



The Neural Basis of Dance Movement and Partnering

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Inappropriate Repetitive Irrelevant

Is Dance “The Next Wave” in Cognitive Neuroscience?

Dancing stimulates the brain in interesting ways.

Post published by A Guest Blogger on Nov 23, 2011 in The Guest Room

 Like 209

By Steven Brown, Ph.D.

In the last 10 years, music's status within cognitive neuroscience has moved from being a fringe area to a topic of central interest to neuroscientists. Dance seems poised to be "the next wave" in cognitive neuroscience. And, in fact, dance takes advantage of many of the strides made by music research and combines them with notions of motor control and sensorimotor coupling that have already attracted great interest in neuroscience.



The Neurocognition of
Dance

Mind, Movement
and Motor Skills

edited by
Bettina Bläsing,
Martin Patten
and Thomas Schack

The 4 P's of Dance

Pattern

Partnering

Pacing

Person



The Neural Basis of Human Dance

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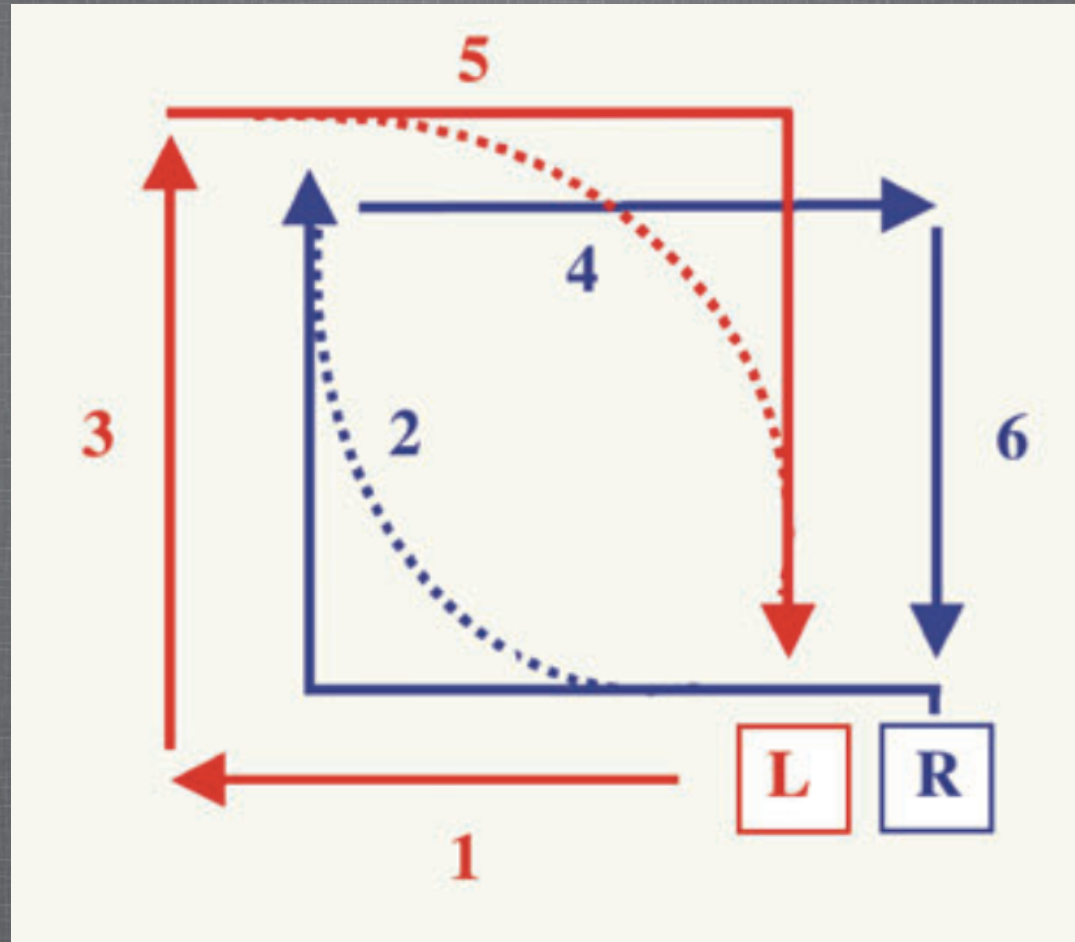
1) spatial patterning of movement

2) meter = rhythmicity

3) entrainment (synchronization)

Subjects

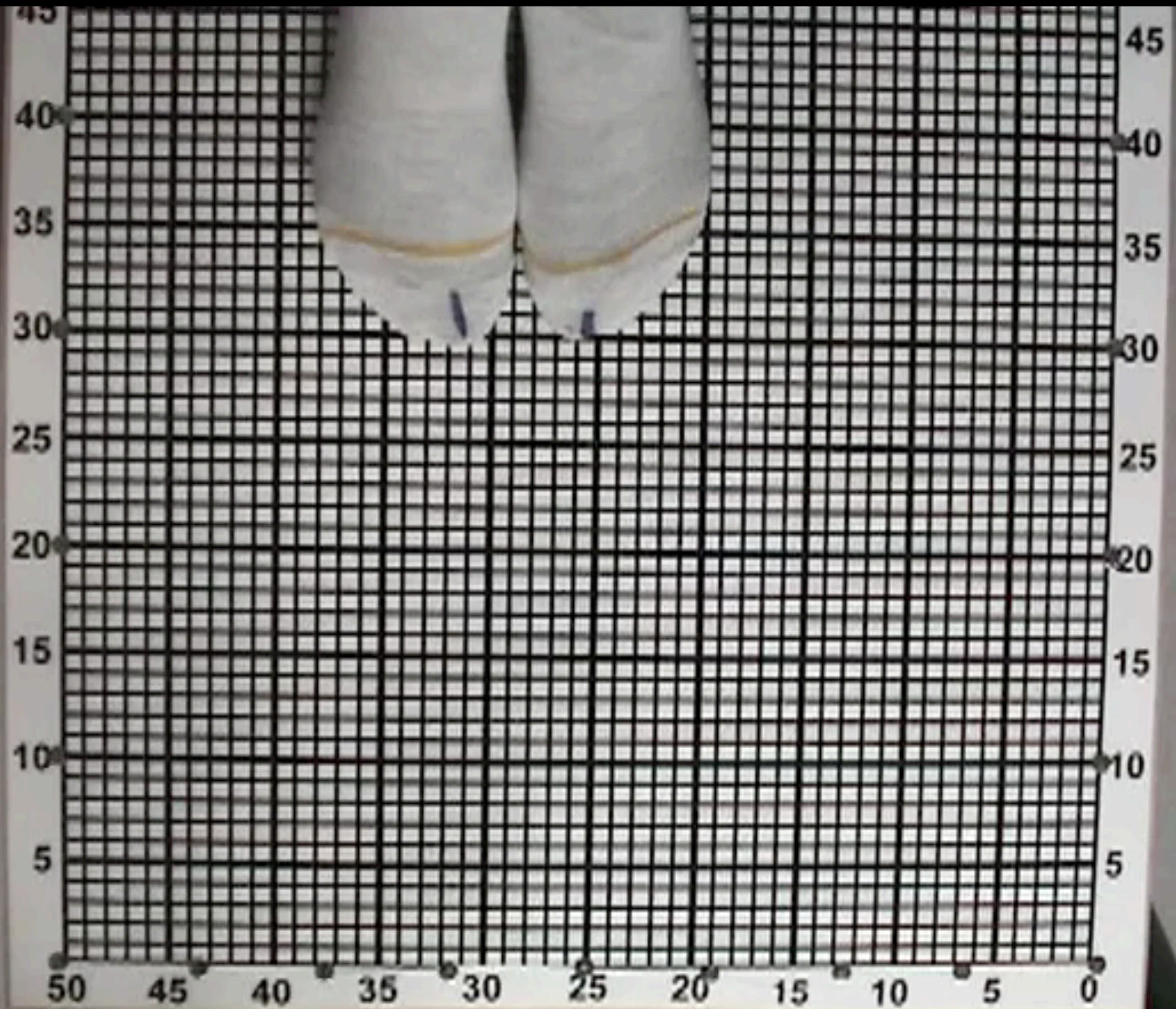
- amateur tango dancers
- minimal musical experience



The step was taught in advance of the PET scan.
No learning occurred during scanning session.
Eyes were closed in all scans.

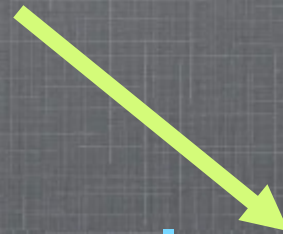


Dance condition



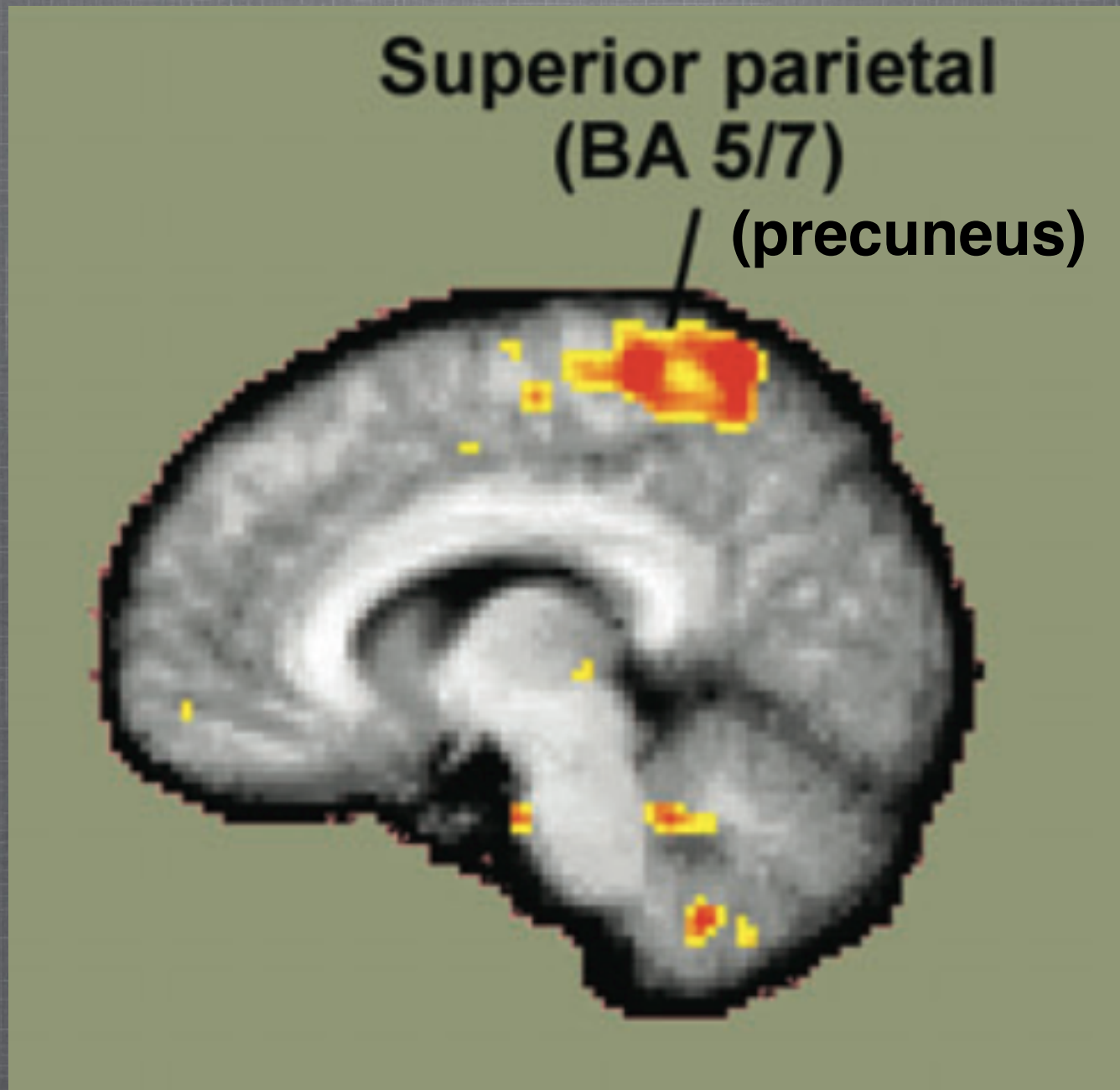
I. Spatial Patterning of Movement

Dance vs. Contractions alone



muscle contractions
but no movement

Dance – Contractions



II. Meter

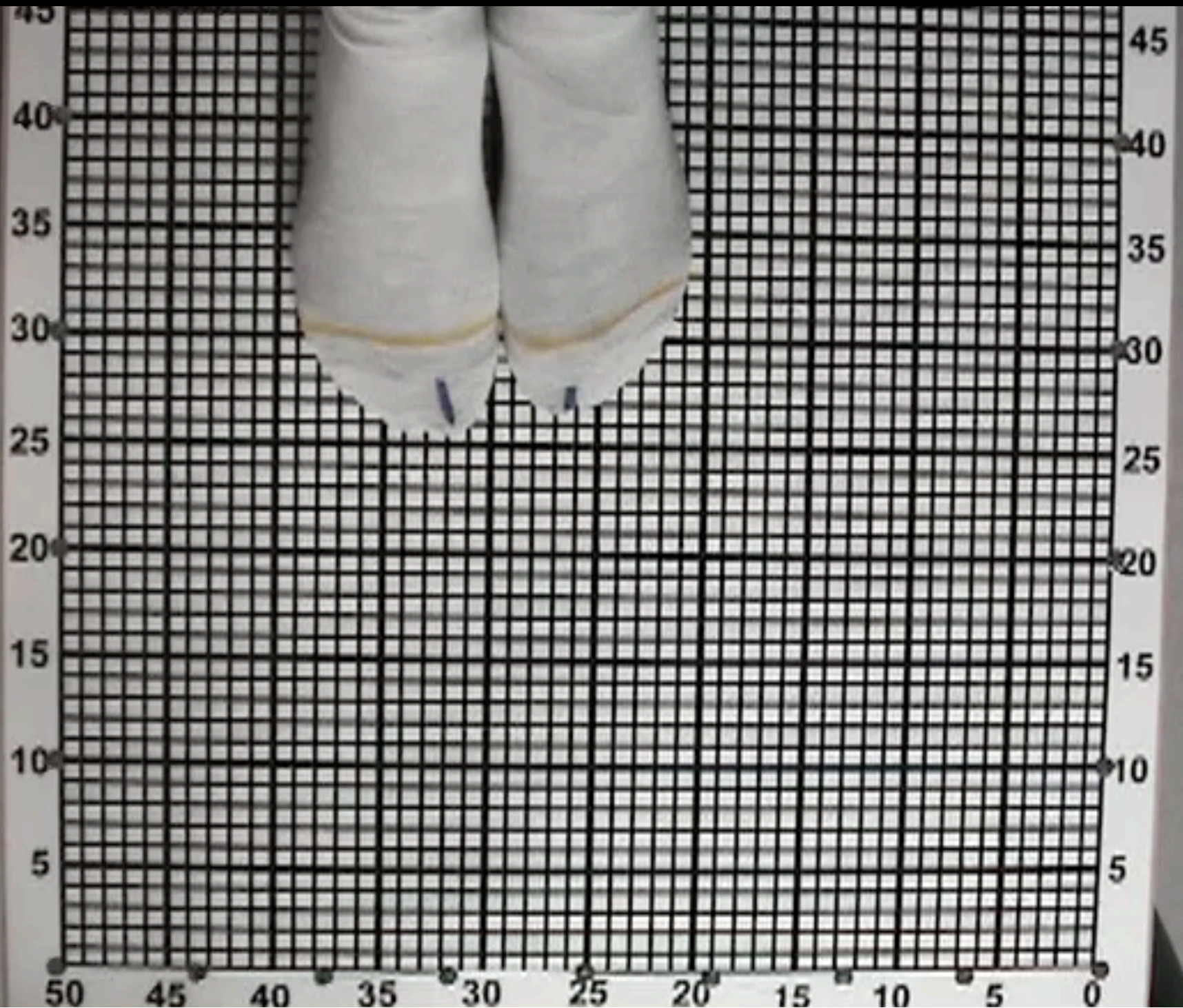
Dance vs. Non-Rhythmic Dance

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graph TD; A[Dance vs. Non-Rhythmic Dance] --> B[regular and predictable]; A --> C[irregular and unpredictable];
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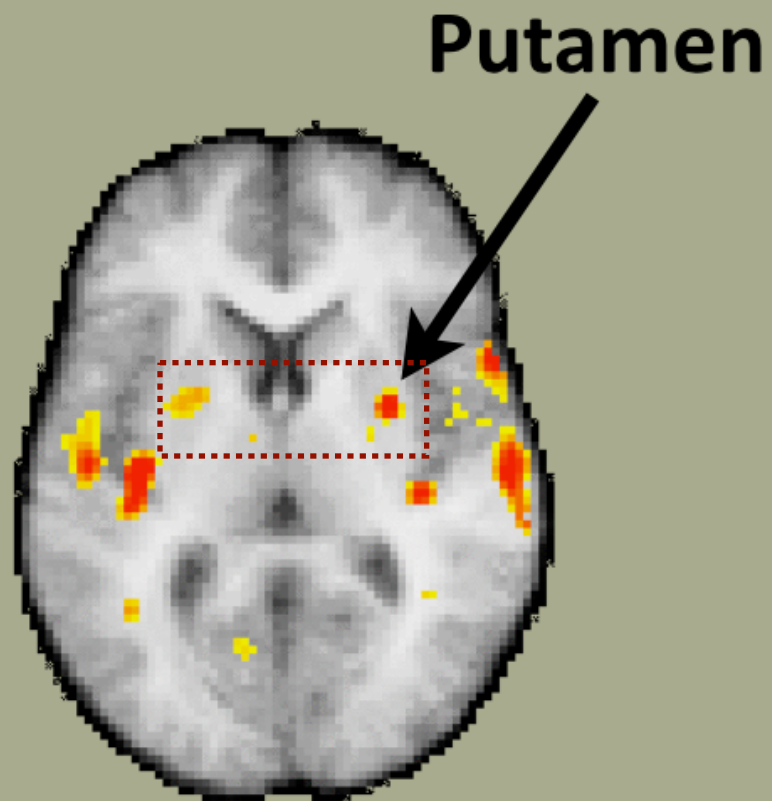
regular and predictable

irregular and unpredictable

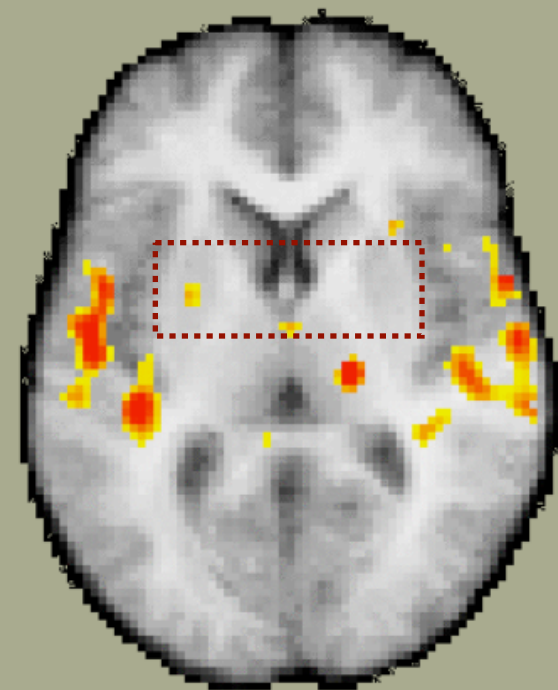
Non-Rhythmic Dance condition



Rhythmic Dance



Non-Rhythmic Dance

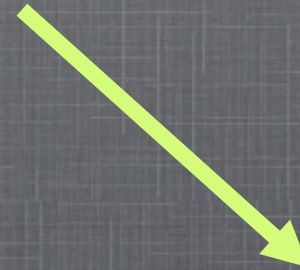


III. Entrainment

Dance vs. Self-Paced Dance

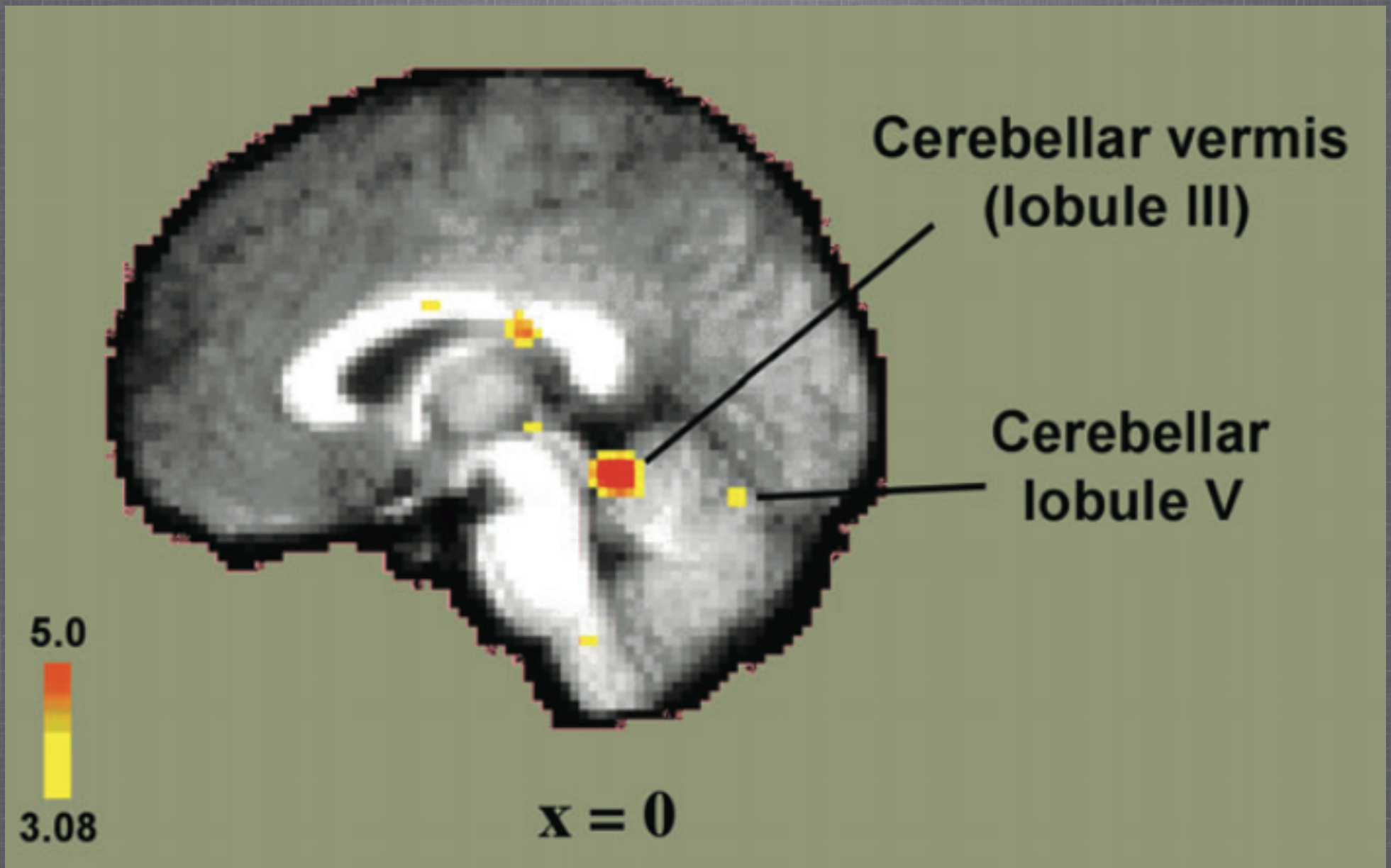


externally-paced
(= entrained)



self-paced
(no entrainment)

Dance – Self-Paced

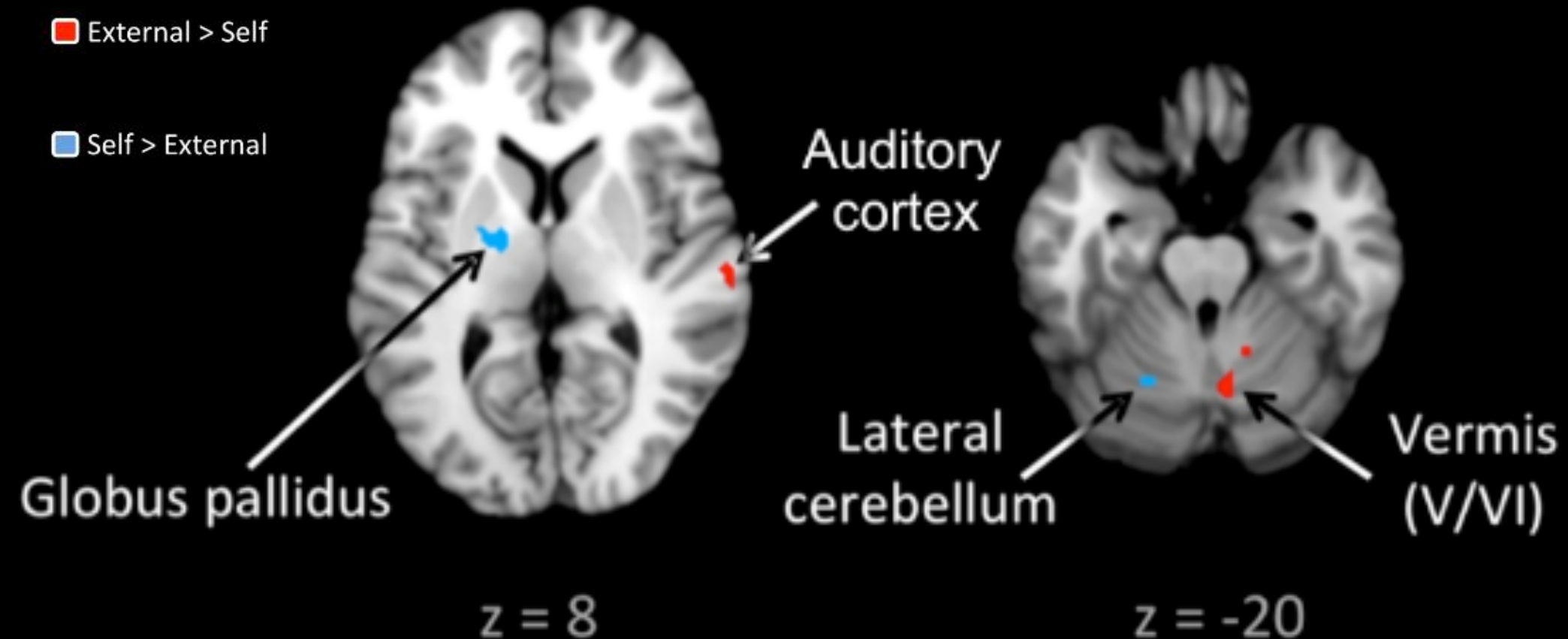


Meta-analysis of finger-tapping

(43 published studies)

External > Self

Self > External



Chauvigné L., Gitau K., Brown S. (2014). *Frontiers in Human Neuroscience*.

Summary

1) spatial patterning of movement
superior parietal (precuneus)

2) meter = rhythmicity
putamen (basal ganglia)

3) entrainment
vermis of cerebellum





Leading: **goal**-directed movement
planning of movements
navigation
transmission of force to partner

Following: **stimulus**-directed movement
receptivity to signals from leader

*But how can we study
partnering in an MRI
scanner?*



Conditions

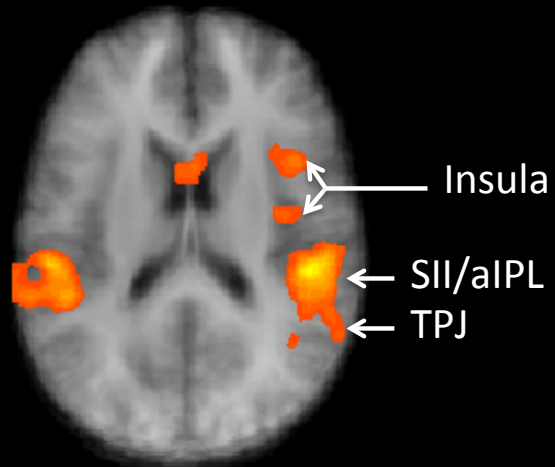
- partnering: Leading (improv)
- partnering: Following (improv)
- partnering: Mutual (pre-learned)
- solo (improv)
- solo (pre-learned)

Partnered > Solo

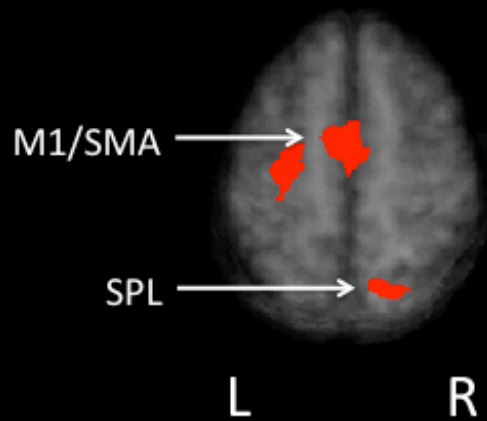
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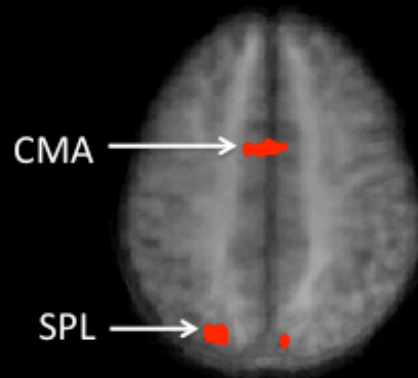
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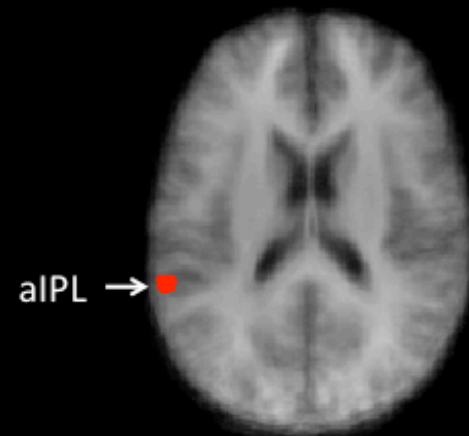
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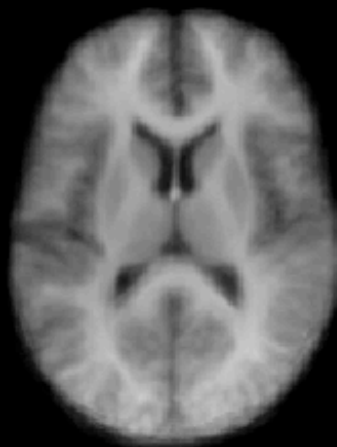
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z = 18




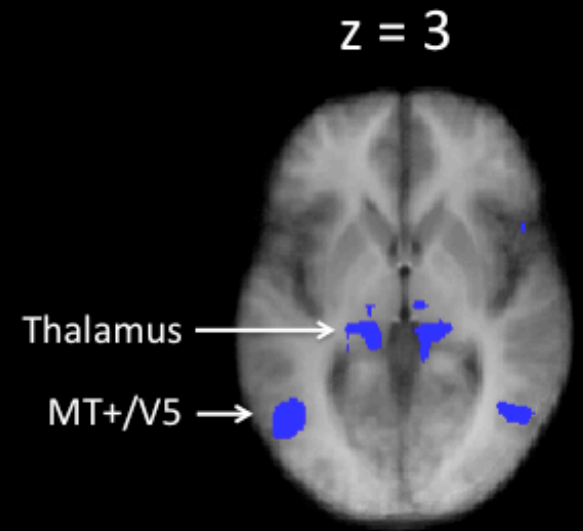
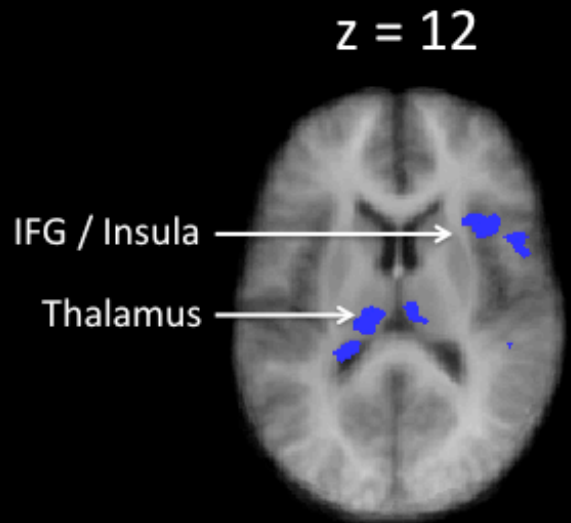
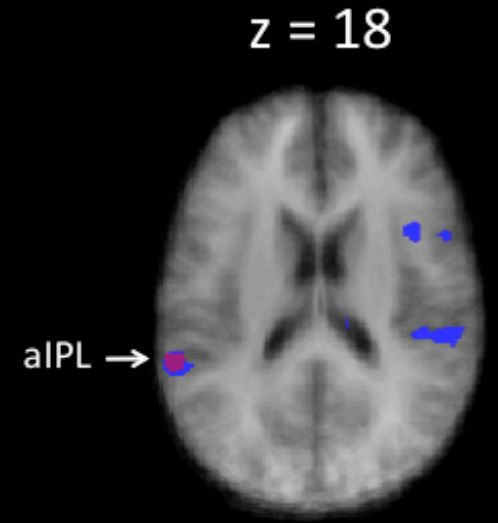
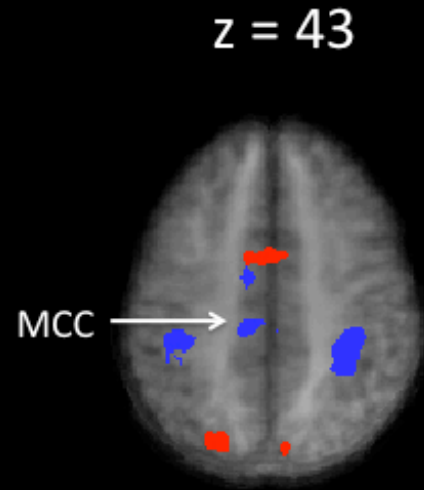
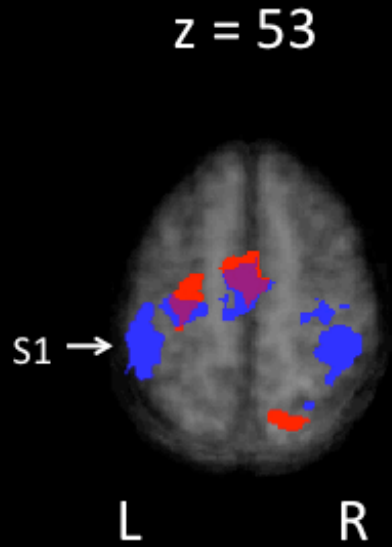
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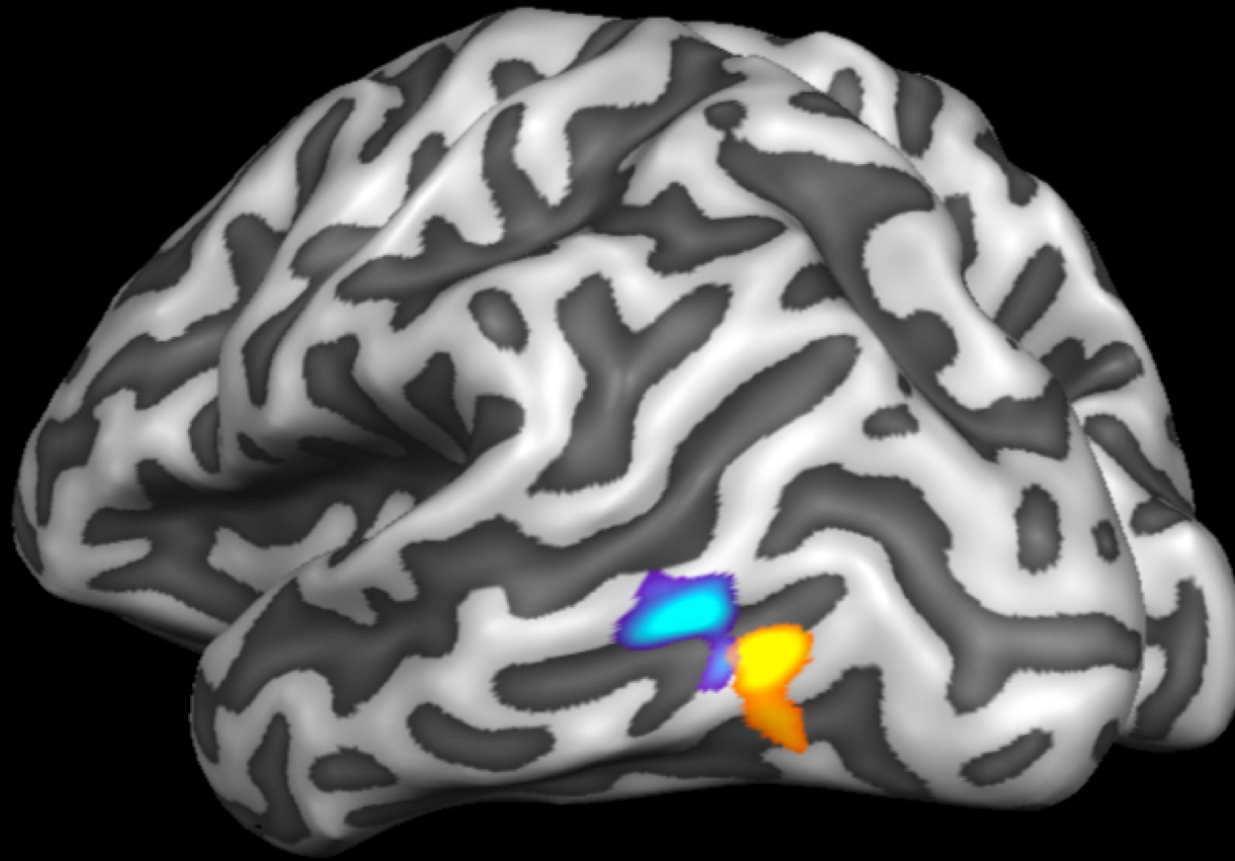
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 Leading



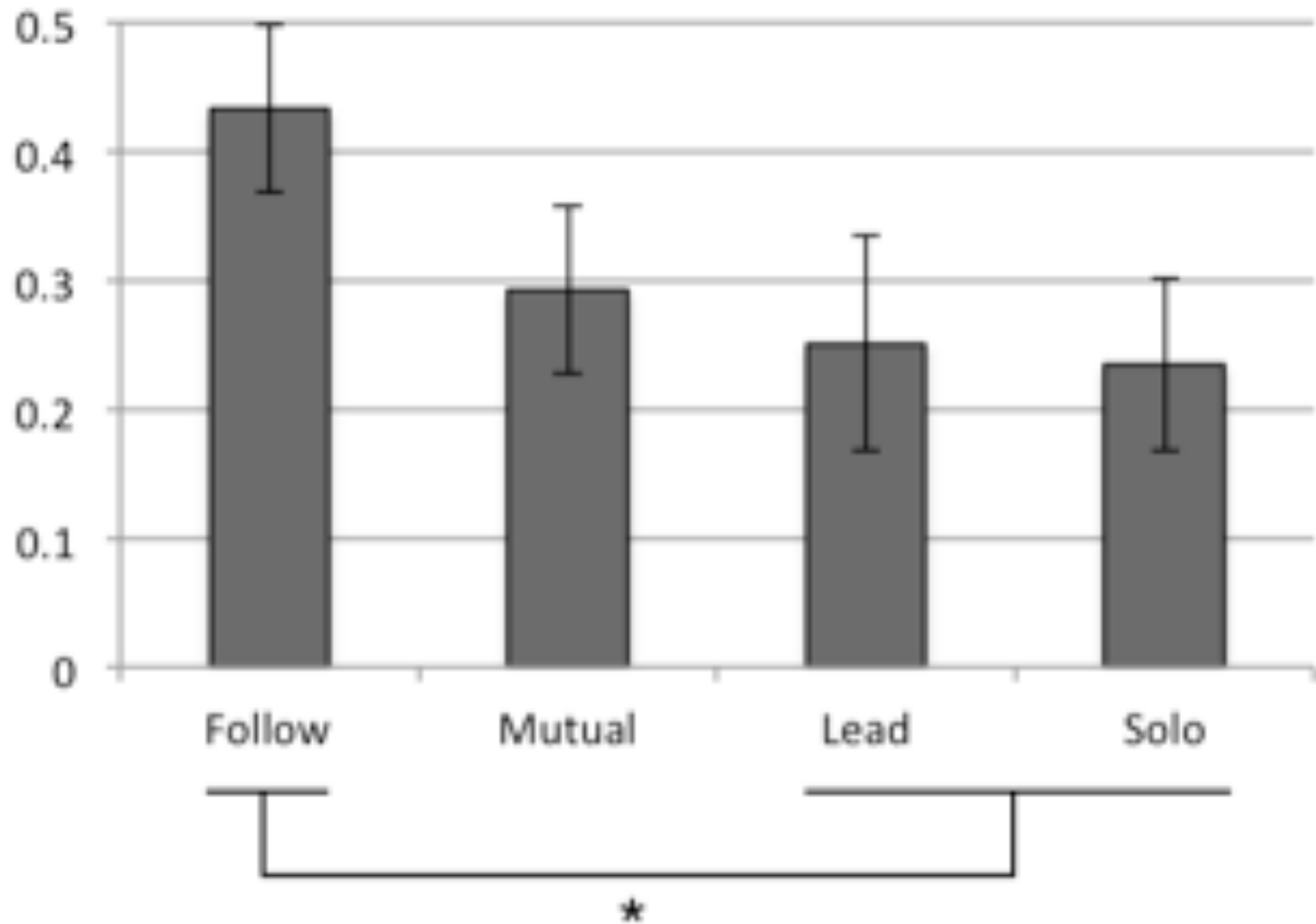
 Following



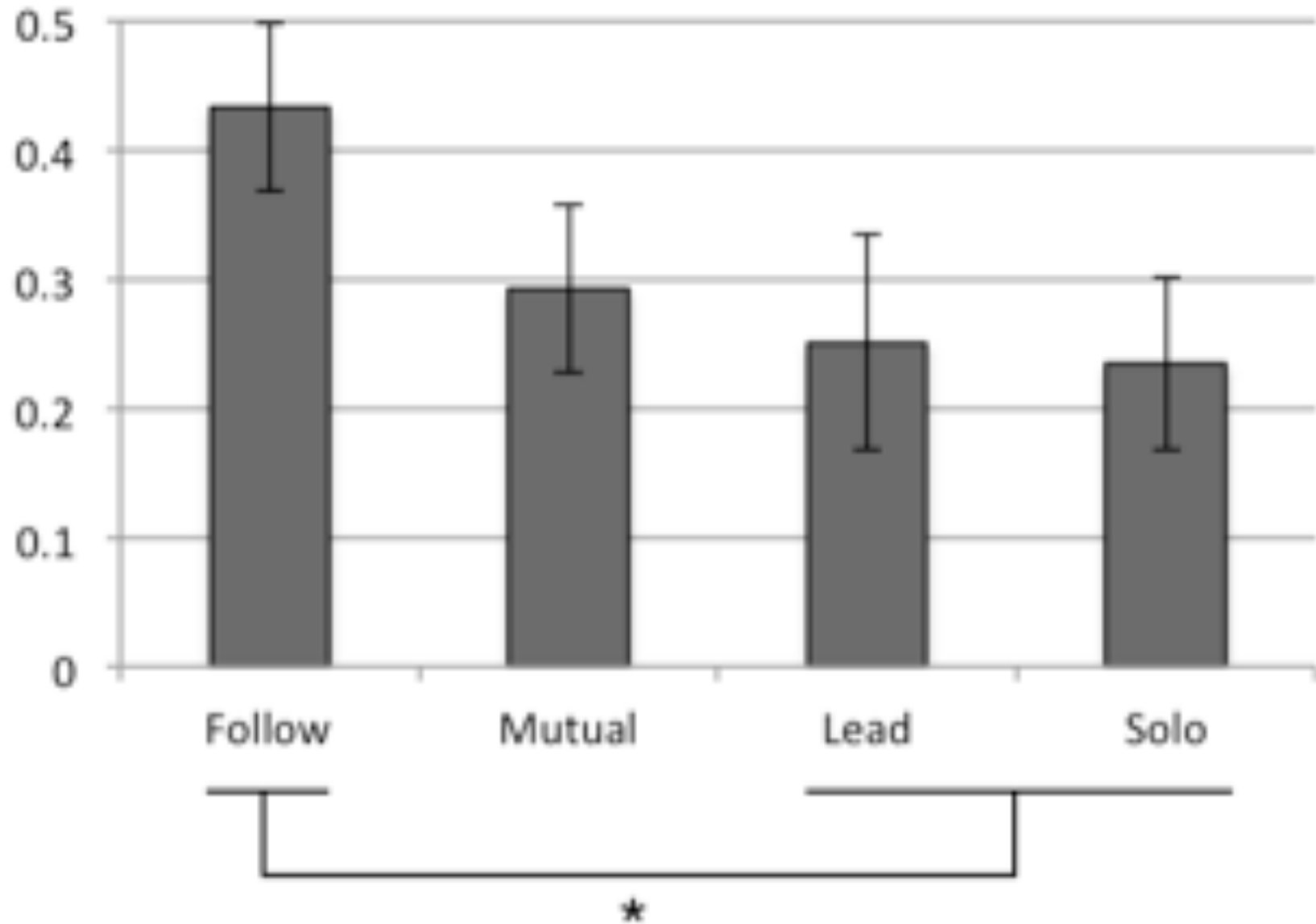
 Tactile motion

 Visual motion

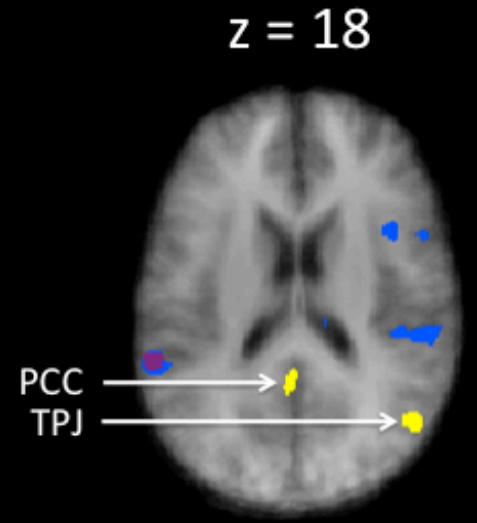
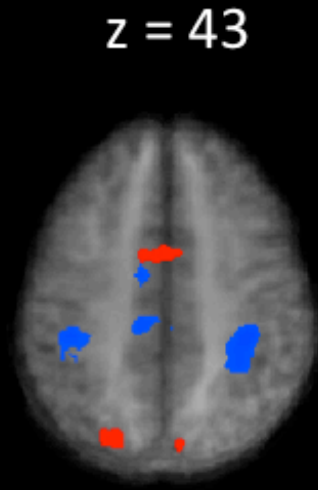
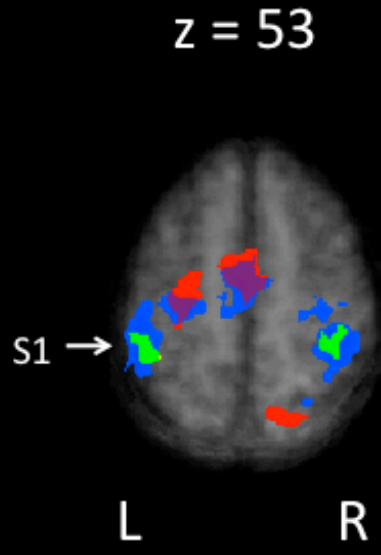
Tactile V5



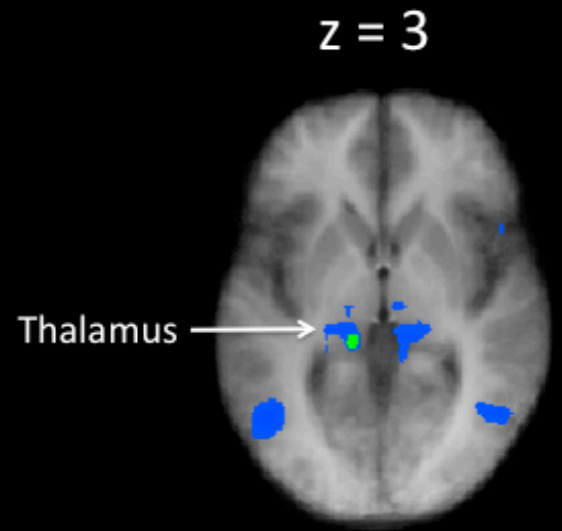
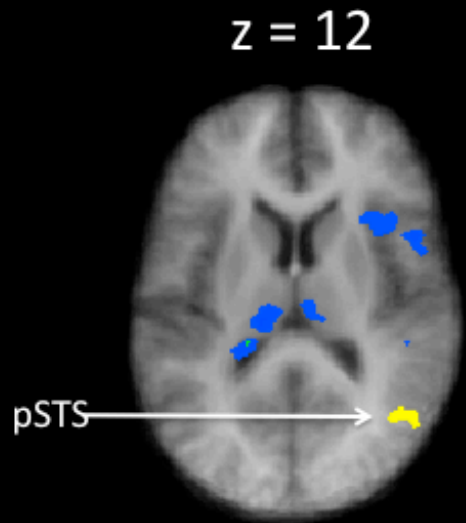
Being moved by someone







 Mutual



Partnering

1) leading

motor planning, navigation

2) following

somatosensory areas, tactile V5

3) mutual

mentalizing areas (cooperation)

The 4 P's of Dance

Pattern

Partnering

Pacing

Person



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Bi morali vsi študija ples.

