

## Areas of Language Impairment in Autism

Nataliya Kostyuk<sup>1</sup>, Raphael D. Isokpehi<sup>1</sup>, Rajendram V. Rajnarayanan<sup>2</sup>, Tolulola O. Oyeleye<sup>1</sup>,  
Tanjah P. Bell<sup>3</sup> and Hari H.P. Cohly<sup>1</sup>

<sup>1</sup>Center for Bioinformatics and Computational Biology, Department of Biology, Jackson State University, Jackson, MS 39217, USA. <sup>2</sup>School of Medicine and Biomedical Sciences, SUNY at Buffalo, Buffalo, New York, 14214, USA.

<sup>3</sup>Department of Psychology, Jackson State University, Jackson, MS 39217, USA.

Correspondence author email: [hcohy2005@gmail.com](mailto:hcohy2005@gmail.com)

---

**Abstract:** The amount of medical literature describing autism spectrum disorder has become a real challenge as the quantity of abstracts deposited in PubMed digital library is constantly growing. Because the major manifestation of autism spectrum disorder (ASD) is impairment in language acquisition and communication, we used primary key words “autism” and “language acquisition” to retrieve the relevant literature from PubMed digital library and annotated a collection of 274 abstracts (from December 2008 to 1976) using Knowtator. The objective was to locate secondary key words which in combination with primary key words would enable one to make information retrieval on language development in autism more specific and focused. The discussion provides a brief description of some selected terms and compares language impairment in autism with normal language development.

**Conclusion:** By using the combination of key words one is able to effectively manage the information retrieval and make the research less time consuming.

**Keywords:** ASD, autism spectrum disorder, language, key words

---

*Autism Insights* 2010:2 31–38

This article is available from <http://www.la-press.com>.

© the author(s), publisher and licensee Libertas Academica Ltd.

This is an open access article. Unrestricted non-commercial use is permitted provided the original work is properly cited.



## Introduction

Autism is a developmental brain disorder that typically affects a person's ability to communicate, engage in social interactions, and respond appropriately to the environment. Autism Spectrum Disorders (ASD), also known as Pervasive Developmental Disorders (PDDs), are defined as the disorders that cause severe and pervasive impairment in thinking, feeling, language, and the ability to relate to others. The reason of autism remains unknown. Many research articles in psychology, neuroscience, neuroimaging, and special education address the issue of language disorder in autism.<sup>1-3</sup> The deficiency in communication and socializing is a key problem that speech therapists, psychologists and doctors try to resolve when working with autistic children.

Language disorders are conditions characterized by deficiencies of comprehension or expression of written and spoken forms of language.<sup>4</sup> These include acquired and developmental disorders as well as may cover a very broad range from simple sound substitutions to impairment in speech and language use. Language acquisition is the process by which humans acquire their native or a second language. Delayed acquisition of language is a common characteristic in autistic children. Most autistic children have difficulty in effectively using language.<sup>5</sup> The communication problems of autistic children vary.<sup>6</sup> Some children may have rich vocabulary and relatively high intellectual and social development, and some may be unable to speak. The pronunciation in most cases is not a problem for autistic individuals, but the majority demonstrates no desire to make eye contact, and they have a poor attention span.<sup>7,8</sup> These children are often unable to use gestures and can neither communicate nor pinpoint the object they want. Some autistic individuals speak in a high-pitched voice or use robot-like speech. Moreover, they are often unresponsive to the speech of others and may not respond to their own names. As a result, some are erroneously thought to have a hearing problem. Language and communication are the topics of major concern in autism; thus, the objective of this study was to identify secondary key words in addition to primary key words "autism" and "language acquisition" that would facilitate information search and retrieval in the domain of language development in autism. The study relied on an extensive collection of abstracts of

articles indexed in PubMed digital library, a service of the United States National Library of Medicine that includes over 19 million citations from MEDLINE and other life science journals. The core subject is medicine, and PubMed covers fields related to medicine and biomedical science.<sup>9</sup> Our automatic information retrieval strategy combined with expert manual annotation of 274 abstracts on language acquisition in autism delivered 30 secondary key words which were grouped into five domains (i.e. phonology, grammar, semantics, pragmatics and non verbal language). The grouping of the language terms in the referred domains provides a better knowledge organization and characterization of language impairment in autism.

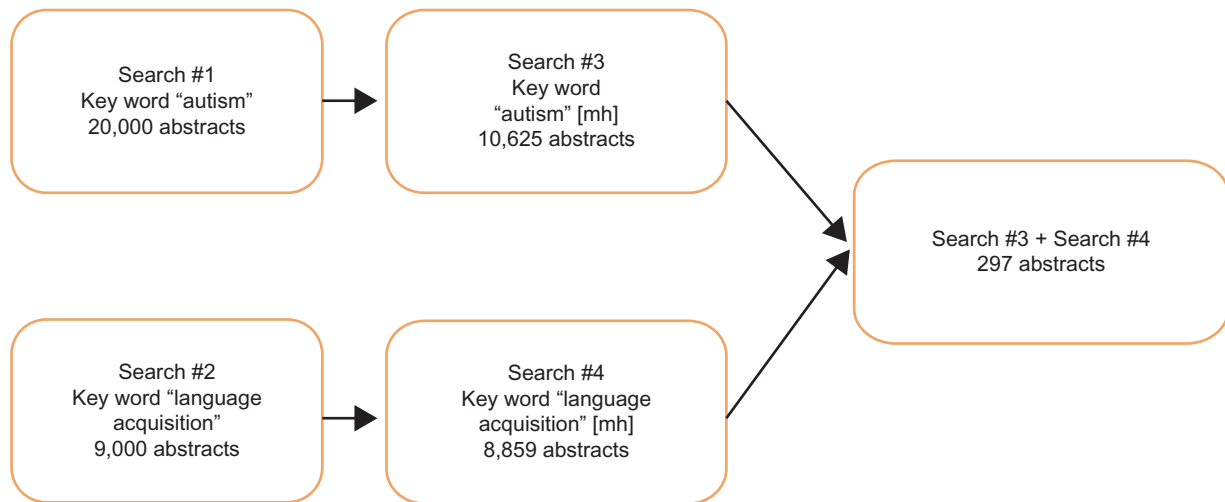
## Methods

### Construction of corpus of PubMed abstracts on autism and language acquisition

Abstracts of journal articles that contain the primary key words "autism" and "language acquisition" were obtained from PubMed digital library.<sup>9</sup> An initial search (Search #1) was conducted using the key word "autism" to gauge the total number of abstracts. Furthermore, the Medical Subject Heading (MeSH) annotation tag (mh) was used to filter abstracts annotated with the MeSH term autism (Search #2). Additional searches were conducted using the term "language acquisition" (Search #3) as well as the term "language acquisition" with the MeSH tag added at the end of the text (Search #4). The combination of Search #2 and Search #4 provided a reduced set of abstracts for examining areas of language impairment in autism (Fig. 1).

### Development of list of language terms and domains

The corpus of abstracts obtained from PubMed using a combination search of primary key words "autism" and "language acquisition" was manually examined and annotated by a Language Expert (N.K.) for secondary key words in areas of language impairment in autism. The annotation tool used was Knowtator plug-in of the Protégé Knowledge Representation System.<sup>10</sup> The advantage of using Knowtator is that one can download the abstracts as separate texts and select the appropriate information from the context. Some other linguistic



**Figure 1.** Results of literature search in PubMed digital library as of December, 2008.

tools, for example simple concordance program, enables one to analyze many abstracts for word/term frequency but it takes all the abstracts as one text and the word/term in question has to be known to the researcher. Thus, the rationale for using Knowtator was to find the key words based on the context and expert knowledge. The annotator read all the abstracts and decided which terms were used to describe language impairment in ASD. The further retrieval of annotated terms was done automatically with the help of algorithm.

The definition of language domains was completed by grouping and describing the retrieved terms and listing subsequent impairments associated with each term. The retrieved secondary key terms were further described as to their relationship to autism and the associated impairments. All the terms represent the result of “top-down” approach where the general information is known but the detailed features are unclear. We refer to the collection of abstracts as general information and specific terms as detailed features and therefore, for the definition of the secondary key words “top-down” approach was necessary.

## Results and Discussion

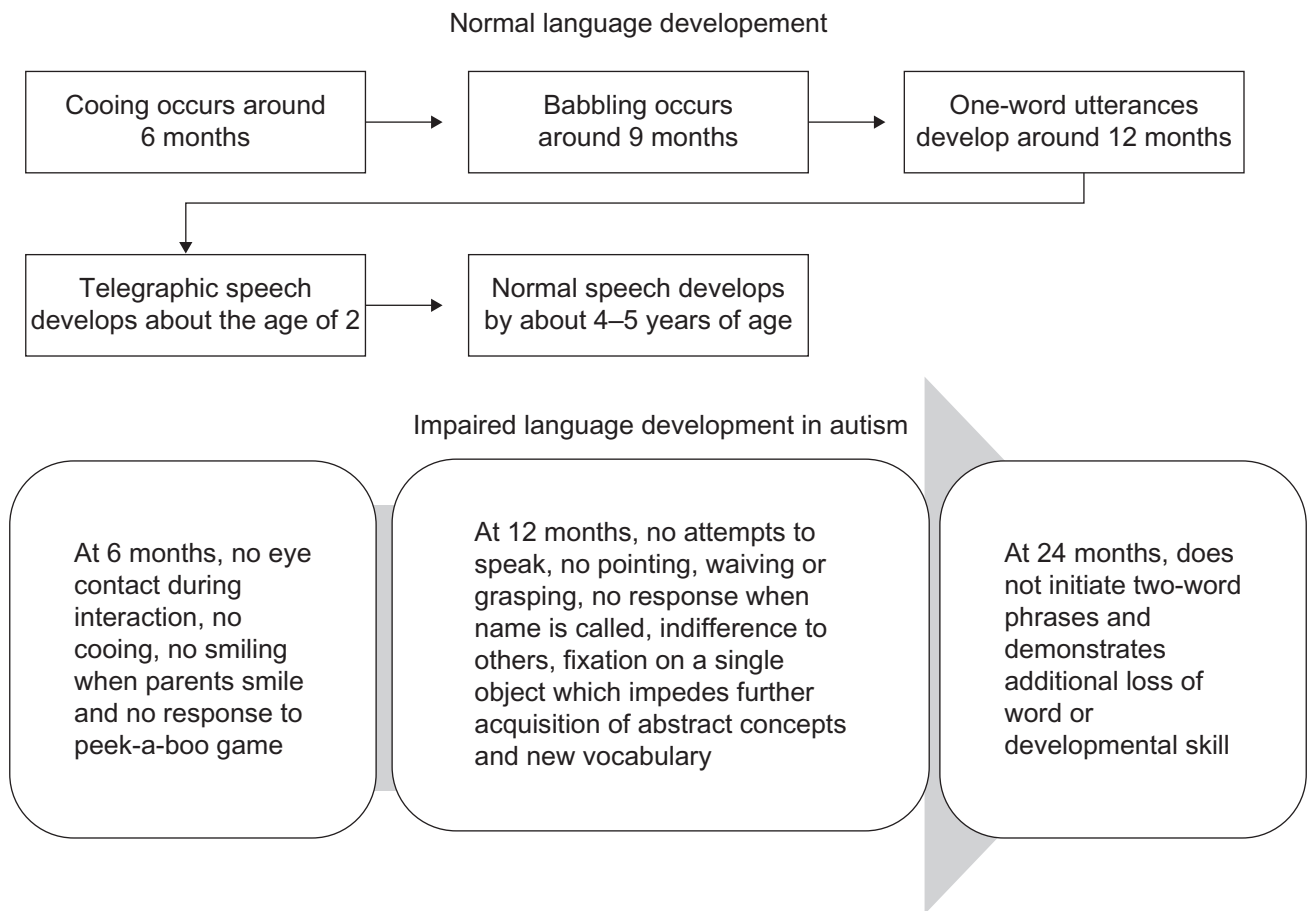
### Normal language development and impaired language development in autism

Normal language development usually follows a predictable sequence. Although there is a great variation

in the age at which children reach given milestones (Fig. 2), certain characteristic features of normal language development still apply to different age groups. For example, children are cooing at six months, babbling at nine months and producing one-word utterances around 12 months of age. Normal speech is usually developed by 4–5 years of age. In autism, the cause of speech and language problems is unknown; however, many experts believe that the difficulties are caused by a variety of conditions that occur either before, during, or after birth and affect normal brain development. Some autistic children may be unable to speak; whereas others acquire rich vocabularies and discuss topics of interest in great depth. In ASD, speech and language develop to some degree, but not to a normal level.<sup>11</sup> The significance of retrieving the terms characteristic of language impairment in autism and grouping them into domains is that these terms can be used in combination with the primary key words “autism” and “language acquisition” for further investigation of language development in autism. Therefore, the secondary words generated by our search aid in making this retrieval process more focused and efficient.

### Language terms and domains in corpus of PubMed abstracts on autism and language acquisition

The PubMed literature database contains over 11,000 citations that have the MeSH term “autism”



**Figure 2.** Normal language development vs. language development in autism.

(as of December, 2008). In addition, the search with term “language acquisition” including the MeSH term tag retrieved over 9,000 citations. A combination of these searches retrieved about 300 abstracts from which 16 had only headings without the abstract and thus only 274 were manually annotated using Knowtator.<sup>12</sup> A total of 30 language terms were identified and categorized into five language domains: phonology, grammar, semantics, pragmatics and non-verbal language. This grouping into domains was necessary to demonstrate the aspects of language affected in autism. Although some of the retrieved terms are used in the same manner in general language, these terms are interpreted from the point of impairment and thus the accent is made on the explanation of these terms in the context of autism. For example, echolalia is not common to normal language as the aspect of pragmatics. However, in the context of autism, we classified this term as a characteristic of the pragmatics domain. Table 1 presents the language

domains and subsequent impairments that appear in the medical literature on autism.

### Phonology

Phonology refers to the sound patterns of a language; that is, the sounds that make up a language and the rules governing their combination. Phonology is the area of language least likely to be impaired in people with autism. However, some preliminary studies with magnetic resonance imaging have shown that children with autism process sounds a split second slower than typically developing children. Their response was delayed by about 20 milliseconds compared to controls.<sup>13,14</sup> Some people with autism are also extremely sensitive to normal sounds. They encode new information through contrastive stress in multiword phrases or through lexicalization in single-word phrases<sup>15</sup> and consistently produce repetitions of previously encoded information whereas the encoding of a new action or state is relatively infrequent in autism. Autistic children show

**Table 1.** Five domains of language terms with characteristic impairments in each.

Domain	Characteristic impairments	Number of terms
Phonology	Articulation; Phoneme; Pitch; Sound; Syllable	5
Grammar	Pronoun; Sentence; Syntax	3
Semantics	Cohesion; Lexicalization; Object naming; Phrase; Receptive vocabulary; Vocabulary; Word	7
Pragmatics	Attention; Behavior; Communication; Comprehension; Echolalia; Encoding; Imitation; Joint attention; Play; Regression; Request; Response; Speech; Utterance	14
Non-verbal language	Gesture	1

a higher capacity in memorizing picture-pitch associations and in detecting pitch changes in melodies than their normal counterparts. Moreover, some individuals with autism known as musical savants possess absolute pitch.<sup>16</sup> It is argued that this superiority may be due to an abnormally high sensitivity to fine-grained pitch differences in sounds.

## Grammar

Grammar is severely impaired in children with autistic developmental disorder.<sup>17,18</sup> Interpreting reflexives and using short and long passive verbs of both action and psychological associations is extremely difficult for autistic children. The inability to process the syntactic relationship between the reflexive and its antecedent is expressed by poor interpretation of reflexive but not personal pronouns, whereas poor performance on passives shows the inability to interpret syntactic chains.<sup>19</sup>

Pronoun reversal, which occurs when individuals confuse first and second person pronouns in speech, is a characteristic of language impairment in autism. Autistic individuals are significantly less likely to apply the pronoun “me” in a visual perspective-taking task and are less likely to employ the pronoun “you”.<sup>20</sup> A high percentage of autistic children are reported to have current difficulties with personal pronouns in

their everyday life. The deficiency in the ability to determine the speaker’s intention without explicit cues and impairment in the comprehension of syntactic structures makes the acquisition of new verbs difficult for autistic children. It has been reported that the function of processing implicit syntactic relationships is significantly dependent on the hippocampus. Autism has been postulated to be a developmental syndrome related to hippocampal dysfunction.<sup>21</sup>

## Semantics

Semantics is an aspect of language that relates to understanding the meanings of words, phrases and sentences and using words appropriately when we speak. Autistic children have difficulties with semantic processing of words, especially abstract words like ‘curious’ or ‘vague’, words that relate to feelings and emotions such as ‘embarrassed’ and ‘anxious’, and words that refer to status (for instance ‘expert’ or ‘authority’) or degree.<sup>22</sup> They have difficulty with idioms, sayings and slang expressions, often taking them literally or interpreting them incorrectly. Odd speech, as manifested by at least two of the following six criteria is one of diagnostic criteria, for Asperger’s disorder: 1. abnormalities in inflection, 2. talks too much, 3. talks too little, 4. lack of cohesion to conversation, 5. idiosyncratic use of words, 6. repetitive patterns of speech.<sup>23,24</sup>

Some autistic children exhibit echolalia, which is the repetition of words, signs, phrases or sentences spoken by other people. Some children use this as a communication device. That is, the adult says “do you want a car?” and the child might say “want a car” to mean yes. A child may repeat the same phrase over and over again as a means of regulating their own behaviour.<sup>25</sup> They learn to talk by memorizing words and phrases while being unable to use these same words freely. Also, they repeat phrases out of context, especially phrases heard on TV.<sup>26</sup> Late emergence of spoken words is an early sign of ASD, but most children with these disorders acquire at least some spoken language, with approximately 80% producing more than five words.<sup>27</sup>

## Pragmatics

Achieving proficiency in pragmatic knowledge—the ability to understand and use basic speech—is impaired in autism.<sup>28</sup> High functioning autistic children acquire some pragmatic skills on an elementary



level, and they learn to answer questions in yes/no or one word responses. The definition of pragmatics skills includes being able to participate in a conversation by taking turns with the other speaker, reacting appropriately to the other person's body language and mood as well as their words, the ability to maintain a topic or change topics appropriately, the ability to maintain appropriate eye-contact during a conversation and the ability to distinguish how to talk and behave formally with some individuals and informally with others.<sup>29</sup> There are various stereotypical behaviors which are commonly seen among people with autism. Some of the most common are 'body-rocking', hand and limb 'flapping', 'head-banging' and 'spinning'. These behaviors can be used to express different psycho-emotional states and may be engaged in at various times: when agitated, when aroused or active, when happy, when excited, when angry and even when simply comfortable and relaxed.<sup>30</sup>

The communication problems of autism vary depending upon the intellectual and social development of the individual. Some may be unable to speak, whereas others may have rich vocabularies and are able to talk about topics of interest in great depth. The majority of autistic individuals have little difficulty with pronunciation though most have problems effectively using language. Despite common areas of language impairment, children and adults who have an autism spectrum disorder will differ from one another in the comprehension of the spoken messages of others and in their response to the strategies applied to facilitate the communication process.

Deficiencies in the development of joint attention skills are a hallmark of children with ASD. However, the range of the development of joint attention in autism is very broad and some autistic children have tendencies to display better abilities than others. Also, it is suggested that children with autism who display more intact joint attention skills exhibit better outcomes with respect to the development of cognitive, language, and symbolic play skills. The normal development of children is characterized by complex and diverse behavior such as play.<sup>31</sup> The play of autistic children can be impaired in all stages of development. Their play behavior is often limited to simple manipulation, the quality of their play is lower than that of non-autistic children of comparable mental age, and spontaneous, symbolic play is usually absent

or impaired.<sup>32</sup> Although children with autism show limitations in spontaneous play, this is not attributable to a complete inability to play but may be the result of lack of experience or behavioral regression manifested in the level of play. When regression occurs, autism appears to be the cause. Approximately 30% of autistic children have regression of both language and behavior which happens usually prior to the age of 2.<sup>33</sup> Developmental regression can be overcome by promoting early play. The children with ASD usually need to be taught the ability to request objects during learning and play.<sup>34,35</sup> Therefore, children with these disorders are most always recommended for speech therapy<sup>36-38</sup> that involves teaching the correct pronunciation of words, non-verbal communication, speech pragmatics, turn taking in conversation, and the development of skills used to understand abstract concepts.

### Non-verbal language

By the age of 18–24 months children later diagnosed with autism show unique communication profile with core deficits in deictic gestures.<sup>39</sup> It has been reported that children with autism have significantly impaired motor coordination skills and also generalized impairment in gestural performance.<sup>40</sup> Therefore, the early development of the use of non-verbal language can be beneficial for individuals with autism. Non-verbal language can decrease the typically expressed negative behaviors such as tantrums, anxiety, self-injury, and aggression and increase social interaction and supports the development of cognitive structures necessary for speech and communication.

### Conclusions

The areas of language impairment found in autism are grammar, pragmatics, semantics, phonology and non-verbal language. Retrieval and categorization of secondary key words based on PubMed corpus of abstracts enables one to use the combination of primary and secondary key words for more efficient and focused information search. Structured presentation of secondary key words enhances the knowledge organization of the domain of language impairment in autism. Information related to the topics in language impairment in autism may be of major concern of doctors, specialists, speech therapists, parents and all the people surrounding autistic children. Further work



may include identification of specific terms pertaining to different aspects of autism based on word frequency in corpus and development of ontology of autism.

## Acknowledgements

HC and RI acknowledge grants from National Center for Research Resources, National Institutes of Health (G12RR013459); and EPSCoR, National Science Foundation (EPS-0556308). Mississippi NSF-EPSCoR Grant Awards (EPS-0903787); Research Centers in Minority Institutions (RCMI)—Center for Environmental Health at Jackson State University (NIH-NCRR 2G12RR013459); and Pittsburgh Supercomputing Center's National Resource for Biomedical Supercomputing (T36 GM008789). The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding agencies.

## Disclosures

This manuscript has been read and approved by all authors. This paper is unique and is not under consideration by any other publication and has not been published elsewhere. The authors and peer reviewers report no conflicts of interest. The authors confirm that they have permission to reproduce any copyrighted material.

## References

1. Sahyoun CP, Belliveau JW, Soulieres I, Schwartz S, Mody M. Neuroimaging of the functional and structural networks underlying visuospatial vs. linguistic reasoning in high-functioning autism. *Neuropsychologia*. 2009.
2. Pickett E, Pullara O, O'Grady J, Gordon B. Speech acquisition in older nonverbal individuals with autism: a review of features, methods, and prognosis. *Cogn Behav Neurol*. 2009;22(1):1–21.
3. Herbert MR, Kenet T. Brain abnormalities in language disorders and in autism. *Pediatr Clin North Am*. 2007;54(3):563–83, vii.
4. National Library of Medicine. MeSH Descriptor Data. 2009; Available at: URL: [http://www.nlm.nih.gov/cgi/mesh/2009/MB\\_cgi?mode=&term=LALANGUAGE+DISORDERS](http://www.nlm.nih.gov/cgi/mesh/2009/MB_cgi?mode=&term=LALANGUAGE+DISORDERS)
5. Landa R, Garrett-Mayer E. Development in infants with autism spectrum disorders: a prospective study. *J Child Psychol Psychiatry*. 2006;47(6):629–38.
6. Tager-Flusberg H, Caronna E. Language disorders: autism and other pervasive developmental disorders. *Pediatr Clin North Am*. 2007;54(3):469–81, vi.
7. Senju A, Yaguchi K, Tojo Y, Hasegawa T. Eye contact does not facilitate detection in children with autism. *Cognition*. 2003;89(1):B43–51.
8. Jones W, Carr K, Klin A. Absence of preferential looking to the eyes of approaching adults predicts level of social disability in 2-year-old toddlers with autism spectrum disorder. *Arch Gen Psychiatry*. 2008;65(8):946–54.
9. Sayers EW, Barrett T, Benson DA, et al. Database resources of the National Center for Biotechnology Information. *Nucleic Acids Res*. 2009;37(Database issue):D5–15.
10. Noy NF, Crubezy M, Ferguson RW, et al. Protege-2000: an open-source ontology-development and knowledge-acquisition environment. *AMIA Annu Symp Proc*. 2003;953.
11. Lanter E, Watson L. Promoting Literacy in Students with ASD: the Basics for the SLP. *Language, Speech, and Hearing Services in Schools*. 2008;39:33–43.
12. Philip VO. Knowtator: a protege plug-in for annotated corpus construction. Proceedings of the 2006 Conference of the North American Chapter of the Association for Computational Linguistics on Human Language Technology: companion volume: demonstrations; New York, New York: Association for Computational Linguistics; 2006;273–5.
13. Redcay E, Courchesne E. Deviant functional magnetic resonance imaging patterns of brain activity to speech in 2–3-year-old children with autism spectrum disorder. *Biol Psychiatry*. 2008;64(7):589–98.
14. Russo N, Nicol T, Trommer B, Zecker S, Kraus N. Brainstem transcription of speech is disrupted in children with autism spectrum disorders. *Dev Sci*. 2009;12(4):557–67.
15. Pettijohn TF, Tesser A. Threat and social-choice: when eye size matters. *J Soc Psychol*. 2005;145(5):547–70.
16. Bonnel A, Mottron L, Peretz I, Trudel M, Gallun E, Bonnel AM. Enhanced pitch sensitivity in individuals with autism: a signal detection analysis. *J Cogn Neurosci*. 2003;15(2):226–35.
17. Eigsti IM, Bennetto L. Grammaticality judgments in autism: Deviance or delay. *J Child Lang*. 2009;1–23.
18. Fisher N, Happe F, Dunn J. The relationship between vocabulary, grammar, and false belief task performance in children with autistic spectrum disorders and children with moderate learning difficulties. *J Child Psychol Psychiatry*. 2005;46(4):409–19.
19. Shulman C, Guberman A. Acquisition of verb meaning through syntactic cues: a comparison of children with autism, children with specific language impairment (SLI) and children with typical language development (TLD). *J Child Lang*. 2007;34(2):411–23.
20. Lee A, Hobson RP, Chiat S. I, you, me, and autism: an experimental study. *J Autism Dev Disord*. 1994;24(2):155–76.
21. Bader JD, Martin JA, Shugars DA. Incidence rates for complete cusp fracture. *Community Dent Oral Epidemiol*. 2001;29(5):346–53.
22. Lopez B, Leekam SR. Do children with autism fail to process information in context? *J Child Psychol Psychiatry*. 2003;44(2):285–300.
23. Szatmari P, Bartolucci G, Bremner R. Asperger's syndrome and autism: comparison of early history and outcome. *Dev Med Child Neurol*. 1989;31(6):709–20.
24. Szatmari P, Bremner R, Nagy J. Asperger's syndrome: a review of clinical features. *Can J Psychiatry*. 1989;34(6):554–60.
25. Dobbins S, Perkins M, Boucher J. The interactional significance of formulas in autistic language. *Clin Linguist Phon*. 2003;17(4–5):299–307.
26. Riches NG, Loucas T, Baird G, Charman T, Simonoff E. Sentence repetition in adolescents with specific language impairments and autism: an investigation of complex syntax. *Int J Lang Commun Disord*. 2009;1–22.
27. McArthur GM. Auditory processing disorders: can they be treated? *Curr Opin Neurol*. 2009;22(2):137–43.
28. Ketelaars MP, Cuperus J, Jansonius K, Verhoeven L. Pragmatic language impairment and associated behavioural problems. *Int J Lang Commun Disord*. 2009;1.
29. Kerbel D, Grunwell P. A Study of Idiom Comprehension in Children with Semantic-Pragmatic Difficulties. Part II: Between-Groups Results and Discussion. *Int J Lang Commun Disord*. 1998;33:23–44.
30. Joosten AV, Bundy AC, Einfeld SL. Intrinsic and extrinsic motivation for stereotypic and repetitive behavior. *J Autism Dev Disord*. 2009;39(3):521–31.
31. Libby S, Powell S, Messer D, Jordan R. Imitation of Pretend Play Acts by Children with Autism and Down Syndrome. *J Autism Dev Disord*. 1997;27:365–83.
32. van Berckelaer-Onnes IA. Promoting early play. *Autism*. 2003;7(4):415–23.
33. Rogers SJ. Developmental regression in autism spectrum disorders. *Ment Retard Dev Disabil Res Rev*. 2004;10(2):139–43.
34. Chiang HM. Expressive communication of children with autism: the use of challenging behaviour. *J Intellect Disabil Res*. 2008;52(11):966–72.
35. Reichle J, Dropik PL, Alden-Anderson E, Haley T. Teaching a young child with autism to request assistance conditionally: a preliminary study. *Am J Speech Lang Pathol*. 2008;17(3):231–40.



36. Fernandes FD, Cardoso C, Sassi FC, Amato CL. Language Therapy and Autism: Results of Three Different Models. *Pro Fono*. 2008;20:267–72.
37. Laushey KM, Heflin LJ, Shippen M, Alberto PA. Concept Mastery Routine to Teach Social Skills to Elementary Children with High Functioning Autism. *J Autism Dev Disord*. 2009;39:1435–48.
38. Pickett E, Pullara O, O’Grady J, Gordon B. Speech Acquisition in Older Nonverbal Individuals with Autism: a Review of Features, Methods, and Prognosis. *Cogn Behav Neurol*. 2009;22:1–21.
39. Shumway S, Wetherby AM. Communicative Acts of Children with Autism Spectrum Disorder in the Second Year of Life. *J Speech Lang Hear Res*. 2009;52(5):1139–56.
40. Dewey D, Cantell M, Crawford SG. Motor and Gestural Performance in Children with Autism Spectrum Disorders, Development Coordination Disorder, and/or Attention Deficit Hyperactivity Disorder. *J Int Neuropsychol Soc*. 2007;13(2):246–56.

**Publish with Libertas Academica and every scientist working in your field can read your article**

*“I would like to say that this is the most author-friendly editing process I have experienced in over 150 publications. Thank you most sincerely.”*

*“The communication between your staff and me has been terrific. Whenever progress is made with the manuscript, I receive notice. Quite honestly, I’ve never had such complete communication with a journal.”*

*“LA is different, and hopefully represents a kind of scientific publication machinery that removes the hurdles from free flow of scientific thought.”*

**Your paper will be:**

- Available to your entire community free of charge
- Fairly and quickly peer reviewed
- Yours! You retain copyright

**<http://www.la-press.com>**