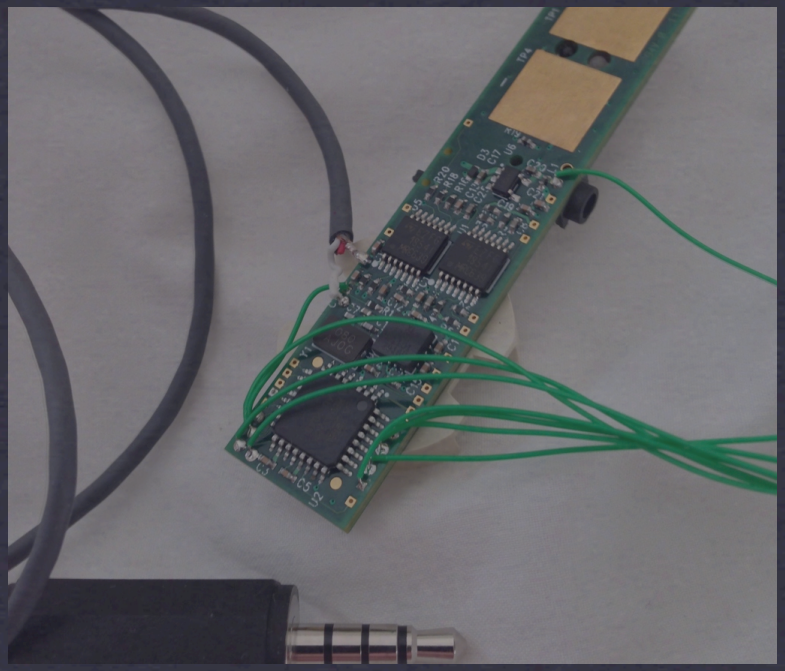

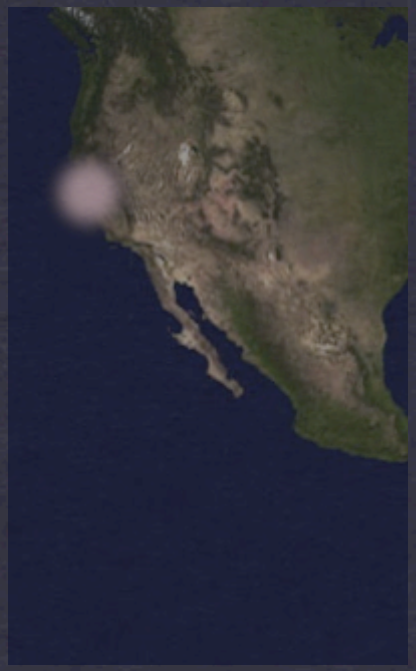

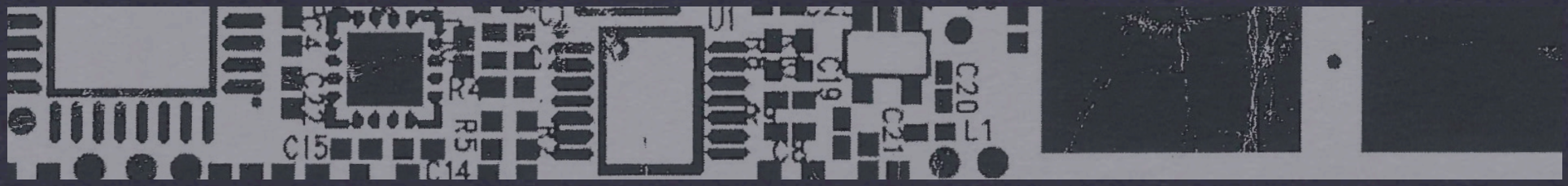

ShEMP: A Mobile Framework for Shared Emotion, Music, and Physiology

B. Bortz, S. Salazar, J. Jaimovich, R.B. Knapp, G. Wang

SOCIAL INTERACTION ENTRAINMENT USING MUSIC PERFORMANCE SIEMPRE

SEVENTH FRAMEWORK PROGRAMME

Introduction

- Existing interaction scenarios:
  - Performer-audience
  - Performer-performer
  - Conductor-performer(s)
- New scenario: mobile co-creativity and musical experience

Motivation

- Bulky previous tools for physiological data acquisition and experimental execution
- New tool must:
  - Suit a mobile environment
  - Be extensible and modular

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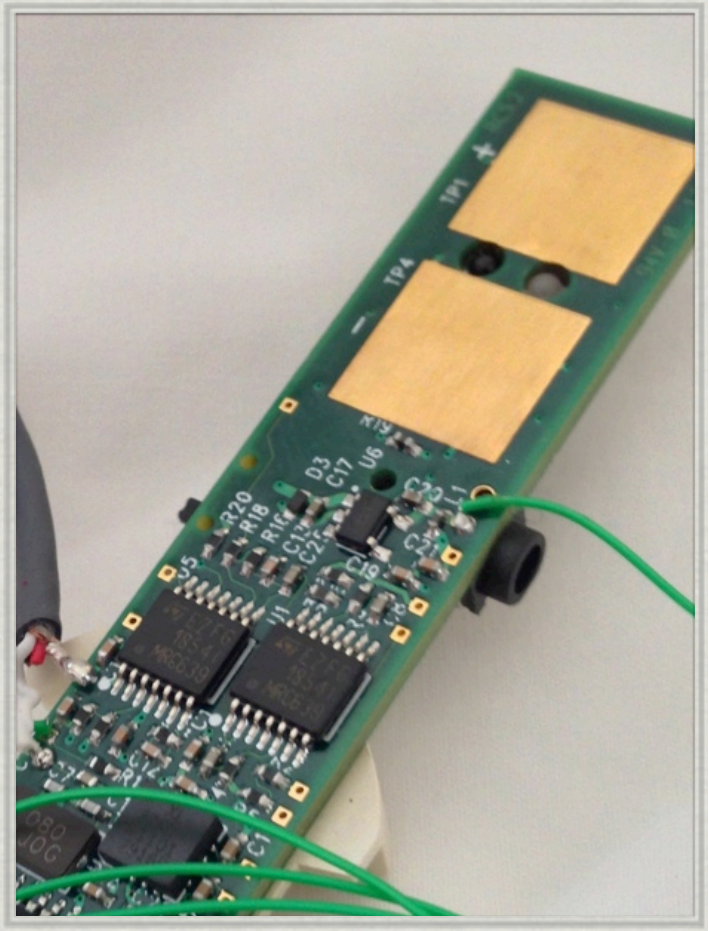
MobileMuse



- Sensors
  - Pulse oximetry
  - EDA
  - Temperature
  - Triaxial accelerometer
- Audio signal output

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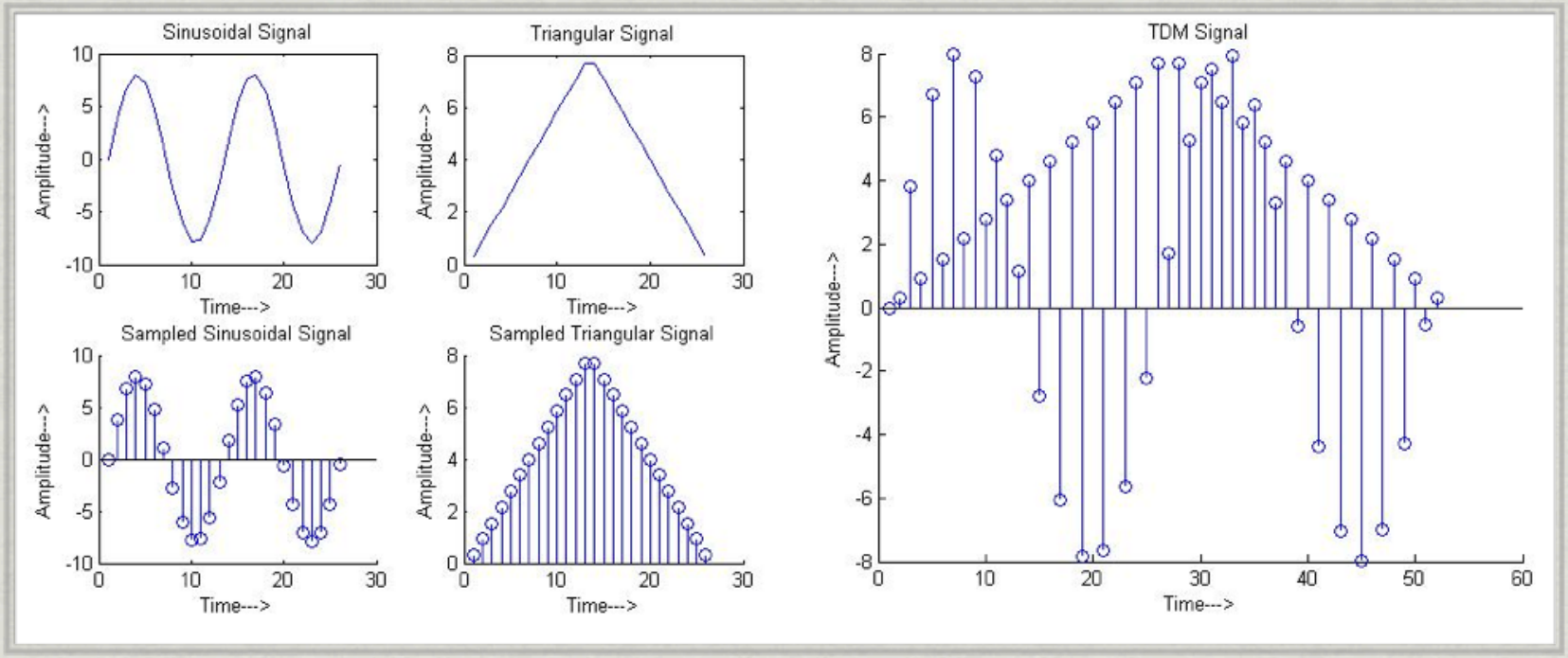
MobileMuse

- Time-division multiplexed signals
- Pulse-width modulated signal sent to DAC



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Framework Tools

- Modular iOS Library for experimental design and execution
- Tools for:
  - Sensor data acquisition
  - Various self-report mechanisms
  - Visualization
  - Shared media
  - Data persistence
  - Co-creation

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Shadow Media

- A shadow is an intrinsically inseparable object from one's own body
- One can locate themselves in a world and sense this world via their shadow

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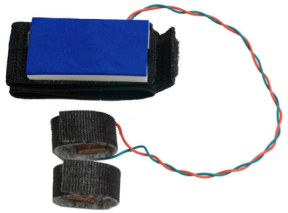
First Experiment

- Purpose: To determine if shadow media might be used to enable remote empathy in a remote environment.
- Hypothesis: Changes in emotional state caused by physical proximity of two individuals can be replicated by the use of shadow media.
- Setup: MobileMuse/ShEMP will be used to quantitatively measure changes in emotional state in a mobile environment. Proximity of two individuals will be used as the emotional modulation trigger.

Physiological Indicators of Emotion (PIEs)

EKG
Reads Heart Rate and Heart Rate Variability

GSR
Reads Skin Conductivity



EEG/EOG
Reads brain activity and ocular movement

EMG
Reads muscular tension

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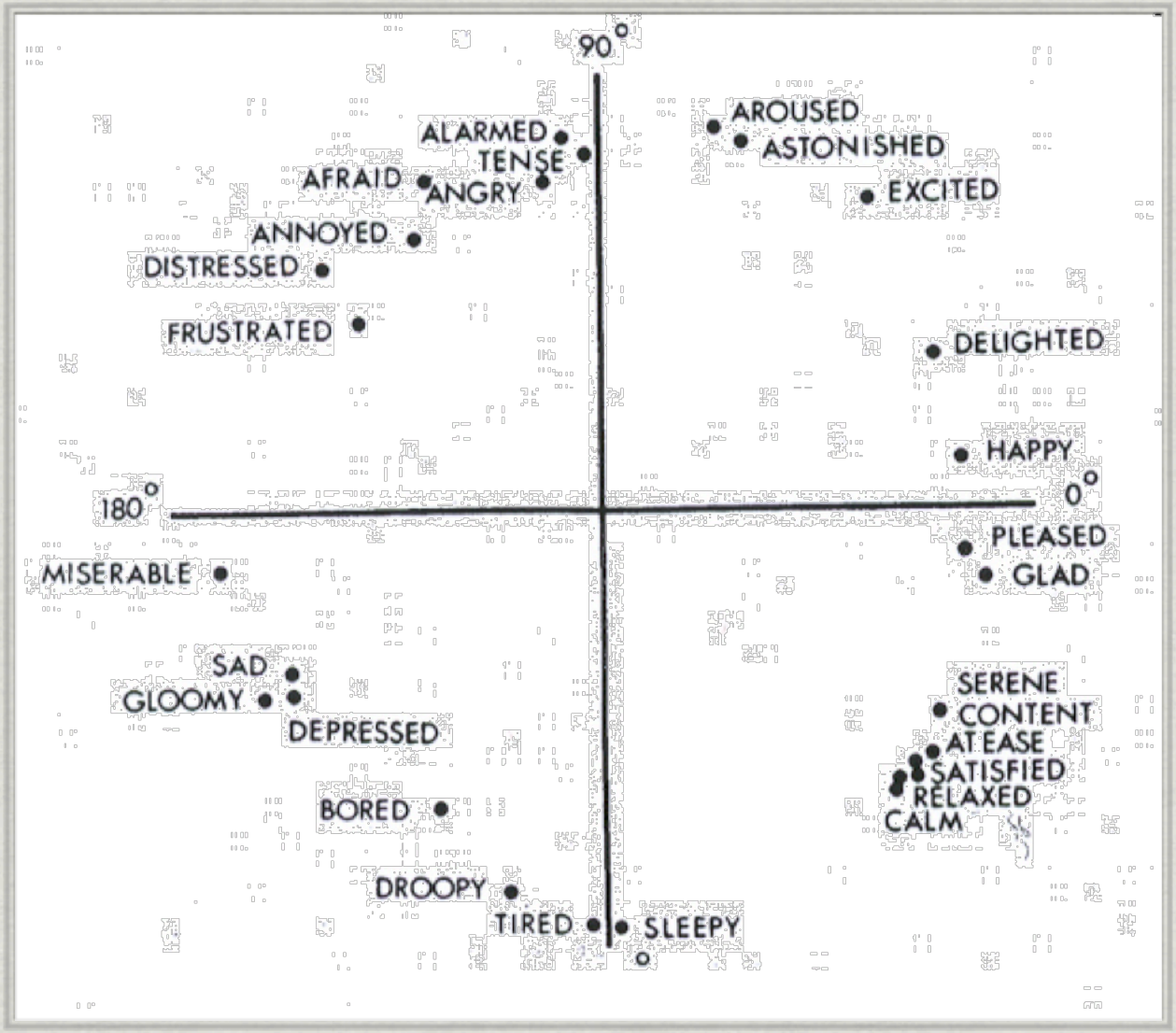
Russel's Circumplex of Emotion



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Equipment - Performances

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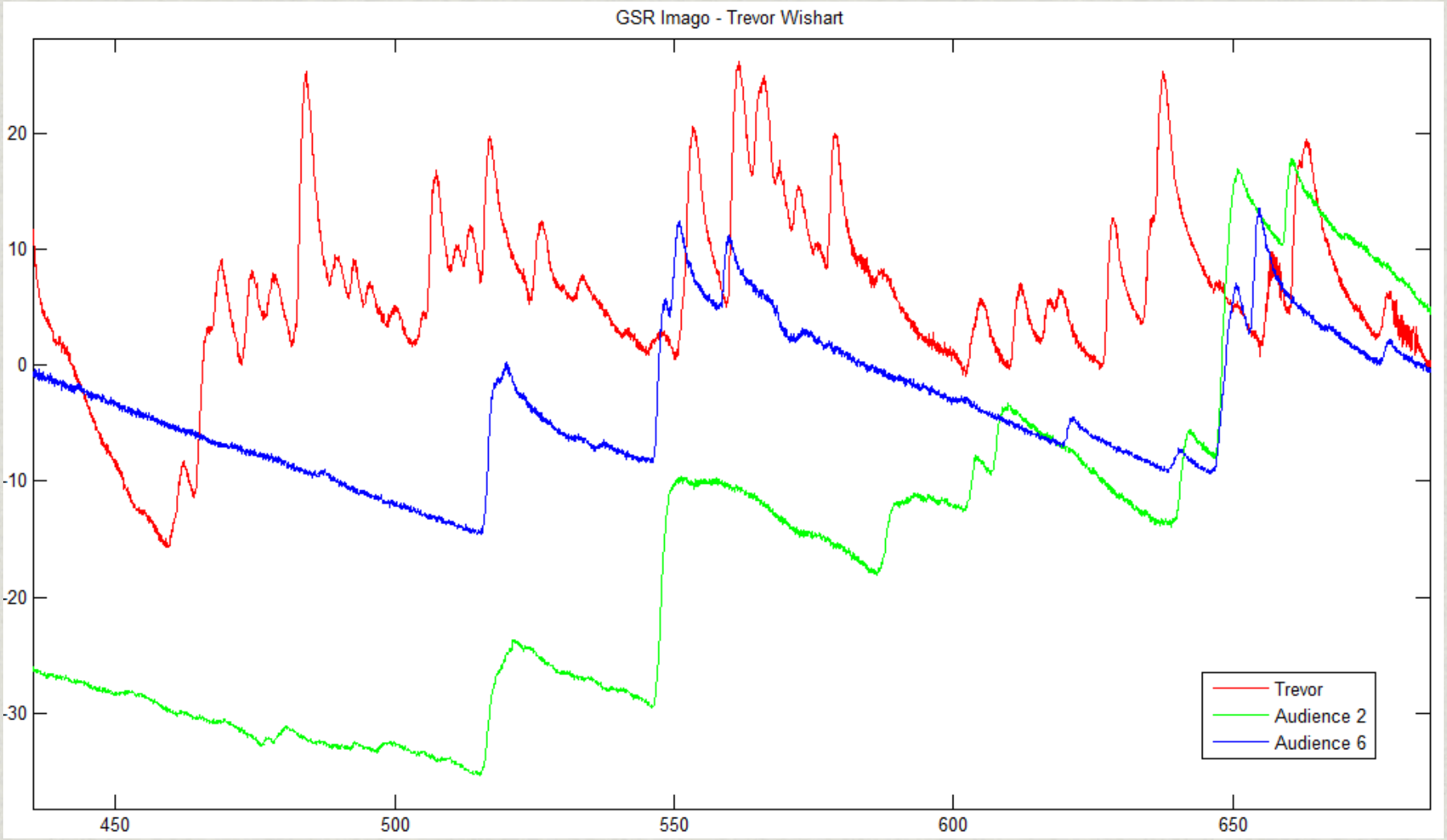
Pilot Studies - EDA



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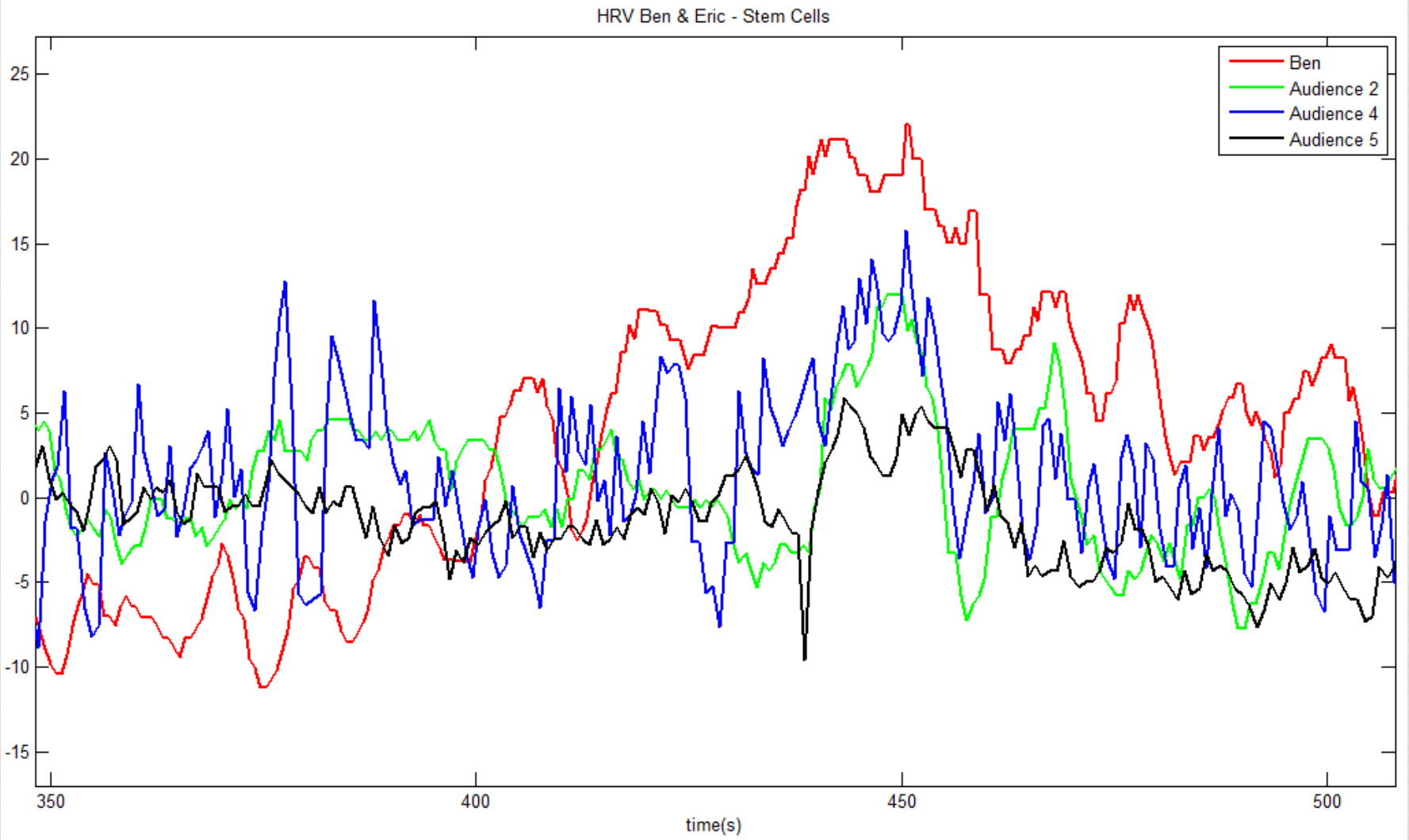
Pilot Studies - HRV



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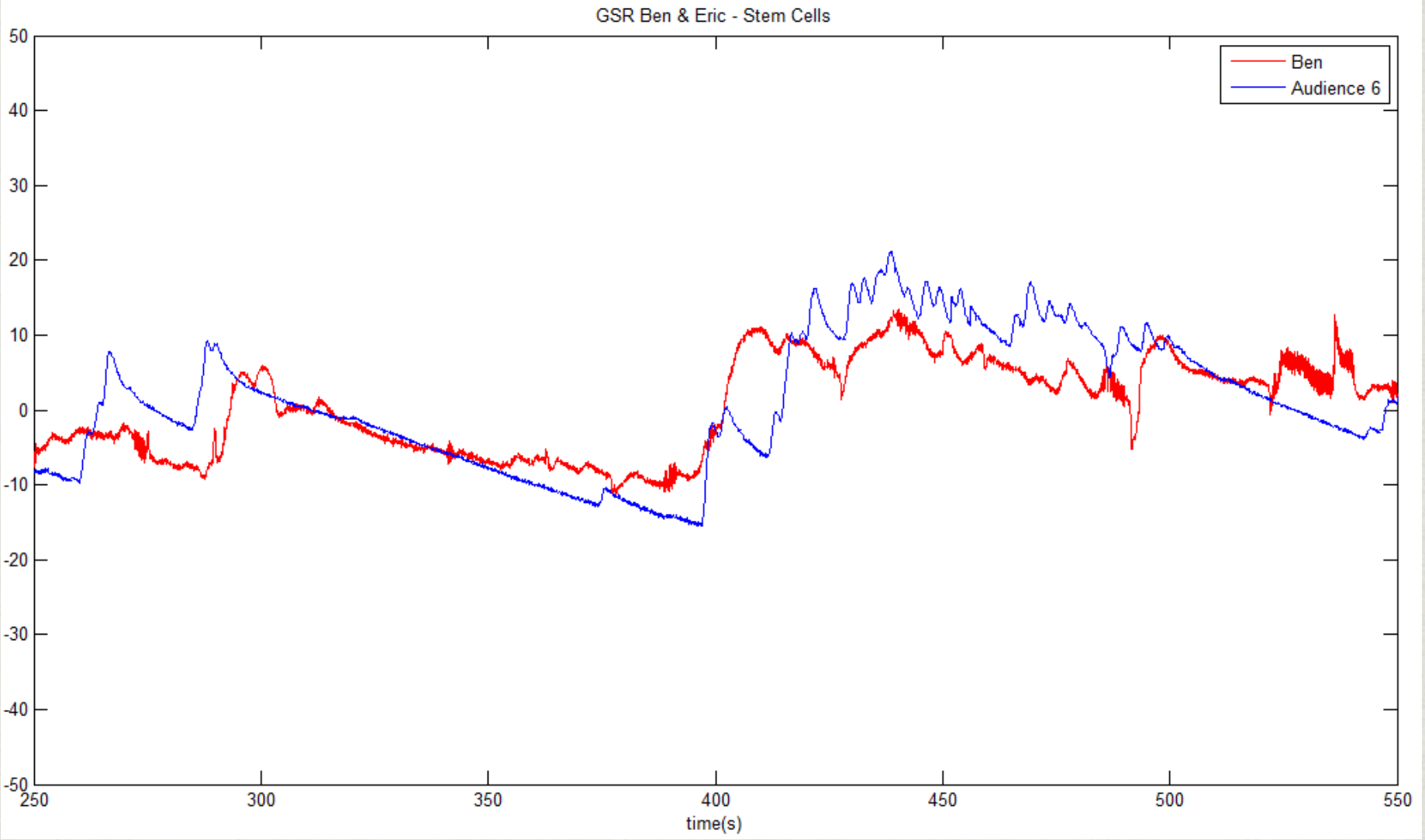
Pilot Studies - EDA



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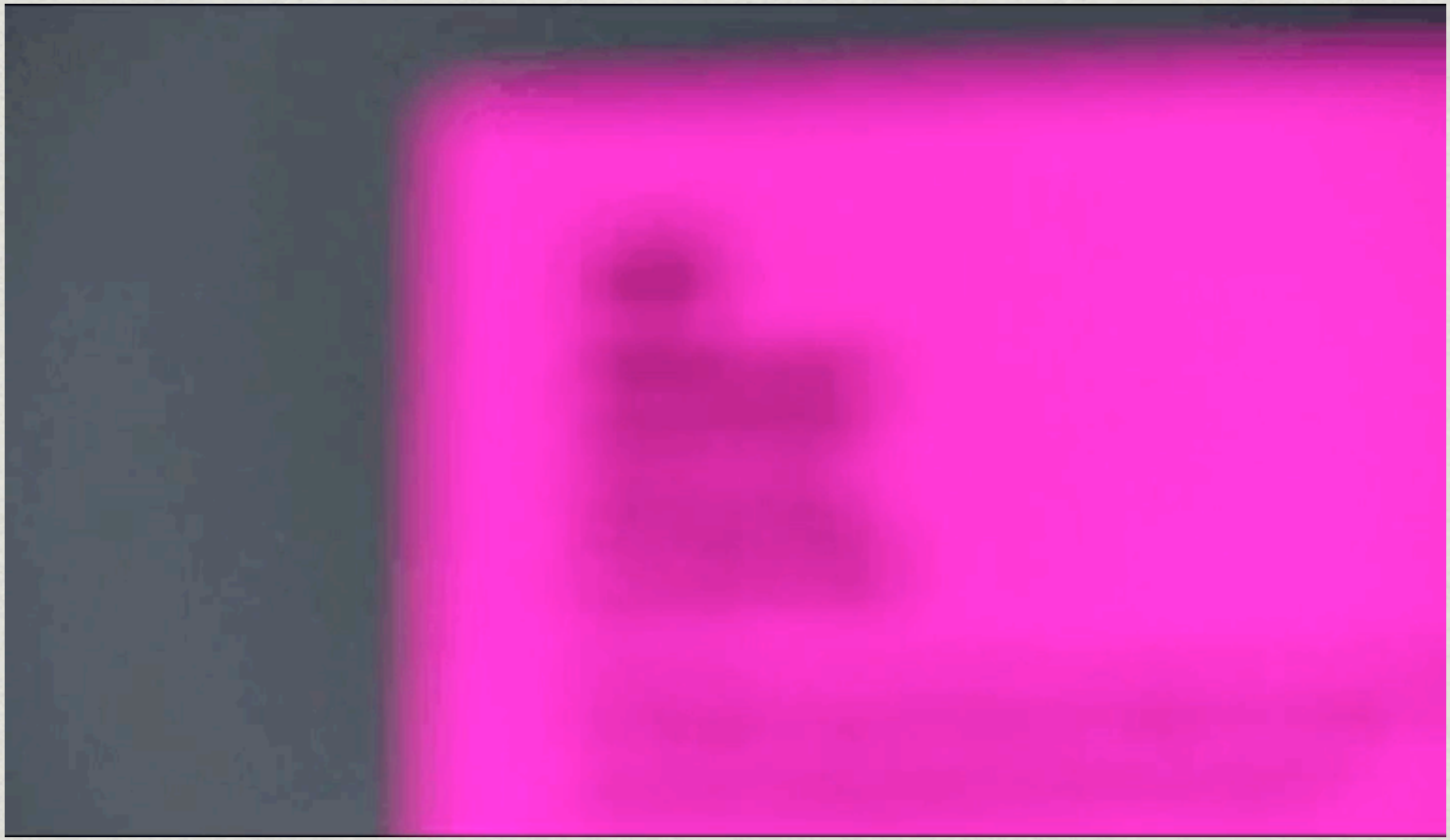
The Emotion in Motion Experiment



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Research Questions

- Is there a link between changes in emotion/ physiological state and music listening?
- Are there factors in music, or certain pieces of music, which are associated with a particular emotional state?

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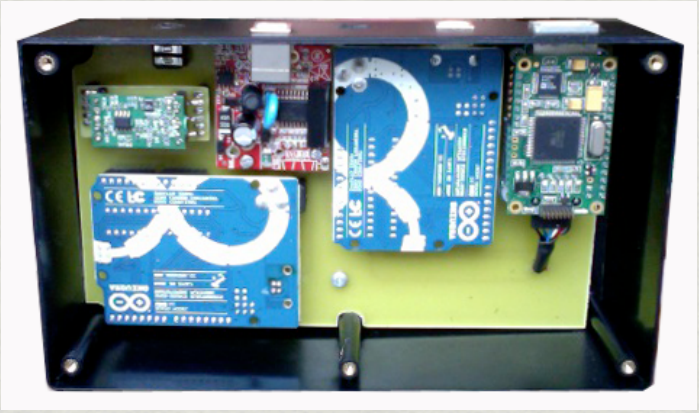
Physiological Signals

- Electrodermal Activity Sensor (EDA)
- Pulse Oximeter → Heart Rate
- Arduino



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Some numbers

- Over 6,000 participants
- Average of 40 visitors per day
- Over 18,000 songs listened!
- Pool of 67 songs
- Happy/Sad, Tense/Relaxed
- From Handel to the Beach Boys to the Black Eyed Peas

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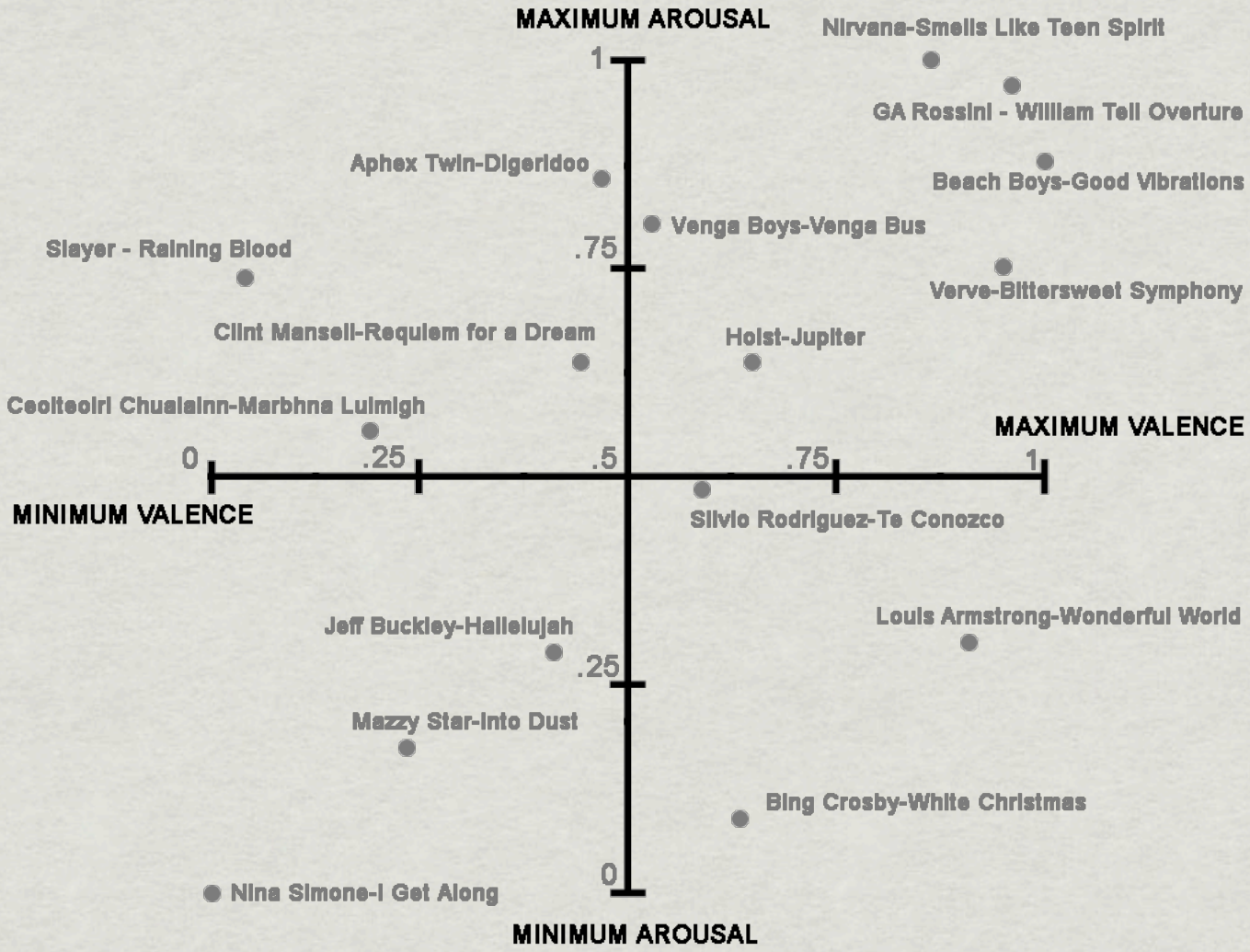
Questionnaire Results



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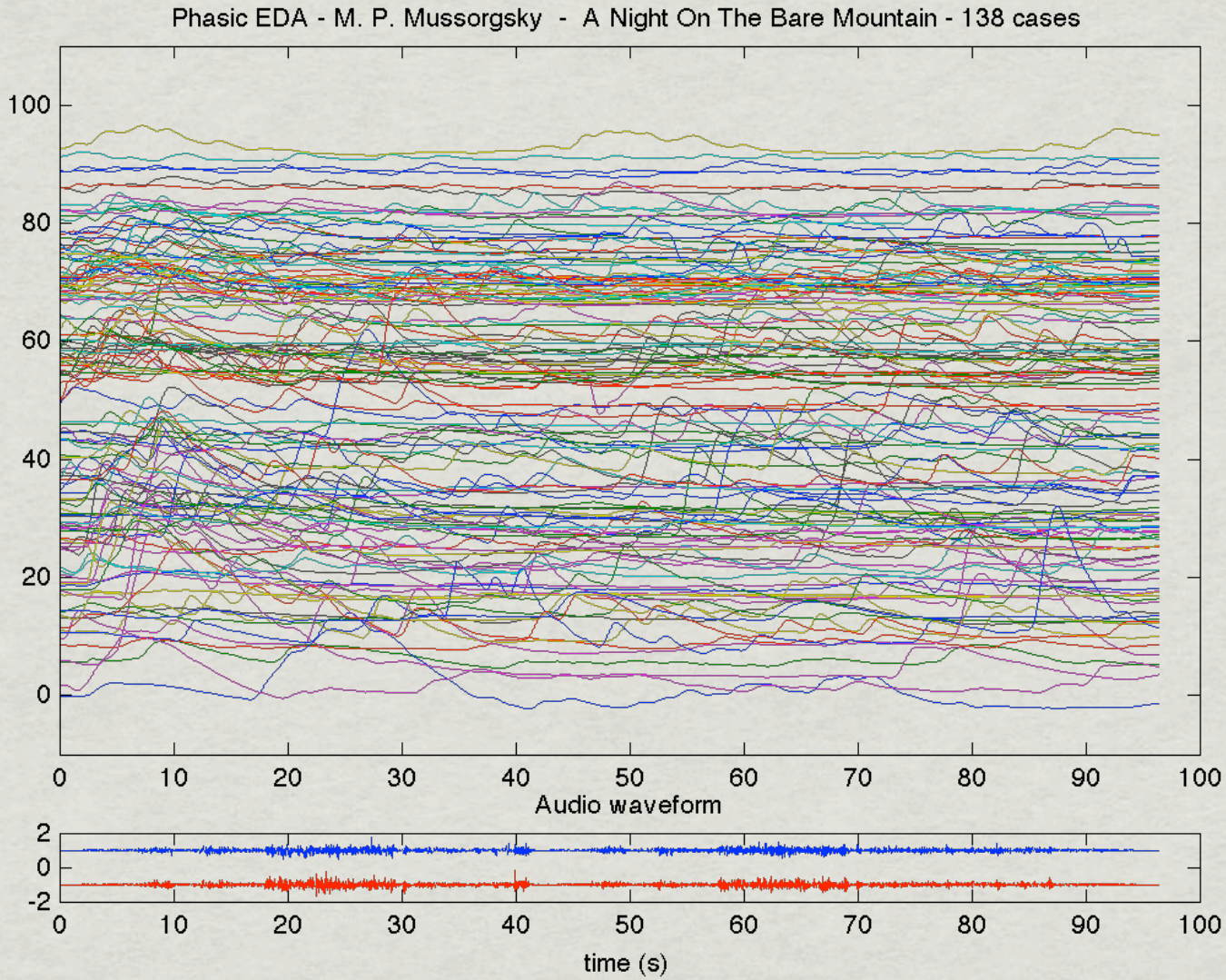
High Variability and EDL



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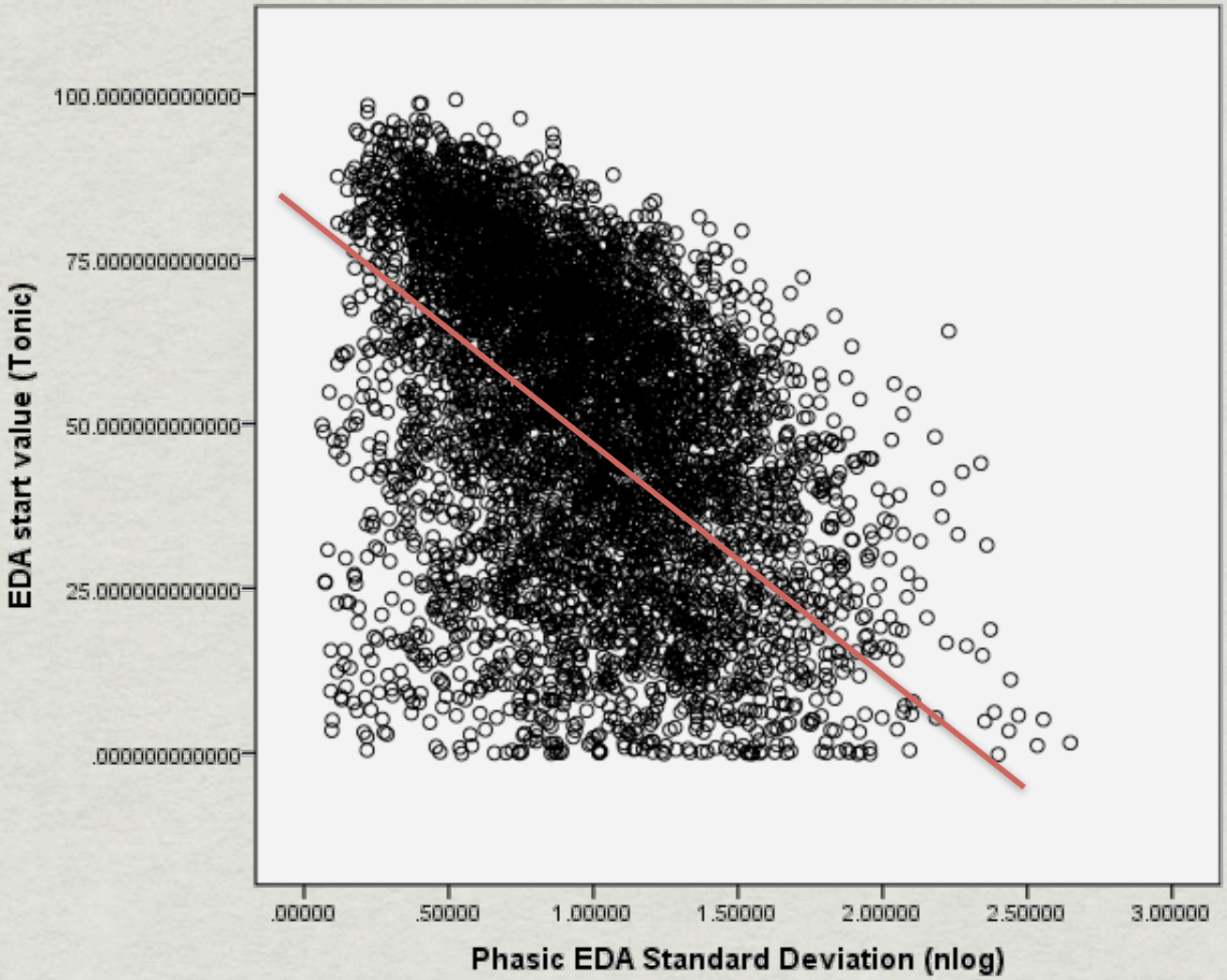

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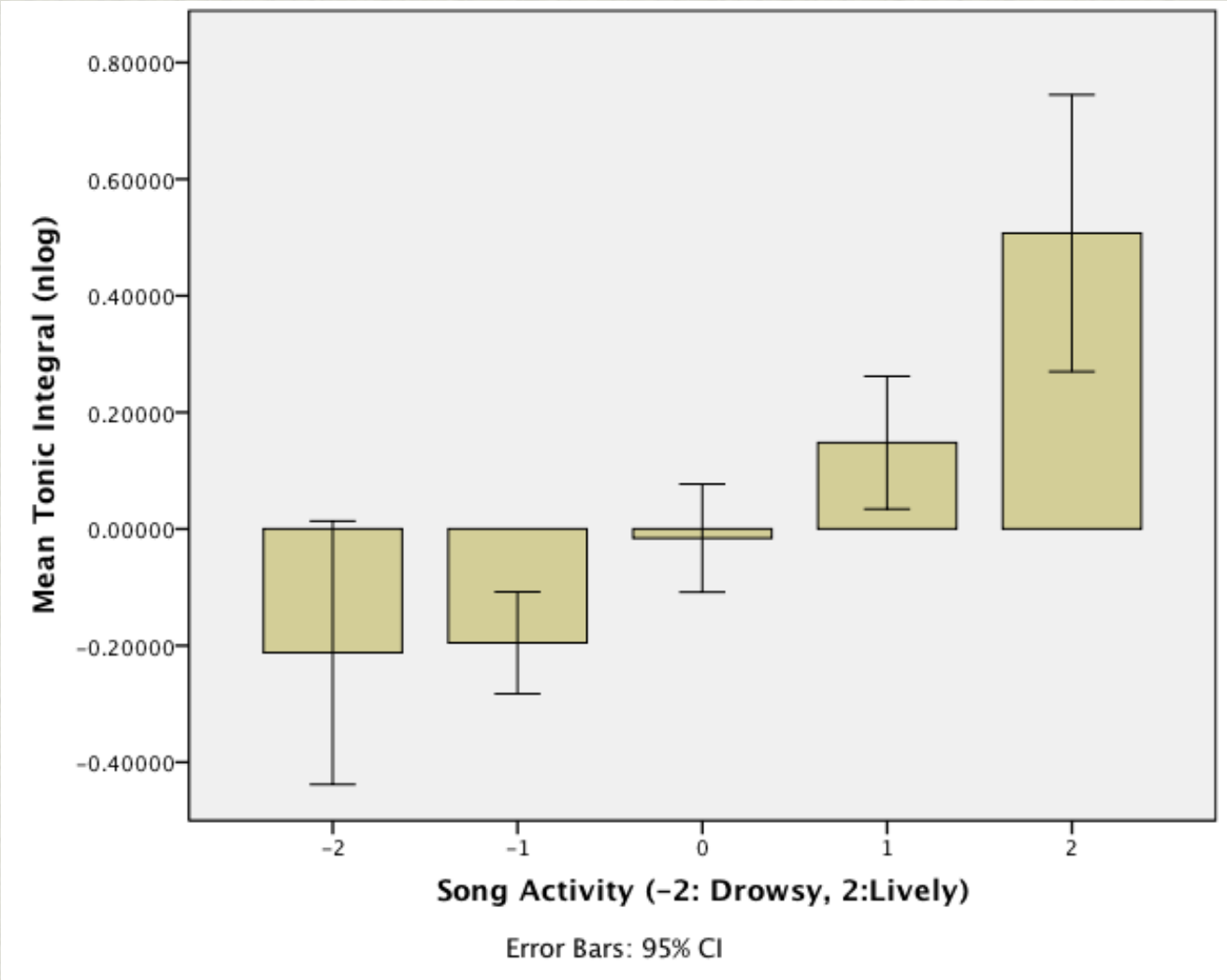
Example of Correlation



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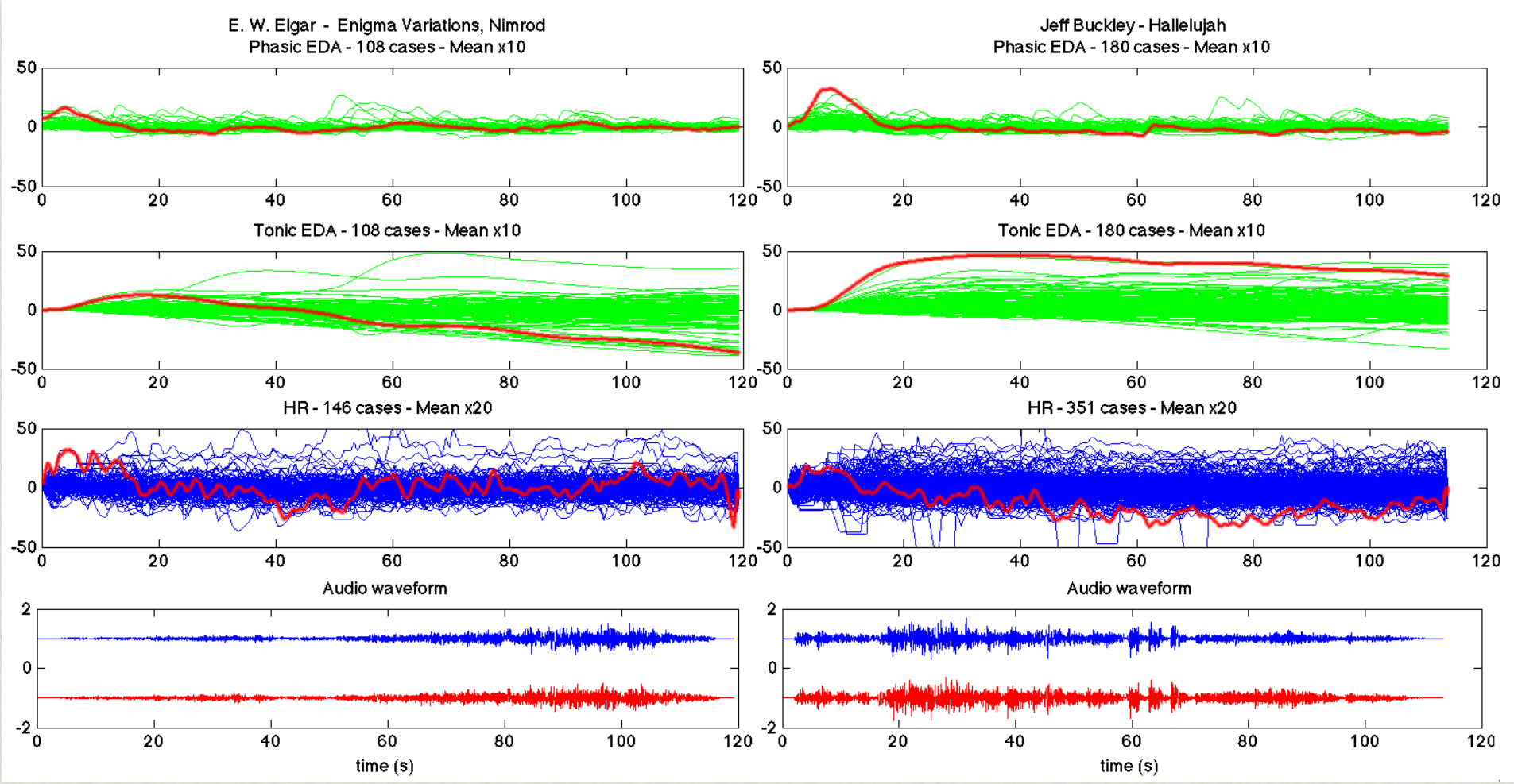
Song Analysis



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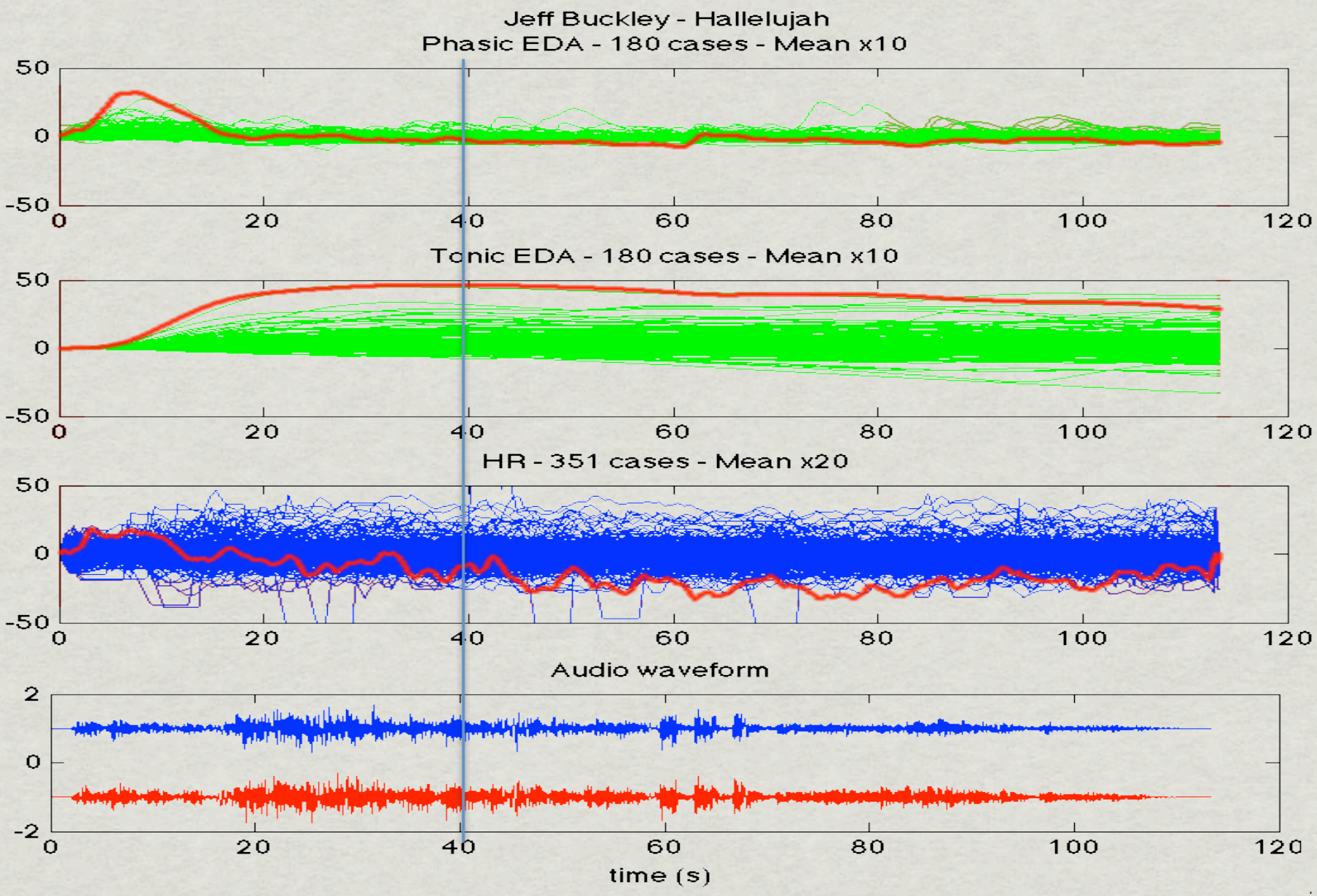

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- Jaimovich, J., Coghlan, N. & Knapp, R.B., 2012. Emotion in Motion: A Study of Music and Affective Response. In *Proceedings of the 9th International Symposium on Computer Music Modeling and Retrieval (CMMR) Music and Emotions*. Symposium on Computer Music Modeling and Retrieval. Queen

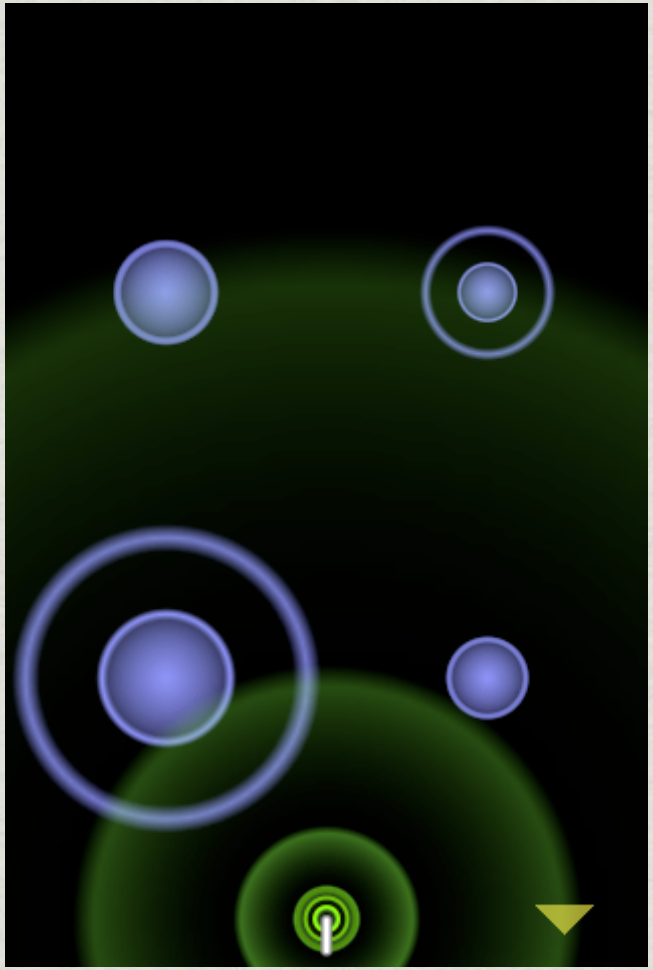
Global-Social Media

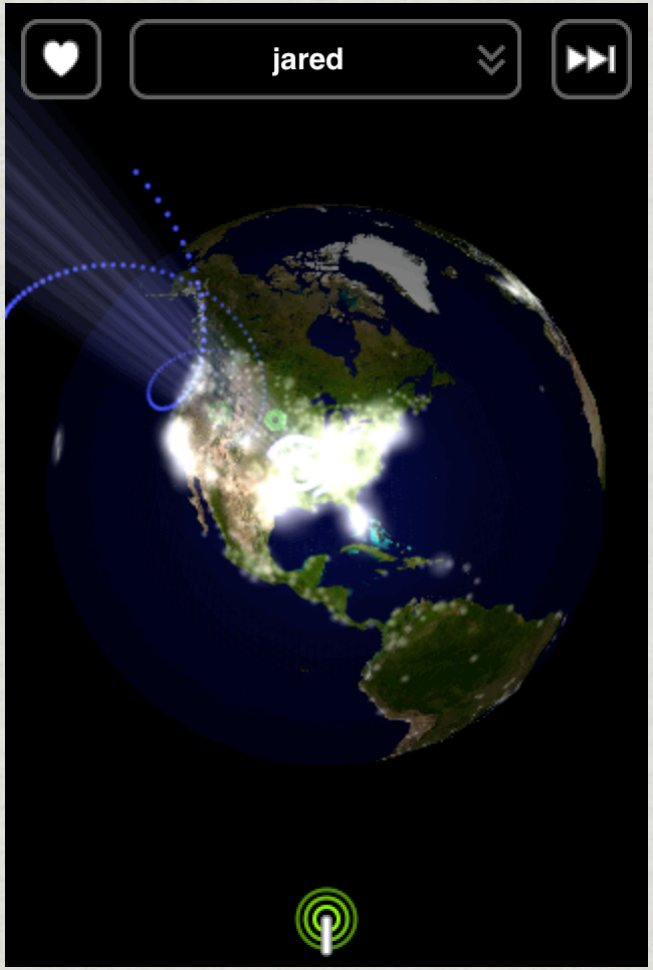
- Mobile devices are a fundamentally distinctive computing platform
  - Personal
  - Geospatially aware
  - Persistent network link
  - “Music” (iPod => iPhone)

Smule

- Mobile phone application company, founded 2008 (iPhone SDK)
- Initial goal: productize/market years of computer music + HCI research
  - Leverage iPhone app buzz

Smule Ocarina





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Smule Ocarina

- Design
  - Unique, expressive musical ***instrument***
  - Interaction with global musical community

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Smule Leaf Trombone

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Smule Leaf Trombone

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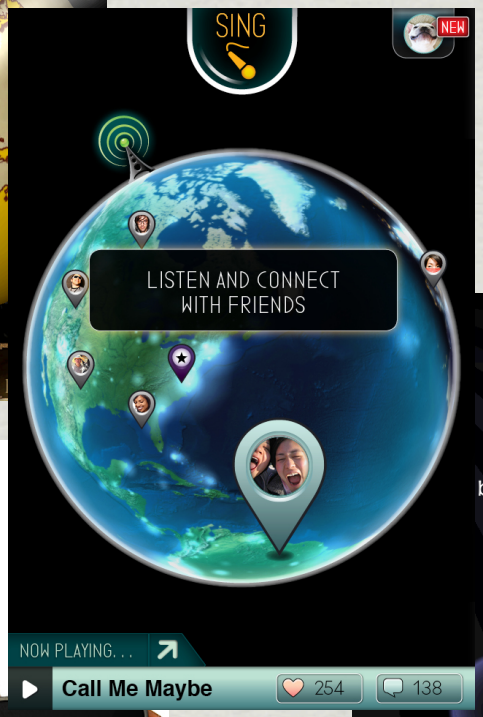
Smule


SHARE
Wild Ones by Flo Rida ft. Sia 1
Report Abuse
MIC
WORLD
BEATS


SING
NEW
LISTEN AND CONNECT WITH FRIENDS
NOW PLAYING...
Call Me Maybe
254
138


Back
mobywv
Report Abuse
Imagine
Singers: 27
Gleeks: 6
SHARE


Poker Face
by
Get this song!


TUNE
Yeah
snap ya fingers,
do ya step,
you can do it all
by yourself
Buy U a Drank (Duet w T-Pain)
Recording... T-PAIN EFFECT ON


Performer
Anonymous
Level 3
PLAY THIS SONG
House of the Rising Sun
3 loves

ShEMP

- Interpret+visualize sensory data to create shared musical+emotional experience
  - Real-time
- Platform for variety of musical interactions and experiments
  - passive <=> active
- Client+server technology

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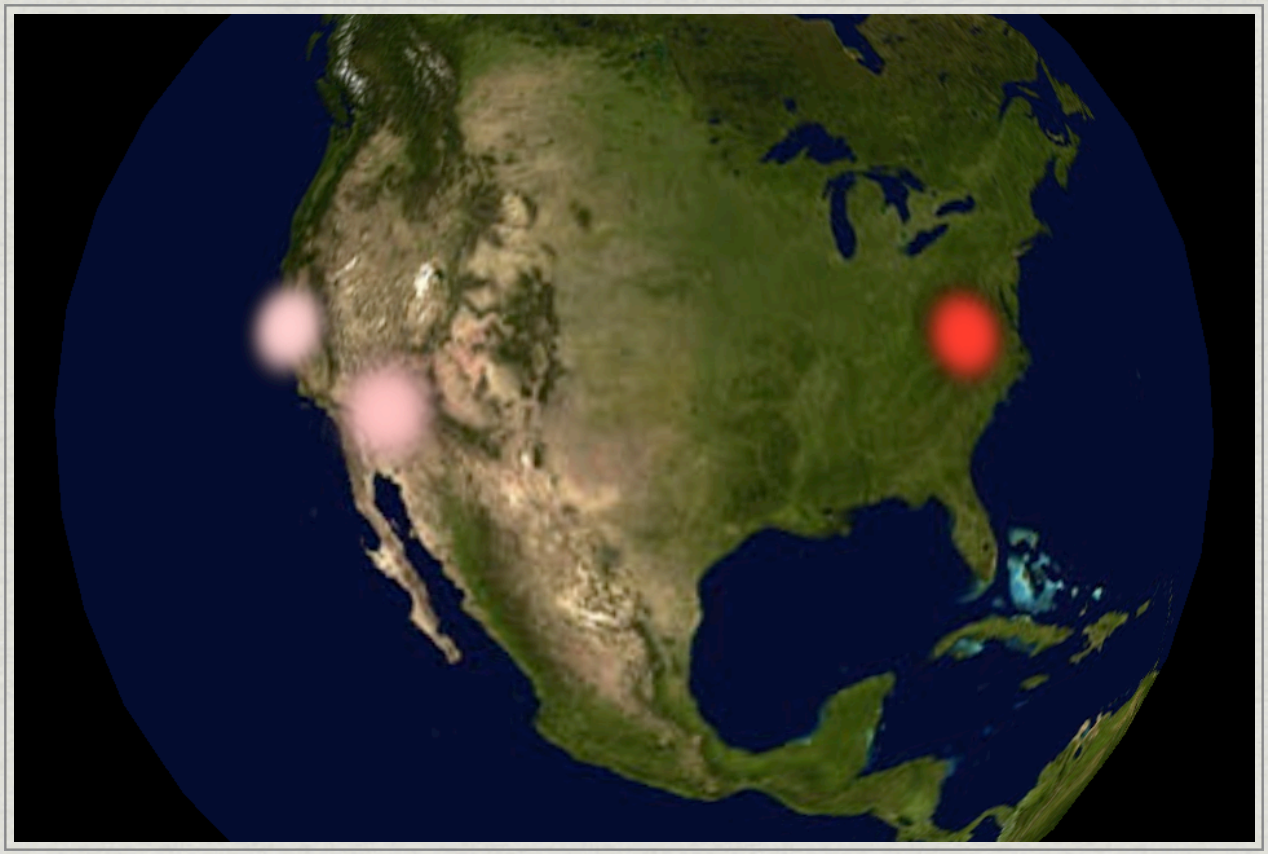
ShEMP



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Questions?

Thank You

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