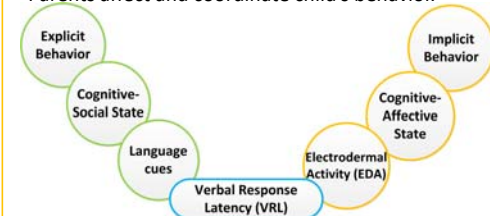


MOTIVATION

- Children with Autism Spectrum Disorders (ASD):
 - limited reciprocal conversations.
 - reduced communicative speech.
- Verbal Response Latencies (VRLs) can indicate a child's cognitive, social and affective state.
- Parents affect and coordinate child's behavior.



Children's Verbal Response Latencies can be predicted by their own and their parents' language and physiology patterns.

RACHEL ECA INTERACTION CORPUS

- Child interacting with an ECA (Embodied Conversational Agent), Rachel, and parent.
- Designed to encourage children to
 - participate in **social interactions**.
 - display their **emotional reasoning abilities**.
- Presents consistent stimuli across subjects.

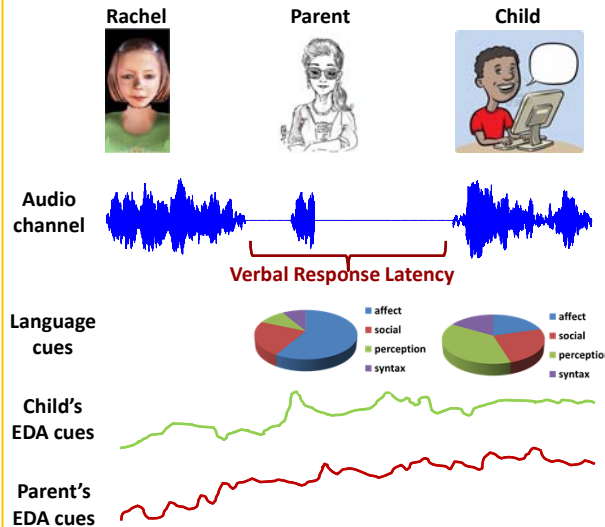
Subject	S1	S2	S3	S4	S5	S6	S7	S8	S9
Age	12	7	10	7	7	6	8	7	8
Outcome	Aut	Aut	Aut	PDD	Aut	PDD	-	PDD	PDD

Aut: Autism, PDD: Pervasive Developmental Disorders

REFERENCES

- K. Lord et al., "Autism Diagnostic observation Schedule-Generic," JADD, 2000.
- E. Mower et al., "Rachel: Design of an emotionally targeted interactive agent for children with autism," ICMC, 2011.

EXPERIMENTAL SETUP



Linguistic Features

1. General turn descriptors (e.g. # words)
2. Sentence structure (e.g. # nouns, verbs)
3. Psychological processes
 - Social, affect, cognition, perception
4. Paralinguistic information (e.g. laughter)

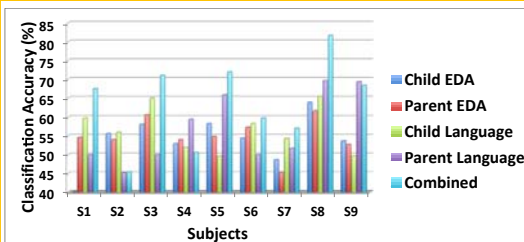
Physiological Features

1. Time-based (first 4 moments)
 - Filtered EDA
 - 1st / 2nd order difference
2. Extrema-based (peaks, valleys)
 - Mean height, width and ratio

Classification

1. Two-class: 70th VRL percentile
2. Feature Selection
 - Fisher Discriminant Ratio (FDR)
 - Decorrelation
3. K-NN classifier (K=15)

RESULTS



- Child's physiology and language can indicate the nature of VRLs.
- Parents' cues contain complementary information.

CONCLUSIONS

- Language and physiology give complementary views of children's VRLs during ECA/parent interactions.
- The physiological response can occur after variable time interval.
- Low cognitive tasks (emotion matching) with long VRLs tend to be discerned by EDA cues.
- High cognitive tasks (storytelling) with long VRLs are manifested with complex linguistic behavior.
- **Future Work:** Study of specific types of ECA stimuli, dynamic modeling of VRLs.