

When sign language is difficult to understand, eye gaze behavior changes—especially in novice signers.

Do the Hands Have Gravity? Time-Series Analysis of Gaze Behavior During Sign Language Comprehension

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INTRODUCTION

Viewers generally fixate on the face during sign watching. But we don't know if viewers' eye gaze changes in response to rapidly moving articulators (hands).

Is the viewer's gaze affected by the signer's hand position over time? Does it depend on **language expertise** and **stimulus complexity**?

METHODS

Group	N
Deaf – Early Signers	15
Deaf – Late Signers	14
Hearing – Late Signers	12
Hearing – Novice Signers	10

Subjects watched 4 narratives in ASL. 2 clips were **played in reverse** which makes it **difficult** to understand. Eye gaze was recorded with a Tobii X120 eye tracker.

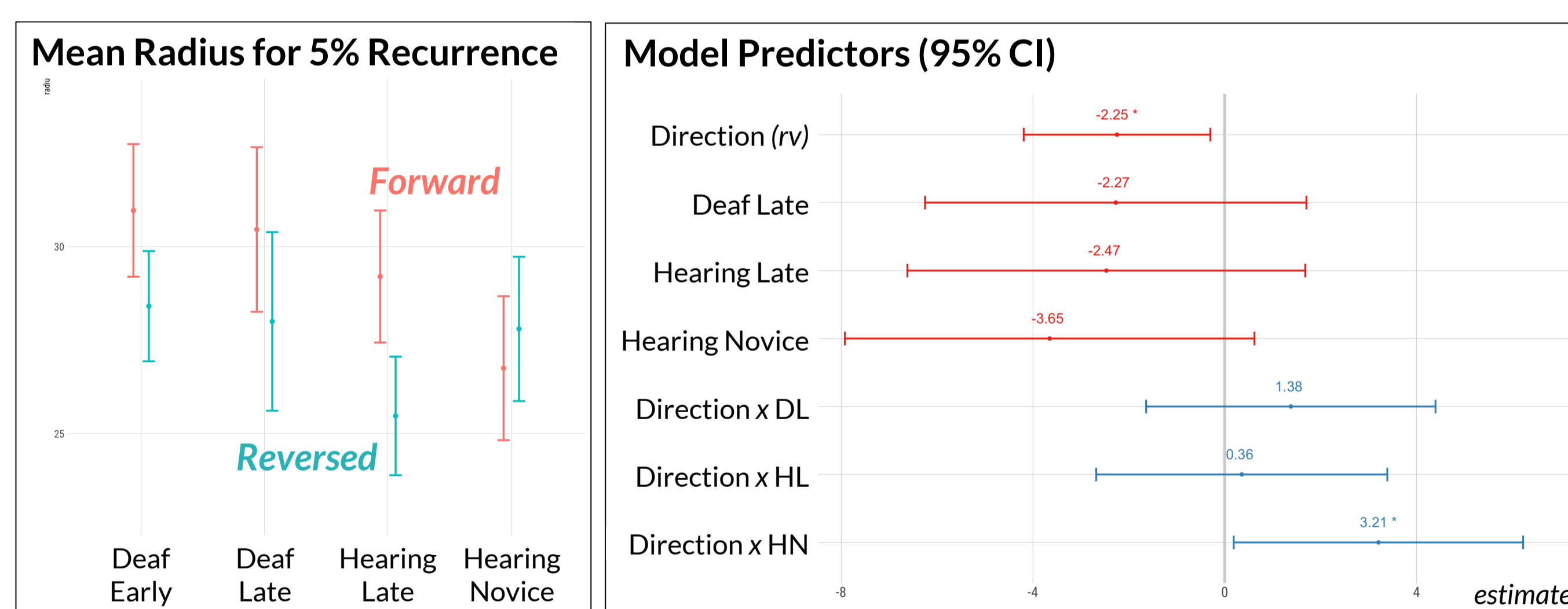


Eye Gaze vs. Hand Position



RESULTS

CRQA analysis performed on eye gaze vs. hand positions. A linear mixed model (LMM) was fitted with predictors *Group* and *Video Reversal* and outcome variable *Radius for 5% Recurrence*. Lower Radius values mean higher synchrony between two time-series.



DISCUSSION

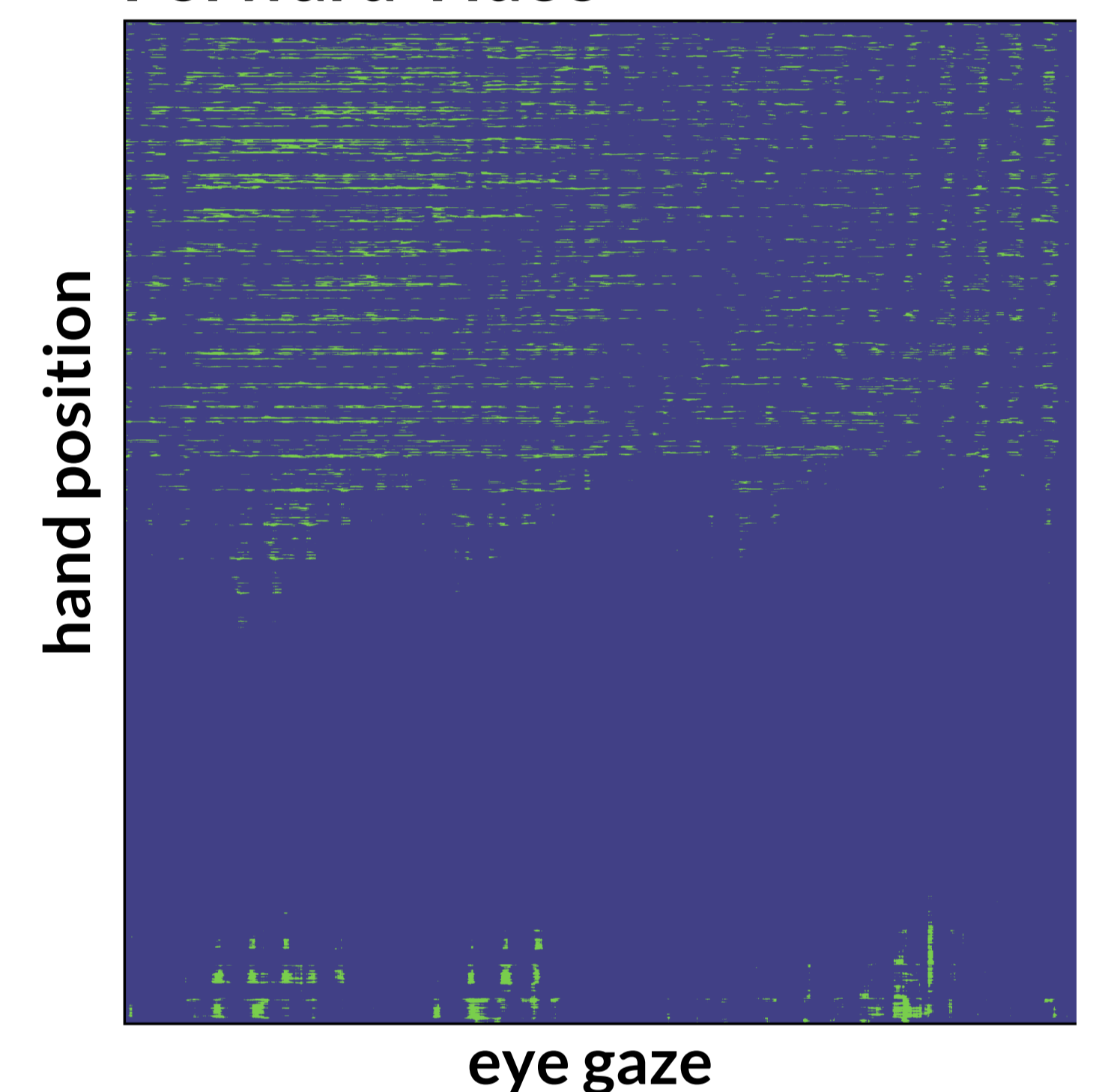
Video Reversal main effect: Watchers attend more to hand position when watching difficult content.

Video Reversal x Hearing Novice interaction: Their viewing behaviors are uniquely disrupted by reversed content—more “scattered” gaze patterns.

CROSS-RECURRENCE QUANTIFICATION ANALYSIS (CRQA)

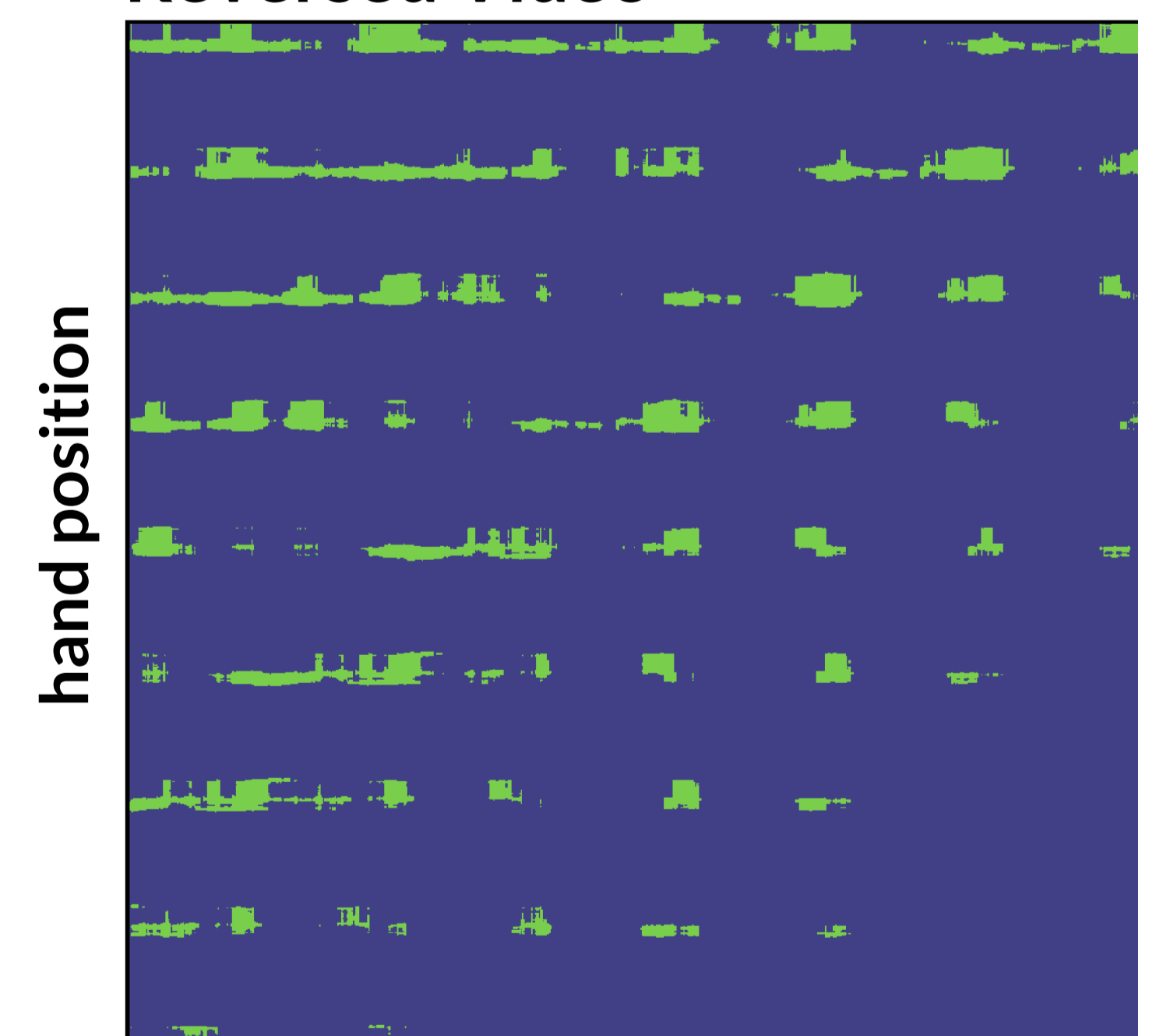
Quantifies the relationship between two time-series datasets at all possible time lags. Radius is an indicator of synchrony between two time-series.

Deaf Early Forward Video



More complex patterns: more chaotic, less deterministic. Eye gaze and hand position recur less often.

Hearing Novice Reversed Video



More regular and recurrent, with long periods where eye gaze falls on or near the hands.

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