Multimodal **Biometric Data** Collection of **Interpersonal** Communication

AUTHORS

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INTRODUCTION

Communication between individuals involves multiple factors: attending to the other person's thoughts, interpreting their non-verbal behavior, and (un)intentionally mirroring their expression- and attention patterns.

Moreover, we may be evaluating the authenticity of their expressions and behavior throughout the conversation. Experimental investigation of these factors in natural settings can be cumbersome and technically challenging.

Here, we perform synchronous multimodal biosensor recordings of dyads conversing about current political issues to test the feasibility of capturing biometrics data during in-person conversations.

We use EEG, eye tracking, galvanic skin response and facial expression analysis to capture synchronicity in brain activity and physiological arousal, mirroring of facial expressions and shared attention patterns.

METHODS

Data were collected from 6 dyadic pairs of subjects during a conversation about their opinions on the effects of social media on mental health.

This involved two sets of Neuroelectrics Enobio 8-channel EEG systems, Pupil Invisible eye-tracking glasses, Shimmer galvanic skin response sensors, and cameras for Affdex facial expression analysis. Sensor data and camera recordings were collected and synchronized using iMotions 9.3 (Glasses Synchronization protocol).

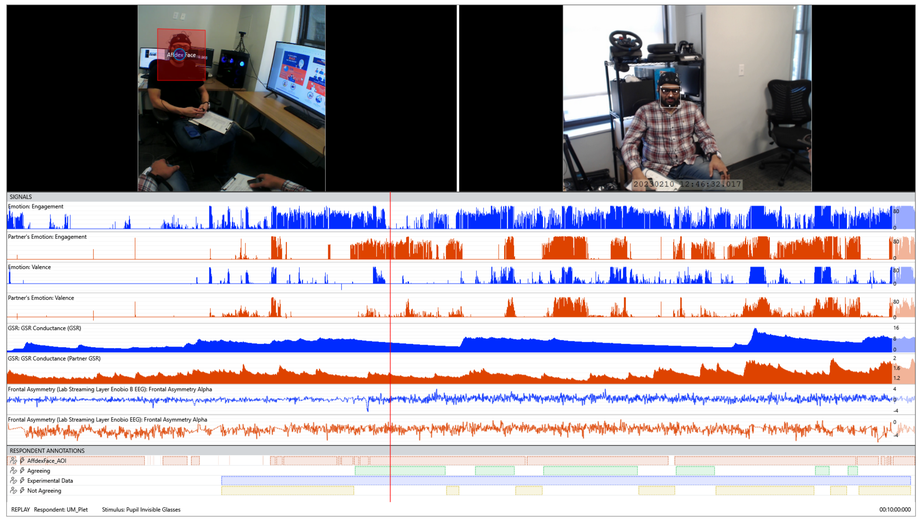
Surveys were also collected about each subject's opinion of the conversation and topic of social media.

Information about the topic was presented during the conversation, on a television screen and on paper. Analyses were performed using signal processing and annotation methods available in iMotions 9.3.

KEY TAKEAWAYS

- Multimodal biosensor data collection can be used to observe dyadic interactions (i.e. conversation while sitting).
- Correlations in sensor data across dyadic pairs may indicate periods of agreement.
- Different sensors capture distinct aspects of physiology and behavior during dyadic interactions. The use of multiple sensors can provide a more complete understanding of subjects' experiences during these interactions.

EXAMPLE RECORDING OF DYADIC BIOSENSOR DATA



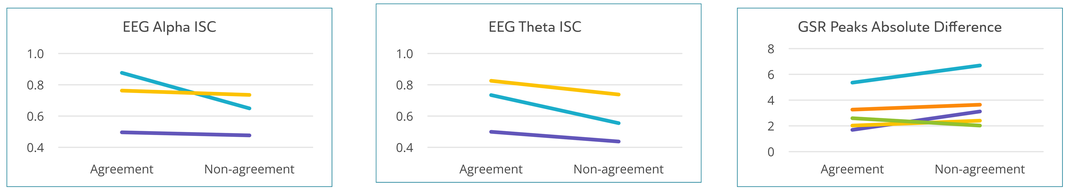
Video recordings (top), synchronized biosensor data (middle), and annotations (bottom) from a dyadic interaction, i.e. conversation between two participants.

Videos are from Pupil Invisible Glasses recording this participant's view (on the left) and Logitech C920 webcam recording this participant's face (on the right).

Data include facial expressions (first 4 rows), GSR conductance (next 2 rows), and EEG frontal alpha asymmetry (last 2 rows).

Annotations denote periods of Agreement (when participants were expressed agreement), Not Agreeing (when agreement was not expressed), Experimental Data (when the conversation was occurring), and AffdexFace_AOI (when the conversational partners face was in view).

DYAD-SPECIFIC RESULTS FOR AGREEMENT VS. NON-AGREEMENT PERIODS

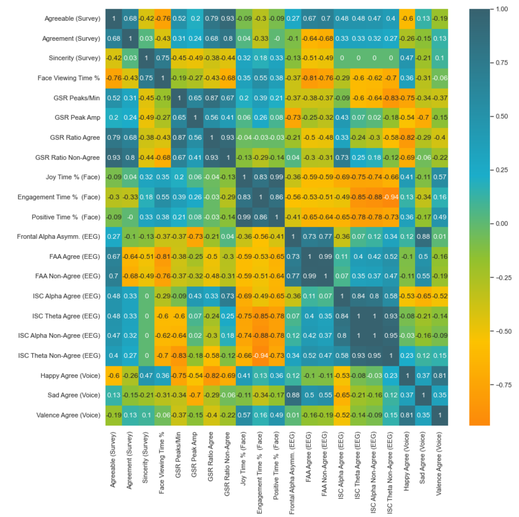


Relationships in biometric data within dyadic pairs of subjects. **Intersubject Correlations (ISC)** indicates correlations in **EEG Alpha band power** (left) and **EEG Theta band power** (center), while **GSR Peaks Absolute Difference** (right) indicates the absolute value of the difference in number of GSR peaks observed in one subject versus the other in a dyad, during Agreement and Non-agreement periods (the closer to zero, the more similar the peak count between the two subjects).

EXAMPLE EYE TRACKING RESULTS

Visualization of eye tracking data recorded from Pupil Invisible Glasses and processed with iMotions Gaze Mapping

WITHIN-SUBJECT CORRELATIONS FOR SENSOR DATA



Exploratory, within-subjects correlation analysis of multimodal data. The top row, for example, shows data that were correlated with a dyadic/conversation partner perceived as more "Agreeable". That is, a higher "Agreeable" rating for a partner corresponds with less time viewing their face (Face Viewing Time %) and more overlap in their GSR peaks (GSR Ratios)

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