



Abstract #1221: Eye Movement and Gait Metrics as Functional Biomarkers of Early Lecanemab Response in Alzheimer's Disease: A 3-Month Case Study

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Background

- Reliable biomarkers capable of capturing early functional responses to disease-modifying therapies remain an unmet need in Alzheimer's disease (AD). While amyloid-targeting agents such as lecanemab reduce amyloid burden, conventional cognitive scales may lack sensitivity to short-term treatment effects. Quantitative eye movement and gait analyses represent promising functional biomarkers reflecting distributed neural network integrity.

Methods

- Two amyloid-PET-positive patients with mild AD (APOE $\epsilon 3/\epsilon 3$) received intravenous lecanemab (10 mg/kg biweekly) over three months. Multimodal assessments were performed at baseline and follow-up, including cognitive testing (MMSE, MoCA, CDR), eye movement paradigms (smooth pursuit, overlapping saccades, anti-saccades), and gait analysis under single- and dual-task conditions. Safety outcomes were monitored throughout treatment.

Figure 1: Clinical timeline of diagnosis, lecanemab treatment, follow-up assessment, and MRI surveillance

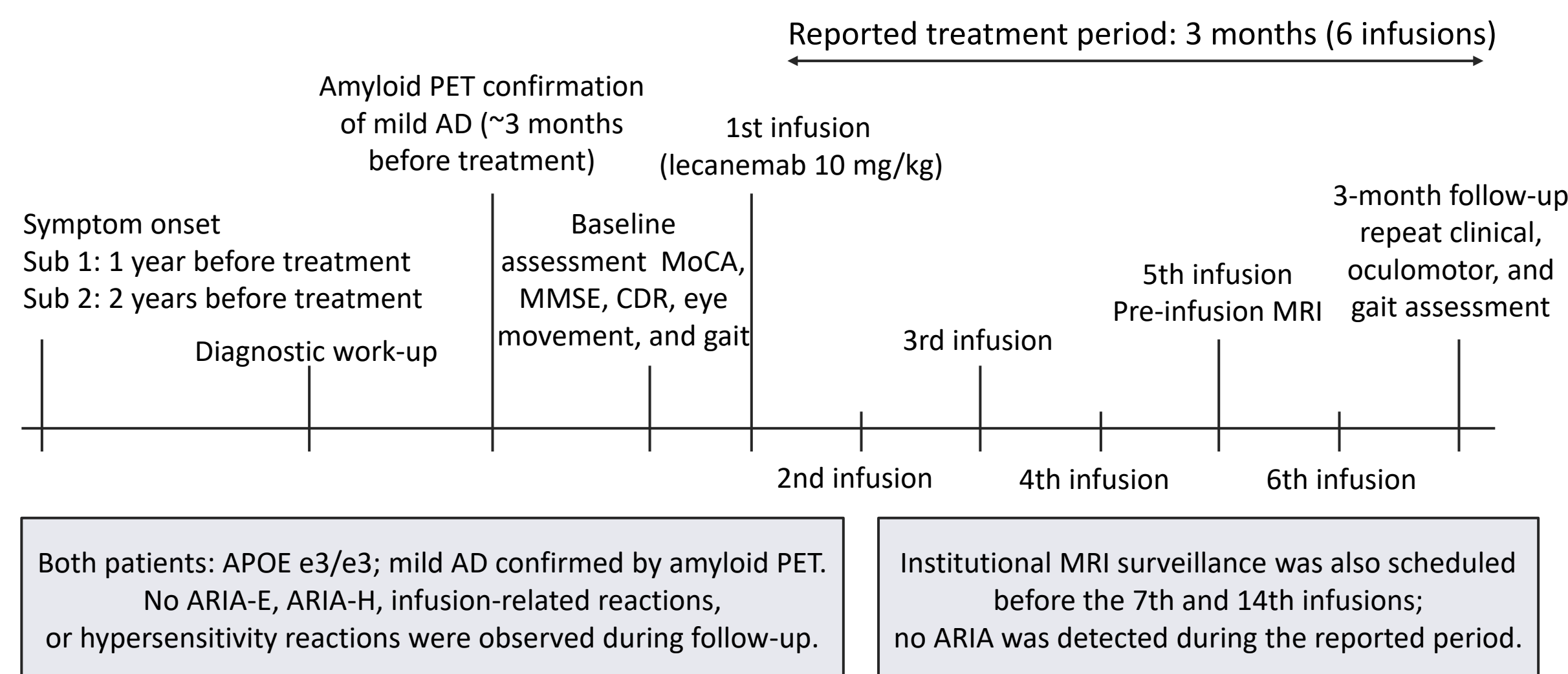
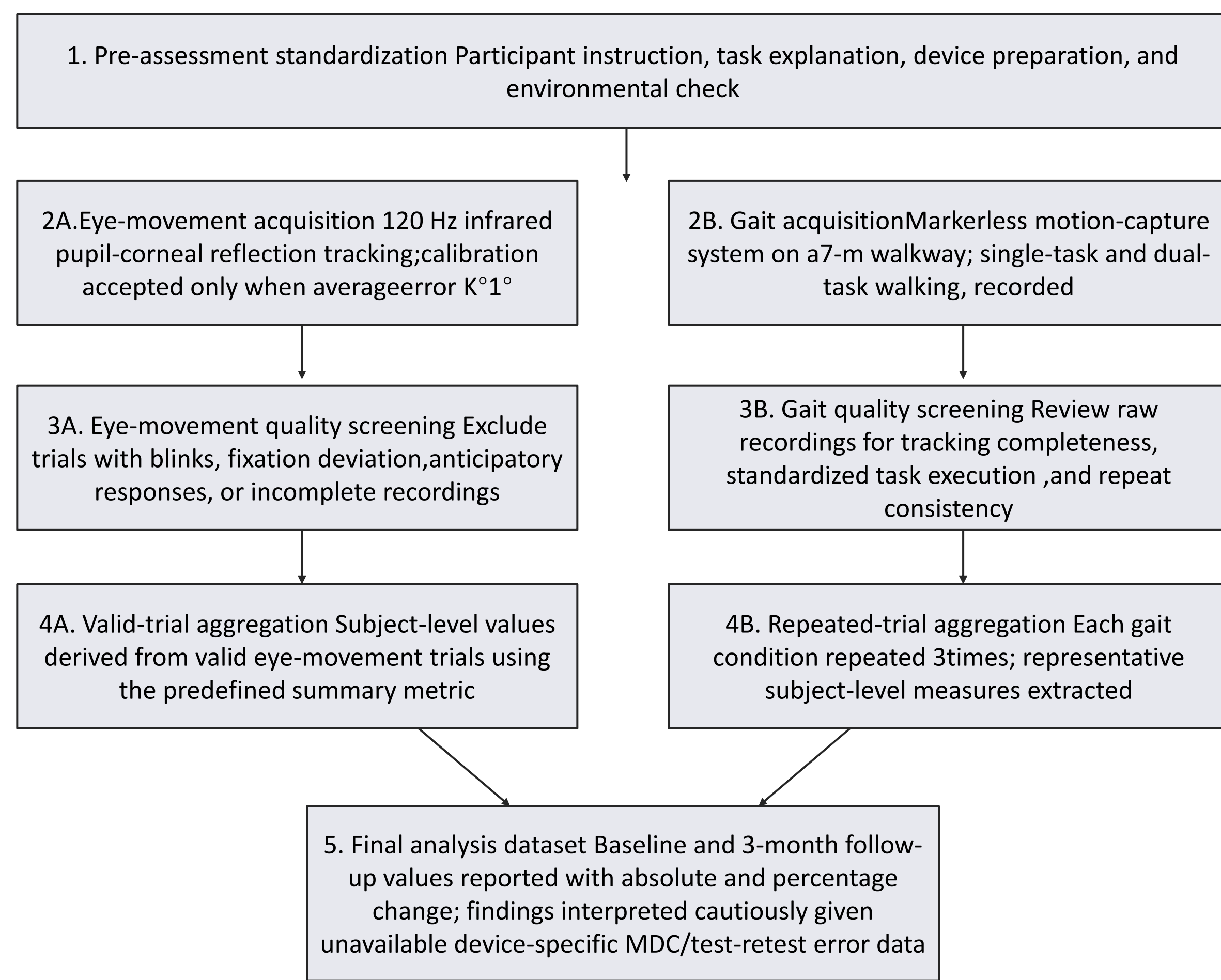


Figure 2: Quality-control workflow for eye-movement and gait assessment



Results

- Both patients completed treatment without amyloid-related imaging abnormalities or infusion-related adverse events. Cognitive performance remained largely stable over three months.
- Quantitative eye movement analysis demonstrated treatment-associated changes across multiple pursuit and saccadic parameters, suggesting sensitivity to short-term neural functional modulation (Figure 1A and Figure 1B).

Figure 1A. Heatmap of Percentage Changes in Eye Movement Metrics After Lecanemab

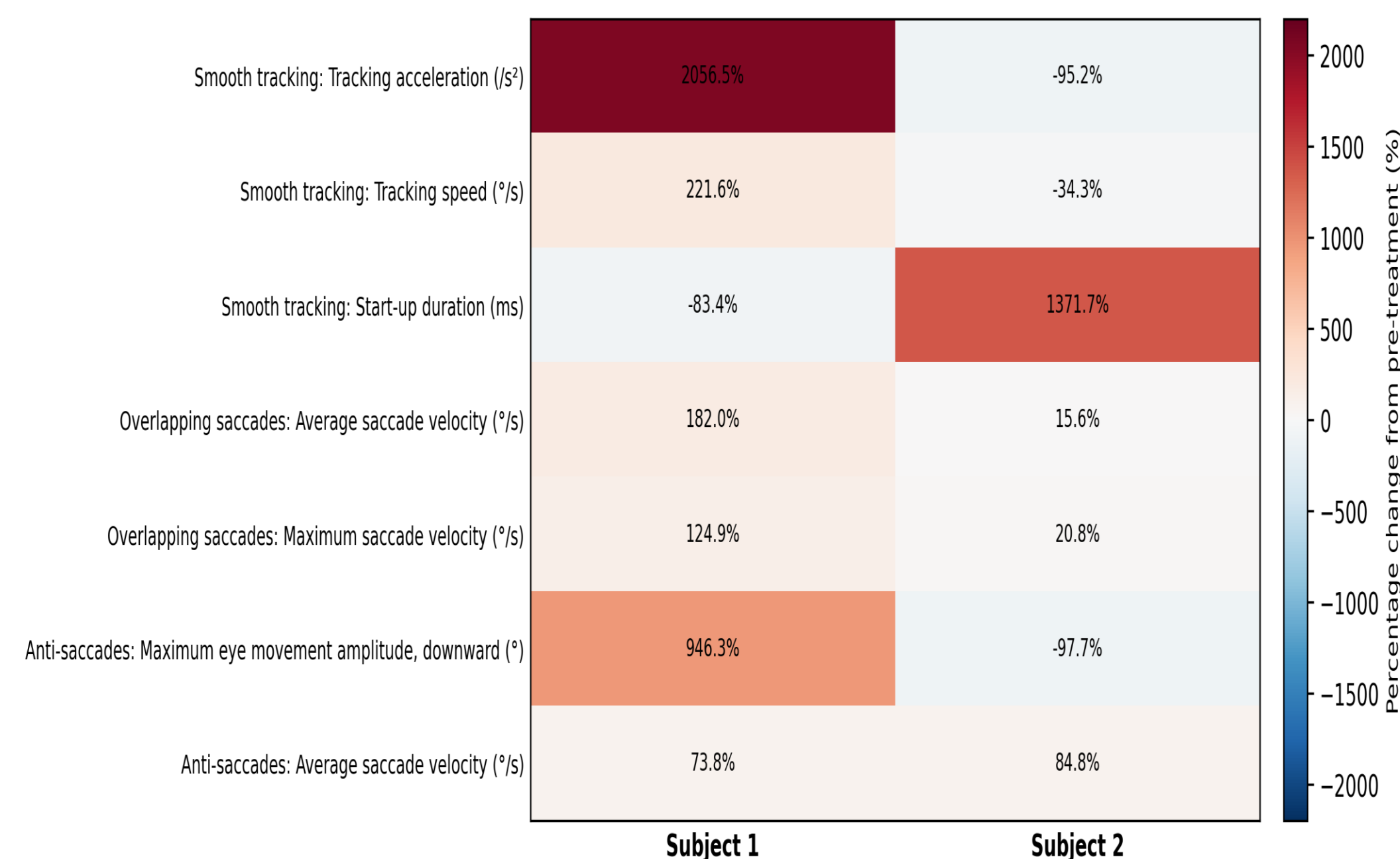
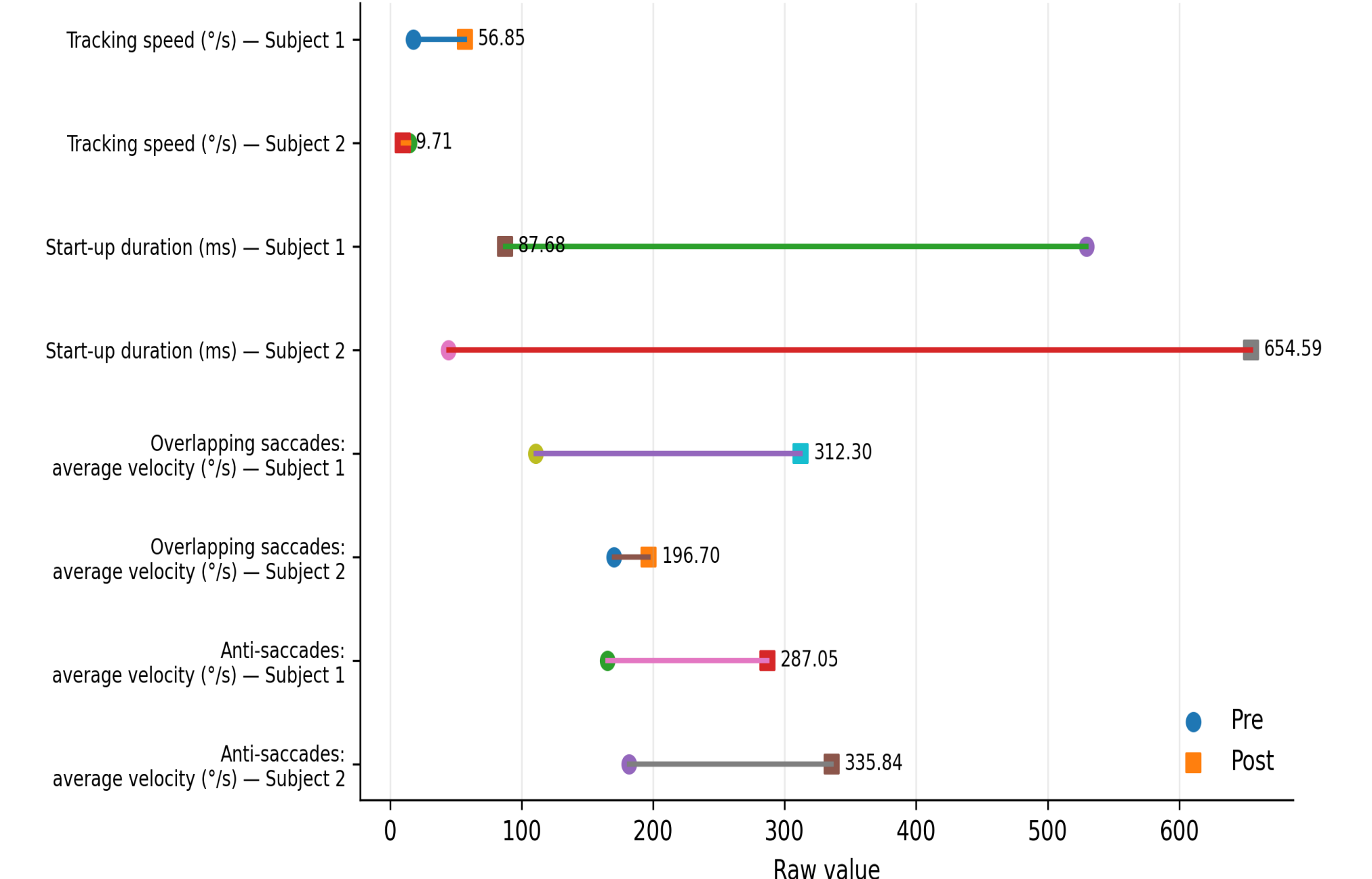


Figure 1B. Pre- and Post-treatment Changes in Selected Eye Movement Metrics



- Gait analysis revealed heterogeneous responses, with selective improvements in stride characteristics and turning time, while global gait speed and cadence were less consistently affected (Figure 2A and Figure 2B).

Figure 2A. Heatmap of Gait Changes Across Baseline and Dual-task Conditions

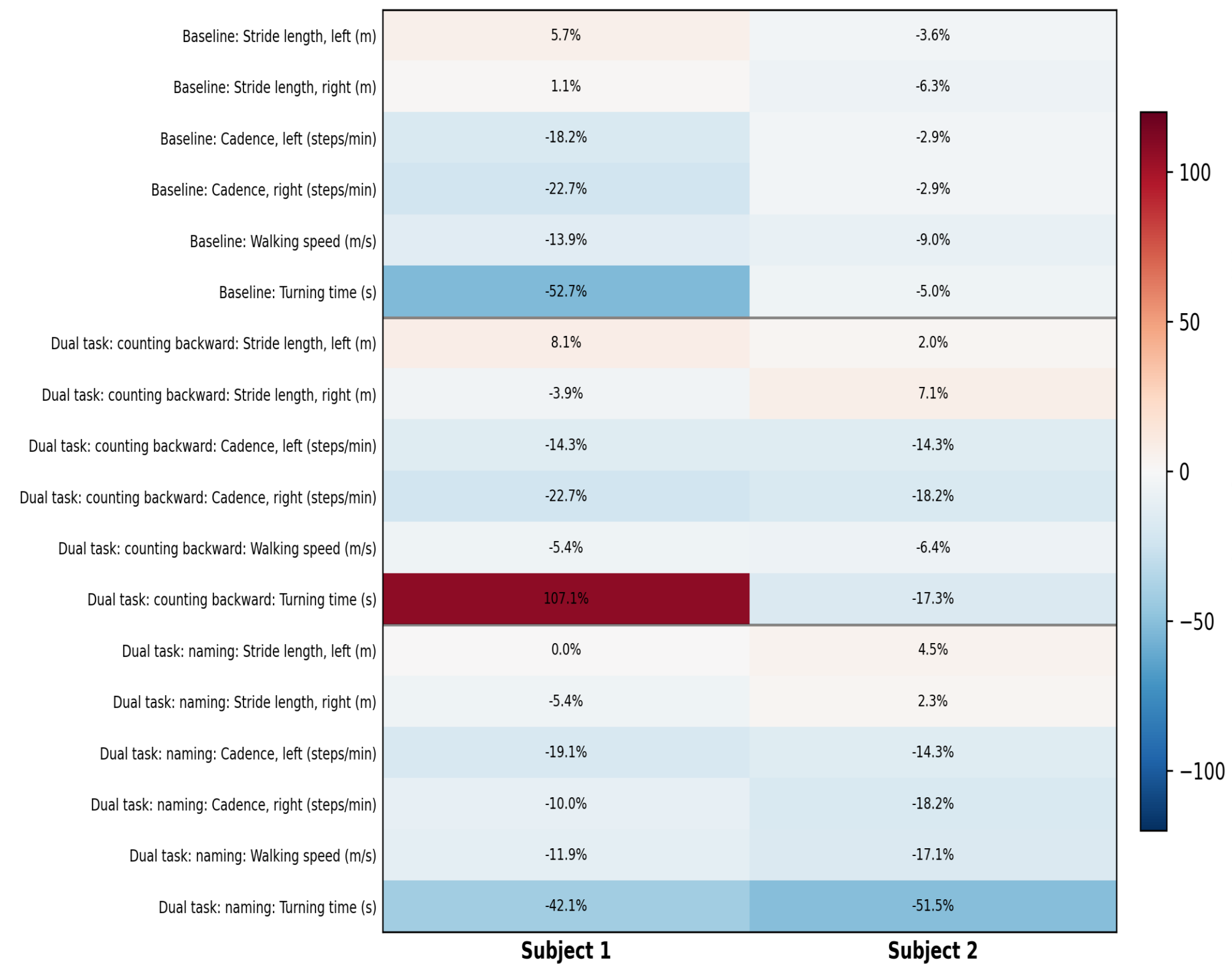
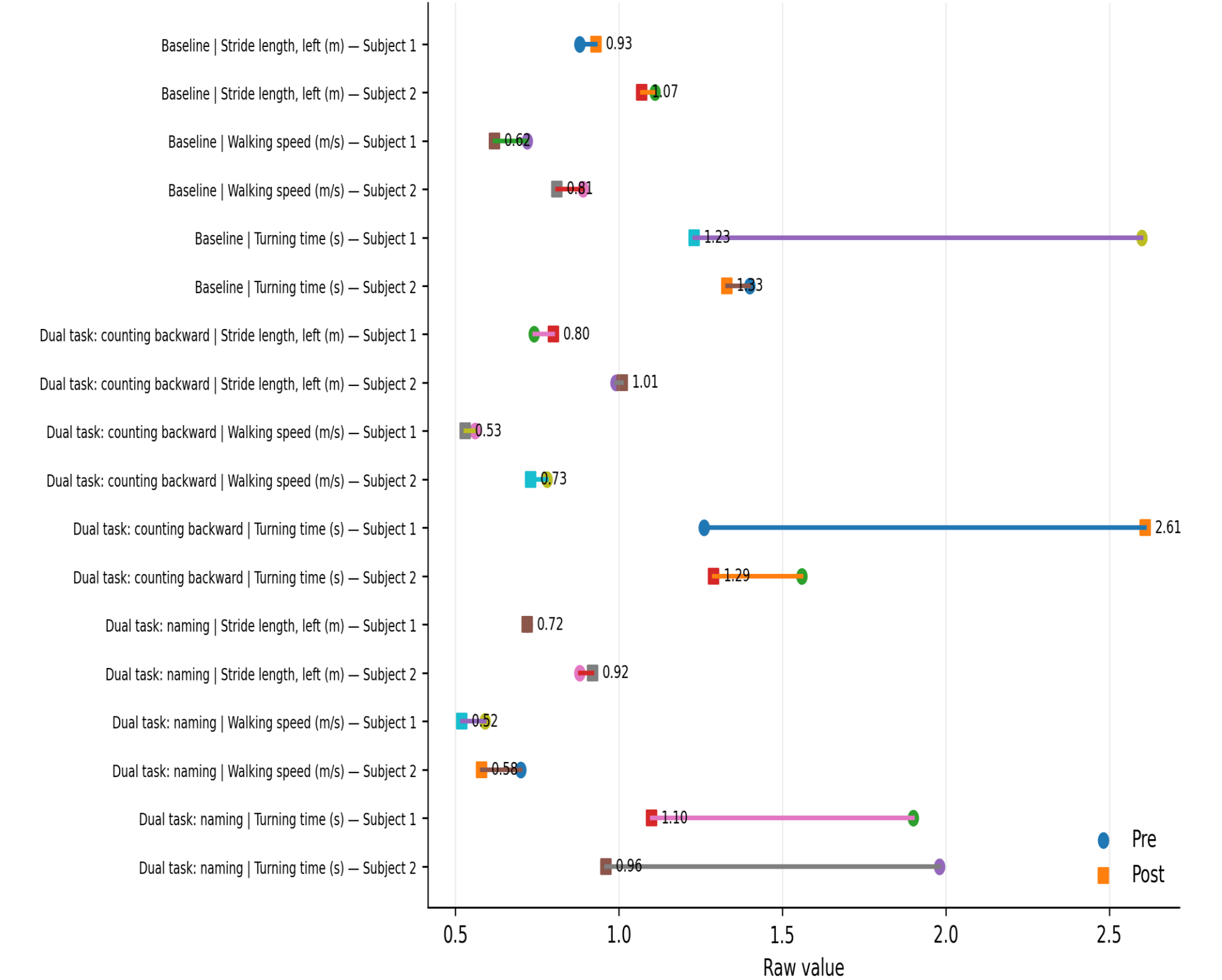


Figure 2B. Pre- and Post-treatment Changes in Key Gait Outcomes Across Task Conditions



- Notably, eye movement metrics and turning time appeared more responsive to treatment than conventional cognitive measures, and functional changes varied according to individual clinical and pathological profiles.

Conclusion

- This exploratory case study supports eye movement and gait metrics as candidate functional biomarkers for monitoring early treatment response to lecanemab in Alzheimer's disease. These objective, non-invasive measures may complement molecular biomarkers by capturing functional network-level changes. Larger longitudinal studies are warranted to establish their reliability, sensitivity, and clinical utility as biomarkers in disease-modifying therapy trials