Introducing E.V.A. – A New Training App for Social Cognition
Design, Development, and First Acceptance and Usability Evaluation for Autistic Users

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Introduction

❖ The main characteristics of autism spectrum conditions (ASC) are impairments in social cognition, including understanding emotional facial expressions, speech prosody, body language and the mental state of others.
❖ To date, only a limited amount of therapeutic tools exist targeting social cognitive dysfunctions.
❖ Computer-based interventions adapted to user-specific deficits are a promising therapeutic approach to overcome this treatment gap in ASC.

Methods

E.V.A.
(Emotionen Verstehen und Ausdrücken)

❖ We developed E.V.A., a new social cognition training app, based on our previous game-like training software SCOTT (Social Cognition Training Tool).
❖ The innovative design of E.V.A. and its higher diversity of improved tasks were especially developed to meet the needs of individuals with ASC.
❖ Users can train facial affect recognition (*Face Module*), emotional prosody recognition (*Voice Module*), and theory of mind abilities (*Film Module*). They are instructed to either match (implicit part) or label (explicit part) the presented emotions.
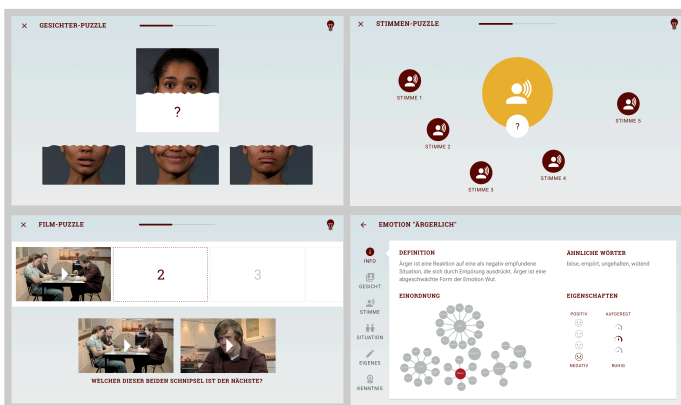

Figure 1: Example items for the Face, Voice and Film Modules (implicit parts) and for the Emotion Library.

❖ Stimuli consist of 40 emotions, displayed by >50 actors of varying gender, age, and ethnicity.
❖ An additional module is the *Emotion Library (Emotions-schatz)*, providing structured information about emotions, including a definition, synonyms, valence and arousal level, description of the facial expression and voice with sample pictures and recordings.

Results

Usability Evaluation

❖ Sample: 10 autistic (36±7 years) and 21 neurotypical participants (33±7 years).
❖ Usability was assessed with a combination of techniques (standard questionnaires, think-aloud protocol, qualitative feedback) after participants performed the different E.V.A. modules for 20min.

❖ Both user groups reported high usability ratings across measures. Mean scores of the *meCUE* and *System Usability Scale (SUS)* showed no significant differences between the autistic (*meCUE*=2.7±2.4; *SUS*=76±22) and neurotypical (*meCUE*=2.5±1.7; *SUS*=82±11) users.
❖ Autistic as compared to neurotypical subjects reported significantly higher levels of effort (*NASA Task Load Index*; p<.01).
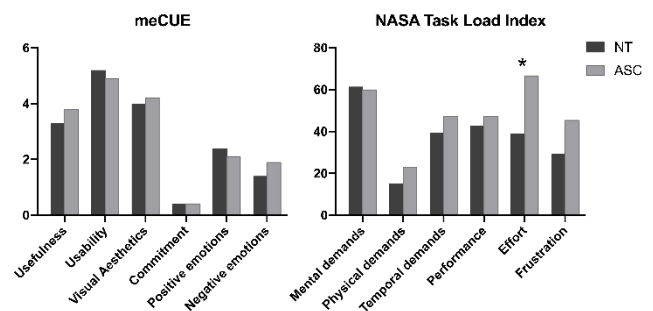

Figure 2: Subscales of the meCUE and NASA Task Load Index.

❖ In the group of autistic subjects, mental demands (*NASA Task Load Index*) increased with symptom severity as assessed with the *AQ-k* (r=.53, p=.06).
❖ Overall, participants highlighted that E.V.A. was visually appealing, easy to use, with well-integrated tasks, and felt confident using the different features of the app.
❖ Qualitative feedback revealed that many subjects experienced technical issues (e.g. low sound volume, program crashes) and wished for higher task variation.

Discussion

❖ E.V.A. has the potential to be an effective and easy accessible tool to enhance social cognition in a new era of personalized, computer-based ASC interventions.
❖ Next steps of development include improving technical aspects, implementing additional tasks and assessing social-cognitive gains after several weeks of training in a large sample.

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