Universität Stuttgart
Institut für Visualisierung und Interaktive Systeme

Visual World Paradigm

Elif Dilara Aygün
Karl Jorge Cleres Andreo
Yanhong Xu

Introduction

Background

- First Visual World Paradigm Experiment by Cooper in 1974 [1]
  - People looked more at objects that were related to the story they were hearing
- Easy to perform, no special requirements for participants
  - Paradigm used extensively in studies on spoken language
- Key paper by Altmann & Kamide in 1999 [2]
  - Sentence processing is driven by predictive relationships between words

Research Question

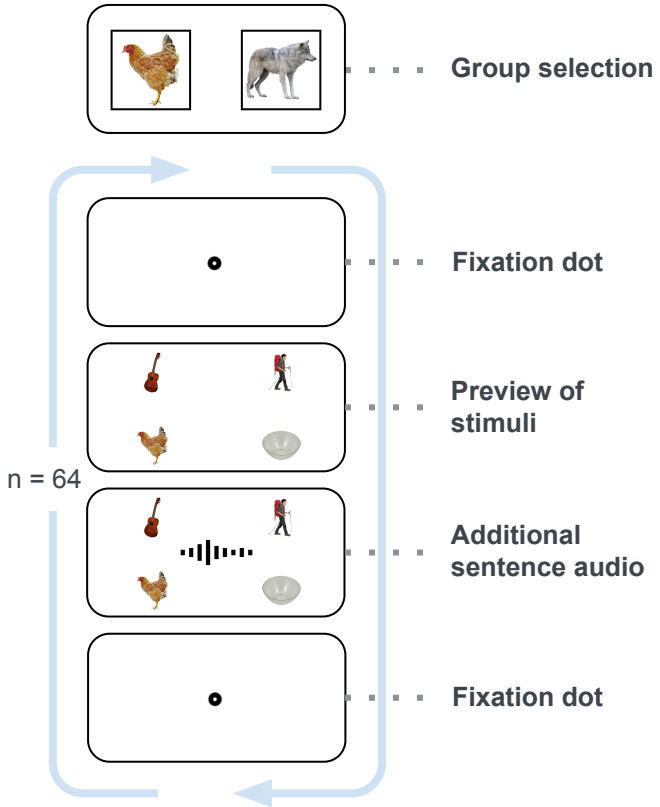
- Humans like to look a things that are in motion
- What happens, when we introduce moving stimuli to the visual world paradigm?

Do people still make anticipatory eye movements when presented images with motion instead of static ones?

Experimental methods

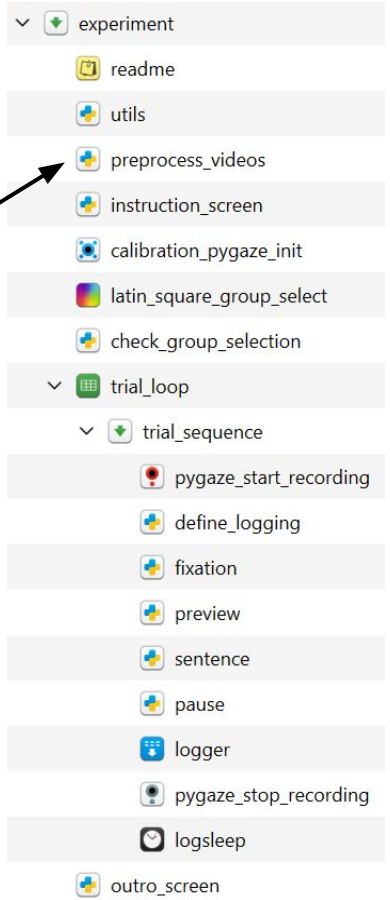
Experiment
Design and logic

- Latin square design
  - Between subject design
- Two conditions
  - 1. static (🍎) 2. motion (🍎)
- Stimuli Design
  - 32 static and 32 motion stimuli per exp.
  - Presentation of static/motion stimuli is reversed for the participant groups
- Random order of stimuli
- Custom logging



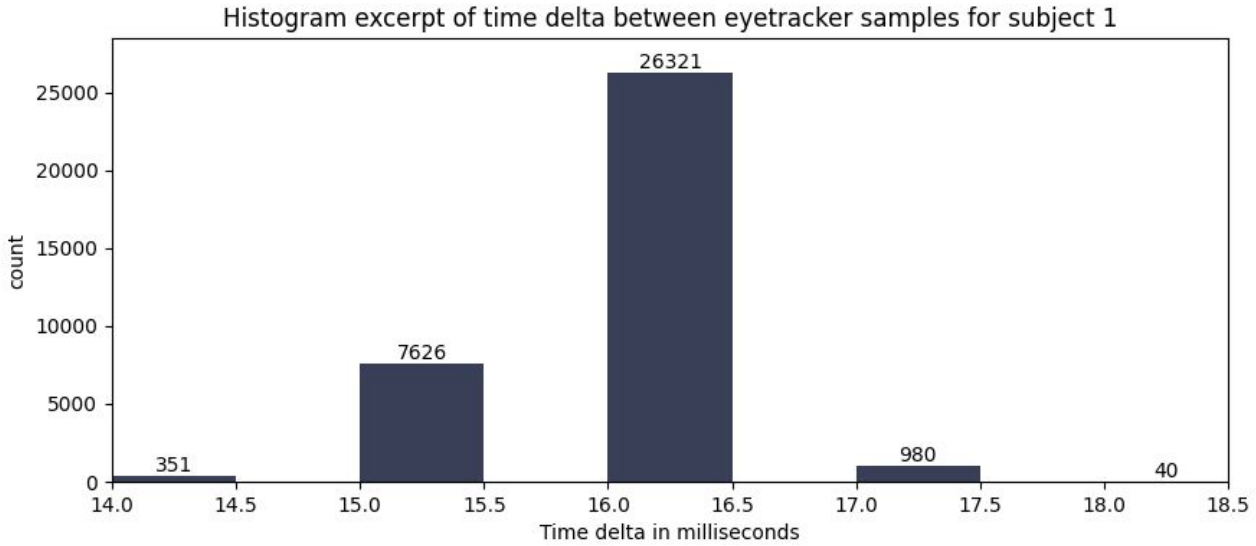
Implementation of the experiment
Challenges

- Stimuli design
  - Finding many sub-stimuli with similar speed, …
  - making up sentences
  - creating audios
- Including video stimuli in OpenSesame
- Handling audio and audio timings
  - Verb cue and target cue



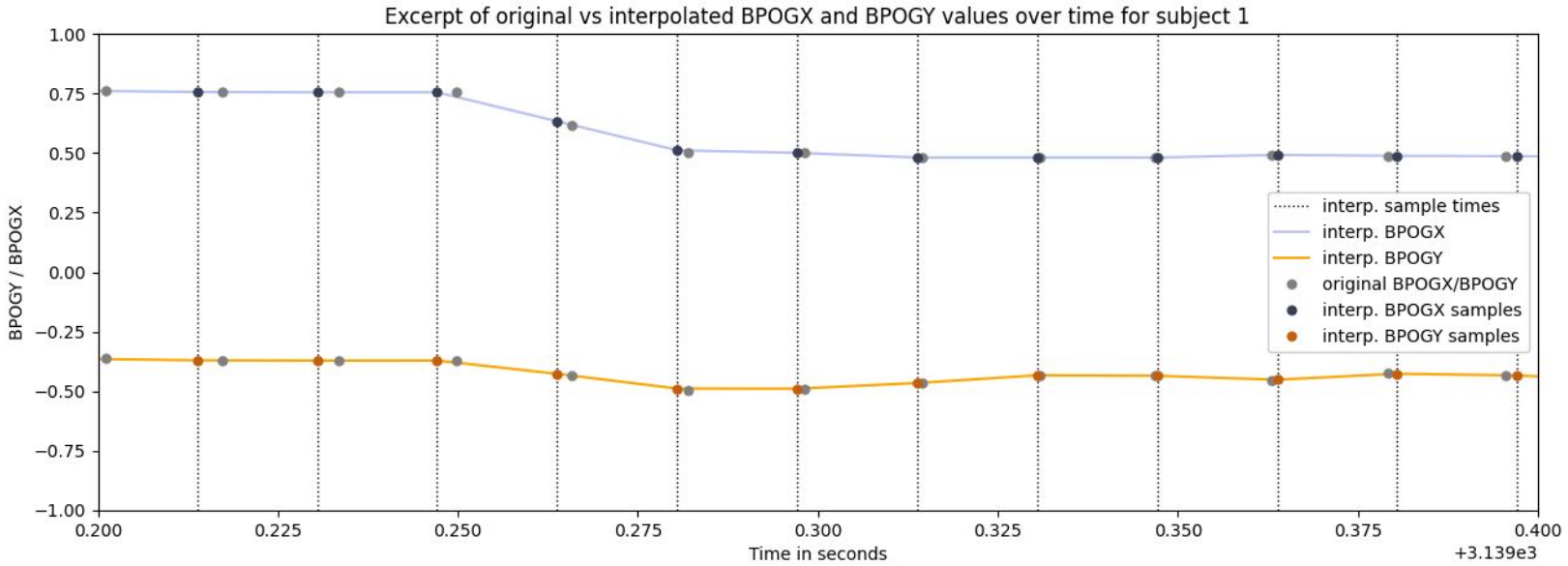
Analysis methods

Quality Control
Time between samples

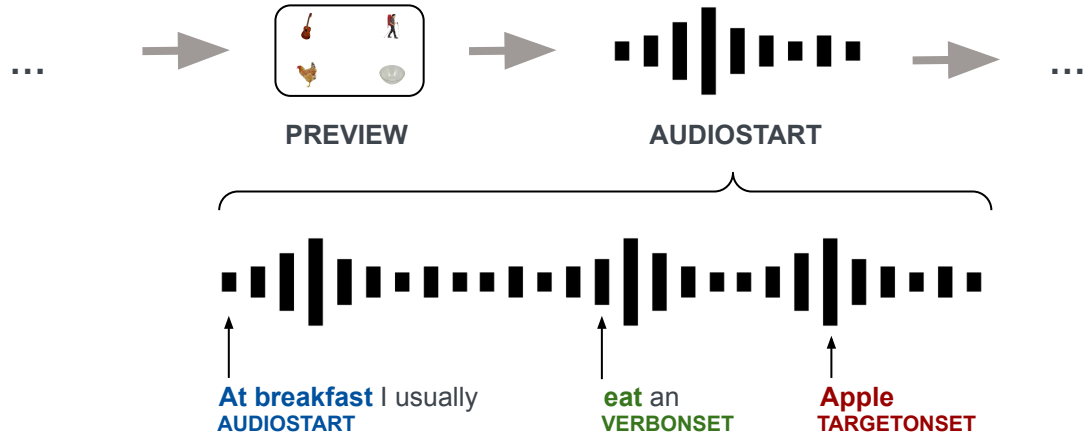


Data Preprocessing
Linear interpolation

- Scipy.interp1d interpolator



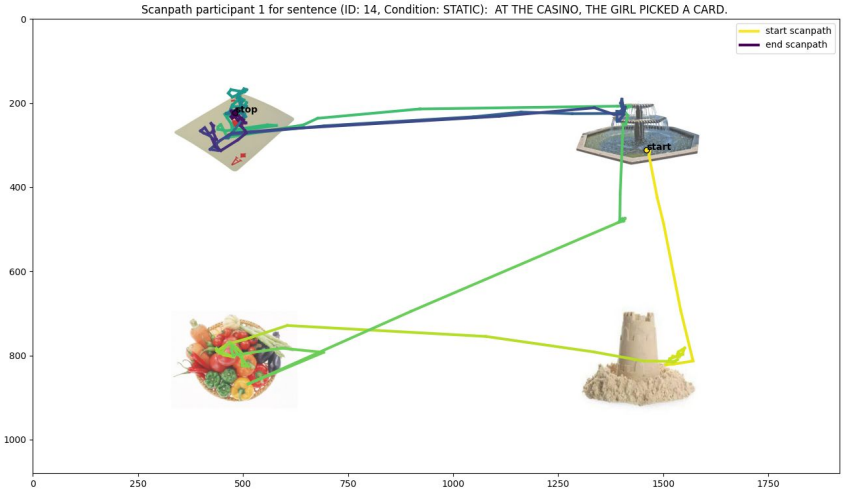
Data Preprocessing
Custom Logs: verb and target onset

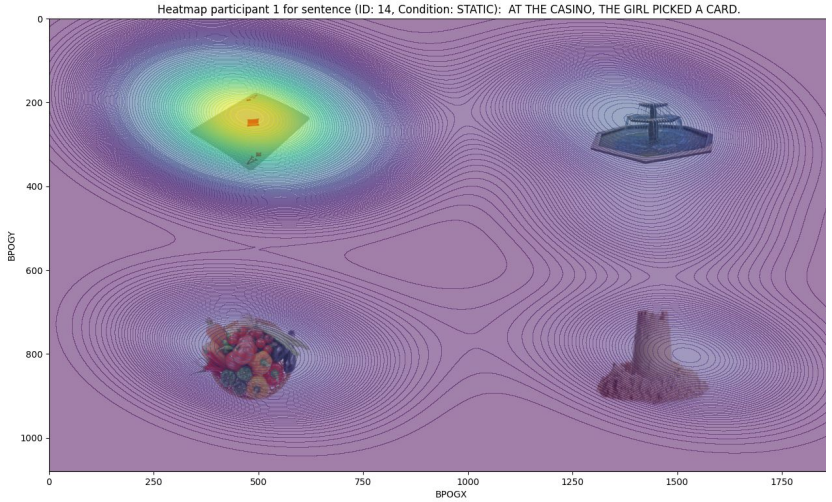


- Stimulus Table

1	index	sentence	verb_cue	verb_cue_timing	target_cue_timing	stimulus_name
2	1	At breakfast, I usually eat an apple.	eat	1657	2696	apple

Analysis
Scanpath and Heatmap for individual subjects





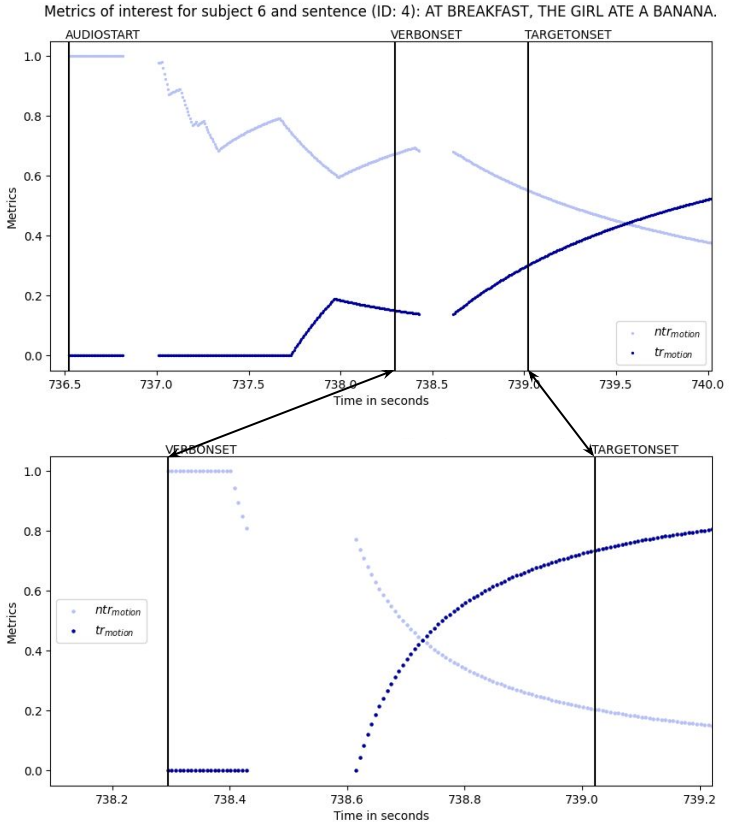
Analysis
Metrics

- Calculate *Target ratio (tr)* and *Non-target ratio (ntr)* for both conditions

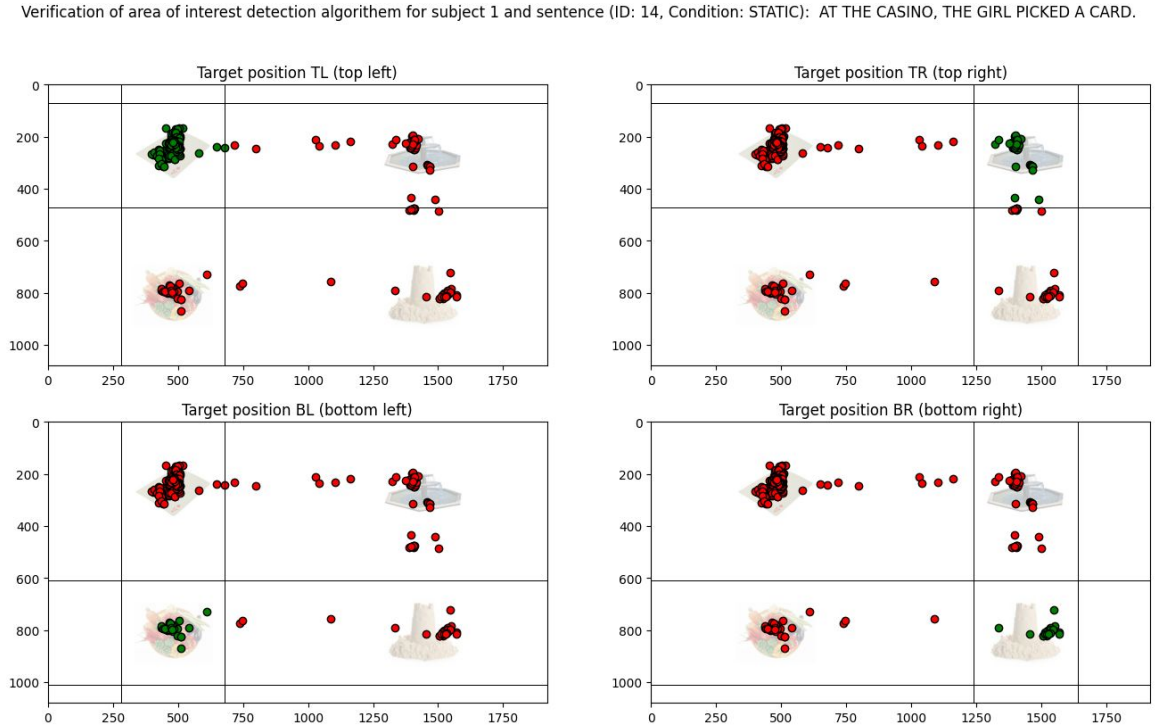
$$(I) \quad tr = \frac{Samples\ on\ target\ AOI}{Total\ samples}$$

$$(II) \quad ntr = \frac{Samples\ on\ non\ target\ AOIs}{Total\ samples}$$

- Visualized the cummulated tr and ntr for a single and all participants

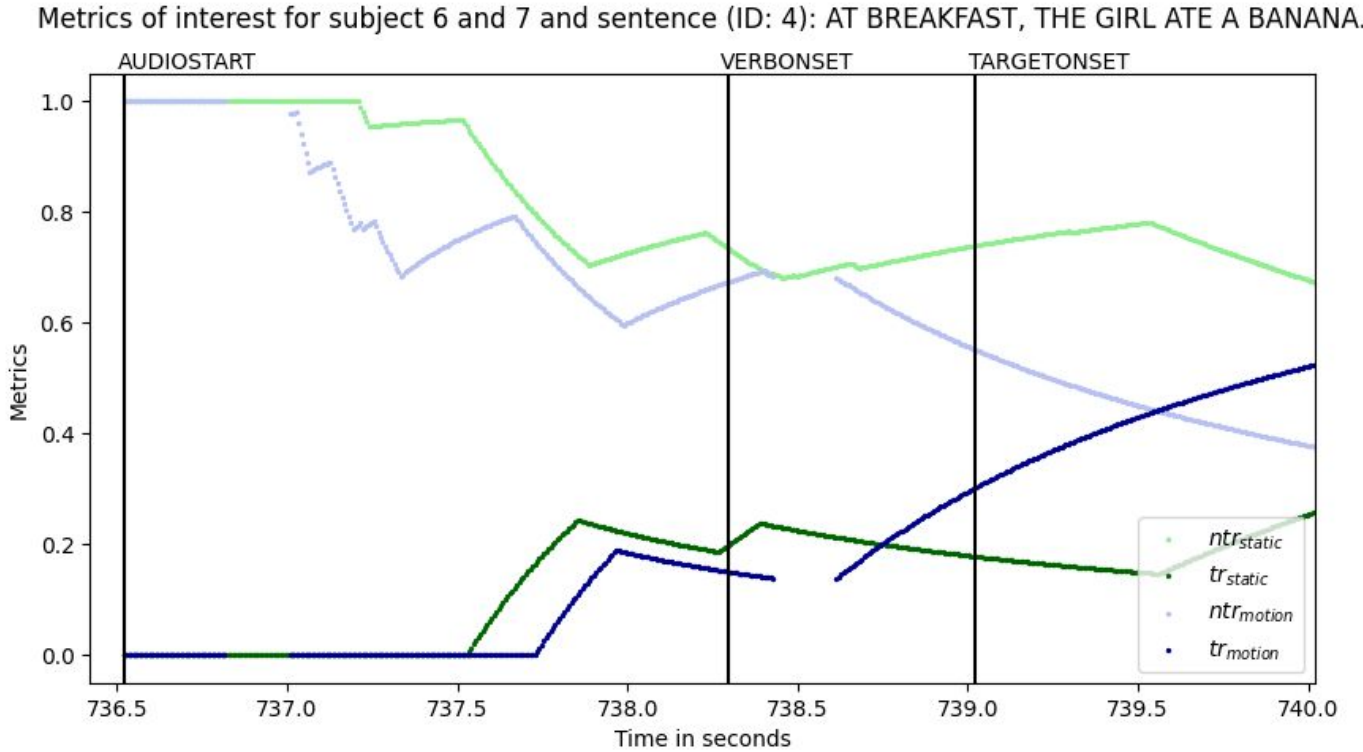


Analysis
Areas of interest



Analysis

Cumulated tr and ntr for static and motion condition



Analysis

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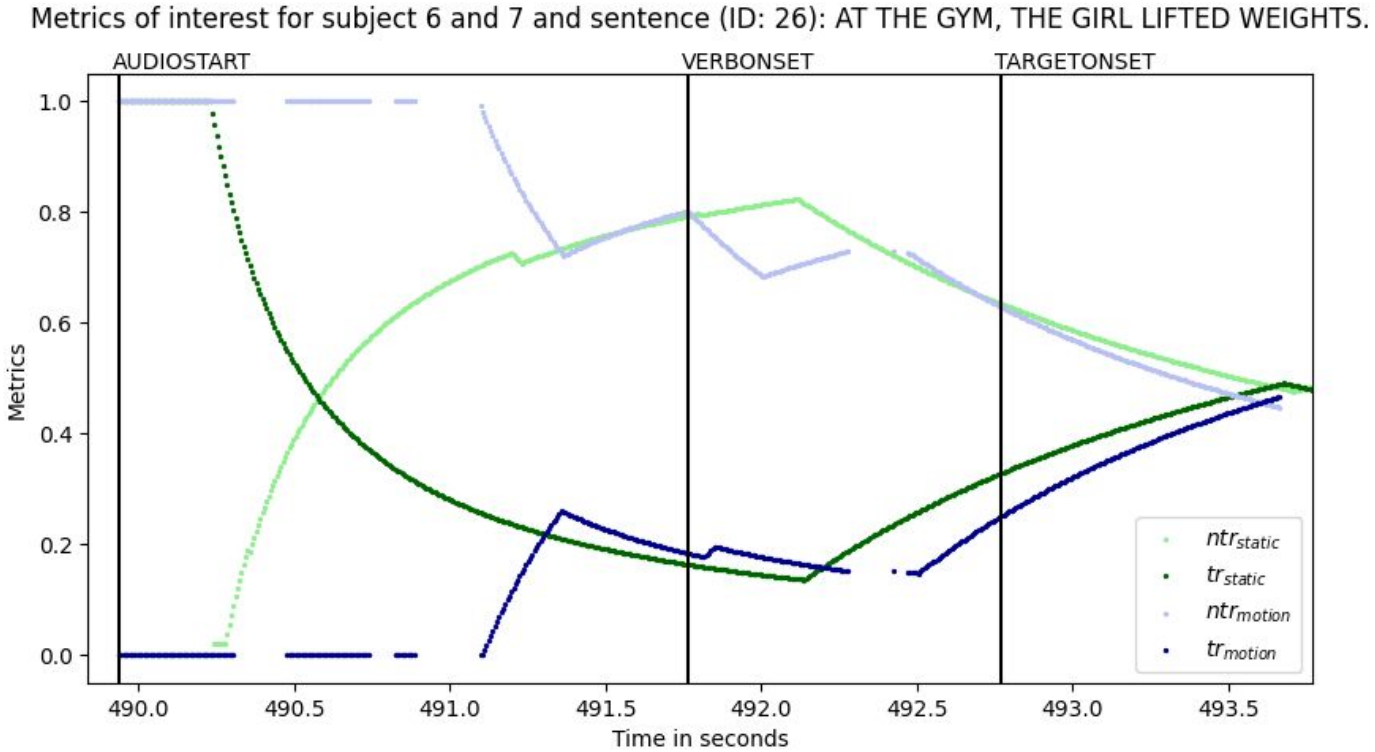
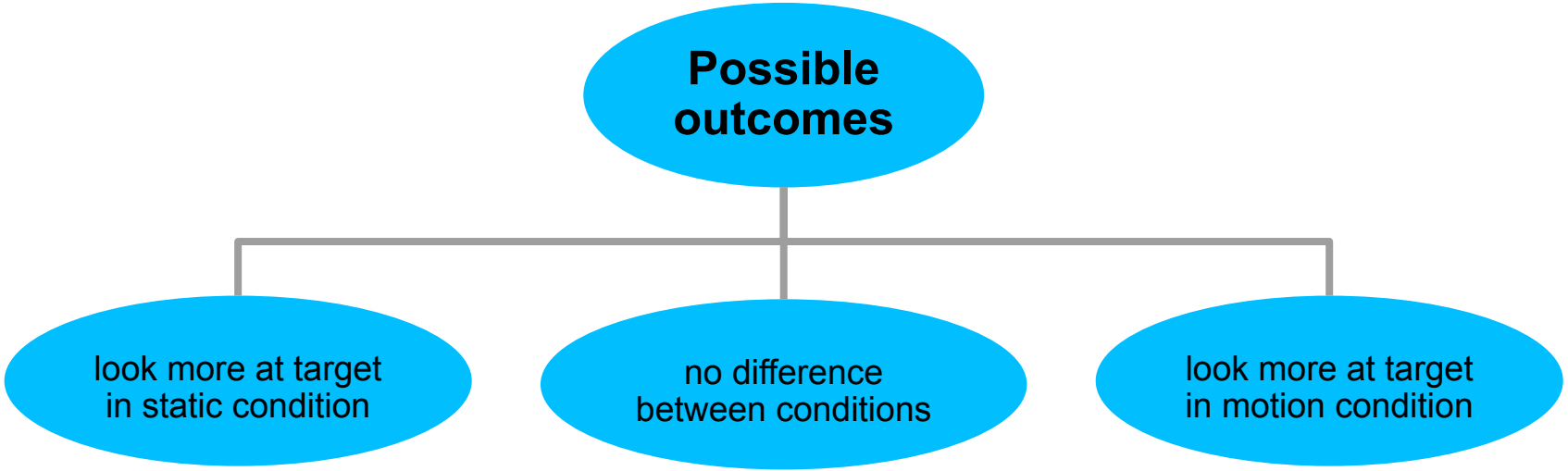


Discussion

Discussion & Tentative Conclusions

- Tentative analysis shows several possible outcomes
- Full analysis needed for the bigger picture



Bibliography

[1] Cooper, R. M. (1974). The control of eye fixation by the meaning of spoken language: a new methodology for the real-time investigation of speech perception, memory, and language processing. *Cognitive psychology*.

[2] Altmann, G. T., & Kamide, Y. (1999). Incremental interpretation at verbs: Restricting the domain of subsequent reference. *Cognition.*

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Thank you!

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