Arm Movement Errors are Coded in Target-Centered Coordinates

Todd E. Hudson, Allison M. Greene & Michael S. Landy

Department of Psychology and Center for Neural Science, New York University

Introduction

• Movement planning is typically described in terms of a vector from an initial position (e.g., of the fingertip) to a target[1,2].

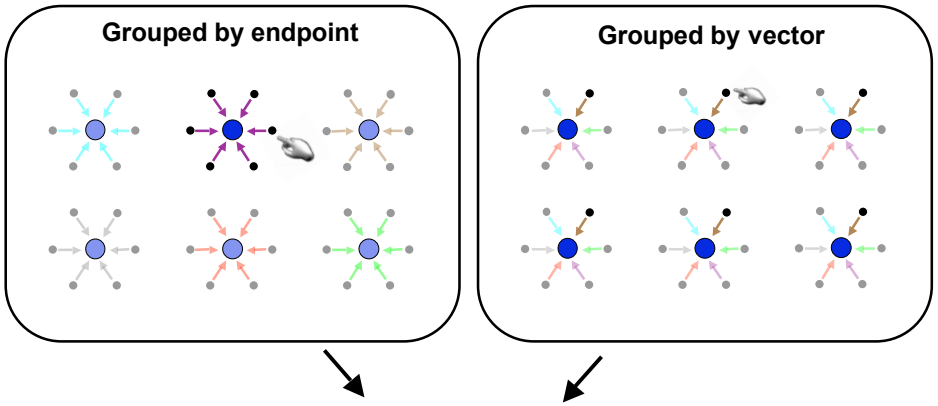
• The nervous system might also make use of egocentric coordinates (e.g., proprioceptive estimates of joint angles that define a particular fingertip location relative to the body) for movement planning[3].

• Does the nervous system use this additional proprioceptive information based on egocentric coordinates to improve performance[4]?

Task

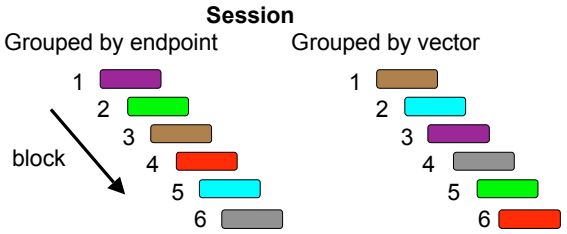
• Point-to-point reaches on a tabletop

Reaches grouped two ways:



• Same 6 targets x 6 start positions = 36 reaches in each session

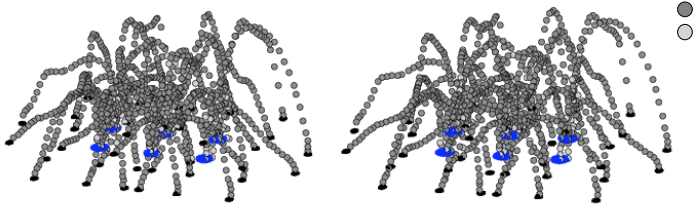
• Example order:

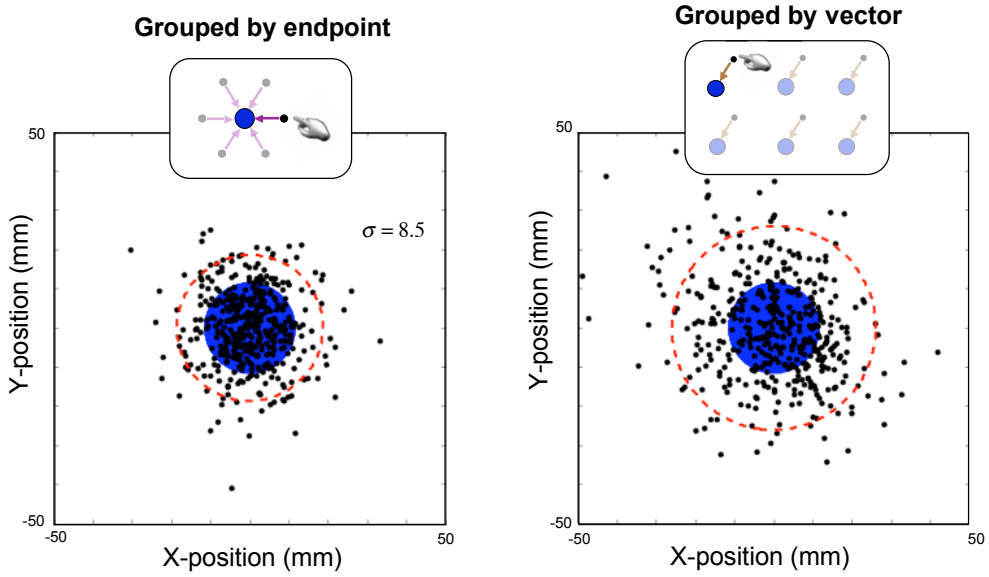


Results

Average reaches (stereogram):

- Endpoint-grouped
- Vector-grouped





Conclusions

• Repeated endpoint planning improved overall reach precision (endpoint vs. vector grouping of reaches).

• Improvement in 'grouped-by-endpoint' session is consistent with additional proprioceptive / egocentric information.

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(1) Krakauer et al. (2000) *J Neurosci* 20:8916-24. (2) Ghez et al. (2007) *J Neurophys* 98:3614-26.
(3) Sober & Sabes (2005) *Nat Neurosci* 8:490-7. (4) Landy et al. (1995) *Vis Res* 35:389-412.