



BIMANUAL CONTROL DIFFERS BETWEEN FORCE INCREMENT AND FORCE DECREMENT

MOVEMENT
NEUROSCIENCE &
REHABILITATION
LAB

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MOTIVATION

Despite significant proportion of daily activities involving bimanual function, force control strategies involved in bimanual control during precise force increment and decrement are not known.

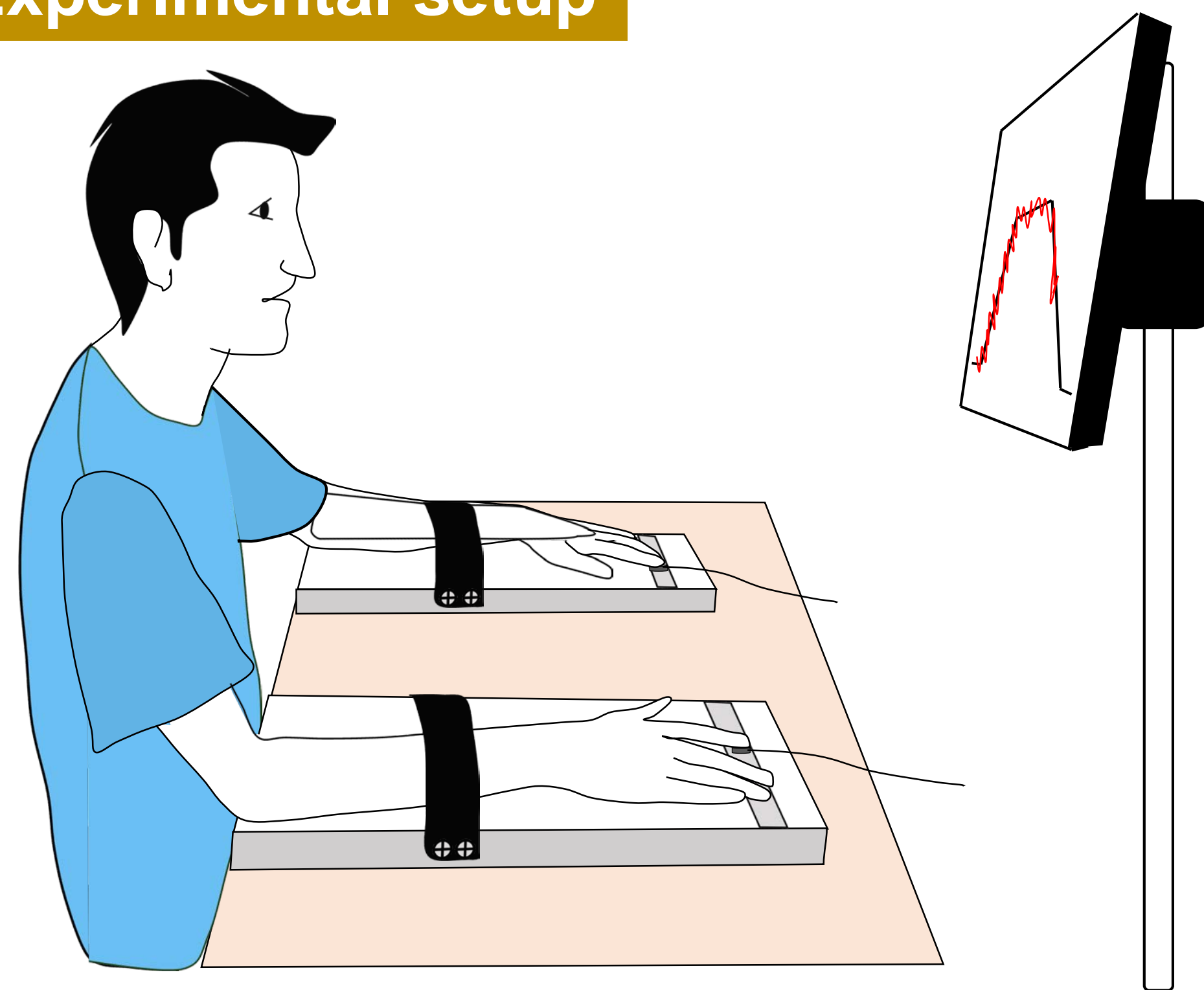
Purpose

- To investigate whether task performance and bimanual coordination differs between force increment and decrement.
- To determine the contribution of bimanual coordination to task performance during force increment and decrement while performing isometric finger flexion.

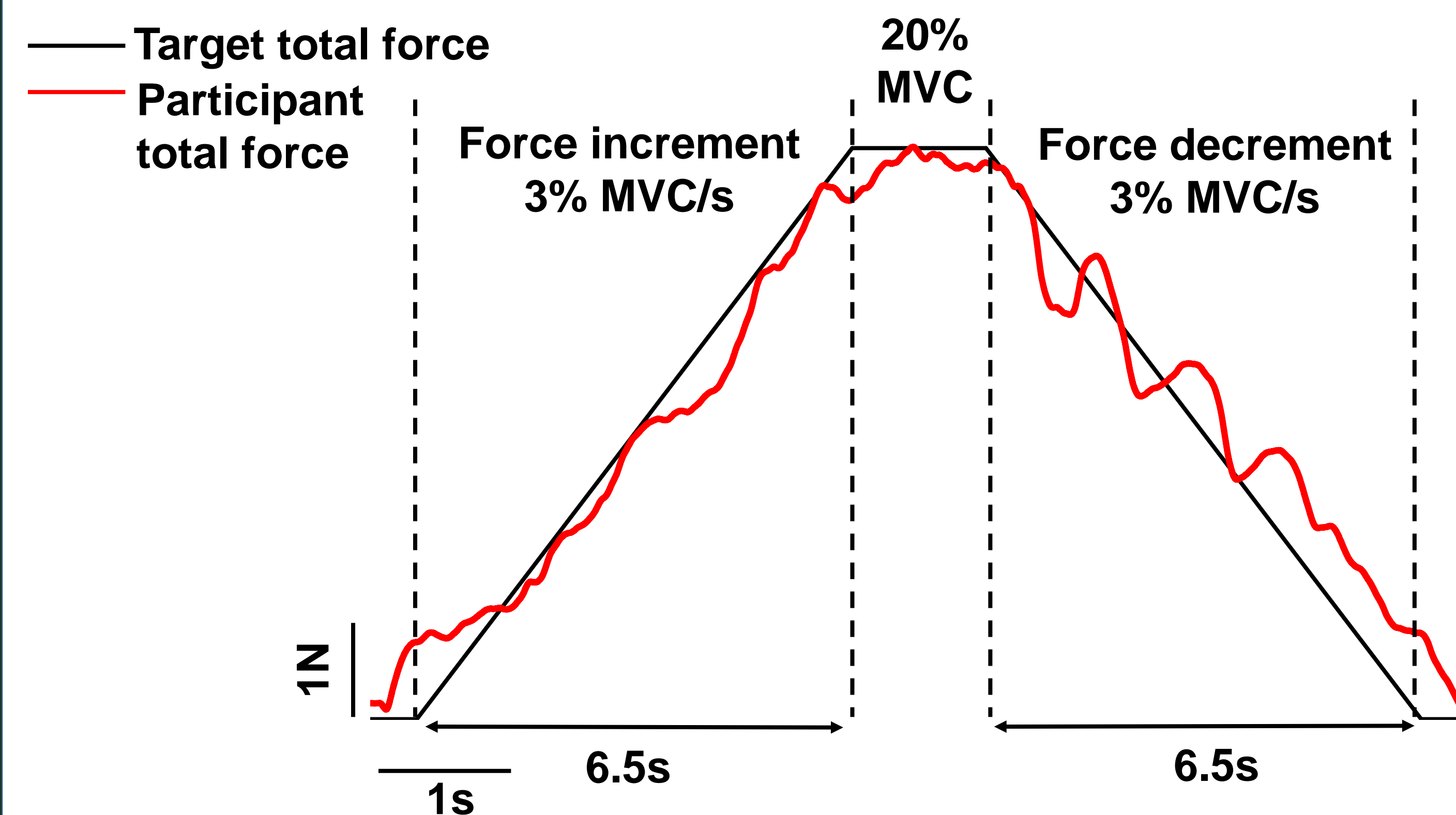
METHODS

Experimental setup

Seventeen right-handed healthy young adults (24.10 ± 3.09 years, 9 females) performed a visually guided force tracking task using isometric finger flexion in unimanual and bimanual condition.

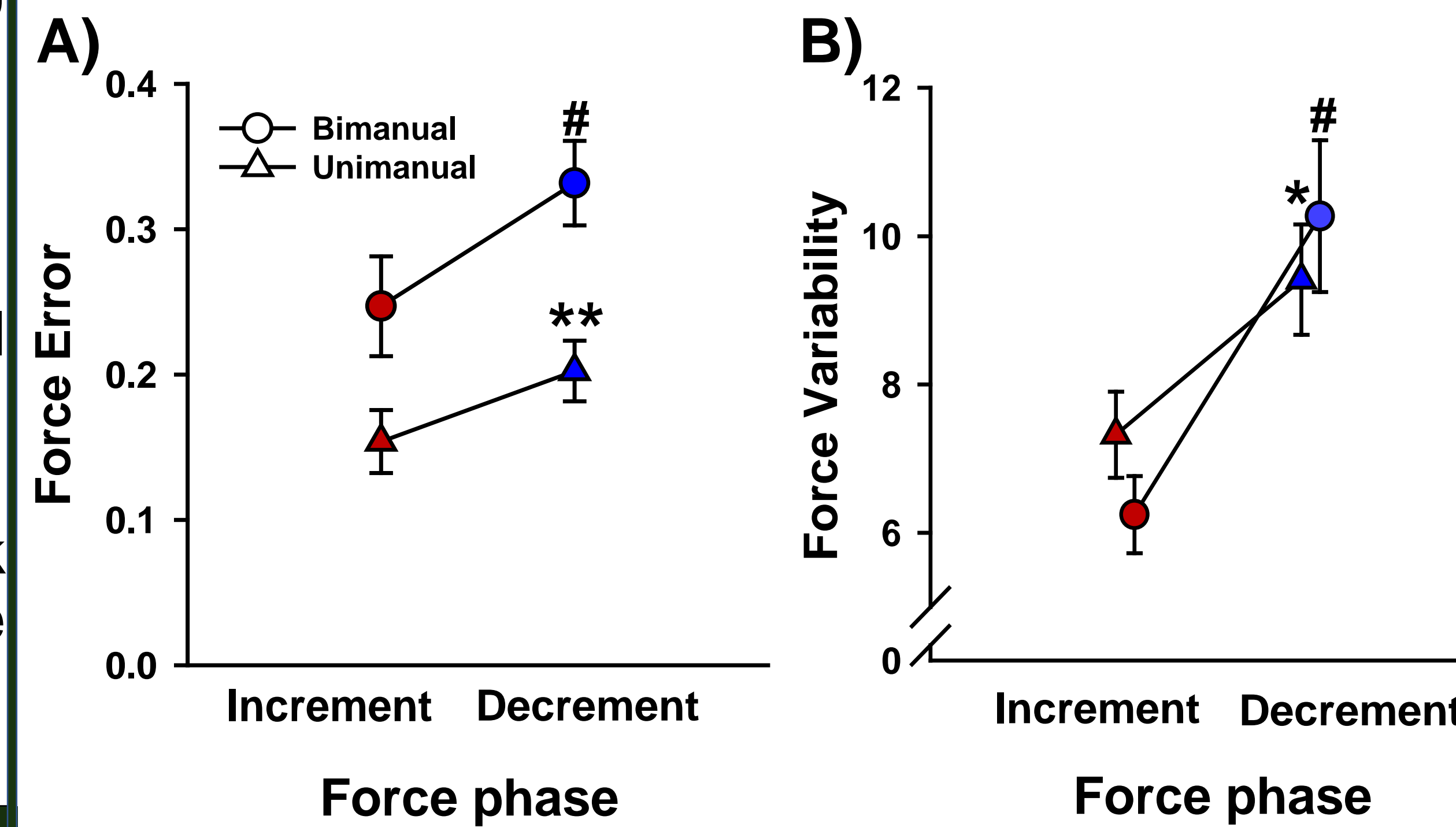


Force tracking task



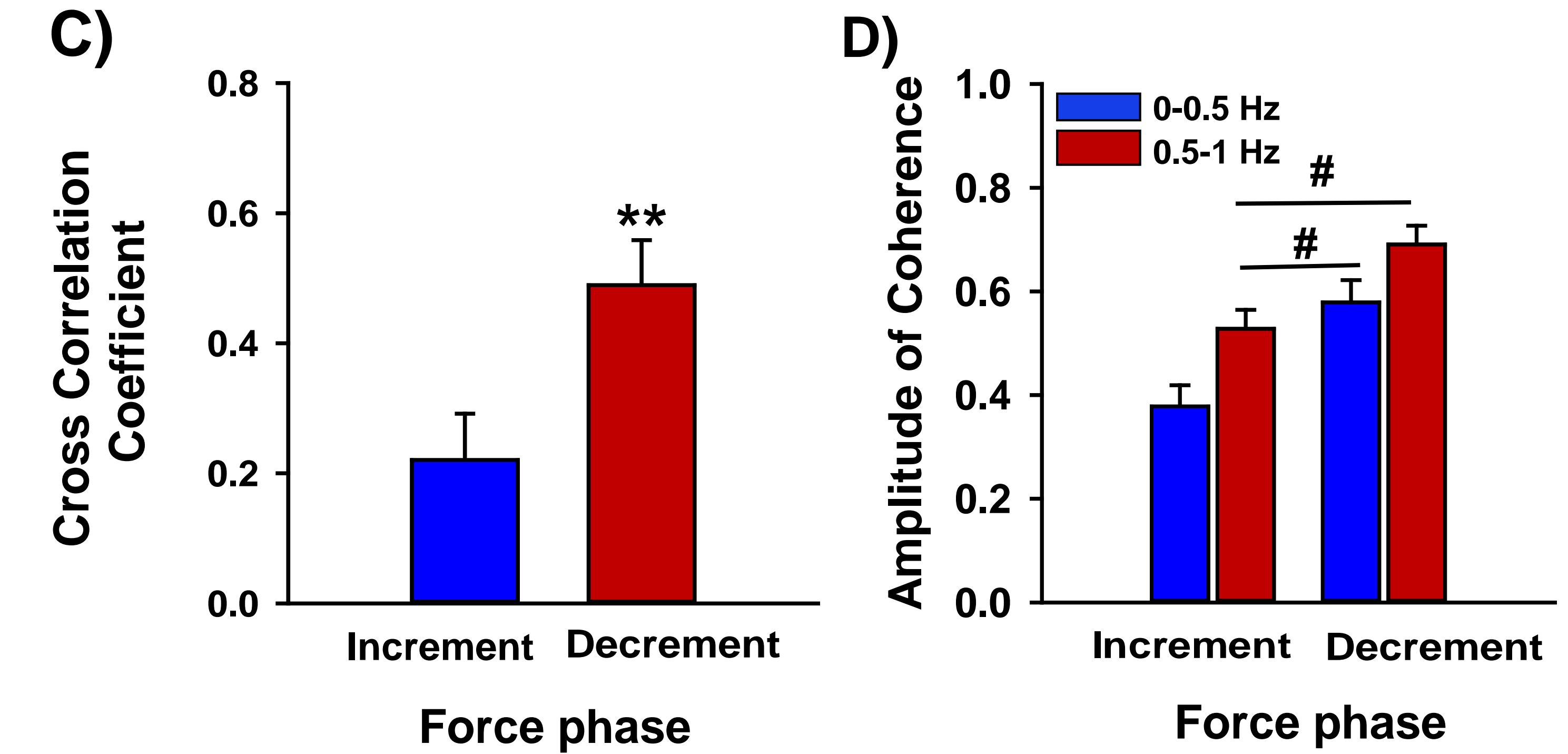
RESULTS

Bimanual task performance



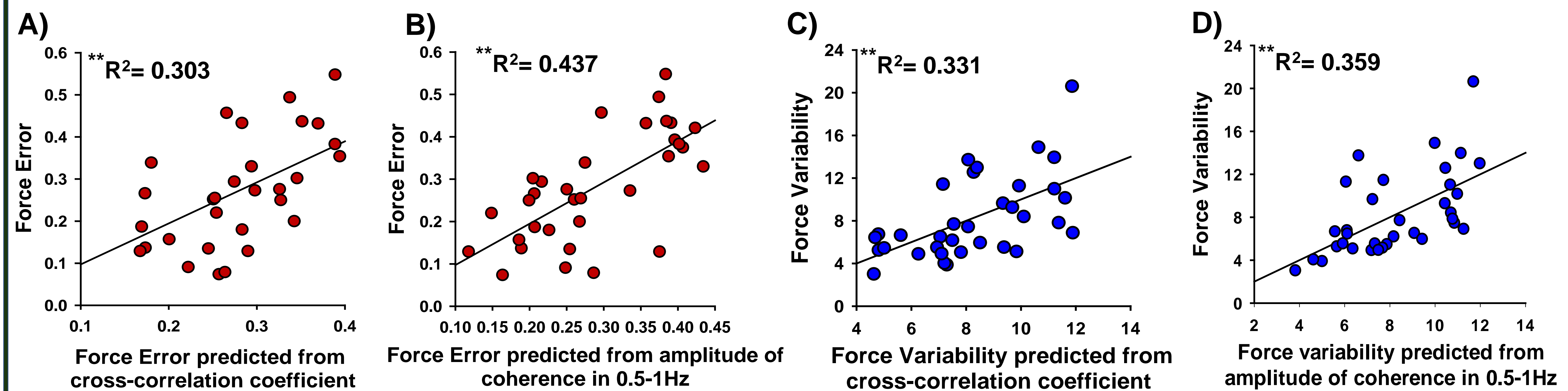
A) Force Error and B) Force variability was greater in force decrement than increment across both hand conditions.

Bimanual coordination



C) Time series cross-correlation was significantly increased during force decrement than force increment phase. D) Amplitude of coherence between force output of two hands was greater in force decrement than increment phase.

Predicting Bimanual Task performance from Bimanual Coordination



Temporal & frequency based coordination predicted total force accuracy (A&B) & force variability (C&D). Greater temporal correlation and higher coherence in 0.5 to 1 Hz reduced accuracy and increase variability.

CONCLUSION

Bimanual task performance deteriorates during force decrement compared with force increment. Further, bimanual coordination increases in force decrement than force increment. Most importantly, this study shows that bimanual coordination predicts the accuracy and variability of the total force in dynamic bimanual force control task.

Our findings highlighted that bimanual force control varies with task constraint and importance of collaborative function of two hands to achieve a common task goal. These results may have implications for understanding changes in bimanual control with aging and neurological disorders.