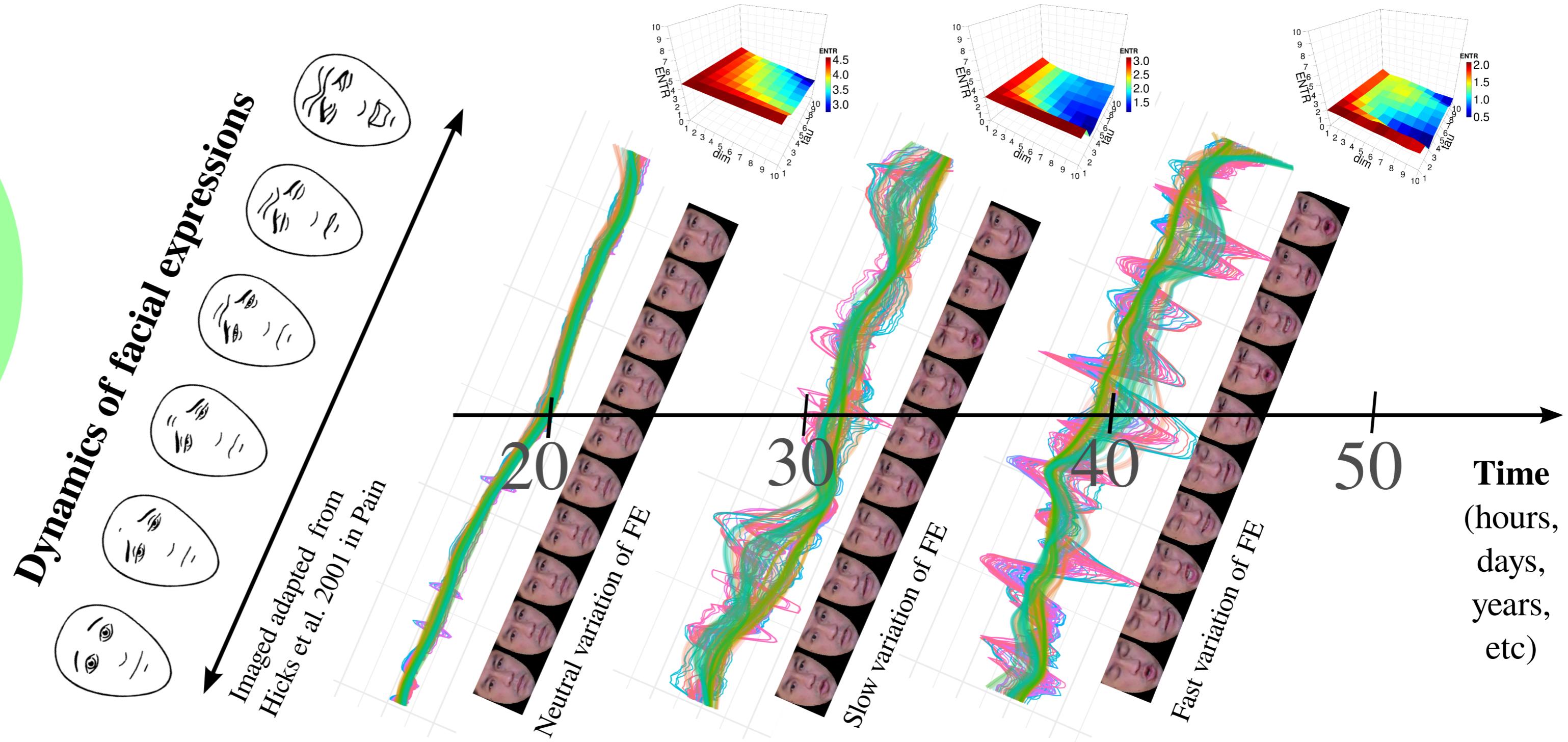
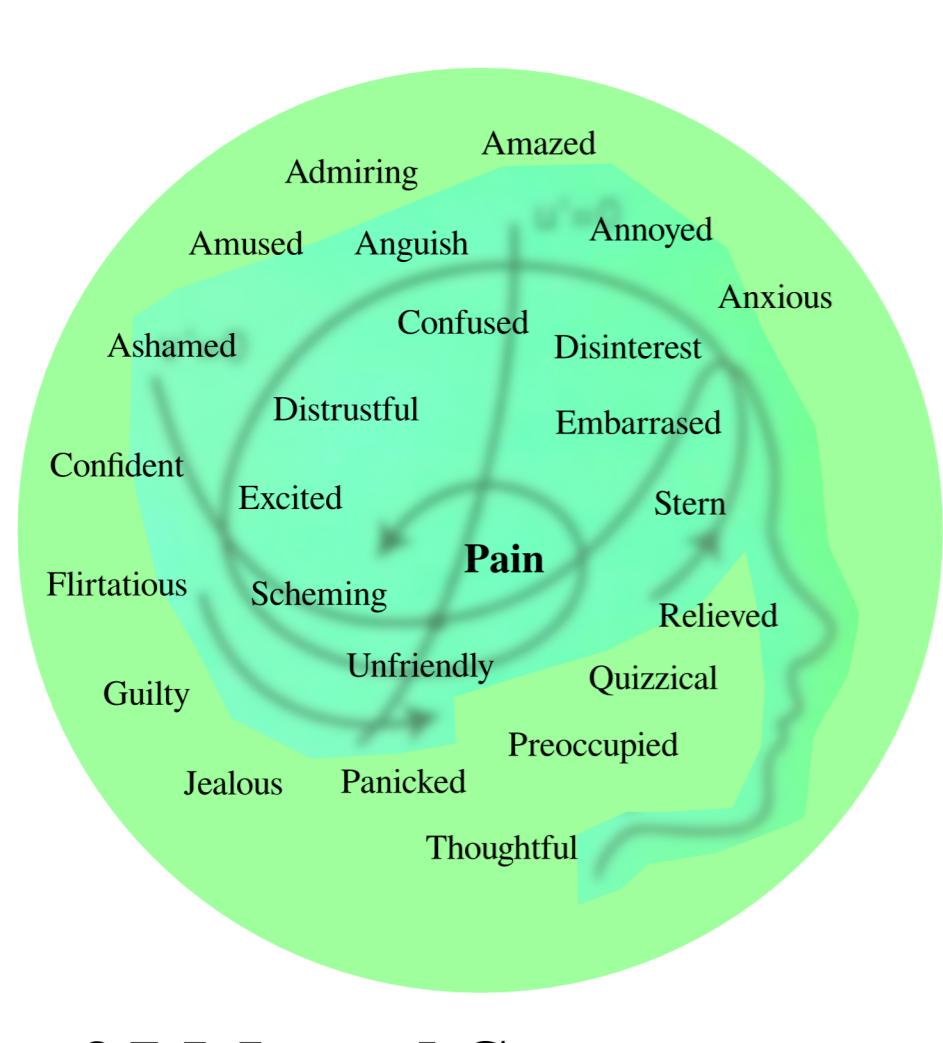




# Quantification of Dynamic Facial Expressions with Shannon Entropy in Human-Humanoid Interaction

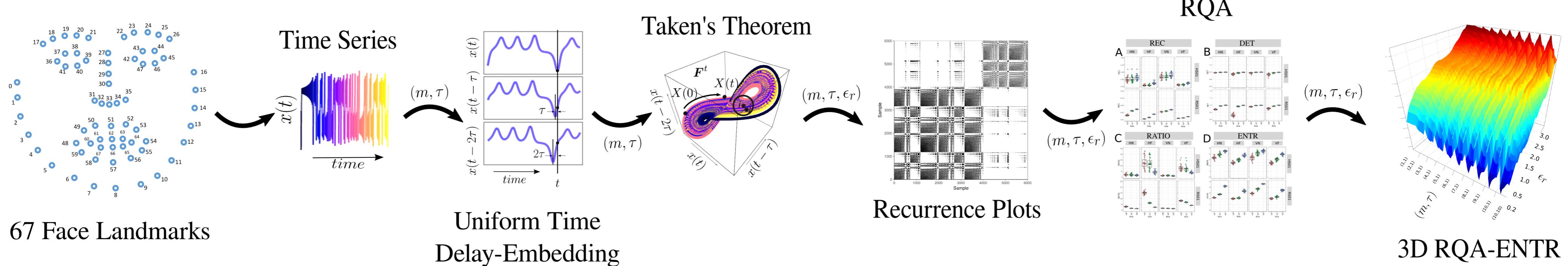
Research on understanding and quantifying movement variability with nonlinear analysis has been well established in the last three decades in areas such as biomechanics, sport science, psychology, cognitive science, and neuroscience [1]. This work is hence hypothesising that tools from nonlinear analysis can be used to quantify subtle variations of facial expressions that can be related to different mental states (i.e. pain, distrustful, relief, etc) of a person [2].

## 1. INTRODUCTION

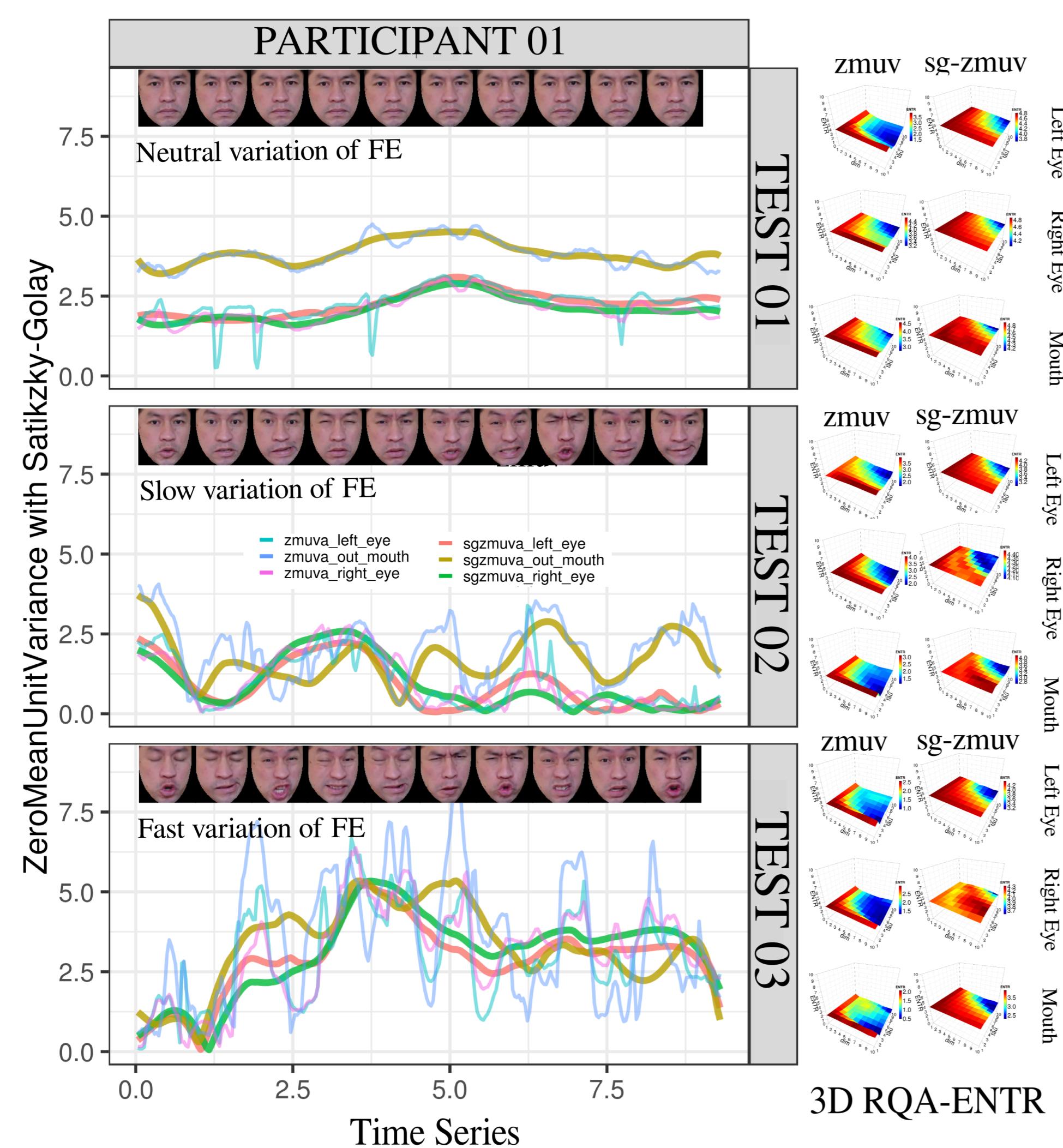


## 2. RQA ENTROPY

Considering that Recurrence Quantification Analysis (RQA) is a robust tool with real-world data time series (i.e. noisy, nonlinear and nonstationary) [3], this work is proposing the application of Shannon Entropy using RQA to quantify the complexity of time series from landmarks of face expressions collected with openface framework [4].



## 3. RESULTS



## 4. APPLICATIONS



## 5. CONCLUSIONS AND FUTURE WORK

This work showed that Shannon Entropy using RQA can be used to quantify movement variability of face landmarks which can potentially be related to the persons' state of mind. The future work will test the robustness of RQA Entropy with different datasets of face expressions and different classification techniques will be explored.

## 6. REFERENCES

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