

# Prosody in Children with Autism Spectrum Disorder: A Systematic Review

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## Introduction

### Background

- **Prosody:** Patterns of rhythm and melody in a language that incorporates
- **Lexical stress:** The stress placed on a certain syllable within a word (*baNana*)
- **Intonational phrase:** Linguistic functions such as intonation and rhythm that affect the entire utterance (*question* vs. *statement*) (Ladd, 1996).
- **Autism Spectrum Disorder** is defined by:
  - Impairments in social communication
  - Presence of restricted and repetitive behaviors and/or interests
  - Manifests within the first 36 months of life

### Diagnostic and Statistical Manual of Mental Disorders (DSM-5)

- In the (DSM)-IV there were four distinct disorders relevant to autism that included:
  - Autistic Disorder (AD)
  - Asperger Syndrome (AS)
  - Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS)
- In 2013, the American Psychiatric Association (APA) merged these diagnoses into one category called autism spectrum disorders (ASD) for the DSM-5.

### Types of Prosody:

- Focus of this systematic review is *linguistic prosody*.

#### Linguistic Prosody

- Language and linguistic meaning
- Lexical stress of a word, intonation, and phrasal breaks for components such as syntax.

#### Affective Prosody

- Reflects the emotion in speech
- Used to determine whether the speaker intends for an utterance be happy, sad, ironic, sarcastic, etc.

**Motivation:** To conduct a systematic review of the literature to date regarding the perception and production of linguistic prosody, specifically *lexical stress* and *intonation*, for children with ASD.

## Research Aims

1. Do school-aged children with ASD have more difficulty in the perception or production of lexical stress?
 

**Hypothesis 1:** Based on past research, the findings will show more children have difficulty in the production of lexical stress rather than the perception of lexical stress. There will be acoustic differences in pitch and intonation between children with ASD and TD children in relation to lexical stress.
2. Do school-aged children with ASD have more difficulty in the perception or production of intonational phrase abilities?
 

**Hypothesis 2:** Based on past research, the findings will show more school-aged children with ASD have difficulty in the production of intonational phrase abilities rather than in the perception of intonational phrases.
3. Why is their contradictory evidence in the current research literature in regard to past conclusions of prosodic abilities?
 

**Hypothesis 3:** A theme in most current research mentions the intonational abilities and the difference in research conclusions. I hypothesize that research on intonational abilities (versus other aspects of linguistic prosody) will prove to be most contradictory to date due to the varying severity across the population with ASD.

## Methods

### Procedure

- Goal: Compile past research that is relevant to the *linguistic prosody* of children with ASD.
- Searched key words in PubMed, EBSCOhost, Linguistic and Language Behavior Abstracts (LLBA), and PsychInfo databases
- Key words used were: “autis\*” AND “child\*” or “child develop\*” AND “speech” or “prosody”

### Existing Prosodic Assessments

- Profiling Elements of Prosodic Elements in Children (PEPS-C)
- Prosody-Voice Screening Profile (PVSP)
- Clinical Evaluation of Language Fundamental (CELF-4)
- Evaluation du Langage Oral: Assessment of Oral Language (ELO Battery)
- Mullen Scales of Early Learning (MSEL)

*Prosodic assessments and ASD diagnostic criteria use for each peer-reviewed article:*

Authors	Year	Assessment	Criteria for ASD Diagnosis of Participants
Baltaxe	1984	N/A	DSM III
Demouy et al.	2011	ELO Battery	ADI-R, CARS (Autism Diagnostic Interview-Revised, Children Autism Rating Scale)
Diehl & Paul	2011	CELF-4	DSM IV
Filipe et al.	2014	MSEL, PVSP	DSM IV
Grossman et al.	2010	CELF-4, PEPS-C	DSM IV
McAlpine et al.	2014	MSEL, PVSP	DSM IV
McCann & Peppé	2003	N/A	DSM III, DSM IV
McCann et al.	2007	PEPS-C	DSM IV
Nadig & Shaw	2012	CELF-4	DSM IV
Wells & Peppé	2003	PEPS-C, TROG, CELF-R	N/A

## Systematic Review Article Summaries

Authors	Year	Domains	Relevant Main Aims	Participants
Baltaxe	1984	Autism, Aphasia, Contrastive stress, perception, production	The use of contrastive stress of groups of children with Autism, Aphasia, and TD	7 TD, 7 aphasic children, 7 autistic
Demouy et al.	2011	Autism, SLI, PDD-NOS, language, prosody	Determine whether and how PDD-NOS language profile, including prosody, differs from those of AD and SLI	12 children with Autism, 10 children PDD-NOS, 12 children SLI
Diehl & Paul	2011	Autism, learning disability, prosody, pitch	Acoustic and perceptual measurements of prosody production on the profiling elements of prosodic systems in children by children with autism spectrum disorders	24 ASD children, 16 learning disability children, 22 TD children
Filipe et al.	2014	Asperger syndrome, atypical prosody, autism spectrum disorders, intonation	The use of prosodic features to express grammatical meaning and how sentences and questions are conveyed by intonation using perceptual and acoustic measurements	12 children AS, 17 TD children
Grossman et al.	2010	Autism, prosody, lexical stress, affective prosody, perception, production	Investigate the perception and production of lexical stress and processing of affective but atypical lexical prosody production	16 children HFA, 15 TD children
McAlpine et al.	2014	Autism spectrum disorder, prosody, early identification	Examine the expressive prosody of young verbal children with ASD	7 ASD children, 7 TD children
McCann & Peppé	2003	Prosody, intonation, autism, Asperger's syndrome	Critical review to establish whether there is prosodic disorder in Autism	N/A
McCann et al.	2007	Autism, prosody, intonation, language	Explore expressive and receptive language, phonology, pragmatics, and non-verbal ability in children with HFA, and how prosody is also related	31 HFA children, 72 TD children
Nadig & Shaw	2012	HFA, expressive prosody, acoustic measurements, pitch variability, perceptual judgements	Define the consistent markers of atypical prosody in speakers with HFA	N/A
Wells & Peppé	2003	Prosody disorders, language disorders, speech disorders, elementary school children, intonation development	Intonational abilities in children with speech and language impairments	28 TD Chronological aged children, 18 children speech and/or language impairment

## Results & Discussion

### Production of Lexical Stress and Intonational Abilities

- Pitch range, mean pitch and max pitch were higher in statements and questions for the ASD group (Filipe et al., 2014)
- Prosodic ability more deficient in children with autism (McCann et al., 2007)
- Longer utterance durations in ASD group (Demouy et al., 2011)
- Group with autism mis-assigned stress twice as often as TD group (Baltaxe, 1984)

### Perception of Lexical Stress and Intonational Abilities

- ASD children exhibit similar patterns to TD children. The ASD group is able to correctly identify the correct production of lexical stress when asked to distinguish between ambiguous word pairs (Grossman et al., 2010)
- ASD group showed most difficulty understanding sentence intonation (Demouy et al., 2011) especially regarding questions and statements as well as emphatic stress (Diehl & Paul, 2011)
- No differences between TD and ASD groups for the perception of statements vs. questions (Filipe et al., 2014)

### Discussion & Conclusions

- Monotonous speech pattern of individuals with ASD is discussed in the early literature and is repeatedly referenced in more current studies, but results following the year 1984 do not coincide with more recent work.
- Recent work has used the DSM-IV criteria when there were still varying types of diagnoses (vs. the DSM-5 criteria).
  - Beneficial for researchers to continue work in this area regarding prosody in children with ASD.
    - Future researchers will need to continue to fill in gaps.
  - More research may lead to advancements in treatments as more information becomes readily available.

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