Social Engagement Recognition in Children Using Electrodermal Activity (EDA)
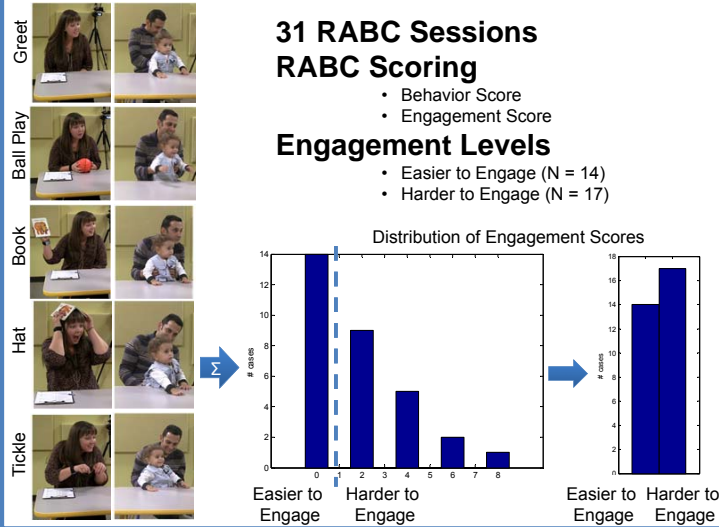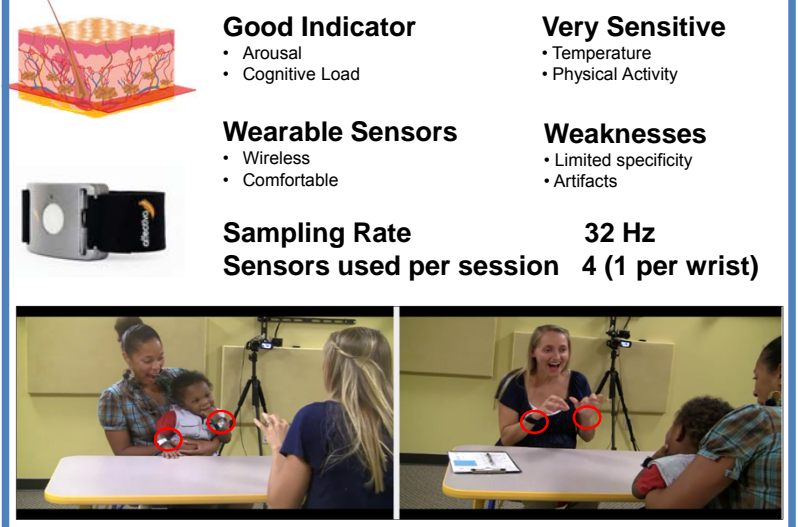
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Children's emotional self-regulation and co-regulation are key components in understanding engagement. Using features from the EDA signals of the child and the examiner we were able to discriminate between easier and harder engagement levels with a performance of 97.18%.

RapidABC & Engagement

Greet · Ball Play · Book · Hat · Tickle

31 RABC Sessions
RABC Scoring
- Behavior Score
- Engagement Score

Engagement Levels
- Easier to Engage (N = 14)
- Harder to Engage (N = 17)

Distribution of Engagement Scores

Easier to Engage | Harder to Engage

Easier to Engage | Harder to Engage

Electrodermal Activity

Good Indicator
- Arousal
- Cognitive Load

Very Sensitive
- Temperature
- Physical Activity

Wearable Sensors
- Wireless
- Comfortable

Weaknesses
- Limited specificity
- Artifacts

Sampling Rate — 32 Hz
Sensors used per session — 4 (1 per wrist)

Engagement Recognition

Preprocessing

Normalized EDA · Tonic · Phasic

Time (minutes:seconds)

Website: http://www.ledalab.de
Benedek, M. and Kaernbach, C. Decomposition of skin conductance data by means of nonnegative deconvolution. Psychophysiology, 47, (2010), 647-658.

Feature Extraction

Standard Features (SF)

Minimum · Maximum · Range · Slope · Position Minimum · Position Maximum

Standard deviation · #Peaks · Mean · Avg. Peak Amplitude

Physiological linkage-based features (PLF)

Child · Adult

Pearson product-moment correlation
Canonical correlation
Dynamic Time Warping

L2-norm between means
L2-norm between #peaks
L2-norm between avg. peak amplitude

Avg. Normalized EDA

Avg. Normalized EDA (±Standard Deviation)

Results

Average AUC and Precision/Recall curves

SF+PLF | SF | PLF — Best Subsets of Features

SF | PLF — Best Single Feature

Easier vs harder to engage
Linear SVM
10-fold-cross-validation
Forward Feature Selection

97.18% SF+ PLF features

Best subset: range of tonic values, average peak amplitude of the phasic component, Pearson correlation of the tonic levels, and difference between tonic means