Introducing a Novel Community-Based Assessment Tool: The Computerized Social Affective Language Task (C-SALT)

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BACKGROUND

• Social communication is a significant area of weakness for individuals with developmental differences like autism spectrum disorder (ASD), but is notoriously expensive and time-consuming to measure.
• A recent movement toward fine-grained behavioral imaging using cutting-edge technologies could drastically improve our ability to automatically capture subtle and complex social communication impairments, thus laying the groundwork to generate personalized interventions.

OBJECTIVES

Assess the feasibility of using C-SALT, a low-cost computer program that children can operate independently, to gather vocalization data as part of a community-based social communication and motor battery.

PARTICIPANTS

• 208 participants (106 ASD, 20 non-ASD, 62 TD) between the ages of 3 and 66 completed C-SALT as part of a 20 minute battery of social-motor and language tasks.
• All participants speak English as their primary language.

COMMUNITY

• 77 participants received the 20-minute battery in summer-camp settings, and parents of participants completed a questionnaire including reporting on developmental diagnoses.
• 13 participants were not administered C-SALT based on the Research Assistant’s concern about low verbal abilities.
• Of the participants who were administered C-SALT, 100% were able to complete at least parts of the task (parts are useable in isolation).

OVERALL EXPERIENCE

• Most participants are able to complete C-SALT or C-SALT-PL with minimal/no help from Research Assistants or aides.
• Child participants are comfortable completing the computer-based task, including using a mouse, trackpad, or touchscreen to interact with the task.

LAB

• Based on our experiences collecting data in the community, we developed C-SALT-PL (preliterate), to allow participants with lower verbal ability to complete the task.
• In the Lab, using both versions, 143 participants were administered C-SALT or C-SALT-PL.
• 100% were able to complete the full task, across a range of ability levels.
• Some participants with developing speech ability were able to complete C-SALT with sentence reading assistance from a Research Assistant.

CURRENT ANALYSES

• Face processing analyses using computer vision across individual subtasks and the entire task.
• Humor response and social referencing analyses of participants while watching funny YouTube videos (see IMARF Abstract #25280).
• Transcription for word-level analyses of cartoon names.
• Diagnostic classification based on facial expressions, word choice, and acoustic properties of speech.

FUTURE DIRECTIONS

Linguistic features affecting social communication will be derived from audio recordings:
• Acoustic properties of voice: pitch variation, volume control, shimer, and jitter.
• Word choice: word frequency/rariness, lexical diversity, social/nonsocial focus.
• Grammatical complexity.
• Pronunciation, rate of speech, etc.

PROGRAMMING

• Programmed in Unity 3D
• Versions: iterate and pre-iterate versions allow for collection of canonical speech, extended phonation, and response to social videos across ability levels.
• Adaptable for lab, community, and (soon) web deployment.
• Video and audio can be recorded via device webcam or external recording.
• Functional on tablets and computers, allowing for mass deployment to increase accessibility for a diverse range of participants.

TECHNICAL DEVELOPMENTS

• Additional versions of C-SALT can be programmed to more closely fit differing ability levels of individual participants.
• Future versions could be adaptable, assessing ability based on response to questions to determine additional items displayed.

LONG-TERM OBJECTIVES

• Use C-SALT to improve screening and diagnosis in remote areas.
• Inform treatment planning (clarify areas of strength and weakness).
• Revolutionize how we measure intervention efficacy.

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