Evaluation of expressive prosodic ability important for diagnosis of neurodevelopmental disorders such as ASD. Existing methods for assessment of prosody require that judgments be made at the time of examination. Accurate automated analysis of prosody could increase both efficiency and accuracy in clinical evaluations of prosodic ability.

**Objectives**
1. Establish reliability of real-time judgments of stress and focus assignment.
2. Determine whether complex automated measures of acoustic features are comparable to naive listener judgments and real-time clinical assessments.

**Speakers**
- 15 ASD, 13 TD, 15 meeting some but not all criteria for ASD.
- Age 4-8; performance IQ > 70.

**Prosodic Tasks**
1. **Lexical Stress**: Repeat disyllabic nonsense word with initial or final stress.
2. **Emphatic Stress**: Repeat four-word sentence with emphasis on one word [1].
3. **Focus**: Correct inaccurate description of a picture by emphasizing the correct word [2].

**Scoring**

The following scores for each of the three tasks were correlated with one another on a per-utterance and per-speaker basis:

**Real-time examiner scores**
During examination, one of 4 clinicians immediately assessed the correctness of each response, yielding real-time scores.

**Web-based perceptual experiment**
- Six naive judges listened to recordings of minimal pairs of responses for each task.
- Each minimal pair from a single speaker with same content but different target prosody.
- Judges identified the intended meaning of the two utterances (e.g., of two recordings, which one was meant to be “BLUE cow” rather than “blue COW”).

**Automated acoustic analysis**
- Pitch and energy trajectories and phoneme duration information extracted from recordings of the children’s responses.
- Data analyzed using an innovative dynamic difference (DD) measure that captures the difference in the pitch and amplitude dynamics of the two recordings of a minimal pair.
- Measures of melody, timing, and intensity combined using multiple linear regression to create a single complex score for each utterance pair.

**Results: Correlations**

**Conclusions**
- Automated digital measures comparable in reliability to judges’ scores and superior to real-time clinical judgments on both a per-utterance and a per-speaker basis.
- Including automated objective measures of prosody alongside traditional real-time judgments could enhance both accuracy and reliability in clinical assessments of prosodic ability.

**References & Sponsors**

NIH 1R01DC007129 (van Santen, PI); Autism Speaks: Mentor-based Fellowship (Prud’hommeaux); Autism Speaks: Computerized Interactive Game for Remediation of Prosody in Children with Autism (Black, PI); Autism Speaks: ITA: Automated Measurement of Dialogue Structure in Autism (Roark, PI).