ECG and EDA Information Transfer on Emotion Evaluation

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INTRODUCTION

Emotions are behind decision-making, perception and learning. Studying emotions and their responses allow us to understand people's preferences and their strategies to adapt across contexts. Both peripheral and central nervous systems are activated by emotions, which are translated on behavioural and physiological alterations.

METHODS

Data refers to 4 healthy volunteers, which came to the lab three times. Each session intends to induce one emotion between happy, fear, neutral. At the beginning, participants rest for 4 minutes to collect baseline data. Afterwards, they watched intense movies associated with each condition for 25 minutes. In this work, we target two physiological signals: electrocardiogram (ECG), and electrodermal activity (EDA) in the happy condition.

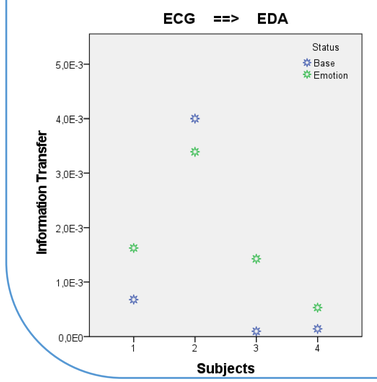
For analysis, the last 3 minutes of baseline data and the last 19 minutes for happy emotion were selected for analysis, all collected at 1000Hz.

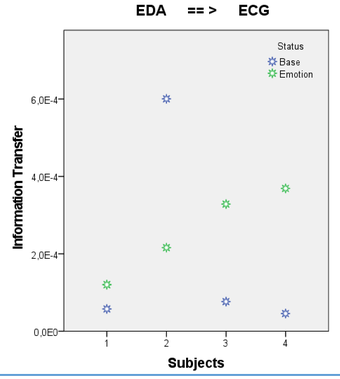
For the baseline and happy condition, the information dynamics based on the linear Gaussian approximation was computed to characterize information storage and transfer between ECG and EDA signals, using ITS Toolbox [1] in MatLab.

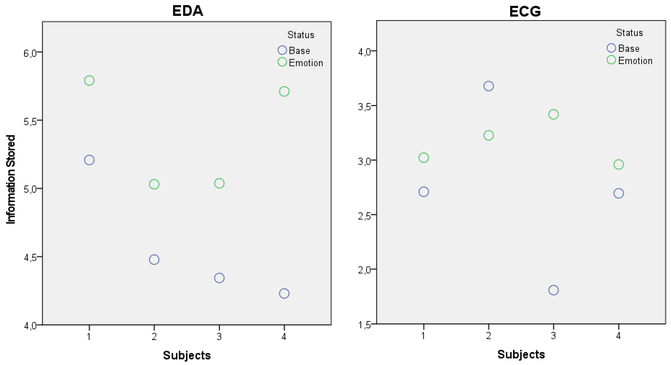
RESULTS

Considering the self-entropy of each signal, EDA presented slightly greater values than ECG. Within subjects, emotion signals show higher self-entropy than baseline, with one exception in subject 3 for ECG.

In all participants, the ECG transfers information to the EDA, indicating that the ECG information may pertain in the system.







The result achieved in this study may indicate that the ECG is a stronger signal when we want to evaluate emotions in real contexts (with highly ecological validity).

CONCLUSIONS

These preliminary results indicate that the ECG is the signal that better describe the happy condition. The EDA may be affected by noise, or artifacts, which may compromise the emotional representation.

An open question stands to the evaluation of different emotional conditions; the physiological description of each emotional condition may be dependent on different signal evaluation.

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