ATP ASSIGNMENT 2
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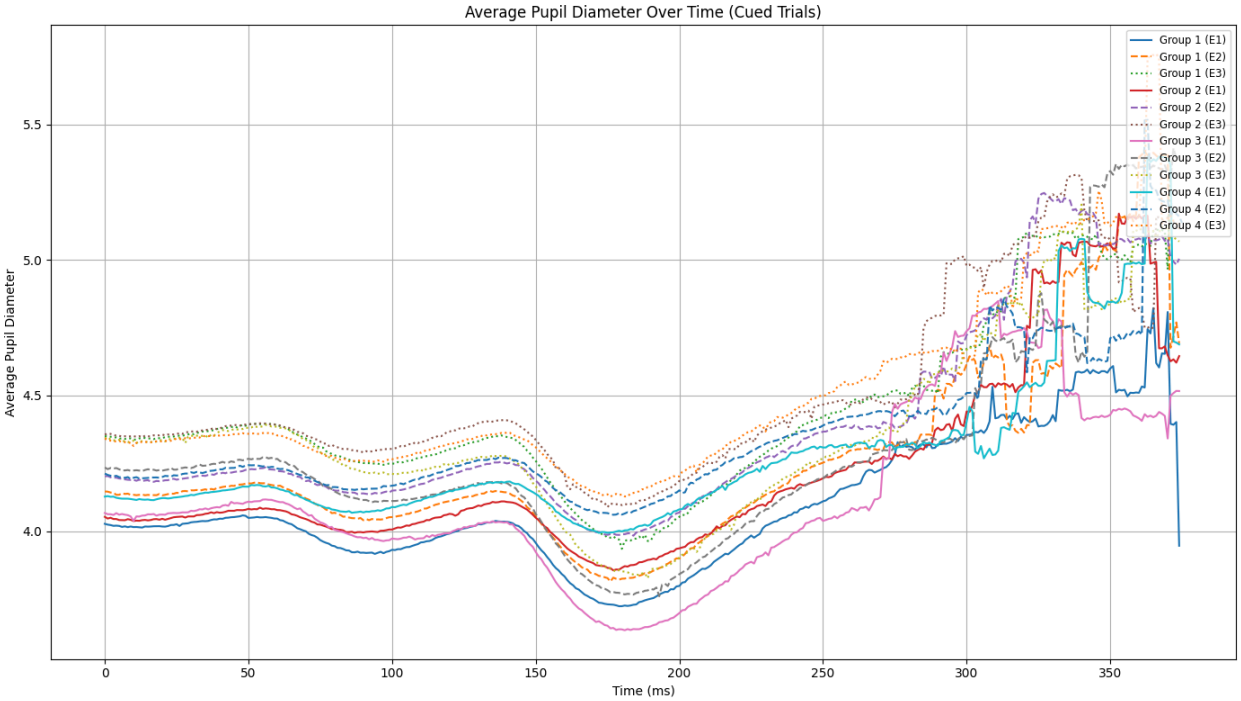
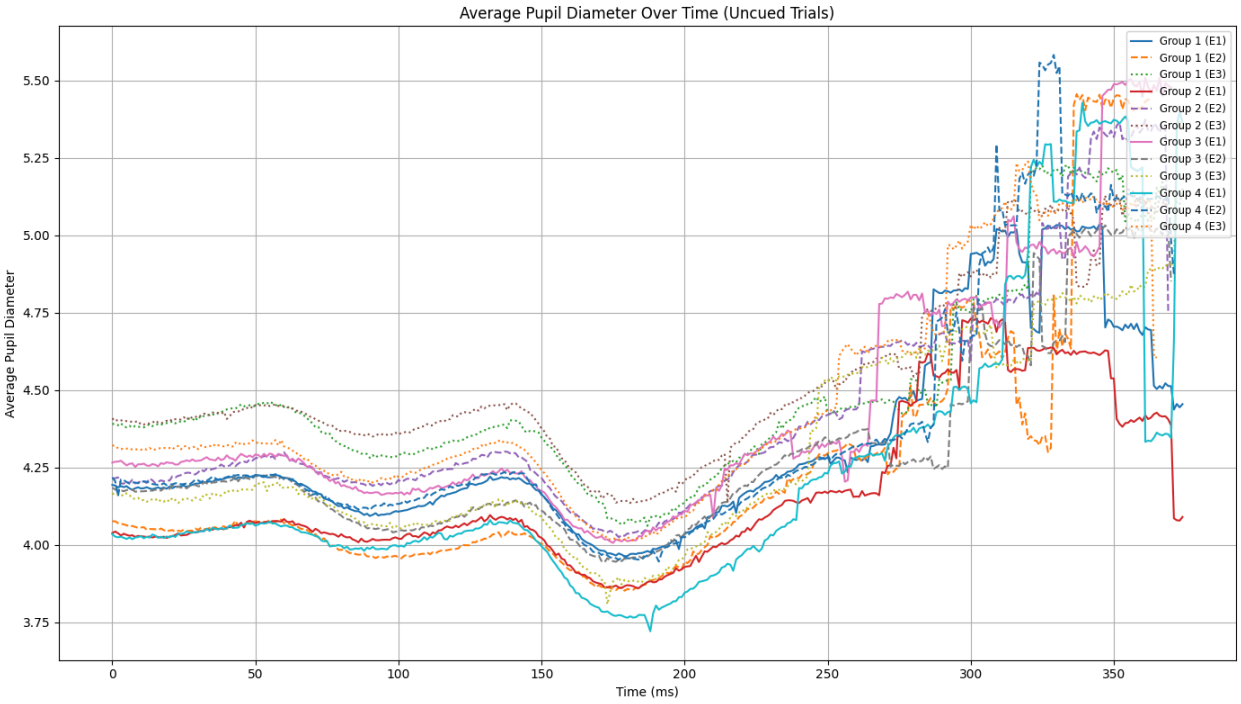
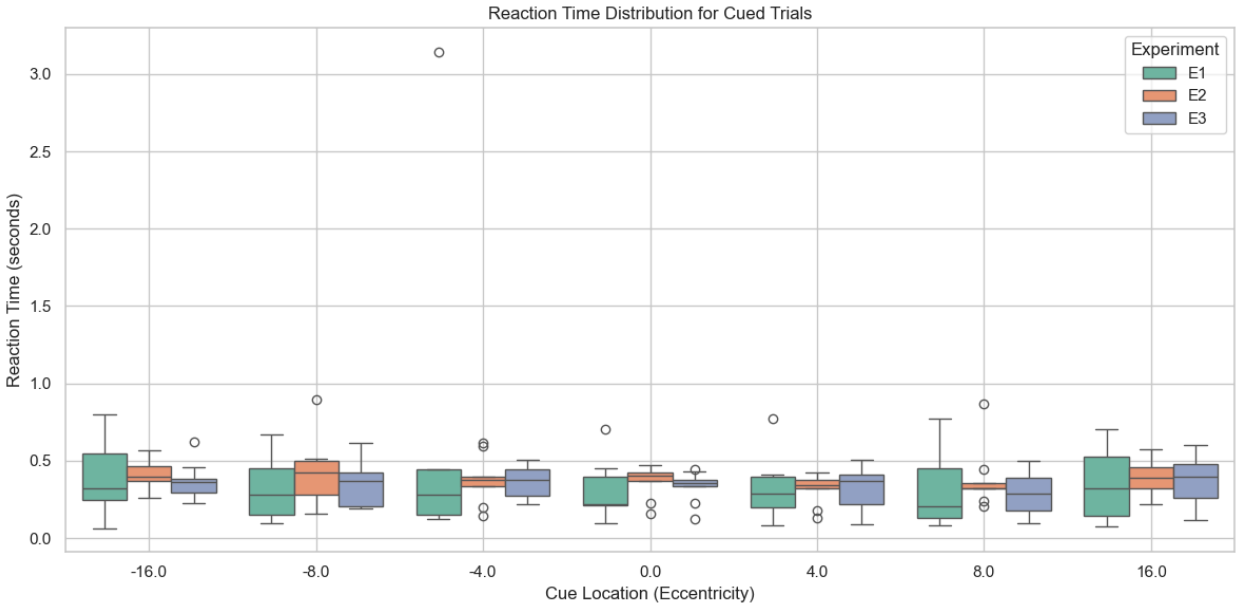
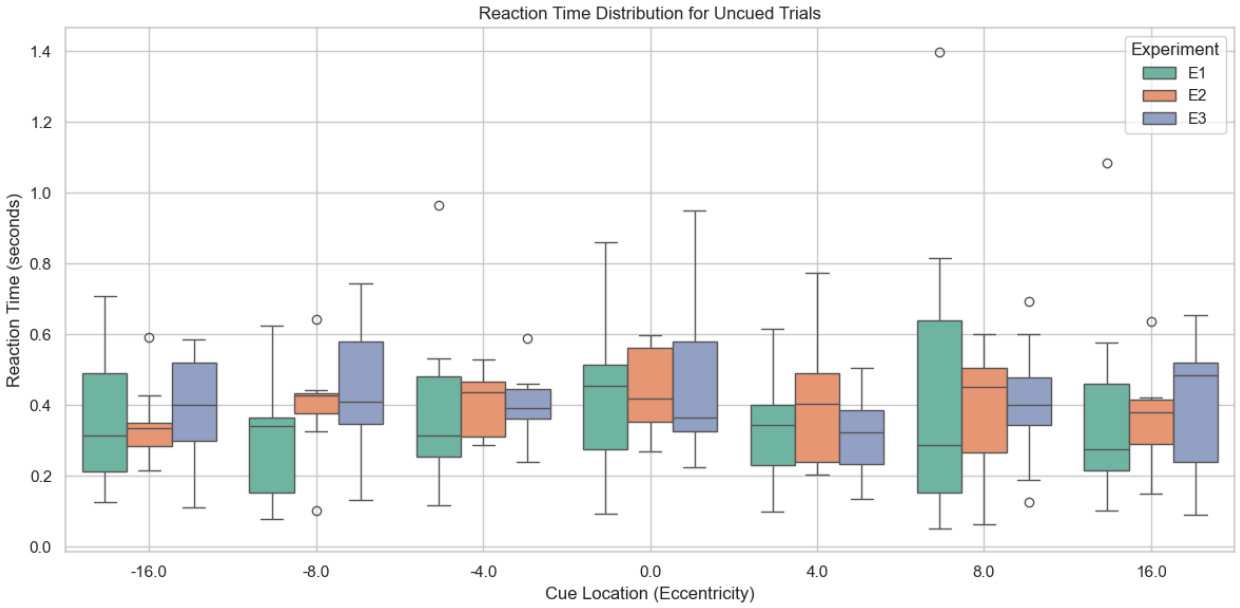
1. Plotting the Average Pupil Diameter for cued(valid) and uncued(invalid) trials.





2. Plotting the Reaction Time





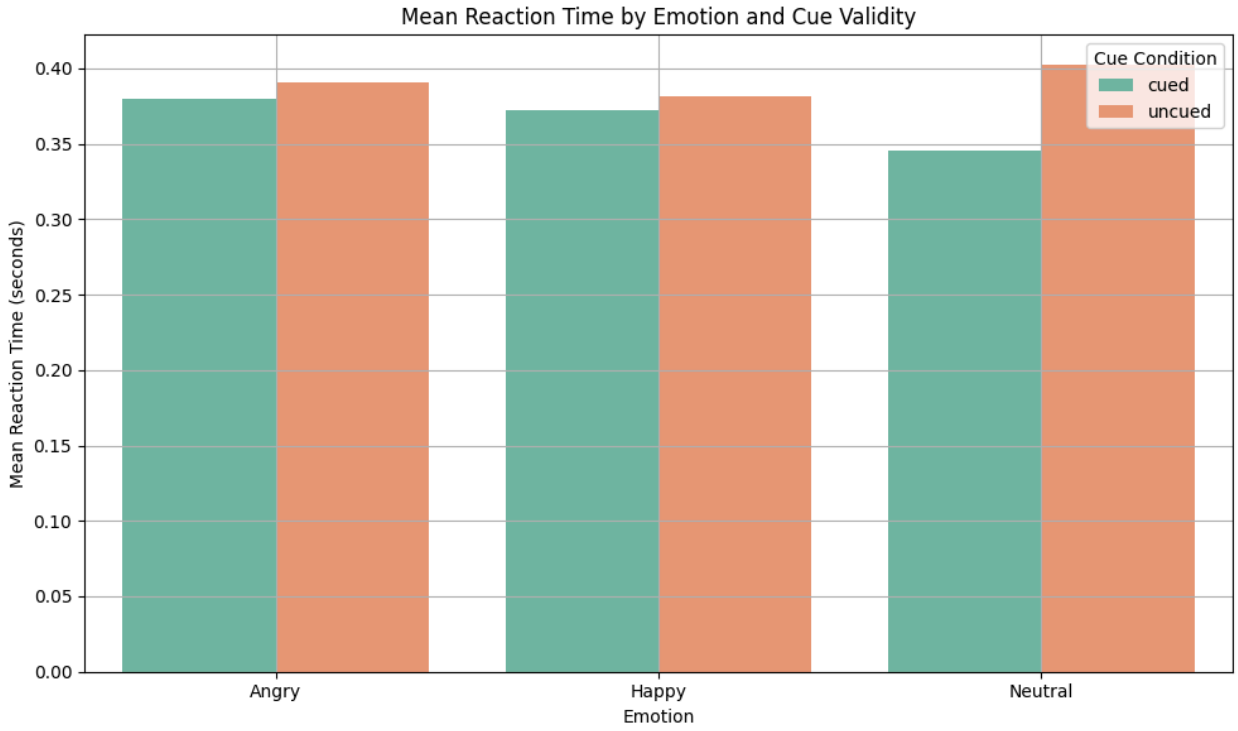
3. Supporting Plot

Mean Reaction Time across Emotions for Cued vs Uncued Trials

Reason for choosing this plot:

- Emotional Influence on Response Speed: It shows whether some emotions—like Happy (positive) or Angry (threatening)—lead to faster or slower reactions.

- Effect of Cue Validity: It compares the mean reaction time when participants knew where to look (cued) versus when they had to redirect attention (uncued).
- Interaction Between Emotion and Cueing: The plot can reveal whether certain emotions are more affected by cueing than others.



4. Inferring Results from the Data

Pupil diameter Analysis:

- **General Observation**
    1. **Initial Baseline (0-10ms) :** Pupil diameters begin at a similar level across all groups and experiments.
    2. **Constriction Phase (100-200ms) :** A dip in pupil diameter is consistently observed around 150–200 ms across all groups.
    3. **Dilation Phase (200-350+ms) :** Post-dip, there's a sharp rise in pupil diameter—indicating task processing and arousal. The magnitude of dilation varies by eccentricity and cueing.

- **Cued Trails**
    1. **Greater Dilation in cued Trails:** Across all groups, dilation is more pronounced than in uncued trials—especially after 250 ms. Indicates higher attention or task engagement when the target is validly cued.
    2. **Group 2 and Group 4 show strongest Dilation:** Particularly in E1 and E2, these groups show the highest peak pupil diameter post-300 ms. Suggests greater cognitive load or difficulty in processing peripheral targets even when cued.

- **Uncued Trails**
    1. **Reduced Dilation Overall:** Peak dilation is generally lower than in cued trials, especially after 250 ms. Reflects less efficient attentional allocation and increased reaction latency**.**
    2. **Group 3 (Central) is Flatter:** As expected, central trials (0°) don't show much eccentricity-related effort, leading to more stable, less extreme pupil changes.
    3. **Higher Noise/Fluctuations in Some Groups:** Notably, Group 4 E3 and Group 2 E3 have sharper spikes/dropouts, possibly due to fewer trials.

Response time analysis:

- **Cue effect :** Across all eccentricities and experiments (E1, E2, E3), reaction times are consistently lower for cued trials compared to uncued trials.
- **Eccentricity and Attention Interaction:** For cued trials, reaction times are relatively stable across eccentricities, with only a slight increase at the most peripheral locations (±16). In contrast, uncued trials show greater variability and dispersion in reaction times across eccentricities, especially at ±8 and ±16.
- **Emotion Influence:** E1 generally shows slightly faster reaction times for both cued and uncued trials, potentially indicating lower cognitive load or more emotionally neutral conditions.

Support Plot:

- **Cueing consistently reduces reaction time across all emotions:** For angry, Happy, and Neutral, the cued trials (green bars) show lower mean RTs than uncued trials (orange bars). This suggests that valid spatial cues

help participants respond faster, likely by pre-allocating attention to the correct location.

- **Emotion influences reaction time:** The slowest reaction times overall are for uncued Neutral trials (~0.40 sec), indicating that neutral stimuli may be less attention-grabbing and harder to detect when not anticipated. Happy faces under cued conditions yield the fastest response (~0.37 sec), hinting at a positive bias in processing or perhaps easier detection due to their emotional salience.
- **Angry faces evoke intermediate responses:** In both cued and uncued conditions, reaction times for Angry stimuli lie between Happy and Neutral. This could reflect a conflict between the attentional capture of threat-related stimuli and their potential to distract or interfere.