 followed by experimental task 1. The other half of the standardized tests were administered in Session 2, followed by experimental tasks 2 and 3.

The Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). Each participant completed the Non-verbal or Performance Intelligence Quotient (PIQ) subtests of the WASI to ensure all participants were within typical limits with respect to cognition. According to the manual, the reliability (i.e., the consistency of the measure across situations) of the PIQ scale of the WASI, for children ranging in age 6-14 was between .93 and .95 for each age group, by year (Wechsler, 1999). The validity (i.e., the degree to which the test measures the construct it purports to measure) of the WASI was determined through a comparison with the WAIS-III (Wechsler Adult Intelligence Scale, Wechsler, 1999). The PIQ scale was found to have a .87 correlation co-efficient with the PIQ on the WAIS (Wechsler, 1999).

Clinical Evaluation of Language Fundamentals – 4th Edition (CELF-4; Semel, et al 2003). Each participant completed specific subtests on the CELF-4 in order to obtain a score of structural language ability. The first three participants completed the Recalling Sentences and Formulated Sentences subtests of the CELF-4. The procedure was then modified for the next seven participants to ensure they completed all age-appropriate core language subtests on the CELF-4 in order to obtain a Core Language Score (CLS) (which includes the Recalling Sentences and Formulated Sentences subtests). The CLS is a standard score which was used as an index of language competence for the participants. According to the test manual, the reliability of the CLS subtests ranged from .79 to .94 across age groups (Semel, et al., 2003). With respect to validity “The Core Language score has a high correlation with most other language indexes” (Semel, Wiig & Secord, 2003, pg. 245). For the participants for whom a Core Language Score was not obtained, their individual scaled scores on both the Recalling Sentences and Formulated Sentences subtests were used as an indicator of structural language ability in order to ensure they met the inclusion criteria.

Test of Word Knowledge (TOWK; Wiig & Secord, 1992). The TOWK (Wiig & Secord, 1992) was administered to measure the level of semantic competence of each participant. A standard score was obtained for the following subtests; Expressive Vocabulary, Receptive Vocabulary, Word Opposites, and Word Definitions. Participants over the age of eight completed the Figurative Usage subtest as well. These data were not used in the current study.

Idiom Tasks. For this research study, ten unfamiliar idioms were selected. “Unfamiliar” idioms were chosen in order to approximate the situation of a child’s first encounter with an idiom. The selected idioms had been determined to be unfamiliar to Canadian 12-year-olds by

Boyes & Reimer (SPA 900 Project, 2010). A list of the idioms used in this study can be found in Appendix I.

A series of idiom comprehension tasks were administered to each participant. There were three tasks in total, each using the same 10 idioms, as well as a practice item. The first task involved presenting the child with a sentence that contained an idiom and asking them to tell the experimenter what the idiom meant. For example, the examiner would say, “The coach said, ‘Greg was taken down a peg,’ what do you think it means to be taken down a peg?”. The participants were encouraged to guess if they were not sure what it meant. Each participant’s answers were written down verbatim, and later coded as being either literal, semantic or “figurative, but not idiomatic”, idiomatic, other, or no response. Definitions of each of these categories and examples of how each of the answers was coded can be found in Appendix II.

The second task presented each idiom in the context of a story, and the participants were again asked to tell the examiner what the idiom meant after hearing the story. A factual question was also presented after each of the stories to ensure the participant had listened to the story and understood it. For example, the participant would listen to the following story:

“Greg scored the winning goal in the hockey game. Everyone cheered at the end of the game. When Greg started to brag about his goal, a teammate said, ‘Anyone could have scored that goal.’ The coach said, ‘Greg was **taken down a peg.**’”

The participant would then be asked: “What does it mean when the coach said, ‘Greg was taken down a peg?’” and “What game was Greg playing?”. Answers to both questions were written down verbatim, and answers to the idiom question were coded as being either: literal, semantic or “figurative but not idiomatic”, idiomatic, other, or no response.

The final task presented to each participant used the same stories as the second task, but included pictures to provide additional context. There were three pictures that told the first part of the story and then three additional pictured alternatives were presented as possible depictions of the meaning of the idiom that concluded the story. The participants were asked to point to one of three pictures to answer what they thought the idiom meant. One picture represented a literal interpretation of the idiom, another represented a semantic or “figurative but not idiomatic” interpretation of the idiom, and the third picture represented the correct, idiomatic interpretation of the idiom. For example, for the idiom **“taken down a peg”**, in the context of the story above, the picture depicting the literal meaning was of Greg physically being moved down a position on a peg board. The picture that depicted the semantic or “figurative but not idiomatic” interpretation was of Greg being happy that he scored the goal, and the picture showing the correct idiomatic meaning was of Greg being upset, since his ego had been deflated by his teammate’s comments. The experimenter noted which of the three pictures the participant selected. Because the three tasks were often administered on separate days, parents of the participants were asked not to discuss the idioms with their children between sessions.

RESULTS

The student researchers and the supervisor scored the first two tasks as a team. The researchers reviewed the answers given by each participant and discussed how to categorize each one (e.g., literal, semantic/figurative, idiomatic, other, or no response) until general

consensus was reached by all members of the research team. Task three was scored according to the picture chosen by the participant.

The average number of idiomatic responses produced per age group across the three tasks can be seen in Table 5 below. Idiomatic responses increased across tasks for all age groups. Children aged 6;0 – 8;11 produced an average of 0 idiomatic responses in task one which increased to 2.25 in task two and to 4.25 in task three. Children aged 9;0 – 11;11 produced an average of 1.33 idiomatic responses in task one which increased to 2.67 in task two and to 7.33 in task three. Similarly children aged 12;0 – 14;11 produced an average of 2.7 idiomatic responses in task one which increased to 4.7 in task two and to 7.67 in task three. These results indicate the average comprehension of idioms improved as the amount of context provided increased. Moreover, as the age of the children increased (6;0 – 8;11 → 9;0 – 11;11 → 12;0 – 14;11), the average number of correct, idiomatic responses increased (i.e. Task 1: 0 → 1.33 → 2.7; Task 2: 2.25 → 2.67 → 4.7; Task 3: 4.25 → 7.33 → 7.67).

Table 5

Average Number of Idiomatic Responses

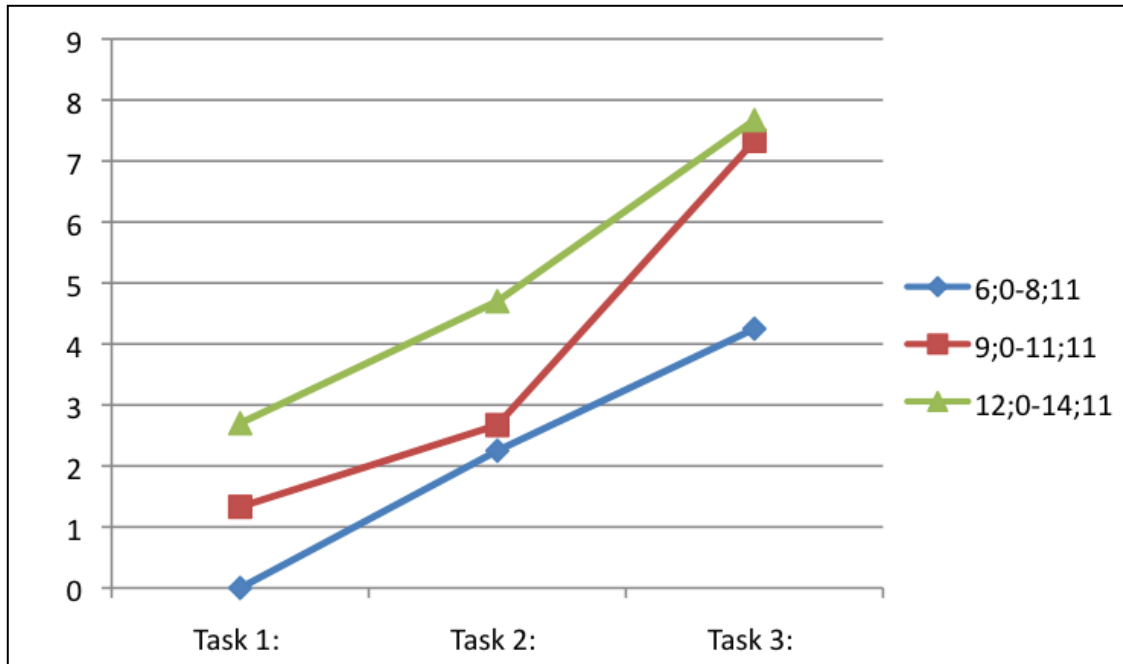
Age Group	Task 1: Average Number of Idiomatic Responses (out of 10)	Task 2: Average Number of Idiomatic Responses (out of 10)	Task 3: Average Number of Idiomatic Responses (out of 10)
6;0-8;11	0	2.25	4.25
9;0-11;11	1.33	2.67	7.33
12;0-14;11	2.70	4.70	7.67

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These results are illustrated below in Figure 1.

Figure 1:

Average of Idiomatic Responses by Age Group



These results support our first hypothesis that older children with ASD interpret more idioms correctly than young children with ASD when both groups are cognitively- and linguistically-able. As age increased, so did the number of correct idiomatic responses. These preliminary results also support the notion that increasing context leads to more accurate figurative interpretation of idioms at every age. The number of correct idiomatic responses increased when the participants were provided with a story and increased again with a multiple choice task in each age group.

DISCUSSION

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The purpose of this preliminary study was to investigate comprehension of idioms across age-groups, and with different amounts of contextual support, in children with ASD. The researchers examined 10 cognitively- and linguistically- able children with ASD in three age ranges: 6 years; 0 months – 8 years; 11 months, 9 years; 0 months – 11 years; 11 months, and 12 years; 0 months – 14 years; 11 months. Researchers expected that older children with ASD would do better than younger children and that more context would assist in comprehension – thus documenting that cognitively and linguistically able children with ASD develop idiom comprehension in the same sequence as has been found for typical children (Levorato & Cacciari, 1995).

On all three tasks in the protocol, understanding of idioms increased across the three age groups, suggesting that comprehension of idioms improves with development. The results also show positive evidence for the effect of context in correctly interpreting idioms. In all three age groups, an increase in the understanding of idioms was seen across tasks, as the amount of context provided was increased. The addition of a third task adding more context extends Norbury's (2004) study, which also showed evidence that context improved understanding of idioms in children regardless of a diagnosis of ASD when participants were controlled to ensure that a language disorder was not present.

A possible limitation to the current pilot study is the repetition of the idioms across the tasks in the idiom protocol over two sessions. Although parents were instructed not to discuss the idioms used in the study until after the second session, participants may have learned on their own about the stimulus idioms between sessions. To control for repeated exposure and possible learning of stimulus items in future studies, researchers could administer the same

kind of protocol, using different idioms, rated as equally unfamiliar, in each of the tasks.

Furthermore, researchers could administer the same idiom protocol using 10 different idioms to determine if results were similar. Re-administering the same protocol with another set of idioms could assess whether or not the idiom protocol is a reliable and valid measure of the effects of increasing context for the comprehension of idioms and whether these results would generalize to all idioms.

In the present study, the examiners noted that the participants learned to interpret more idioms correctly as context was increased in this setting (the research lab), but these results cannot be readily generalized to other settings, such as the classroom. Further research could look at whether the same phenomenon would be observed in the classroom setting. Since this was a pilot study, there were a small number of participants who took part. A future study could include more participants with ASD, and possibly compare these children to typically developing kids and other kids with language disorders such as Specific Language Impairment.

The results of this study have implications for the classroom teaching. Increasing teachers' awareness of idiom use in the classroom, as well how to use contextual support for idioms, may improve interpretation of idioms by children with ASD. This is a topic for future research.

This attention to idioms and other figurative language could have dramatic positive effects on the social behaviour of children with ASD. The ability to understand figurative language is an important part of social communication (Paul, 2007). The ability to understand and use figurative language provides children with ASD another way to relate to their peers: through jokes, sarcasm and idioms. Intervention that provides education around figurative language

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could aid in improving the social skills for children with ASD, further enabling these children to have a better sense of understanding and success in their day-to-day social interactions.

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APPENDIX I: IDIOMS USED IN STUDY

1)	"Greg was taken down a peg. "
2)	"Evan is talking through his hat. "
3)	" That goes against the grain. "
4)	"Well I can paper over the cracks. "
5)	"Does Suzy always lead with her chin. "
6)	"Joey voted with his feet. "
7)	"This has gone to pot. "
8)	"That has a hollow ring "
9)	"You need to hoe your own row. "
10)	"Jake rose to the bait. "

APPENDIX II: DEFINITIONS OF RESPONSE TYPES AND EXAMPLES

“Literal” Response – one which expressed a meaning associated with the common understanding of each of the words presented in the idiom, a piece by piece explanation of the language (Levorato and Cicciari, 1995).

E.g. Idiom #4: “Well I can **paper over the cracks**” means *I can put paper on the cracks*

“Semantic/Figurative” Response - one which expressed a meaning which was plausible in the context of the story and semantically appropriate, even though different from the idiomatic meaning (Levorato and Cicciari, 1995).

E.g. Idiom #4: “Well I can **paper over the cracks**” means *I can fix it*

Note: The semantic/figurative response applied mostly in a situation where the participant was given a context in which the idiom occurred, in this case, the wheel on a boy’s toy truck had fallen off, and his mother offered to “paper over the cracks” until the boy’s father returned home and could fix it correctly. The participant’s response of “I can fix it” indicates that the child realizes there is a meaning beyond the literal understanding of the mother’s words, but the definition given depends too much on the context provided (i.e. fixing the truck) to be considered idiomatic.

“Idiomatic” Response – one which takes into consideration the context of the phrase including tone and communication attempt and therefore adapts the meaning of the words to create a global, coherent meaning (Levorato and Cicciari, 1995).

E.g. Idiom #4: “Well I can **paper over the cracks**” means *I can make it appear better, but it won’t really be better, the repair job won’t last.*

“Other Response” – not relating to literal, contextual or idiomatic meaning.

E.g. Idiom #4: “Well I can **paper over the cracks**” means *She can let him for a bit*.

This kind of response did not fall into any of the other three categories of responses mentioned above and was therefore categorized as “other”. Similarly, other responses that did not fit with the definition of “literal”, “semantic/figurative”, or “idiomatic”, were classified as “other”.