# When Do Japanese Children with Autism Spectrum Disorder Comprehend Ambiguous Language Overliterally or Overnonliterally?

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The present study aimed to clarify whether comprehension of ambiguous sentences in Japanese children with high-functioning autism spectrum disorder (HFASD) varies depending on the degree to which the use of these sentences is conventional. We examined the relationship between comprehension by children with HFASD and college freshmen's assessment of conventionality of usage of these sentences in contexts encouraging literal or nonliteral interpretation. One hundred ninety-four freshmen participated. Children's interpretation preferences were correlated with freshmen's assessments of 9 ambiguous sentences for which previous da-

ta showed a significant intergroup difference in interpretation between 45 2nd to 6th graders with HFASD and 45 typically developing (TD) children matched for grade and gender. All the HFASD children fulfilled the criteria for pervasive developmental disorder of DSM-IV-TR, and they ranged in full-scale IQ from 79 to 129 (mean = 97.56, SD = 17.54) and in verbal-IQ from 80 to 136 (mean = 98.87, SD = 17.81). In 6 of these 9 sentences, the interpretation preferred more strongly by children with HFASD than TD children was rated by the freshmen as significantly less strange than the nonpreferred interpretation, regardless of whether it was literal or nonliteral. These results suggest that children with HFASD comprehend ambiguous sentences in accordance with their conventionality as assessed by freshmen. Even when TD children choose a literal interpretation, children with HFASD select the nonliteral one judged more conventional than its literal counterpart. This conformity of children with HFASD to conventional interpretation of ambiguous language seems to account for overliteralness and overnonliteralness.

Key Words: autism, literalness, ambiguous language, comprehension

# Introduction

Literalness has been highlighted repeatedly by researchers to be one of the most prominent characteristics of language in autism since the first clinical descriptions of autism by Kanner (1943) and Asperger (1944). The notion has been strongly believed among researchers even in the past decade (Frith, 2003; Perkins, 2007). Empirical studies conducted on this issue by researchers from English-speaking countries have concentrated on comprehension of metaphor and similar constructs (Happé, 1993; MacKay & Shaw, 2004; Rundblad & Annaz, 2010); however, linguistic ambiguity applies to a far wider range of language (Kess & Nishmitsu, 1989). The results of these studies have uniformly indicated deficits in individuals with autism in this respect.

Few studies have challenged the assumption that people with autism demonstrate literalness. As an exception, a study by Ozonoff and Miller (1996) suggested a kind of "overnonliteralness" glimpsed in adults with high-functioning autism spectrum disorder (HFASD), despite their pervasive tendency for literalness in understanding humor, drawing inferences, and appreciating indirect requests. These adults were more likely than controls to choose a nonliteral response to indirect requests in contexts where a literal interpretation was encouraged. In addition, the autistic group was significantly more likely to choose indirect than direct responses, regardless of the directions of contextual encouragement. In interpreting their findings, Ozonoff and Miller argued that individuals with autism have overlearned the rule by which questions beginning with "Can you . . . " should be interpreted in a nonliteral way, as in everyday situations such syntactic forms are more likely to be polite requests for action than inquiries about ability. Ozonoff and Miller regard individuals with autism to be less able to use context to determine when this rule should not be applied. They argue that such a paradoxic difficulty on indirect requests seen in these adults originates from their inability to inhibit an overlearned and proponent response (Ozonoff, Strayer, McMahon, & Filloux, 1994).

This exceptional glimpse of "overnonliteralness" from individuals with autism was regarded by Ozonoff and Miller as the result of a specific underlying impairment in using context to understand details. They did not believe it might stem from a generic effect of an overly concrete communication style (Dewey & Everard, 1974). We doubt, however, whether Ozonoff and Miller's interpretation is valid in this regard. A concrete communication style might cause an overly nonliteral interpretation as well as an inappropriately literal one. Dewey and Everard, although intending to explain how words and sentences are processed literally in individuals with autism, have tacitly provided a possible basis for overnonliteralness in autism by saying that someone with autism "tends to persevere in his first impression rather than discarding it to test other meanings" (p. 349). We think this way of language learning could lead to both overliteralness and overnonliteralness. A person with autism would comprehend ambiguous language such as indirect requests, exactly in the same way as she or he has learned it. Nonliteral response to questions beginning with, "Can you . . . " might be learned this way when they are asked indirectly as is done conventionally. In putting forward this explanation, however, we do not deny the difficulty experienced by individuals with autism in using contextual information to respond to indirect requests when the context encourages a literal response. Rather, an overly concrete communication style and impairment in using contextual information in comprehending language could be regarded as two sides of the same coin. In other words, both might be regarded not as discrete entities but as an emergent phenomenon (Perkins, 1998). Literal comprehension of humor and the overnonliteral comprehension of indirect requests observed by Ozonoff and Miller in adults with autism could have emerged out of some common underlying mechanism.

Thus, we need to take the first steps in elucidating such a common underlying mechanism. The first step is re-examining findings indicating the co-occurrence of overliteralness and overnonliteralness in individuals with autism. Oi and Tanaka (2010) have coincidentally shown this co-occurrence in elementary school children with HFASD. They asked 53 2nd to 6th graders with HFASD and 50 without HFASD to rate ambiguous sentences on a 5-point scale between two cartoons representing literal and nonliteral interpretation of the sentences. Fifty sentences varying in types of ambiguity were given. These were devised by Oi and Tanaka on the basis of a cross-linguistic investigation by Kess and Nishimitu (1989) on ambiguity in Japanese and English. The types consisted of lexical ambiguity, grammatical ambiguity, and ambiguity in discourse acts including indirect requests and irony. Metaphors, idioms, humor, and puns also were included. The results of Oi and Tanaka, contrary to the belief about literalness in autism, showed that most (40/50)of the ambiguous sentences were comprehended in a similar way between children with and without HFASD; those with HFASD did not demonstrate more literalness. In 4 sentences, on the other hand, children with HFASD showed a stronger preference for the literal meaning, and in 6 sentences, conversely, they showed stronger preference for the nonliteral meaning than 50 typically developing (TD) children. Of the 4 sentences responded to "overliterally" in children with HFASD, 2 were grammatically ambiguous, one consisted of an indirect speech act, and the other was a metaphor. Of the 6 responded to "overnonliterally," 3 involved ambiguous discourse acts (with the exception of indirect requests) and 3 were grammatically ambiguous. Out of 2 indirect requests given to the children, one showed no group difference.

These results, first, dismiss the idea that children with HFASD tend to comprehend any ambiguous language literally, and second, add another piece of evidence that "overnonliteralness" occurs in individuals with autism, replicating the results of Ozonoff and Miller in terms of co-occurrence of "overnonliteralness" and "overliteralness" and broadening these results to different types of language ambiguity. These findings warrant re-examination as a possible key to understanding why this co-occurrence happens.

In addition, we anticipate that re-examining "literalness" in autistic language could explain why pragmatic deficits in autism are so pervasive. These defects are indeed incredibly diverse and occur in almost all pragmatic aspects of language (Oi, 2006; Ozonoff & Miller, 1996; Perkins, 2002, 2007). Some have attempted to explain this generality of the disability using the concept of a single cognitive dysfunction such as lack of theory of mind (Happĕ, 1993, 1995), impairment of executive function (Bishop & Nuburry, 2005), and weak central coherence (Joliife & Baron-Cohen, 1999a, 1999b; Noens & van Berckelaer-Onnes, 2004). Perkins (2007) insists any pragmatic disability, regardless of differences in underlying brain pathology, such as specific language impairment (SLI), dementia, right hemisphere dysfunction (RHD), aphasia, traumatic brain injury (TBI), and autism, could not be attributed solely to a certain single cognitive dysfunction mentioned above. Rather, he sees many different cognitive processes as being engaged simultaneously and interactively in any communicative behavior. For Perkins, "each cognitive process which merits a single individuating label is itself the complex product of subsidiary interactions" (Perkins 2007, p. 106). While paying respect to his considerations, we seek "a more pervasive (and perhaps ultimately even more maladaptive) deficit in general cognitive functioning" (Bruner & Feldman 1993, p. 286) specific to autism.

Lawson (2003) proposed a promising conceptualization of autism that could explain the generality of the pragmatic disability by bringing together all cognitive deficits believed to cause it. He puts forward the depth accessibility difficulty (DAD) model as a way of embracing distinct theories of autism. The DAD model proposes that individuals with autism reduce the world "to closed systems of atomistic (essentially unconnected) actualities" (Lawson, 2003, p. 197).

Another possibility of a pervasive deficit causing the generality arises (Ohigashi,

2009) when we consider revolutionary neurologic insights into human consciousness and (Edelman, 2004) together with modern philosophical concepts about the relationship between language and experience (Agamben, 2001). Taken together, these insights suggest that language in autism can be regarded to emerge just for the individual, not for others, in fragmental "primary consciousness" without connection to integrative "higher consciousness." According to this view, any pragmatic deficit seen in individuals with autism is due to the lack of language for others and a result of having fragmentary language by nature. A person with autism would produce or comprehend language fragmentally in a similar manner to which she or he has learned it. Hence, language production and comprehension may be based on what individuals have memorized fragmentally in the context they perceived it to be directly related to words from others heard at the time (Oi, 2010).

Thus, we can hypothesize that the co-occurrence of overliteralness and overnonliteralness in individuals with autism comes from their fragmental or atomistic language. An ambiguous sentence would be comprehended appropriately when used in a context (presumably conventional) that is almost identical to that in which the person learned it. Inappropriate comprehension would arise when the context (presumably less conventional) is considerably different from the one where the language was learned. Such learning seems to be influenced by conventionality of the usage of a sentence, as Ozonoff and Miller (1996) indicated in referring to "Can you . . . " type questions.

Here we have the question of whether comprehension of an ambiguous sentence in individuals with autism, regardless of literalness or nonliteralness, varies depending on the degree of conventionality of the usage of the sentence in certain context. Another question that arises is what causes the difference between the cases where comprehension is overliteral and those in which it is overnonliteral in individuals with autism. Based on the assumption given by Ozonoff and Miller (1996), an ambiguous sentence would be comprehended overliterally when the context encourages nonliteral interpretation, and overnonliterally when the context encourages literal interpretation. However, we predict that this theory would not hold true because the conventionality of a sentence would play a key role in this difference in comprehension.

The purpose of the present study was to answer the above two questions by examining the relationship between comprehension of ambiguous sentences in children with HFASD and the opinion of college freshmen regarding conventionality of usage of these sentences in contexts contrastive in the direction of encouragement.

### Methods

## **Participants**

University freshmen were randomly recruited to rate the degree of strangeness (unconventionality) of the combination of a sentence and a cartoon picture representing the nonliteral or literal interpretation of the sentence. These sentences and pictures were the same as those used for children with HFASD and TD children. Participants were 98 male freshmen (mean age = 19.50 years, SD = 0.74) and 96 female freshmen (mean age = 19.19 years, SD = 0.64). The group was bisected into two gendermatched subgroups. One subgroup (freshmen A) was asked to rate the strangeness of 25 sentences in combination with their literal interpretations and a further 25 sentences in combination with their nonliteral interpretations. In rating, the order of the type of sentence-interpretation combination was randomized. The other subgroup (freshmen B) was asked to do the same but with the opposite interpretation in combination with the same sentences. Hence, when a sentence was rated in combination with its literal interpretation by half of the freshmen, the other half rated that sentence in combination with its nonliteral meaning. Thus, each of the 50 sentences was rated, in terms of strangeness of interpretation, twice separately in combination with its literal or nonliteral interpretation by 97 freshmen as shown in Table 1.

The freshmen were asked to rate the strangeness of the combination of these ambiguous sentences and their literal or non-literal interpretation on a 5-point scale. The strangest was assigned 5 and the least strange 1.

We next examined the relationship between these freshmen's ratings of strangeness and children's interpretation of 100 combinations of a sentence and its interpretation. To do this, we used the data of Oi and Tanaka (2010) concerning 45 2nd to 6th graders with HFASD (40 boys and 5 girls, mean grade = 4.29, SD = 1.27) and 45 TD children extracted randomly from 666 2ndto-6th graders in an elementary school (exactly matched for grade and gender). The TD children all attended regular classes, received no special educational services, and had no sensory or motor impairments. All

**Table 1.** Allocation of Sentence-Literal (Nonliteral) Meaning Combination in

 Rating by the Two Groups of Freshmen

|                           | Freshmen A ( $n = 97$ )                       | Freshmen B ( $n = 97$ )                       |
|---------------------------|---|---|
| 25 sentences              | rated sentence-literal meaning combination    | rated sentence-nonliteral meaning combination |
| The other 25<br>Sentences | rated sentence-nonliteral meaning combination | rated sentence-literal meaning combination    |

the HFASD children were assessed by psychiatrists or paediatricians as fulfilling the criteria for any of the pervasive developmental disorders of DSM-IV-TR. All were assessed using the third edition of the Wechsler Intelligence Scale within a year before the data were collected. They also all attended regular classes. HFASD children ranged in fullscale IQ from 79 to 129 (M = 97.56, SD = 17.54), and in verbal-IQ from 80 to 136 (M = 98.87, SD = 17.81). No standardized intelligence scale was administered to TD children, because it is general practice among typical council elementary schools in Japan not to assess pupils' intelligence.

#### Procedures

First, the correlation r was calculated between the children's mean magnitude of preference between literal interpretation and nonliteral interpretation of sentences and the mean strangeness-rating of sentence-interpretation combinations by freshmen (described above). The magnitude of preference between the literal interpretation and nonliteral interpretation was defined as the distance between the mean value of children's rating and either the most literal or the most nonliteral interpretation of the sentence on the 5-point scale. The most literal interpretation was assigned 1 and the most nonliteral 5.

Calculations of r were conducted as follows: (1) in calculating r between children's mean preference magnitude and freshmen's mean strangeness rating of the combination of a sentence and its literal meaning, the distance between children's mean rating value and the most nonliteral interpretation (5 on the scale) was adopted and (2) in calculating r between children's mean preference magnitude and freshmen's mean strangeness rating of the combination of a sentence and its nonliteral meaning, the distance between children's mean rating value and the most literal interpretation (1 on the scale) was adopted. This calculation method is shown by a figure in the Appendix.

Second, we examined how the strangeness ratings by the freshmen of the two combinations, the sentence-literal and the sentence-nonliteral interpretations, relate to the difference seen in the sentence-interpretation preference between the two groups of children, for the 9 sentences in which significant intergroup difference was shown. In 10 sentences Oi and Tanaka (2010) showed intergroup differences in sentence-interpretation preference between children with and without HFASD, although matching between the 2 groups was not perfect in terms of grade and gender. In the present study we ensured perfect matching of these variables, and as a result, one sentence in which an intergroup difference was seen in the previous study did not attain statistical significance. This sentence was excluded from the examination. The strangeness ratings by the freshmen were compared between the sentence-literal interpretation combination and the sentence-nonliteral interpretation combination using the Mann-Whitney U-test.

#### Results

The correlation r between children's mean preference magnitude and freshmen's mean strangeness rating was -.65 (p < .001) for children with HFASD, and -.67 (p < .001) for TD children. The two r values did not differ significantly from each other.

In 6 sentences (#1 to 6 in Table 2) of the 9 in which the intergroup difference was reconfirmed in terms of sentence interpretation preference by children, the interpretation preferred more strongly by children with HFASD than by TD children was rated by the freshmen as significantly less strange in its combination with the sentence than the nonpreferred interpretation, regardless of whether the interpretation was literal or nonliteral. In 5 (#1 to 5) sentences for which the children with HFASD showed stronger preference for the nonliteral interpretation than did the TD children, the freshmen rated the sentence-nonliteral in-

| Meanings (munices in                                       | I pai chilicoco illuicaic of                                     | , icara were two tarrent.                    |                      |                       |                |                   |       |       |
|--|--|--|----------------------|-----------------------|----------------|-------------------|-------|-------|
| •  | •  |  | Mean pro<br>toward n | eference<br>onliteral | Mean st<br>r:  | rangeness<br>ated |       |       |
| Sentence in<br>Japanese                                    | Literal<br>interpretation  | Nonliteral<br>interpretation                 | HFASD                | TD                    | Literal        | Nonliteral        | и     | þ     |
| #1 Doa ni te wo<br>hasanda.                                | I made my hand get<br>caught in the door.                        | I caught my hand in the door.                | 4.42<br>(1.01)       | 4.04<br>(1.21)        | 3.63<br>(1.53) | 1.23 (0.64)       | 9.71  | <.001 |
| #2 Taku-chan ga ishi<br>ni ataru.                          | Taku directed himself into the stone.                            | A stone hit Taku.                            | 4.24<br>(1.23)       | 4.07<br>(0.99)        | 4.10<br>(1.17) | 2.56<br>(1.63)    | 12.03 | <.001 |
| #3 Otou-san ga niwa<br>de moratta imo wo<br>yaita.         | Dad baked sweet<br>potato which he was<br>given in the backyard. | Dad baked sweet<br>potato in the backyard.   | 3.91<br>(1.27)       | 3.53<br>(1.32)        | 3.27<br>(1.47) | 2.36<br>(1.36)    | 4.23  | <.001 |
| #4 Kore shukudai ni<br>suru?—Ii desu.                      | One more bit of homework?—Yes.                                   | One more bit of<br>homework?—No.             | 4.02<br>(1.32)       | 3.33<br>(1.46)        | 3.86<br>(1.18) | 2.09 (1.34)       | 7.81  | <.001 |
| #5 Shiroi hato to<br>karasu ga imasu.                      | There is a white dove<br>and a white crow.                       | There is a white dove<br>and a (black) crow. | 4.16<br>(1.30)       | 3.78<br>(1.36)        | 3.11<br>(1.64) | 1.71<br>(1.21)    | 5.74  | <.001 |
| #6 Omawari-san ga<br>otou-san to dorobou<br>wo tsukamaeta. | The policeman<br>arrested the thief and<br>my dad.               | The policeman and my dad arrested the thief. | 2.28<br>(1.61)       | 3.27<br>(1.50)        | 2.94<br>(1.54) | 3.65<br>(1.44)    | 3.53  | <.001 |
| #7 Ouchi ni chiisana<br>neko to inu ga imasu.              | We have a small cat<br>and a small dog.                          | We have a small cat and a (big) dog.         | 2.07<br>(1.34)       | 2.78<br>(1.51)        | 2.32<br>(1.41) | 2.31<br>(1.29)    | .12   | n.s.  |
| #8 Okasan ha imasu<br>ka?—Iru yo.                          | Is Mom home?—Yes.  | Is Mom home?—Mom!                            | 2.35<br>(1.37)       | 3.33<br>(1.44)        | 2.24<br>(1.33) | 2.49<br>(1.48)    | 1.04  | n.s.  |
| #9 Oisha-san no<br>tamago.                                 | Doctor's egg.  | A resident.                                  | 2.93<br>(1.55)       | 3.60 (1.40)           | 4.31<br>(1.23) | 1.37 (0.64)       | 11.10 | <.001 |

Table 2. Relationships Between Children's Preference of Literal or Nonliteral Meaning and Freshmen's Rating of Strangeness of These

terpretation combinations as significantly less strange compared with the literal meaning (Mann-Whitney U-test, z scores were applied to calculate p and shown in Table 2, all p-values <.001). In one sentence (#6) where literal interpretation was preferred significantly more strongly by the children with HFASD than the TD children, the freshmen rated the sentence-literal interpretation as significantly less strange (Mann-Whitney U, z score was applied to calculate p and shown in Table 2, p <.001).

On the other hand, there were 3 sentences (#7 to 9) for which the above-mentioned relationship was not seen. The children with HFASD preferred the nonliteral interpretation more strongly than TD children for these sentences. In 2 sentences (#7, 8) of these 3, the freshmen did not rate the sentence-literal interpretation combination and the sentence-nonliteral interpretation combination differently (Mann-Whitney U-test, z scores were applied to calculate pand shown in Table 2, both p-values N.S.). Finally, in 1 sentence (#9), the freshmen rated the combination of the sentence and its literal interpretation less strange than that with its nonliteral interpretation.

## Discussion

The present study addressed two questions. The first asked whether the appropriateness of comprehending an ambiguous sentence by individuals with autism varies depending on the degree of conventionality of the context in which the sentence is used. The second asked whether an ambiguous sentence would be comprehended overliterally when the context encourages nonliteral interpretation and vice versa.

The answer to the first question was "yes." The more strangely the combination of an ambiguous sentence and its context was rated by freshmen, the more literally the sentence was comprehended by children with HFASD. We presupposed that this would occur only in children with HFASD or, at least, that it would occur more explicitly in these children than in TD children. Contrary to our presupposition, however, it occurred to the same degree in TD children; the significant correlation r was almost identical between the two groups of children.

When considering the notion that the younger the child the more literal the comprehension of ambiguous language such as indirect requests (Kelly, 2001) and metaphor (Happé, 1993), before withdrawing the abovementioned presupposition, we have to test the possibility of a high dependence on conventionality in comprehending these sentences that is specific to older individuals with autism. We need to ask whether the correlation between strangeness rating by freshmen and literalness in sentence comprehension in children with HFASD is replicated in adolescents or adults with autism; specifically, whether r for this correlation would differ from that in typically developing individuals.

In regard to the second question, the present findings seem to favor our prediction rather than the assumption of Ozonoff and Miller (1996). They assumed that nonliteral interpretations of language such as responses to "Can you . . . " questions had been overlearned by adults with autism to be comprehended nonliterally even when the context encourages literal interpretation. On the contrary, the present results showed that, regardless of whether they were literal or nonliteral, interpretations of ambiguous language preferred by children with HFASD more strongly than by TD children were ones which freshmen rated less strange. This means the co-occurrence of "overliteralness" and "overnonliteralness" in individuals with autism could not be explained simply as failure to use context or inability to inhibit an overlearned and proponent response. Rather, the results suggest seemingly high conformity of children with HFASD with conventional language usage in adults. This reminds us of formulaic language often seen in second language learners (Weinert, 1995) as well as in people with autism and patients with Alzheimer's disease (Wray & Perkins, 2000), although this was discussed not from the viewpoint of receptive language but from that of productive language. Formulaic language in autism is considered by Prizant (1983) as the product of "an inability to segment others' utterances and realise their internal structure" (p. 303). This might also apply to receptive language, as production and reception are closely related to each other. The co-occurrence of overliteralness and overnonliteralness in children with HFASD has to be investigated as a part of language formulaicity which can be regarded as a "'Hobson's choice' solution to processing constraints" (Wray & Perkins, 2000, p. 23).

We cannot shift away immediately, however, from the assumption of overnonliteralness in autism by Ozonoff and Miller (1996). This is because we found a relatively small number of sentences where a stronger sentence-interpretation preference in children with HFASD than in TD children coincided with freshmen's lower rating of strangeness of the interpretation. Although these sentences accounted for 6 of the 9 sentences with an intergroup difference, this proportion could not attain statistical significance with binomial distribution.

Contradictory to our prediction, some of the present results supported the belief that autistic language is literal by nature. Literalness in children with HFASD was seen in 2 sentences when literal and nonliteral interpretations were not rated differently in terms of strangeness. This suggests that literalness in autism is a potential tendency that could be activated when interpretations of an ambiguous sentence are equally conventional.

In addition, children with HFASD showed significantly stronger literalness than TD children in one metaphor for which the literal interpretation was rated by freshmen as significantly stranger than the nonliteral interpretation. This supports the idea that literalness in autism is the result of failure to use context, as Ozonoff and Miller (1996) assumed. This, however, must not be overemphasized because this was the case only in 1 of 5 metaphors investigated by Oi and Tanaka (2010), with the rest not comprehended differently between the two groups of children.

For further investigation that moves us toward an underlying mechanism of the cooccurrence of overliteralness and overnonliteralness in autism, we first need to clarify why the results of the present study varied in terms of the relationship between children's preference and adults' rating of the sentence-meaning combination. A larger number of sentences is required for accurate multivariate analysis in these circumstances.

Finally, taking presumable cross-cultural/linguistic differences between Japanese and English (Hinds, 1987) into account may enrich further investigation on literalness in autism seen in comprehending ambiguous language. Hinds (1987, p. 143) suggested that in "a typology that is based on speaker and/or writer responsibility as opposed to listener and/or reader responsibility . . . in English, the person primarily responsible for effective communication is the speaker . . . in Japanese, the person primarily responsible for effective communication is the listener." Theoretically, a language imposing responsibility on the listener is considered to allow a speaker to be more ambiguous than a speaker-responsible language, and accordingly members of a community with listenerresponsible language are exposed to more ambiguous language than those whose language is speaker-responsible. How autism interacts with the language type in this regard is worth investigating. Japanese individuals with autism might be more knowledgeable about nonliteral and literal meanings of ambiguous language than their Englishspeaking counterparts. The study by Oi and Tanaka (2010) was not the only one to show that sentences where no difference between children with and without HFASD was seen in terms of comprehending ambiguous language far outnumbered sentences with intergroup difference. This finding has been replicated in other studies on comprehension of indirect speech acts in Japanese (Taguchi, Oi, & Takahashi, 2010; Yata & Oi, 2009). The difference between findings on literalness in autism from studies conducted in English-speaking countries and from those in Japan might be based on this presumable cross-cultural/linguistic difference between the two languages. The former studies indicate a uniform deficit in individuals with autism, whereas the latter ones depict a different and more complicated picture in this respect.

#### Conclusion

The results of the present study, as expected, suggest that children with HFASD comprehend ambiguous language in accordance with its conventionality as assessed by college freshmen, regardless of whether this involves literal or nonliteral comprehension. This could be the basis of the co-occurrence of overliteralness and overnonliteralness in these children. Even when TD children choose a literal interpretation of a sentence, children with HFASD select the nonliteral one assessed less strange by college freshmen than the literal one. This conformity of children with HFASD to conventional interpretation of ambiguous language seems to account for the co-occurrence of overliteralness and overnonliteralness. Repeating the present study using a larger number of sentences may help in the gradual examination of our hypothesis that this co-occurrence stems from the fragmental or atomistic nature of language in autism.

The present results have a clinical implication for assessing comprehension of ambiguous language such as metaphor, irony, indirect speech acts, and the like in individuals with autism. In taking into account to what extent adults with autism regard interpretations of ambiguous sentences as conventional, we can avoid mistaking their seemingly high conformity to conventional language use for a lack of knowledge of nonliteral meaning or a failure to use context.

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#### References

- Agamben, G. (2001). *Infanzia e storia. Distruzione dell'esperienza e origine della storia.* Torino, Italy: Einaudi.
- Asperger, H. (1944). Die "Autistischen Psychopathen" in Kindersalter. Archiv für Psyciatrie und Nervenkrankheiten, 117, 76–136.
- Bishop, D. V. M., & Norbury, C. F. (2005). Executive functions in children with communication impairments, in relation to autistic symptomatology I: Generativity. *Autism*, 9(1), 7–27.
- Bruner, J. S., & Feldman, C. (1993). Theories of mind and the problem of autism. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), Understanding other minds: Perspectives from autism (pp. 267–291). Oxford, UK: Oxford University Press.
- Dewey, P., & Everard, P. (1974). The near-normal autistic adolescent. *Journal of Autism and Child Schizophrenia*, *4*, 348-356.
- Edelman, G. (2004). Wider than the sky: A revolutionary view of consciousness. London, UK: Penguin Books.
- Frith, U. (2003). *Autism: Explaining the enigma* (2nd ed.). Oxford, UK: Blackwell.
- Happé, F. G. E. (1993). Communicative competence and theory of mind in autism: A test of relevance theory. *Cognition*, 48, 101-119.
- Happé, F. G. E. (1995). Understanding minds and metaphors: Insights from the study of figurative language in autism. *Metaphor and Symbolic Activity*, 10, 275-295.
- Hinds, J. (1987). Reader versus writer responsibility: A new typology. U. Connor & R. B. Kaplan (Eds.), Writing across languages: Analysis of L2 text (pp. 141–152). Reading, MA: Addison-Wesley.

- Joliffe, T., & Baron-Cohen, S. (1999a). The strange stories test: A replication with highfunctioning adults with autism or Asperger syndrome. *Journal of Autism and Developmental Disorders*, 29(5), 395–406.
- Joliffe, T., & Baron-Cohen, S. (1999b). A test of central coherence theory: Linguistic processing in high-functioning adults with autism or Asperger syndrome: Is local coherence impaired? *Cognition*, 71, 149–185.
- Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child*, 2, 217-250.
- Kelly, S. D. (2001). Broadening the units of analysis in communication: Speech and nonverbal behaviors in pragmatic comprehension. *Journal of Child Language*, 28, 25–349.
- Kess, J. F., & Nishmitsu, Y. (1989). Linguistic ambiguity in natural language: English and Japanese. Tokyo, Japan: Kuroshio Shuppann.
- Lawson, J. (2003). Depth accessibility difficulties: An alternative conceptualisation of autism spectrum conditions. *Journal for the Theory of Social Behaviour, 33*, 189-202.
- MacKay, G., & Shaw, A. (2004). A comparative study of figurative language in children with autistic spectrum disorders. *Child Language Teaching and Therapy*, 20, 13–32.
- Noens, I., & van Berckelaer-Onnes, I. (2004). Making sense in a fragmentary world: Communication in people with autism and learning disability. *Autism*, 8, 197–218.
- Ohigashi, Y. (2009). Personal communication.
- Oi, M. (2006). Pragmatic impairment in individuals with high-functioning pervasive developmental disorders: Characteristics, backgrounds, and intervention. *Japanese Journal* of Communication Disorders, 23, 87–104.
- Oi, M. (2010). Language and mind in autism: A perspective to relate the triad of autism to social brain bypothesis. Paper presented at International Conference on Social Brain: Autism and Neuroethics, Kanazawa.
- Oi, M., & Tanaka, S. (2010). Comprehension of ambiguous language in children with highfunctioning autism spectrum disorder. Japanese Journal of Communication Disorders, 27, 10-18.

- Ozonoff, S., & Miller, J. N. (1996). An exploration of right-hemisphere contributions to the pragmatic impairments of autism. *Brain and Language*, *52*, 411-434.
- Ozonoff, S., Strayer, D. L., McMahon, W. M., & Filloux, F. (1994). Executive function abilities in autism and Tourette syndrome: An information processing approach. *Journal of Child Psychology and Psychiatry*, 35, 1015-1032.
- Perkins, M. (1998). Is pragmatics epiphenomenal? Evidence from communication disorders. *Journal of Pragmatics*, *29*, 291–311.
- Perkins, M. (2002). An emergentist approaches to clinical pragmatics. In F. Windsor, M. L. Kelly, & N. Hewlett (Eds.), *Investigations in clinical phonetics and linguistics*. (pp. 1-14) New York, NY: Laurence Erlbaum.
- Perkins, M. (2007). *Pragmatic impairment*. Cambridge, UK: Cambridge University Press.
- Prizant, B. M. (1983). Language acquisition and communicative behavior in autism: Toward an understanding of the "whole" of it. *Journal of Speech and Hearing Disorders*, 48, 286-296.
- Rundblad, G., & Annaz, D. (2010). The atypical development of metaphor and metonymy comprehension in children with autism. *Autism*, 14, 29-46.
- Taguchi, A., & Oi, M. (2010). Comprehension of indirect speech in children with high-functioning pervasive developmental disorders under different task conditions. *Japanese Journal of Communication Disorders*, 27, 168-177.
- Weinert, R. (1995). The role of formulaic language in second language acquisition: A review. *Applied Linguistics*, 16, 180-205.
- Wray, A., & Perkins, M. (2000) .The functions of formulaic language: An integrated model. *Language and Communication*, 20, 1–28.
- Yata, A., & Oi, M. (2009). Comprehension of indirect speech in children with high-functioning pervasive developmental disorders. *Japanese Journal of Learning Disabilities*, 18, 128–213.

# Appendix

Correlation *r* was calculated between the mean preference magnitude in children and the mean value of strangeness-rating by adults.

