

**Distance estimation
training with metric
feedback: Investigating
the roles of cognition and
perception.**

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Background

PEOPLE MISESTIMATE DISTANCE

- Pilots
 - (Gibson, 1947)
- Divers
 - (Luria, Kinney, & Weissman, 1967; Kinney, Luria, & Weitzman, 1969; Ferris, 1972, 1973a, 1973b)
- Soldiers
 - Night Vision Goggles
 - (Dyer & Young, 1998; Fuson, 1990)
 - Firing range
 - (Rogers, Sprol, Viterales, Voss, & Wickens, 1945; Viteles, Gorsuch, Bayroff, Rogers, & Wickens, 1945; as cited in Gibson & Bergman, 1954)
- In Virtual Environments
 - (Witmer & Sadowski, 1998; Witmer & Kline, 1998; Loomis & Knapp, 2003)



Introduction

- Researchers have tried training people
 - Distance
 - Feedback
 - Three phases
 - Pre-test
 - Training
 - Post-test
 - DVs – Accuracy and variability
 - (Gibson & Bergman, 1954; Ferris, 1972, 1973a, 1973b; Niall, Reising, & Martin, 1999; Reising & Martin, 1994, 1995)
- Training improves distance estimation, but with a negative effect on some other tasks
 - (Jones, DeLucia, Hall, & Johnson, under review)

Introduction

- This training has been shown to affect cognition
 - Training does not generalize to untrained tasks following metric feedback
 - (Gibson, Bergman, & Purdy, 1955; Richardson & Waller, 2005)
 - Training does not generalize to untrained tasks following descriptive feedback
 - (Wohlwill, 1964)
- Perceptual/motor tasks typically do not involve cognition
- Distance estimation training may encourage people to use cognitive processing to perform perceptual/motor tasks

Pre-Test Throwing

Distance

Target

Training – Verbal Estimation

0

+

0

-

Post-Test Throwing

Distance

Target

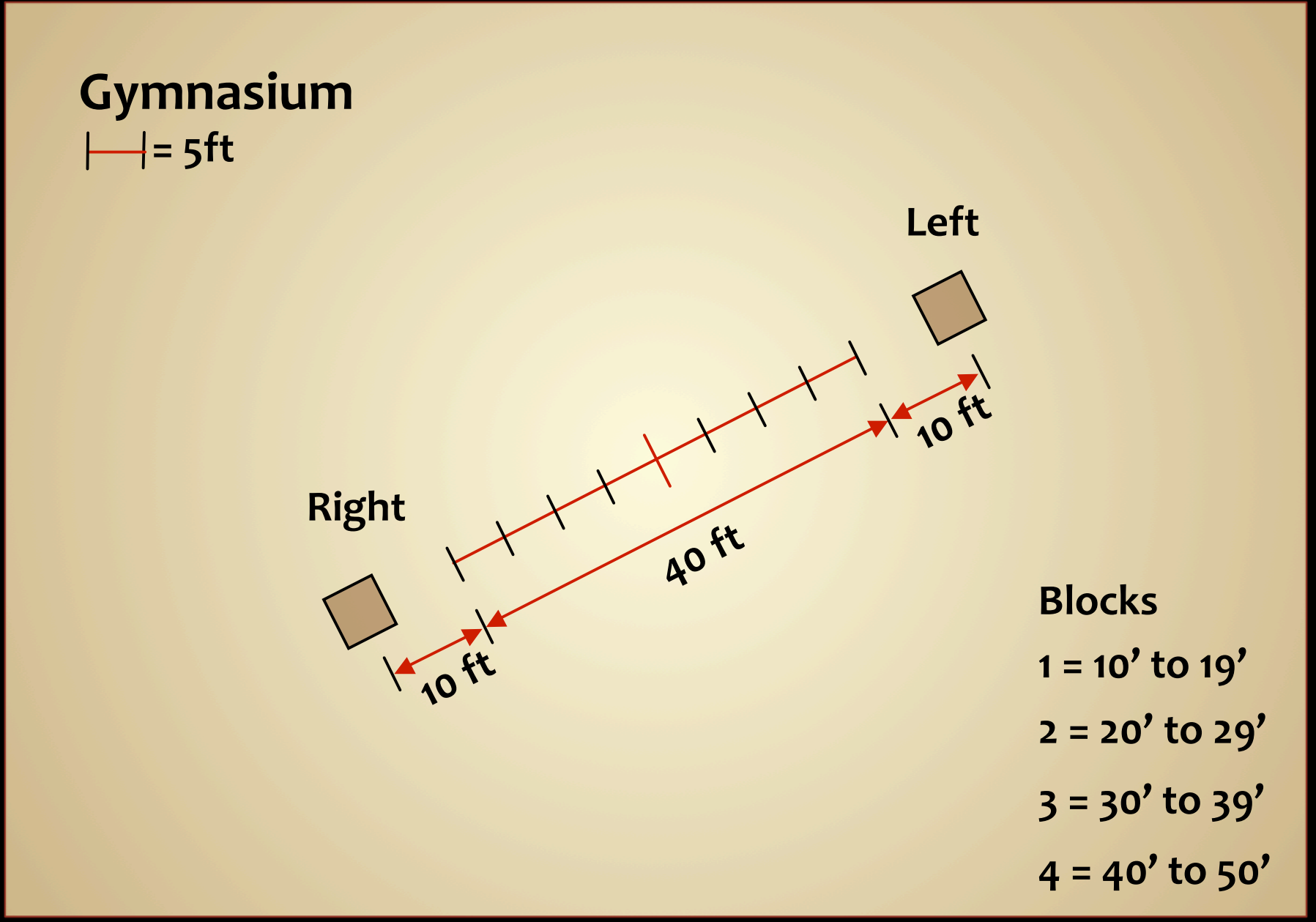
Method

- 64 participants (32 male)
- Age range, from 18 to 44 ($M=20.22$, $SD=3.41$)
- No visual or motor impairments

Gymnasium

|—| = 5ft

86 ft



Left

Right

Blocks

1 = 10' to 19'

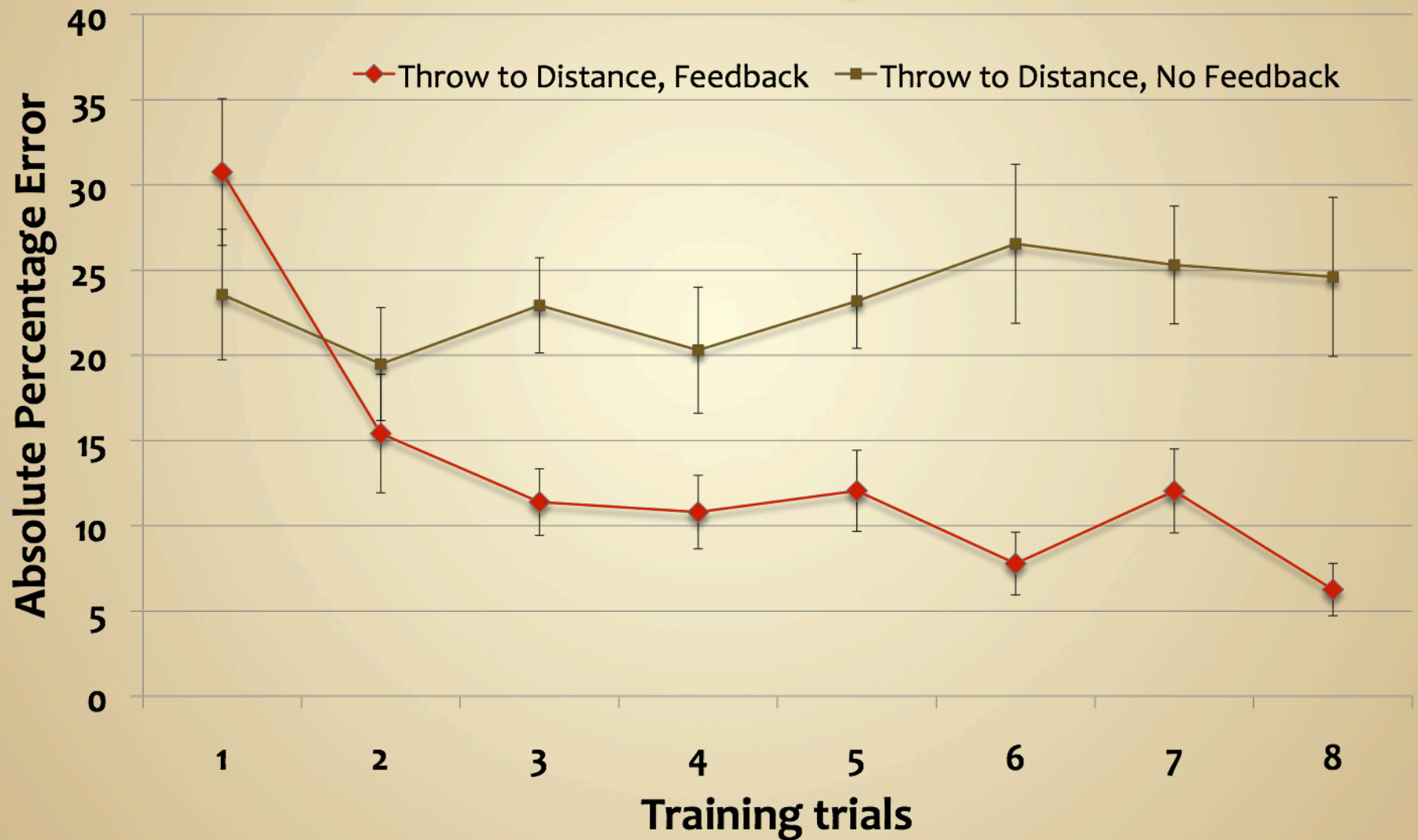
2 = 20' to 29'

3 = 30' to 39'

4 = 40' to 50'

114 ft

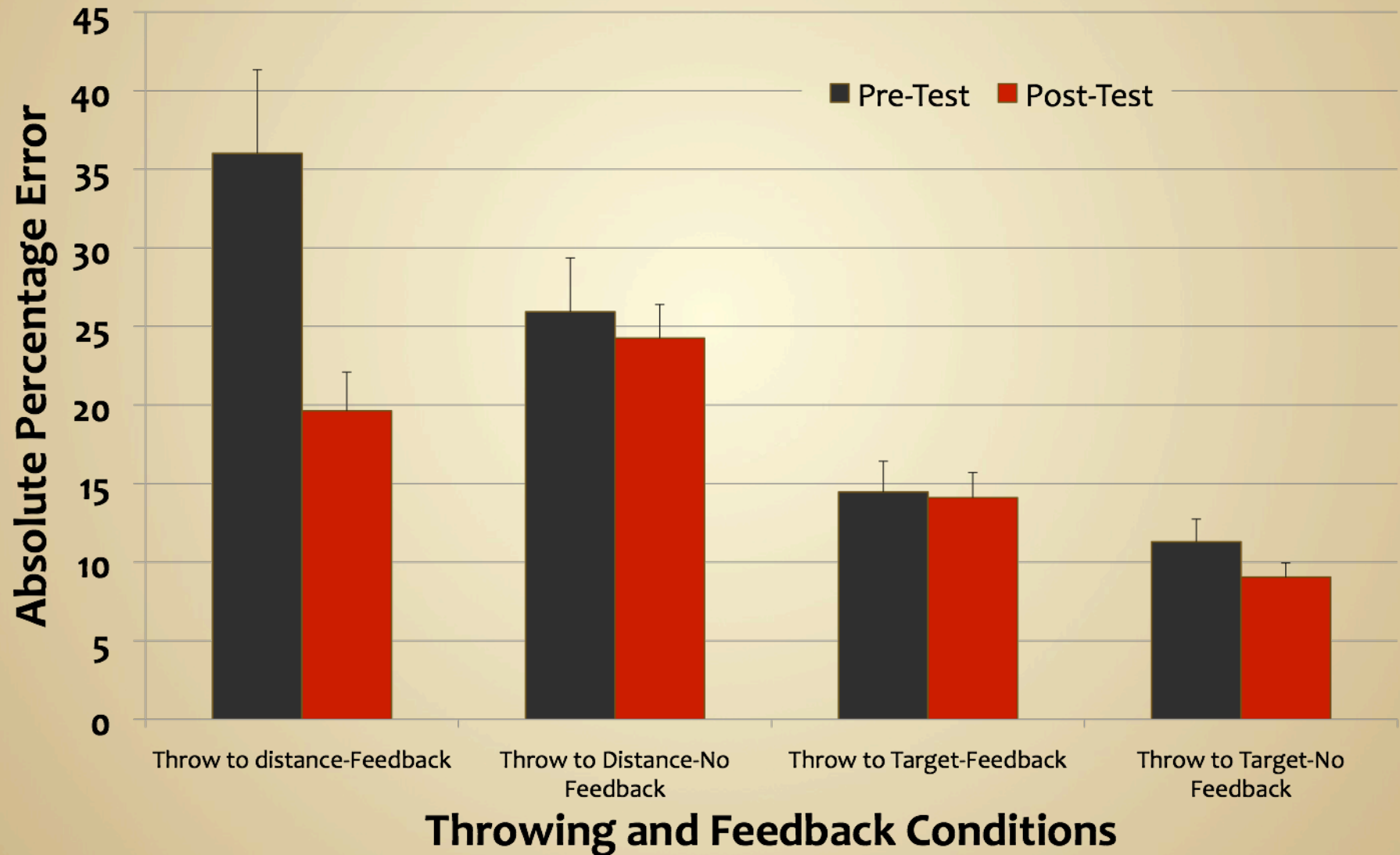
Results – Training, Distance



Results – Training, Target



Results – Pre & Post-test



Discussion

- The results of the Throw to a Distance condition were expected
 - Training with Feedback lead to improved accuracy
- The results of the Throw to a Target condition were not expected
 - Inconsistent with previous findings
 - Suggest a possible practice effect
- We are currently investigating the possibility of a practice effect.



Cognition or Perception?

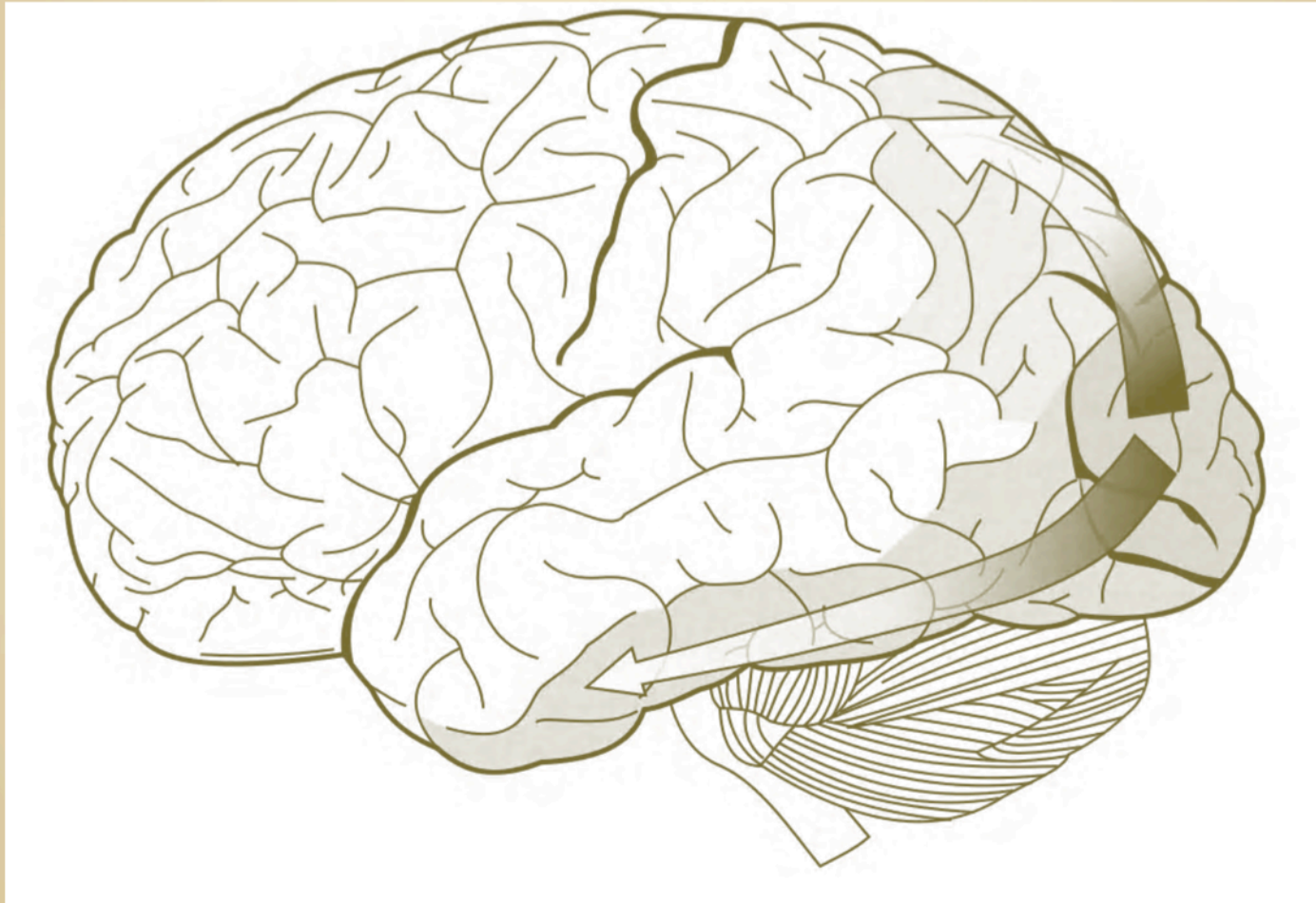
COGNITION

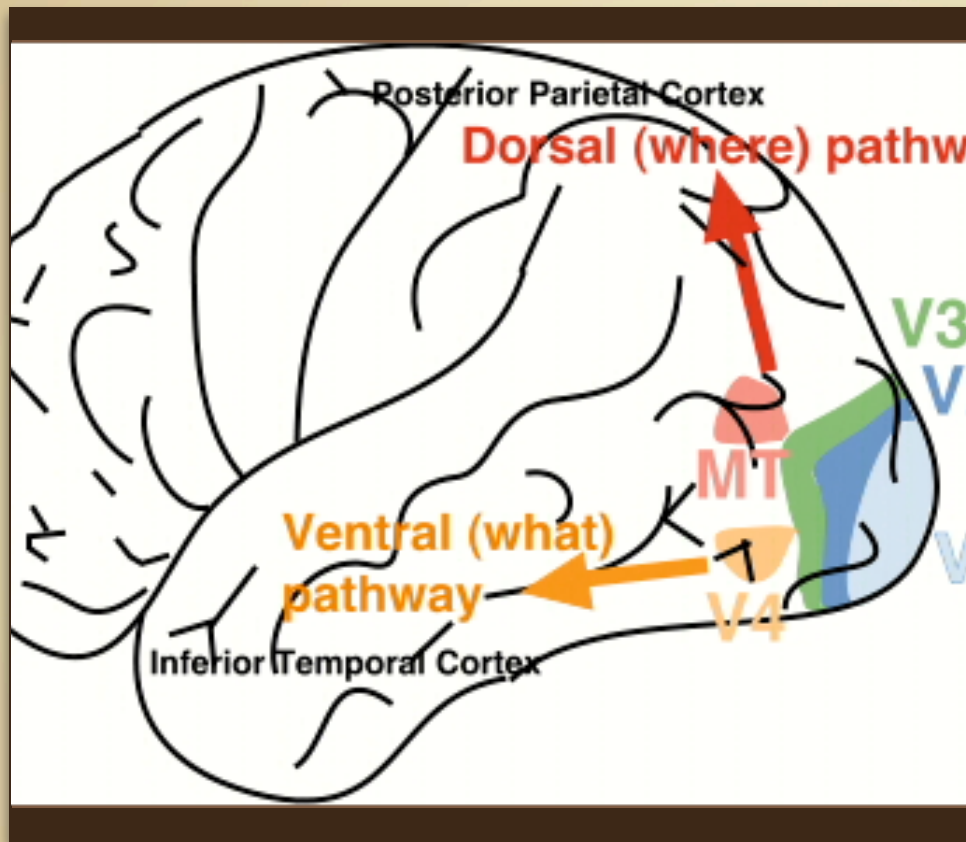
- Untrained tasks do not generalize with
 - Metric feedback
 - Descriptive feedback
- Ventral system
 - Relative representation
- Throw to a distance

PERCEPTION

- Untrained tasks do generalize with
 - Sensory feedback
- Dorsal system
 - Absolute representation
- Throw to a target

Dorsal & Ventral





A Closer Look