Articolo #2

NeuroImage

Magnetic stimulation of visual cortex impairs perceptual learning

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Struttura di un articolo scientifico

- **Introduction** *Cosa è stato fatto in precedenza? Perché è stato condotto lo studio?*

- **Results + Materials and Methods** *Cosa è stato scoperto? Come è stato condotto lo studio?*

- **Discussion** *Cosa significa?*

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- **Discussion** *Cosa significa?*

Introduction

- *Cosa è stato fatto in precedenza?* Breve overview della letteratura sul topic affrontato
- *Cosa non è chiaro?* Introduce il problema
- *Scopo della ricerca.* Espone la motivazione del lavoro presentato
- *Come è stato condotto lo studio?* Breve overview del Metodo
- *Predizioni*. Cosa ci aspetta di trovare

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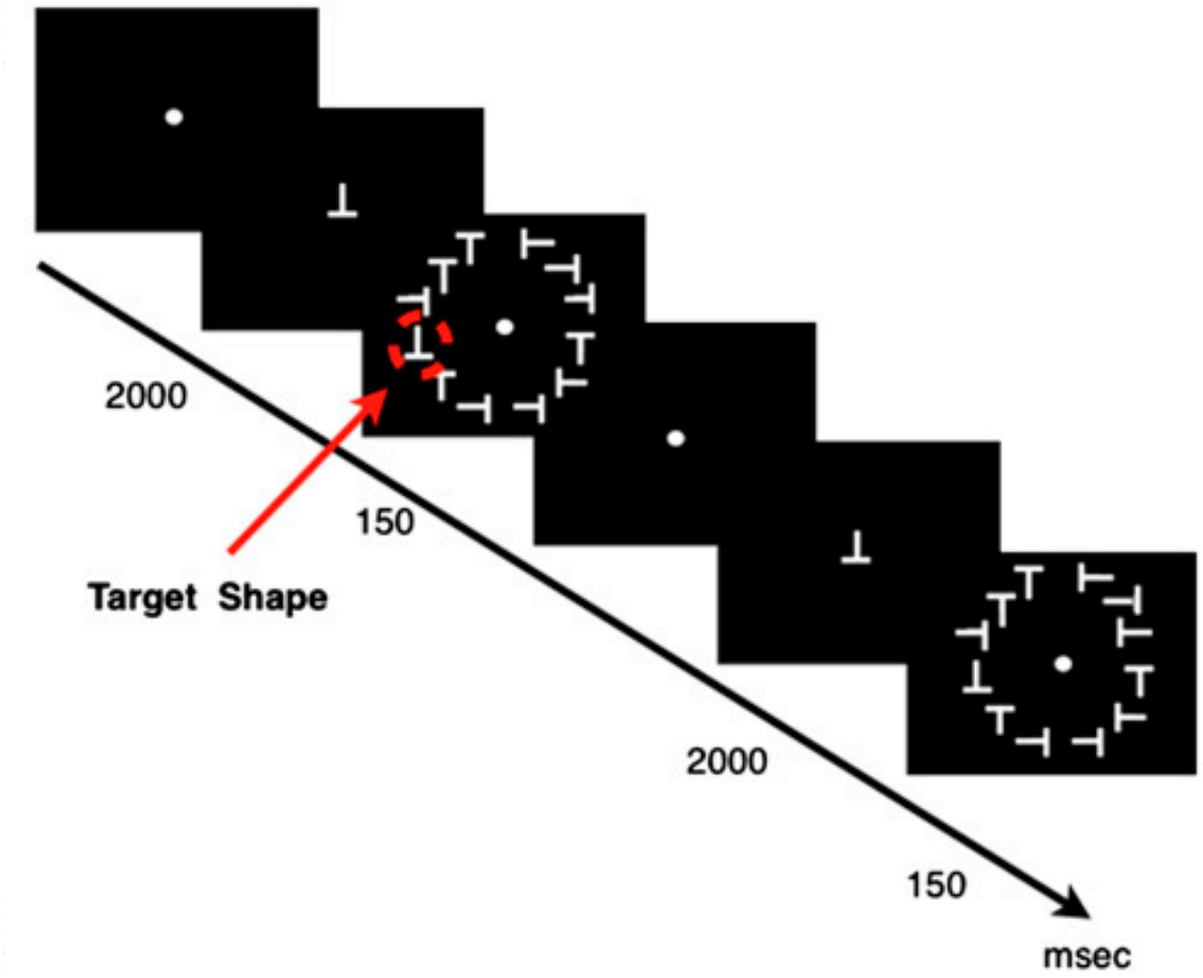

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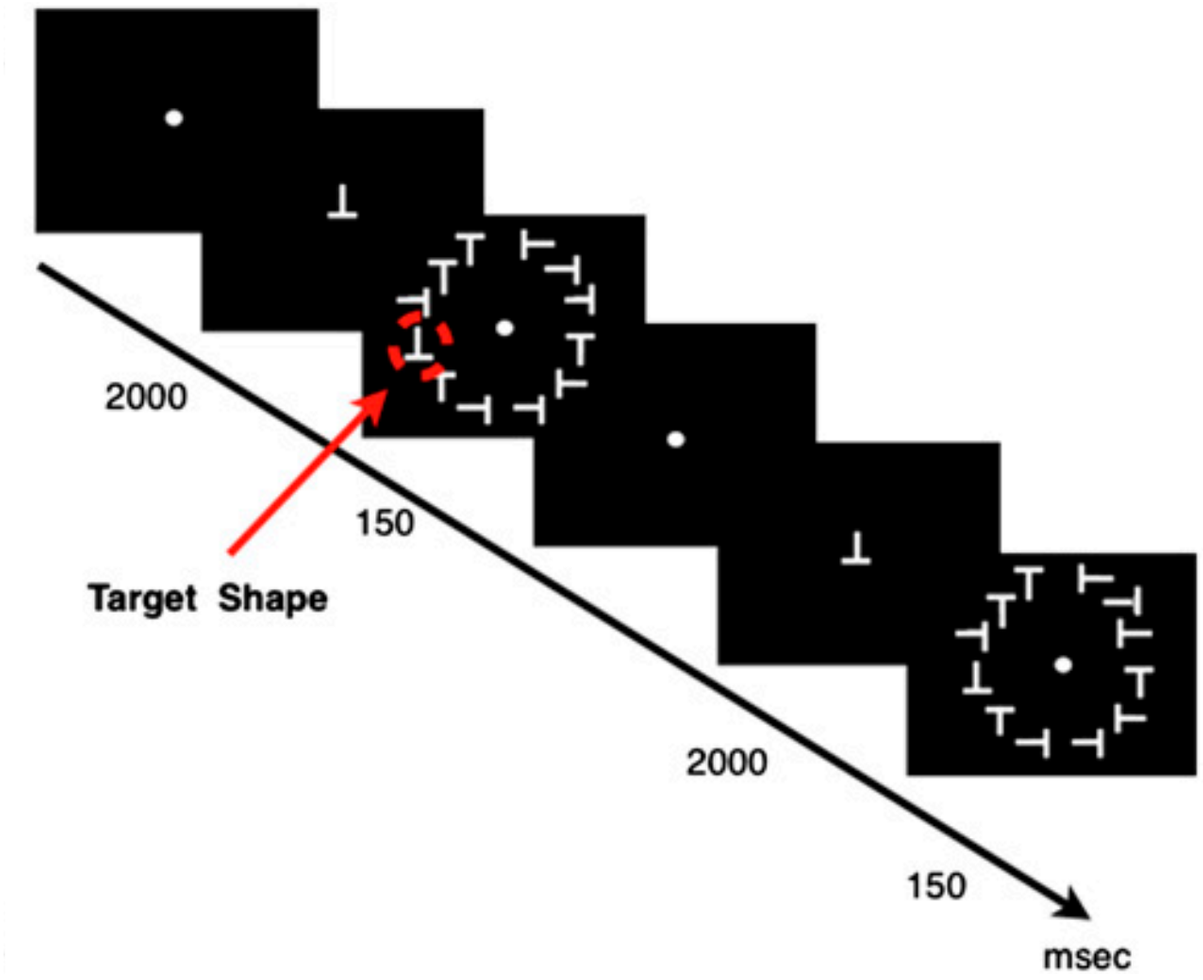

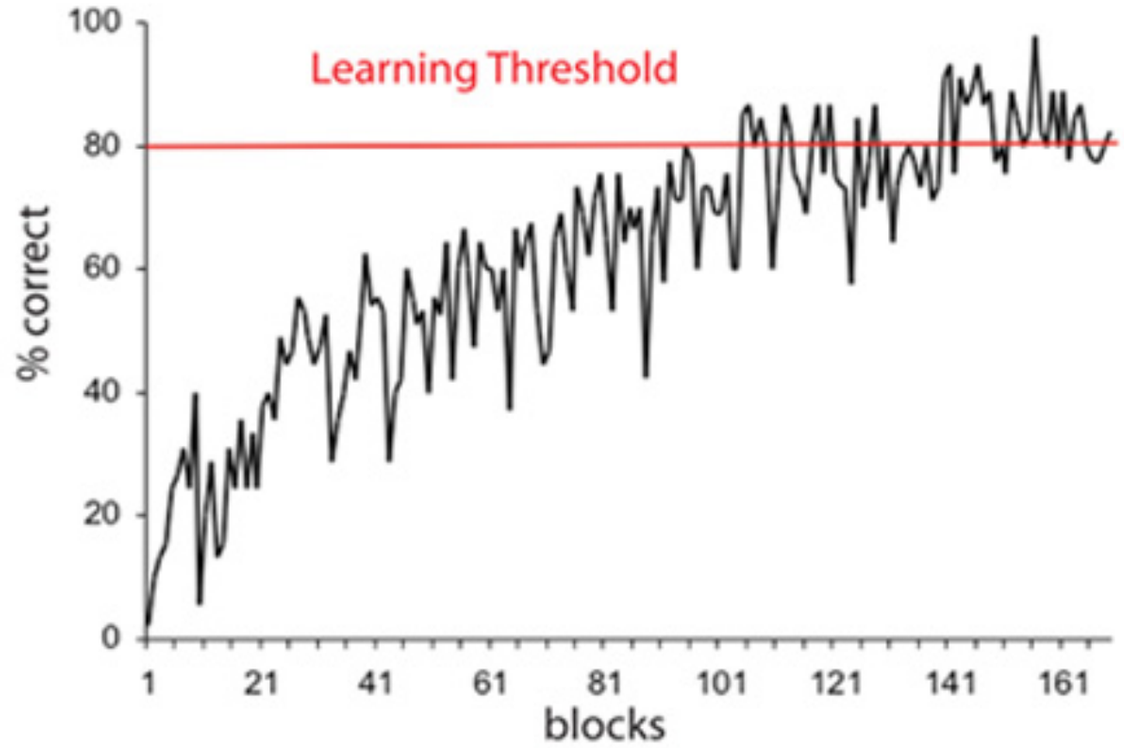

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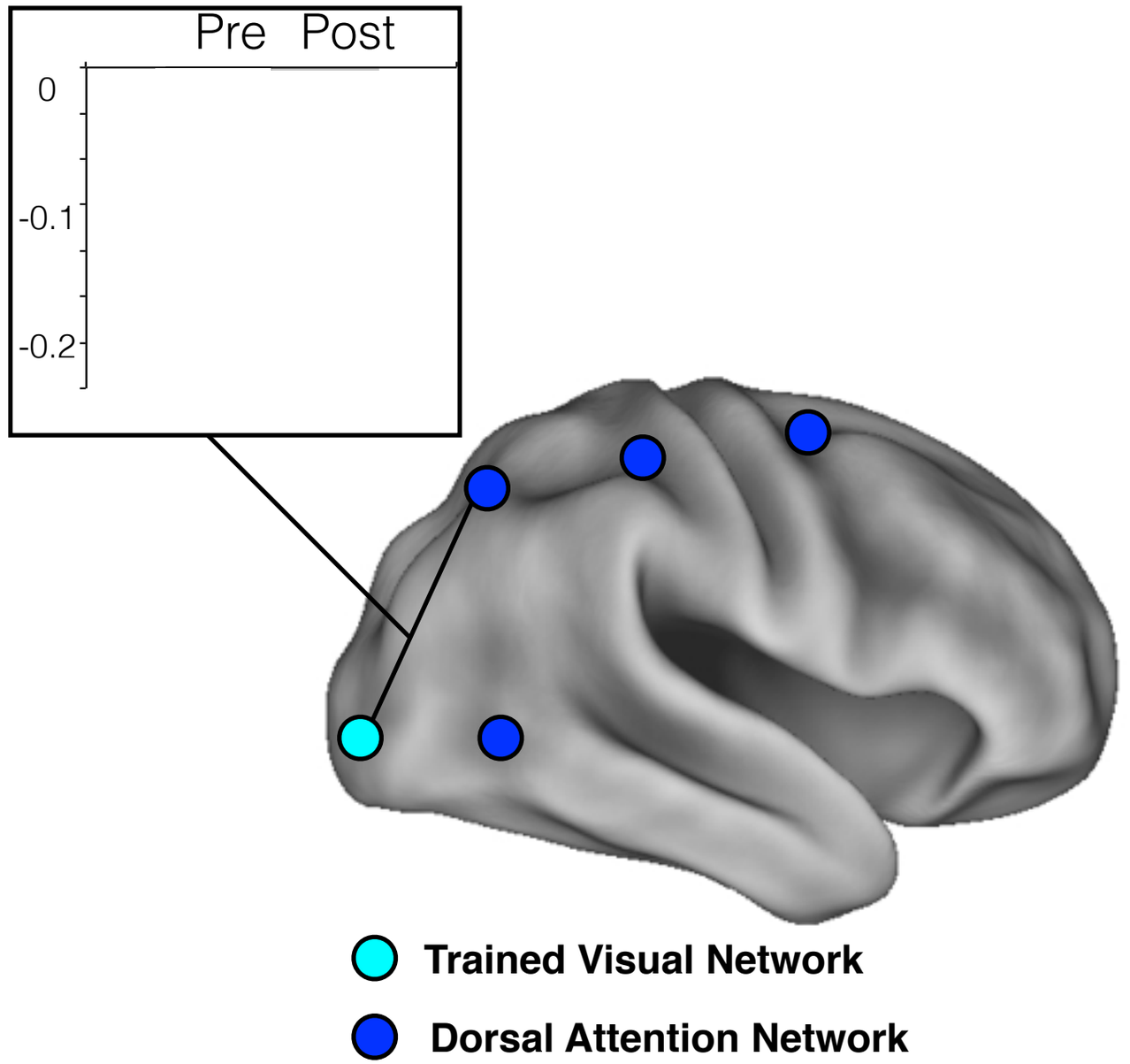

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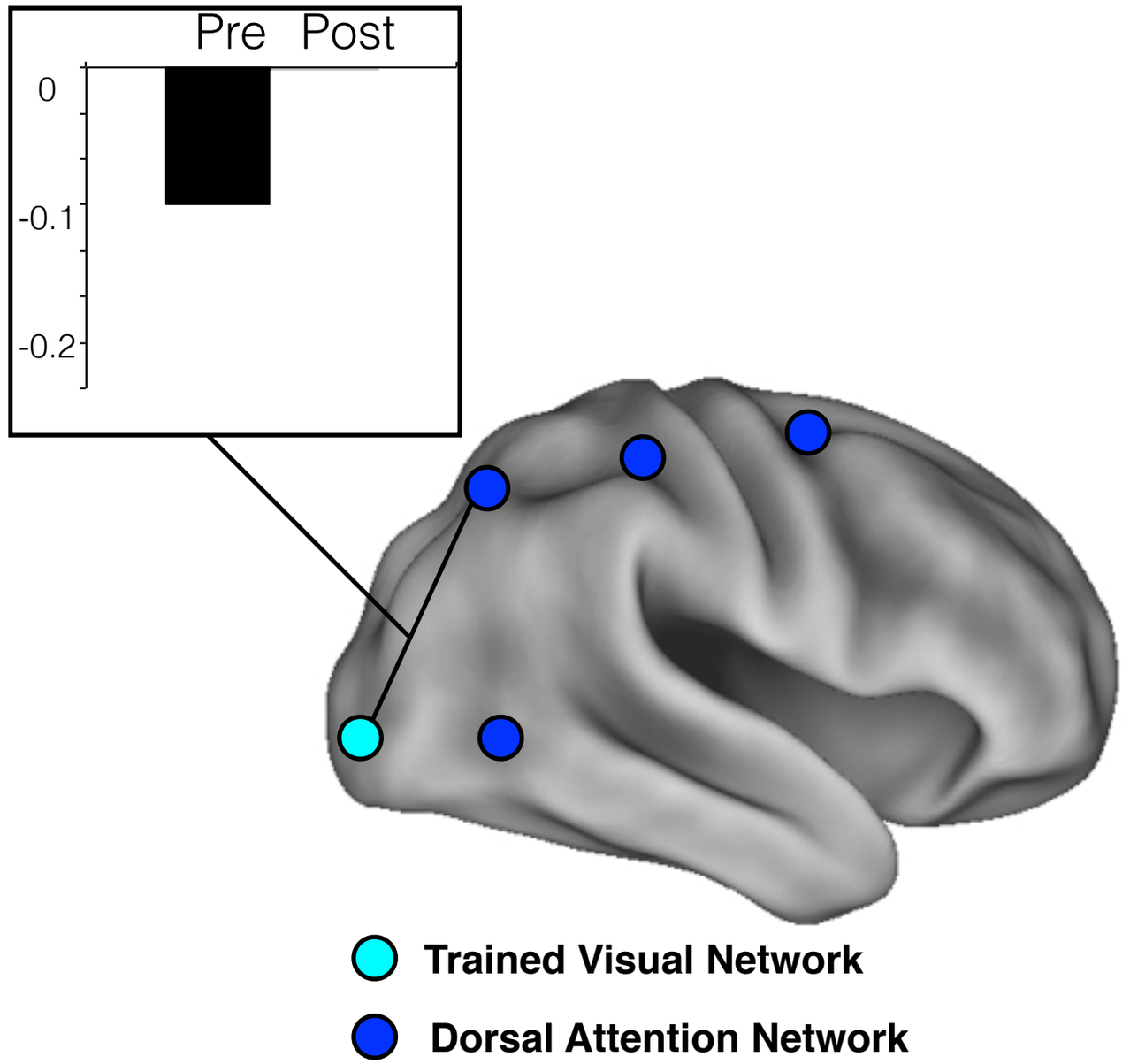

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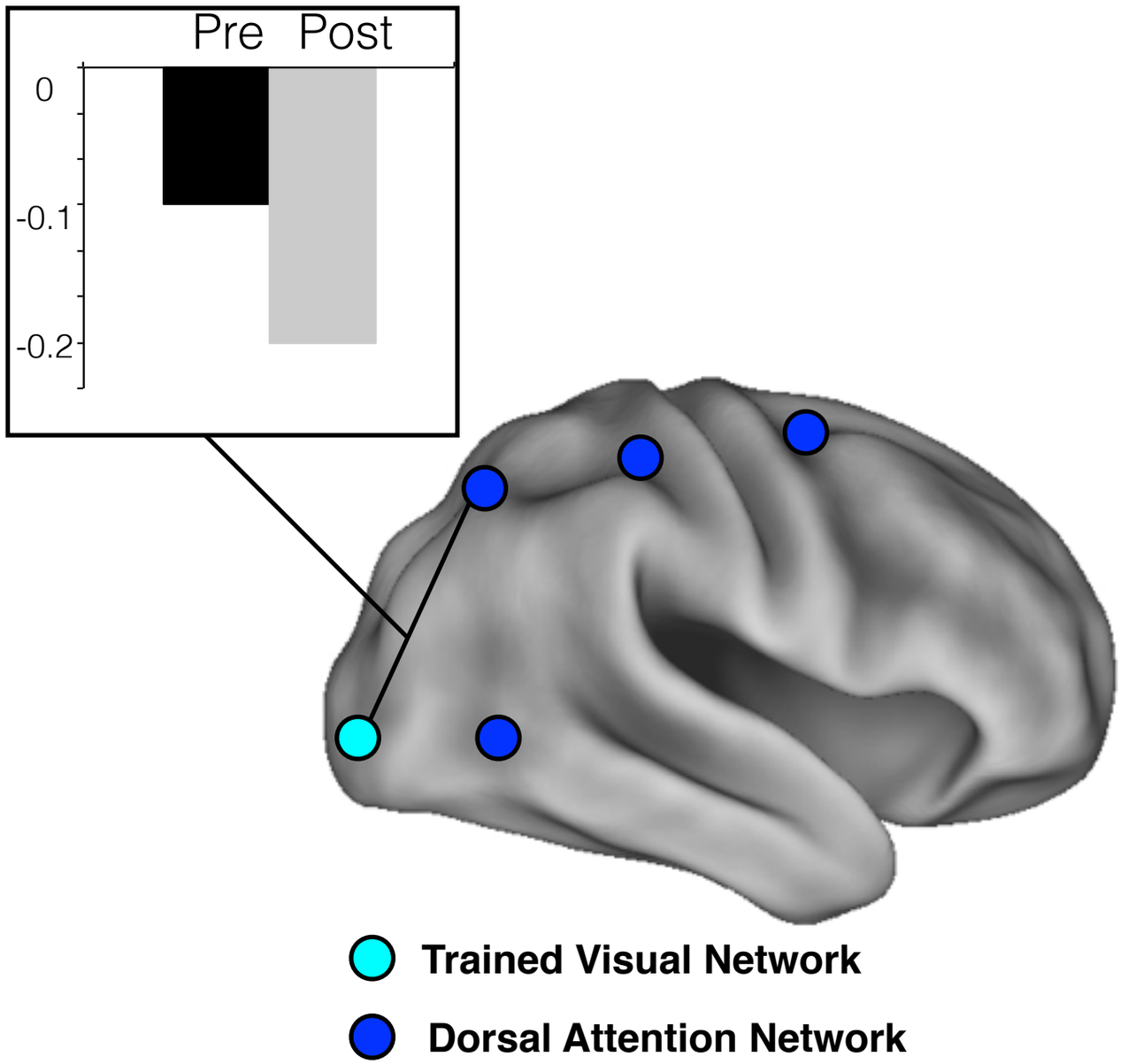

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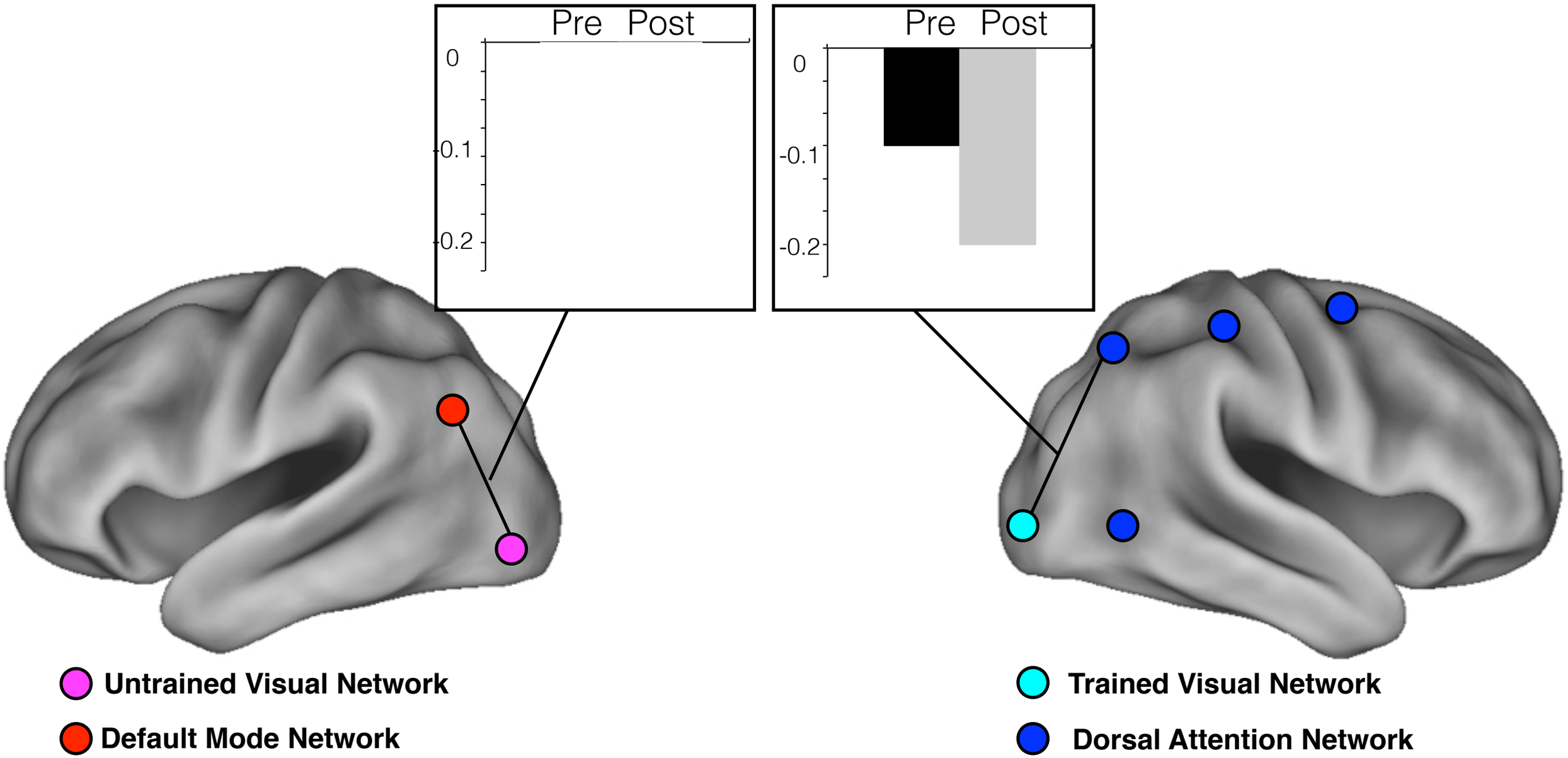

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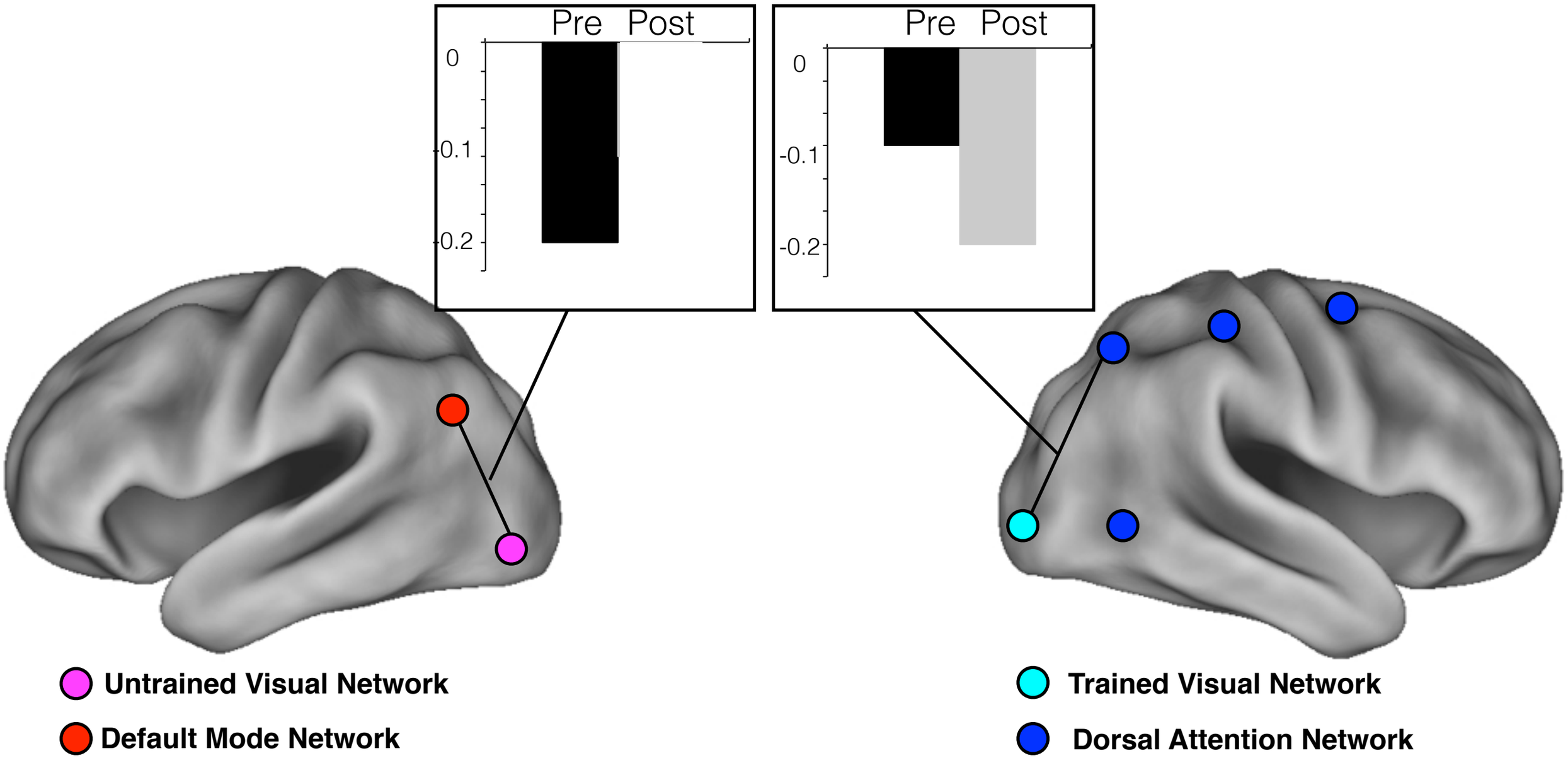

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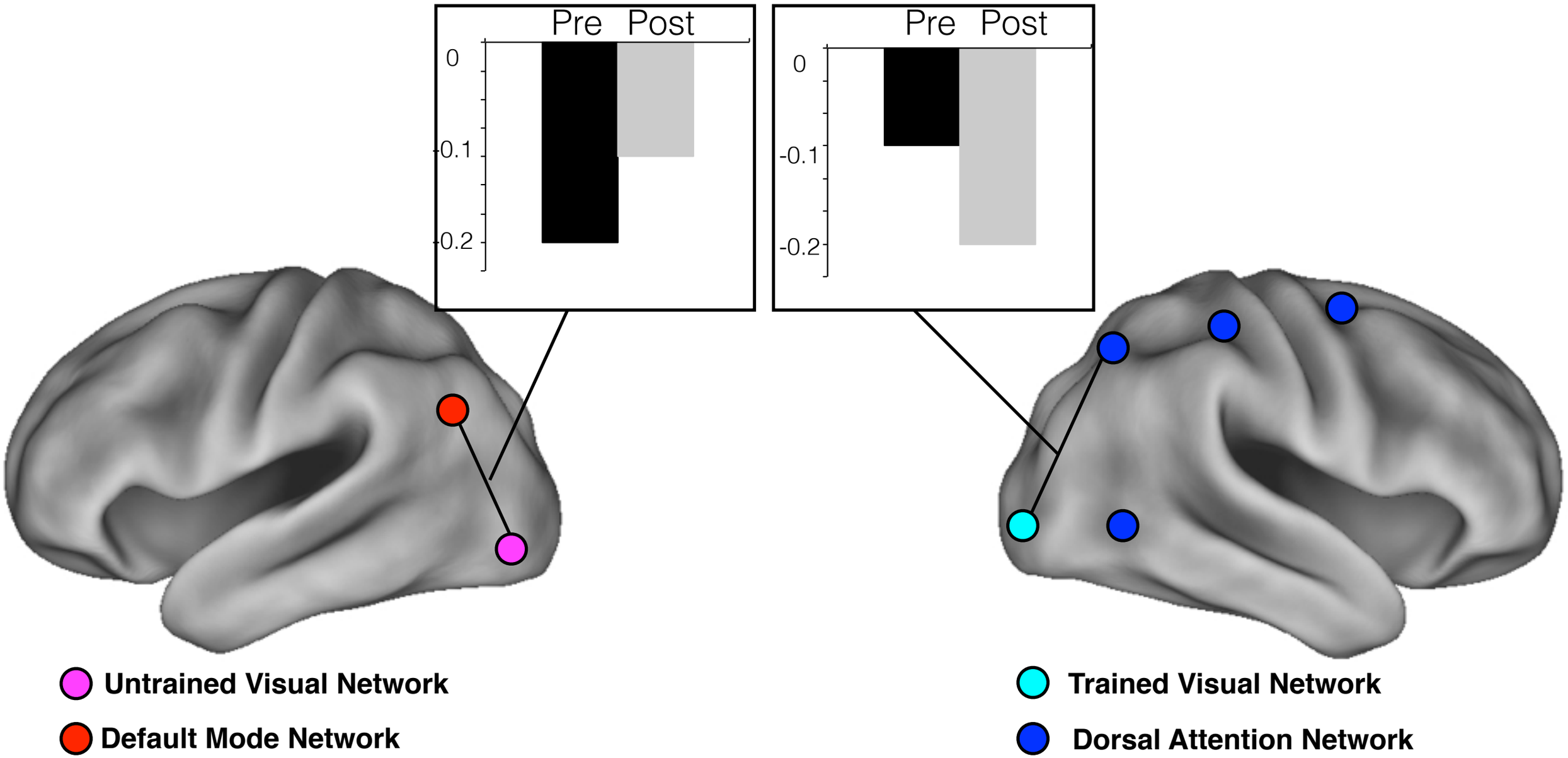

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- Per esempio, lo studio fMRI di Lewis e coll. (2009) sul VPL han mostrato che il ***dorsal attention network*** era maggiormente attivato per la forma nuova (non-allenata) e meno activate per la forma familiare (allenata).

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- E' stato suggerito che il VPL sposta il locus corticale dell'elaborazione deli stimuli appresi da regioni di alto-ordine di control cognitive (nella fase iniziale del training) verso region della corteccia visiva (quando il training e' completato)

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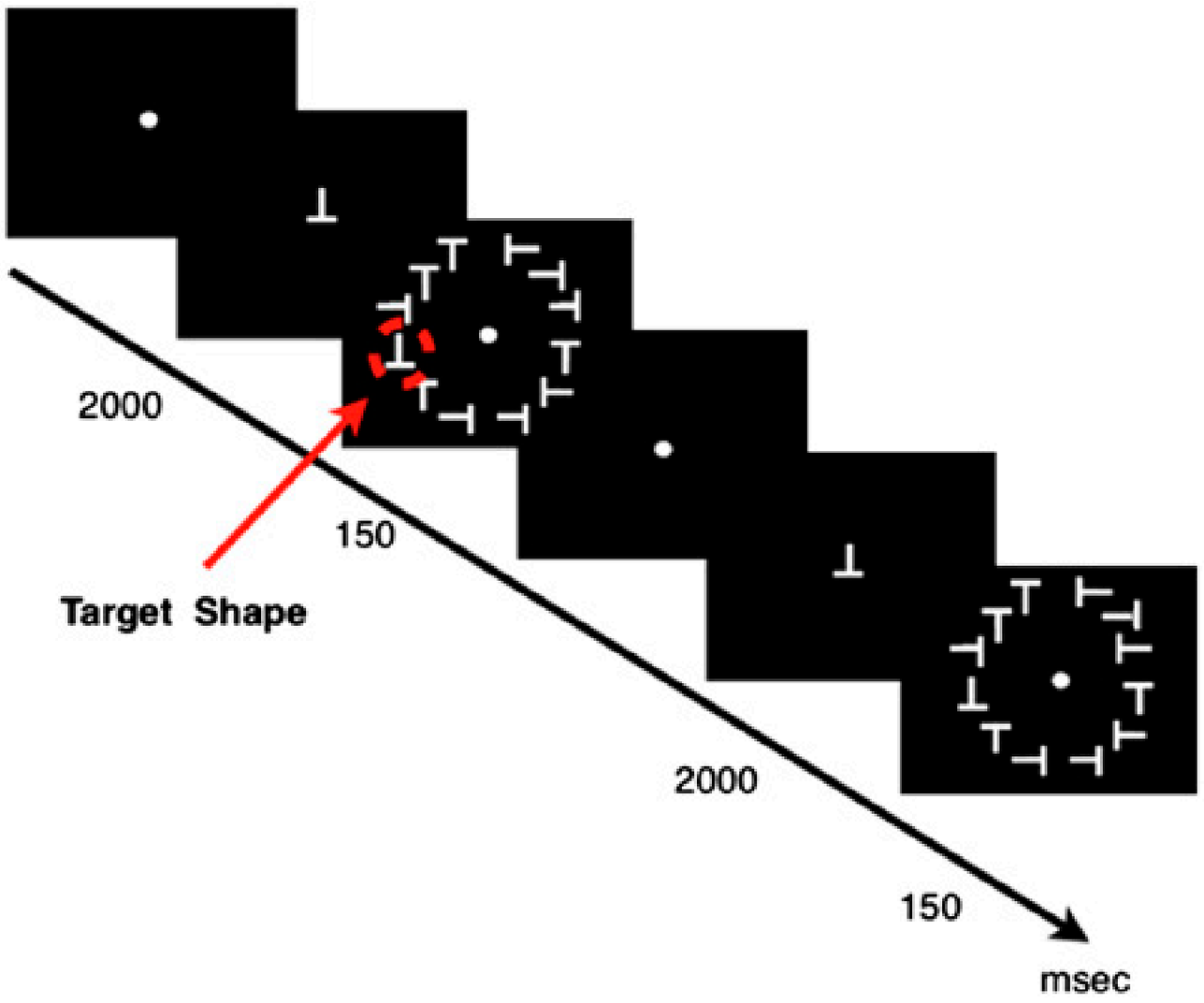
- Dicontro, la ***corteccia visiva*** era piu' attivata per la forma familiare (allenata) rispetto a quella nova (non-allenata)

Introduction

Orientation Discrimination task



- 14 soggetti sani
- Stimoli: 12 T con diverso orientamento
- Durata stimolo: 150 msec
- Target: T rovesciata solo nel quadrante inferiore sx
- 80% casi presente; 20% assente
- Distrattori: T diverso orientamento
- Compito: mantenere la fissazione e prestare attenzione quadrante inferiore sx per identificare la forma target
- Risposta: presente/assente
- Registrazione dell'accuratezza e dei tempi di reazione (RTs)
- *Learning threshold* (soglia di apprendimento): 10 blocchi consecutivi con 80% accuratezza
- Risposte "pesate" per i falsi positivi

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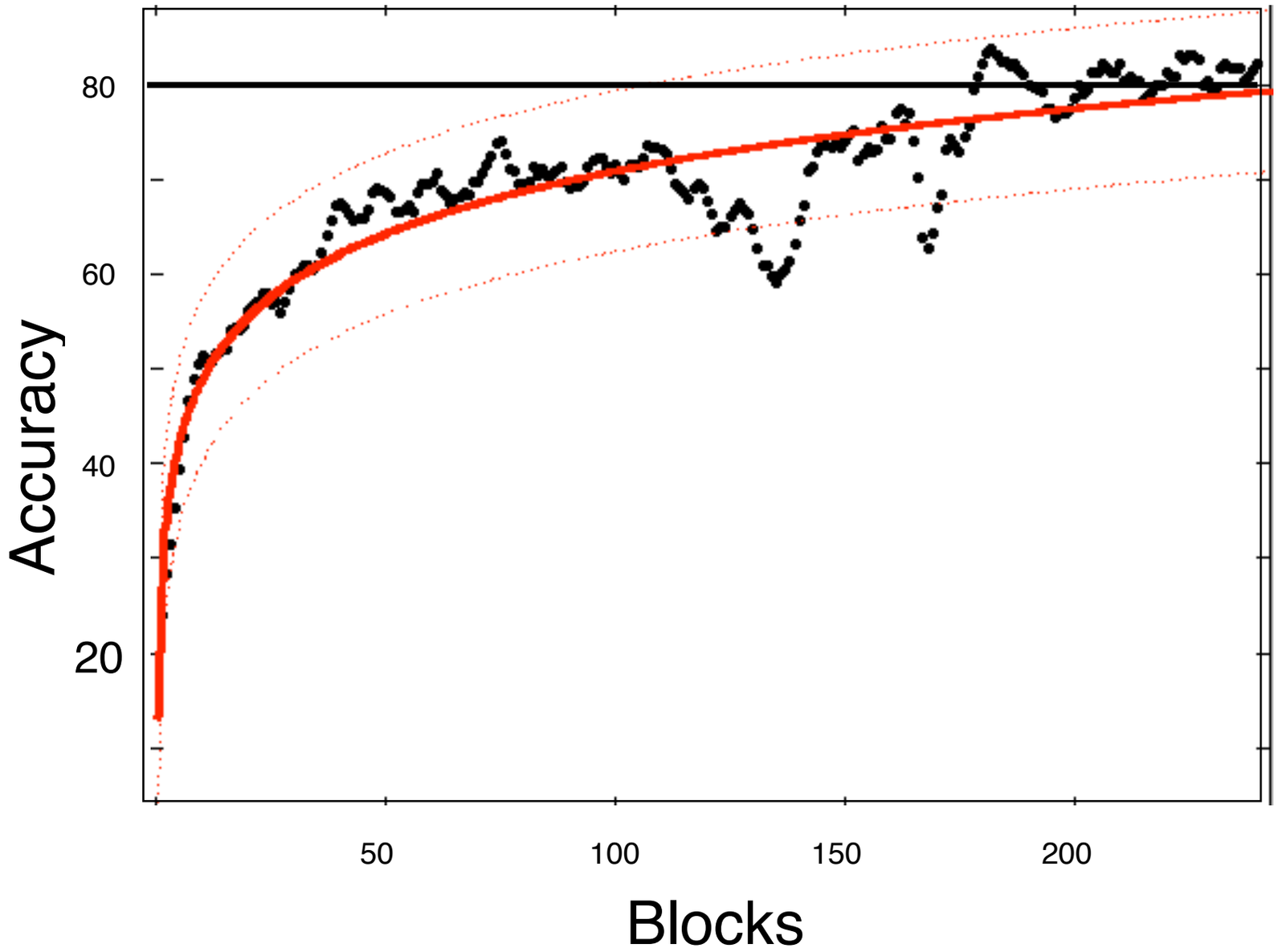

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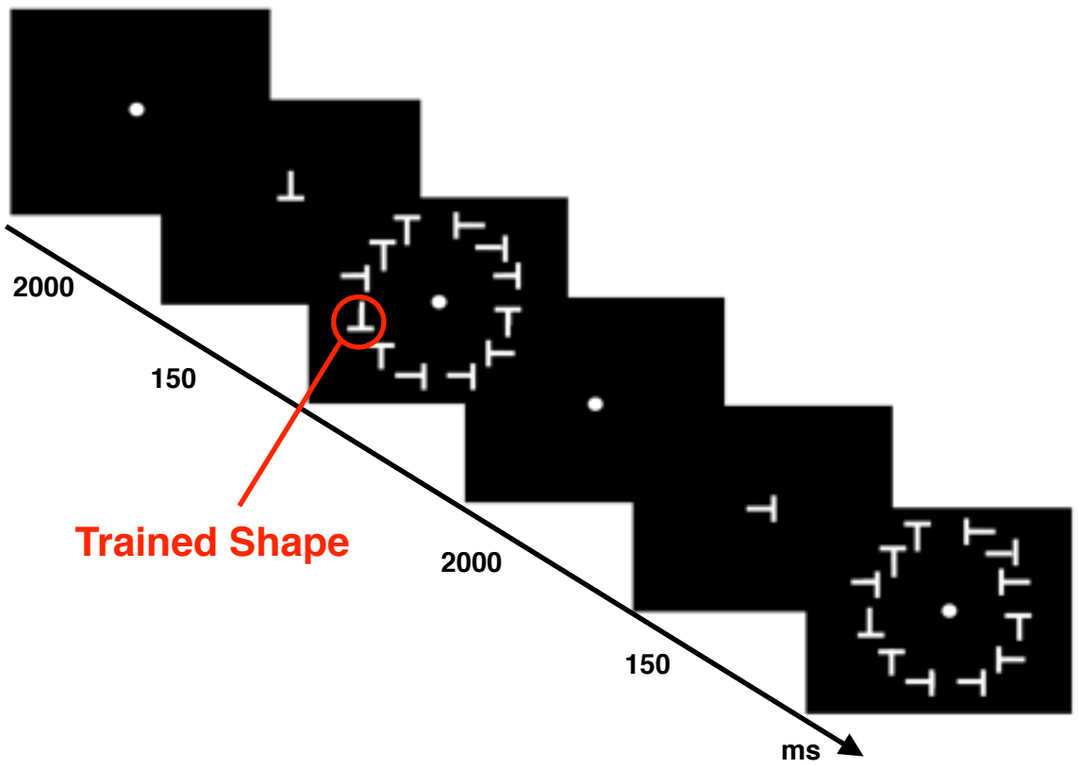

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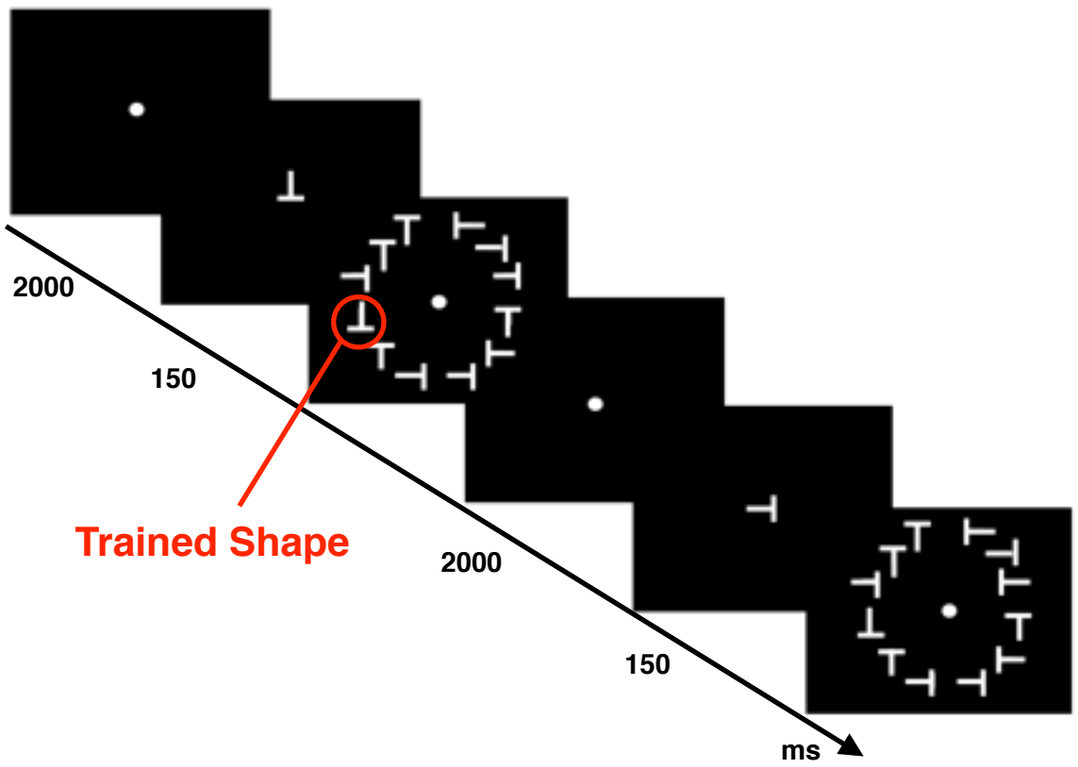

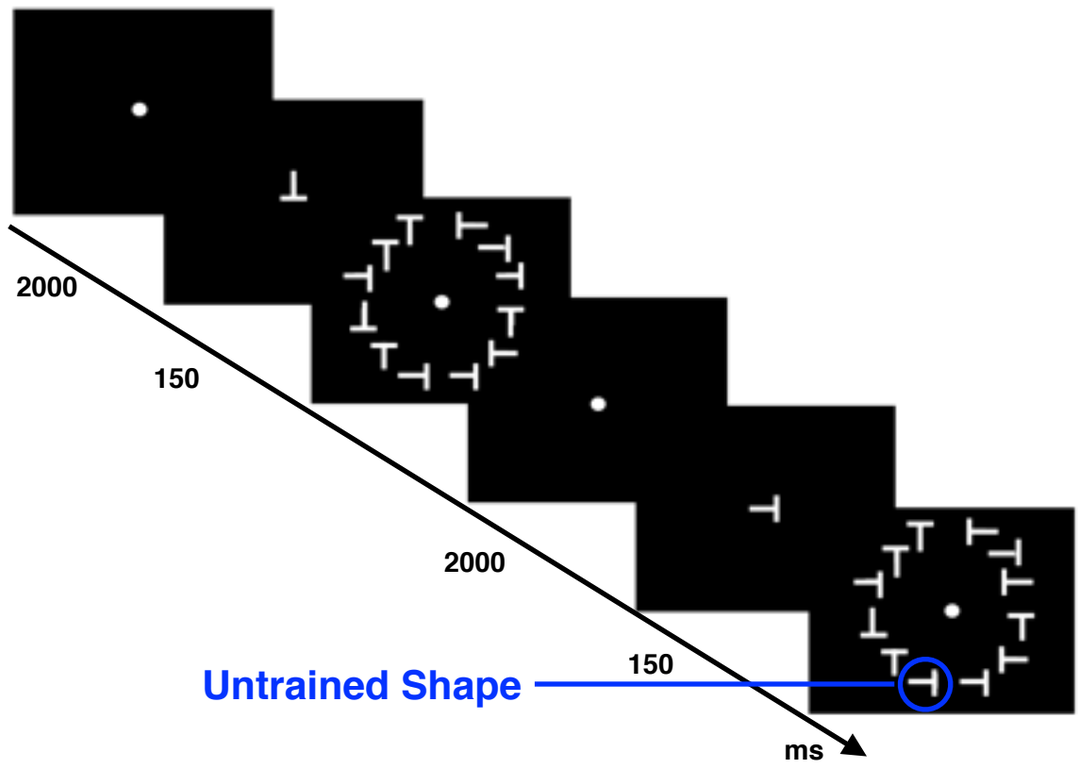

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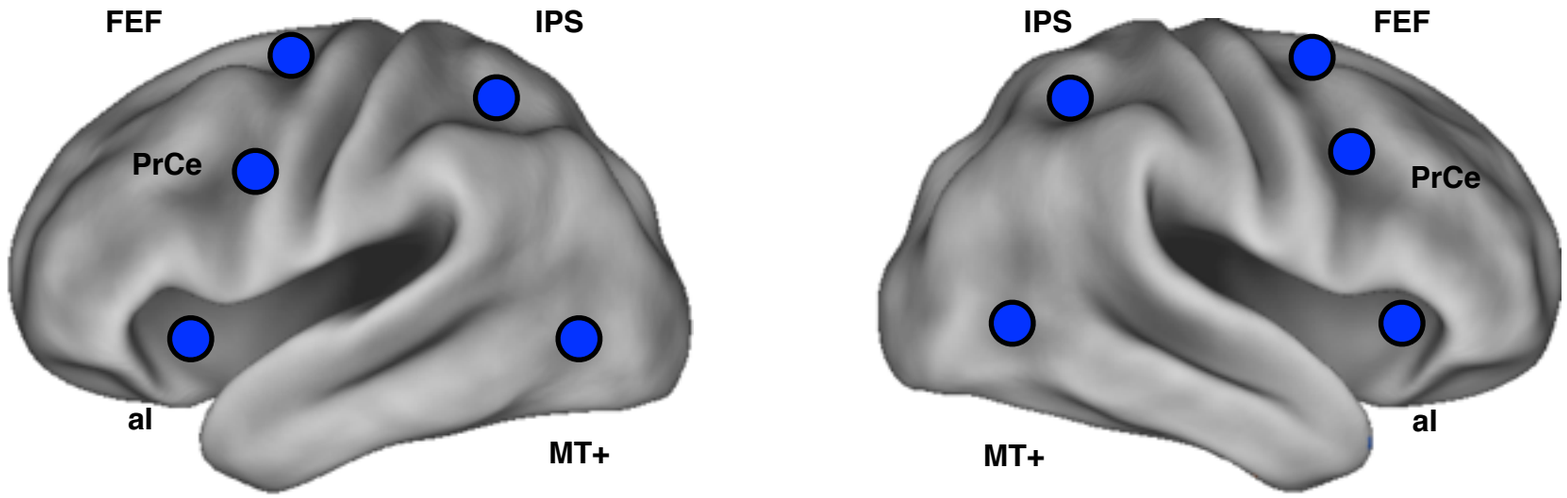

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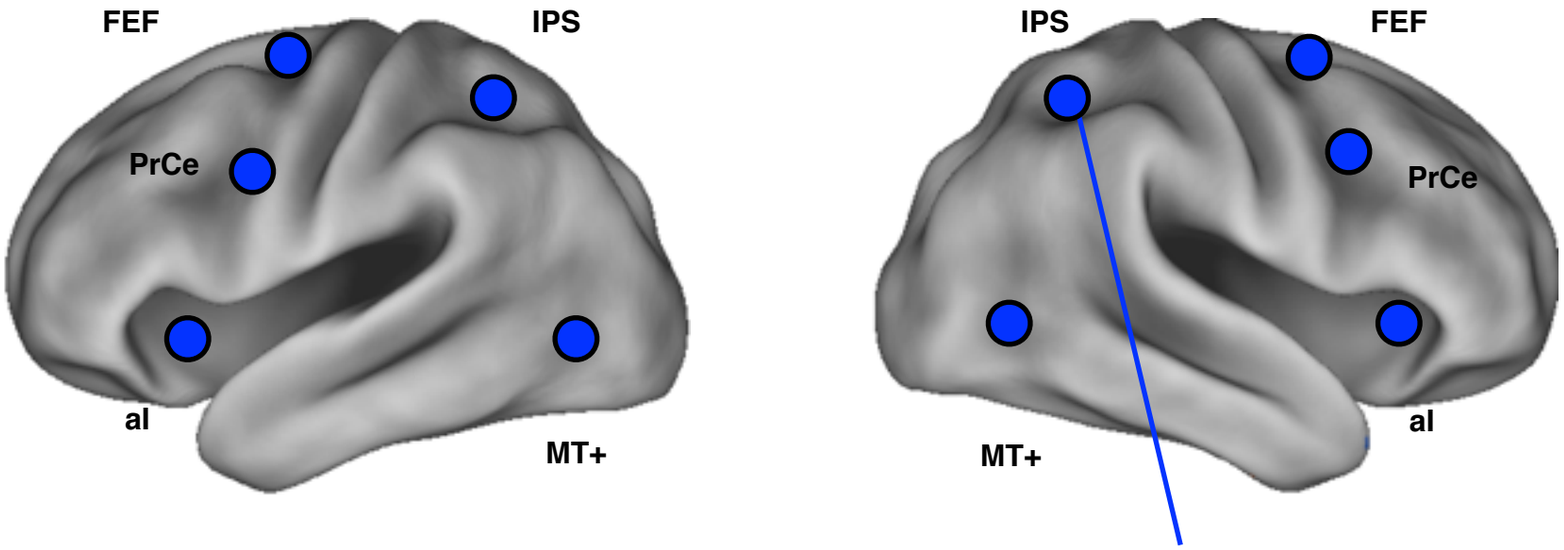

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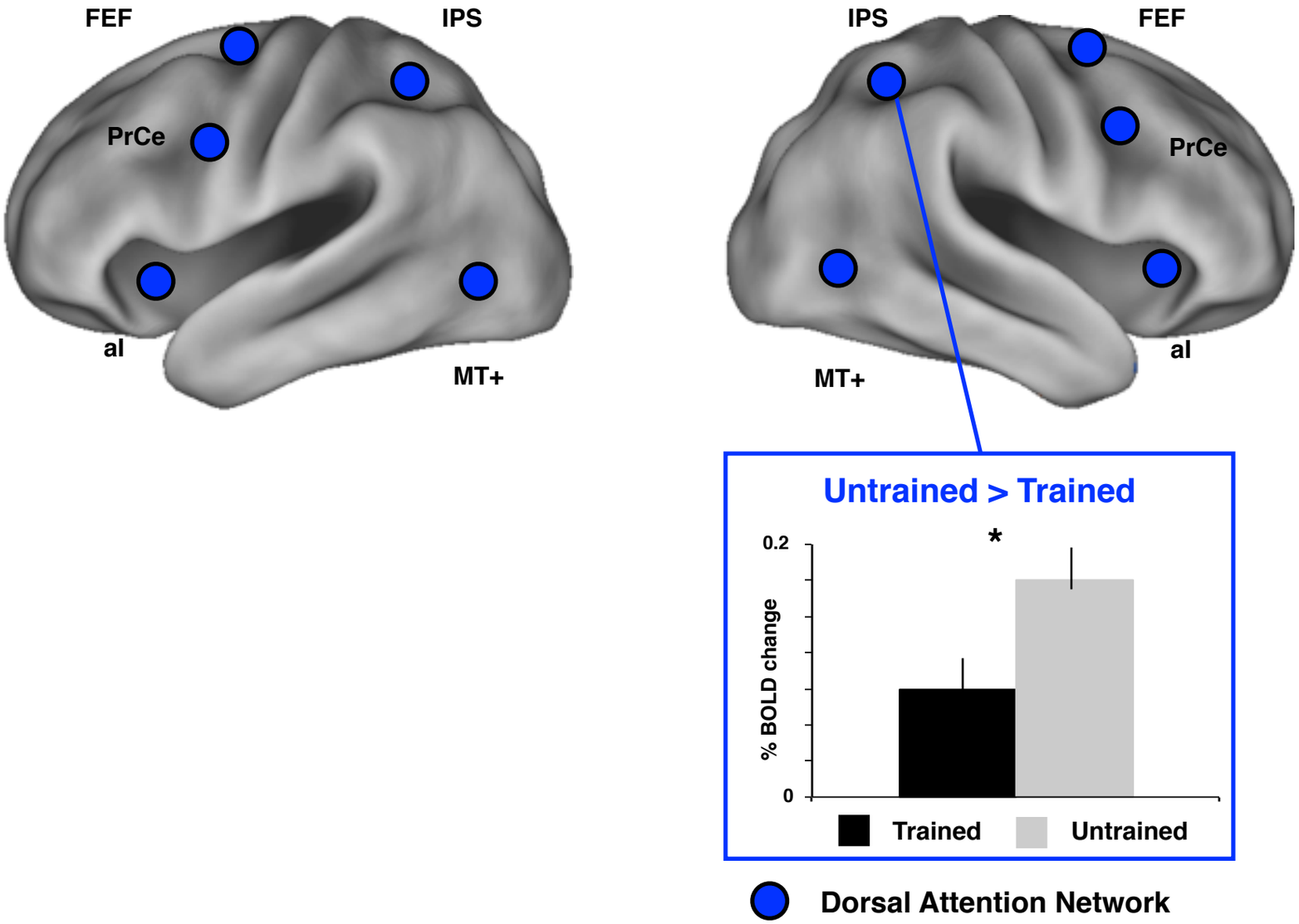

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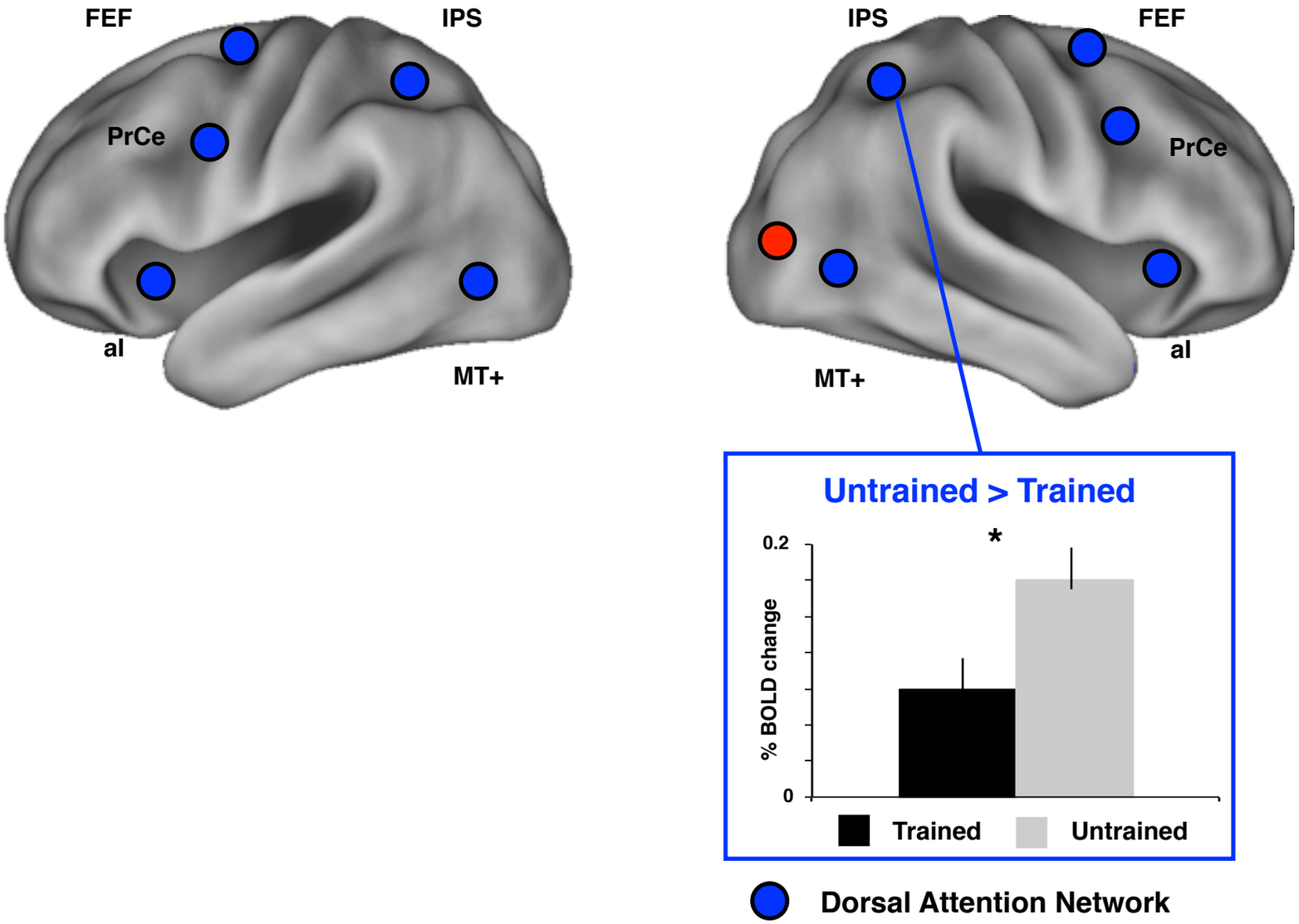

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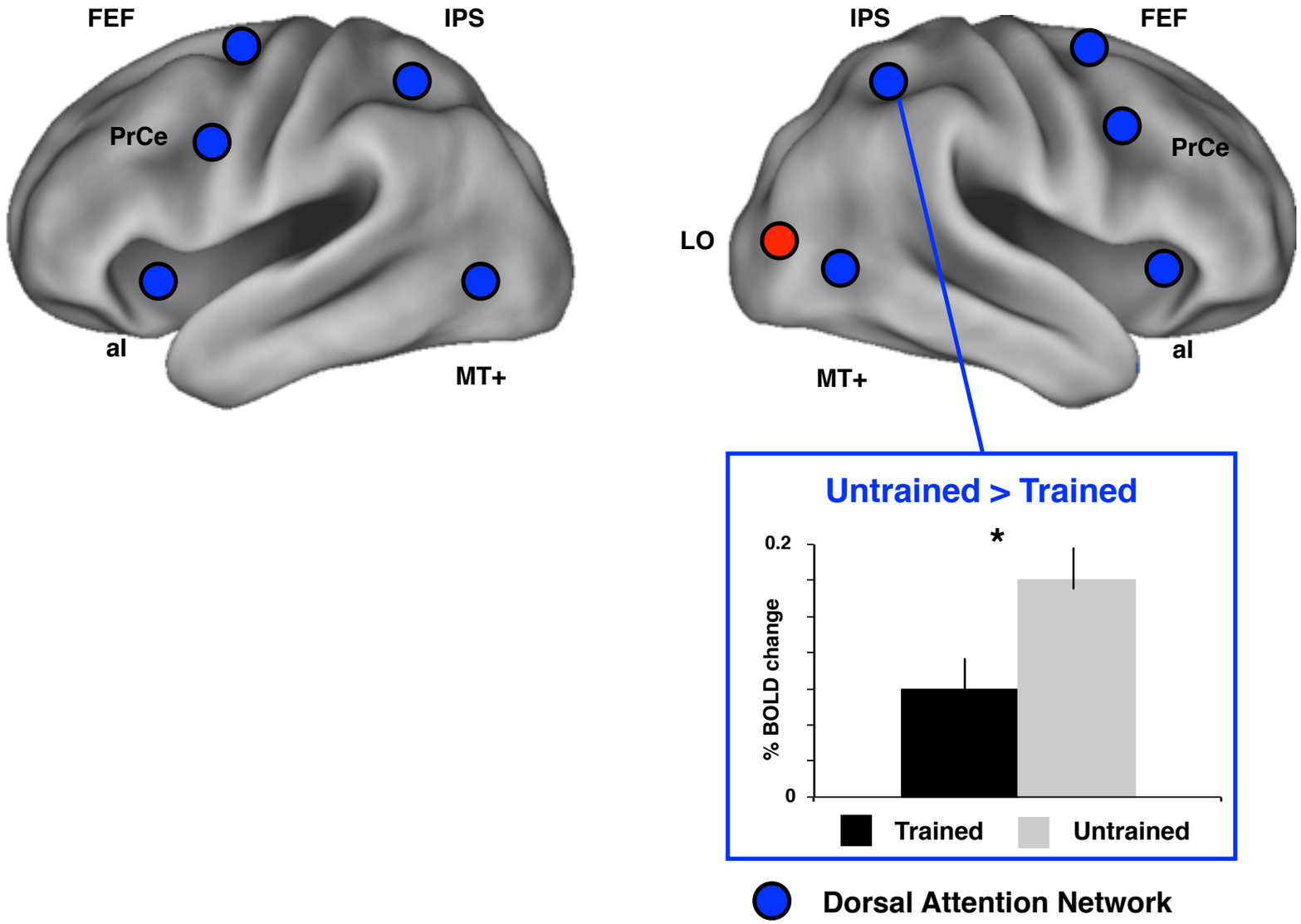

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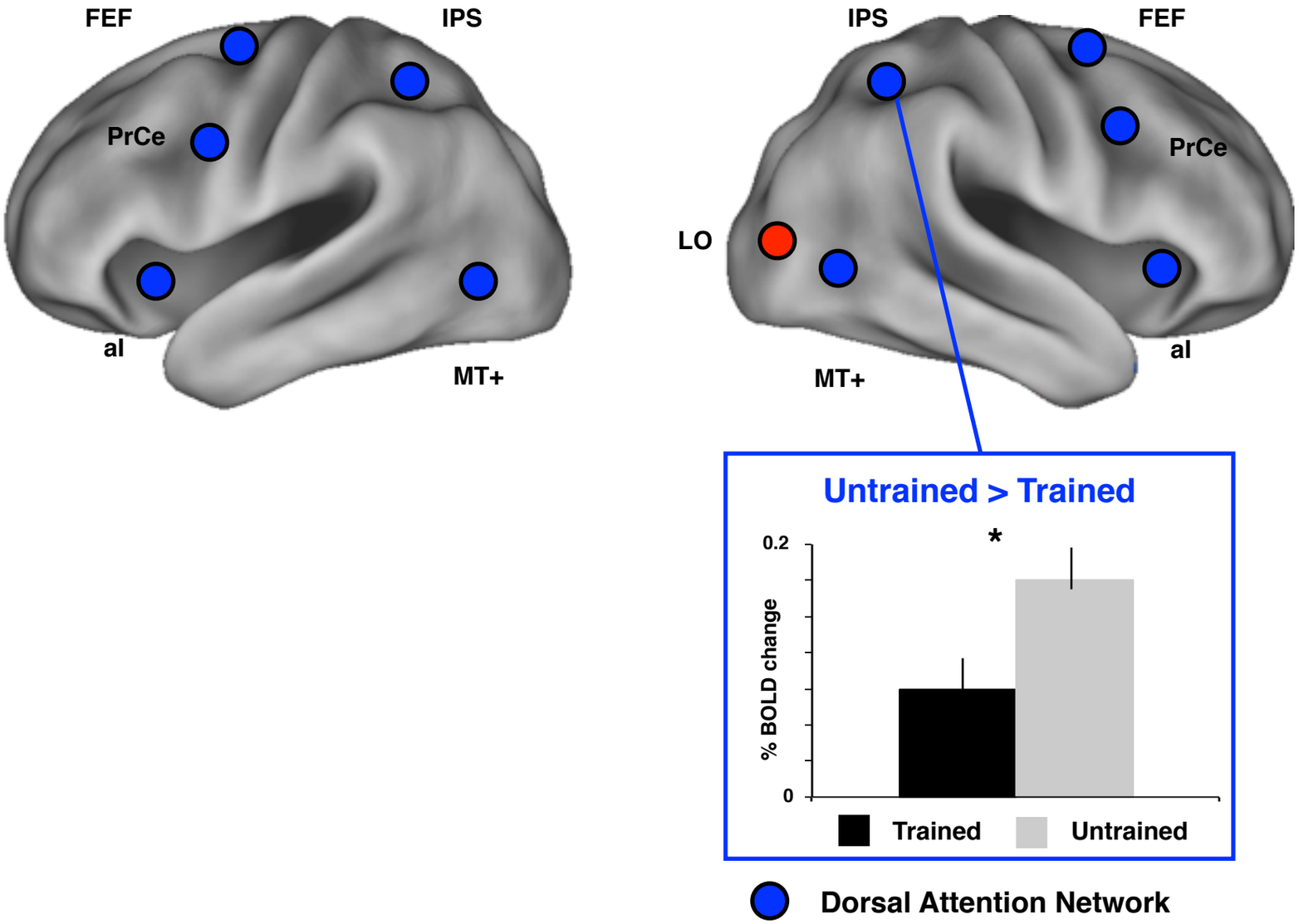

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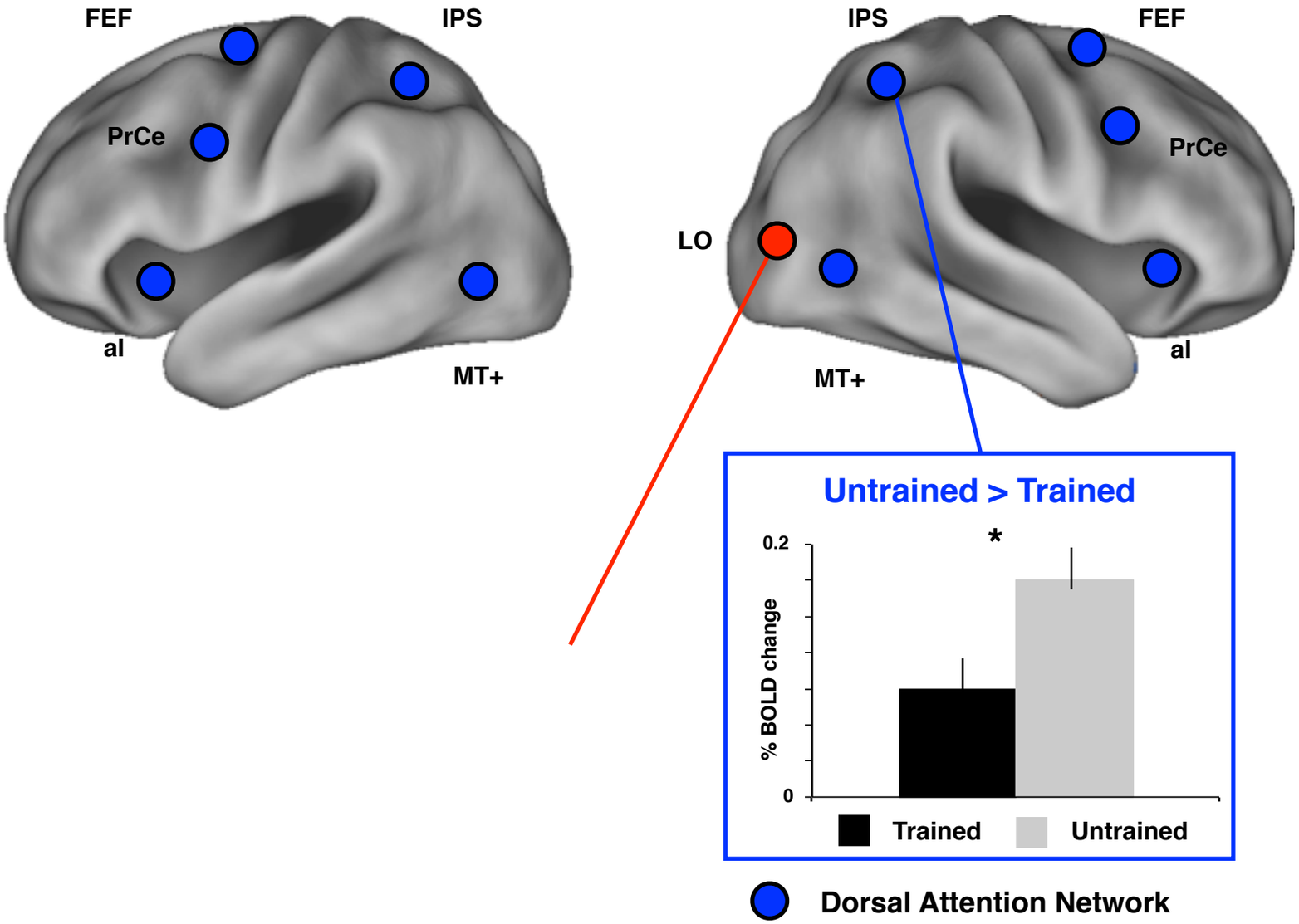

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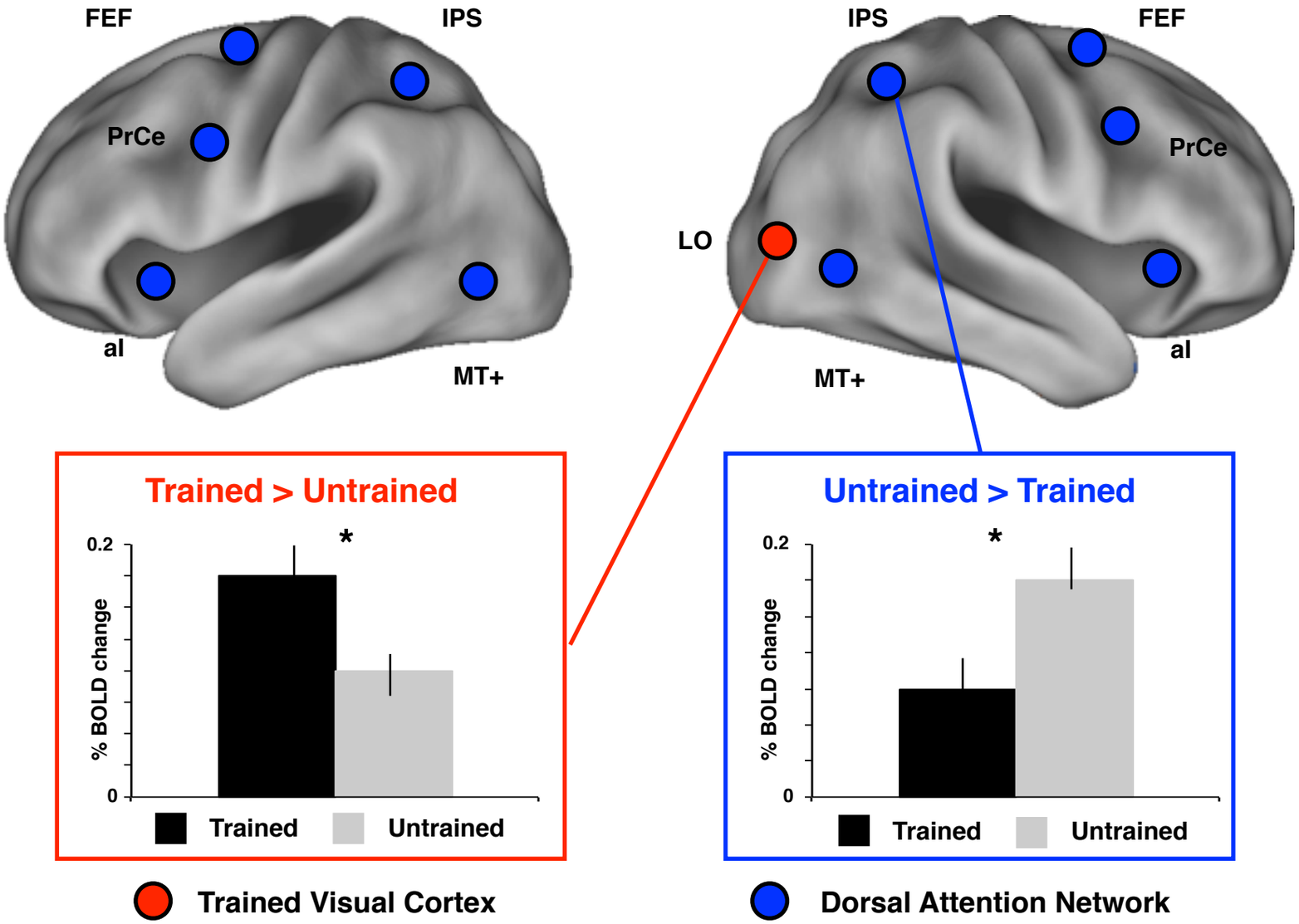

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- Considerati nel complesso, questi risultati supportano l'ipotesi che, mentre le regioni attentive/ controllo fronto-parietali sono piu' importanti nella fase iniziale del training, il controllo attentive diviene meno importante nella fase finale del training quando si formano dei 'templati' in corteccia visiva.

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While the above studies have provided invaluable information on the neural mechanisms of VPL, there is actually scarce direct evidence that the learning specific visual regions (i.e. V2d/V3 and LO) are actually mediating perceptual learning. Here we used repetitive TMS (rTMS) in healthy volunteers to test with a causal approach hypotheses that are based on our fMRI findings (i.e. correlative), and specifically the crucial role of visual cortices in shape identification task. Using the same visual paradigm of our mentioned studies (Lewis et al., 2009; Baldassarre et al., 2012), after the intensive training, rTMS was employed to interfere with the activity in right V2d/V3, LO, or pIPS. If VPL is completed and the template of learned shape is formed in the corresponding (i.e. right) visual regions, then we predict that the inactivation of parietal cortex (i.e. pIPS) will not affect the behavioral performance. On the contrary, we expect impairment in detecting familiar shapes after inactivation of both visual cortices (i.e. V2d/V3 and LO). Furthermore, since our previous neuroimaging experiments showed a similar learning-related fMRI modulation for V2d/V3 and LO, we predict a similar impairment in such visual regions.

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- Dopo un training intensivo la TMS e' stat utilizzata per interferire con l'attivita' delle aree visive alienate (V2d/V3 e LO) e di una regione del solco intraparietale (IPS)

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Methods

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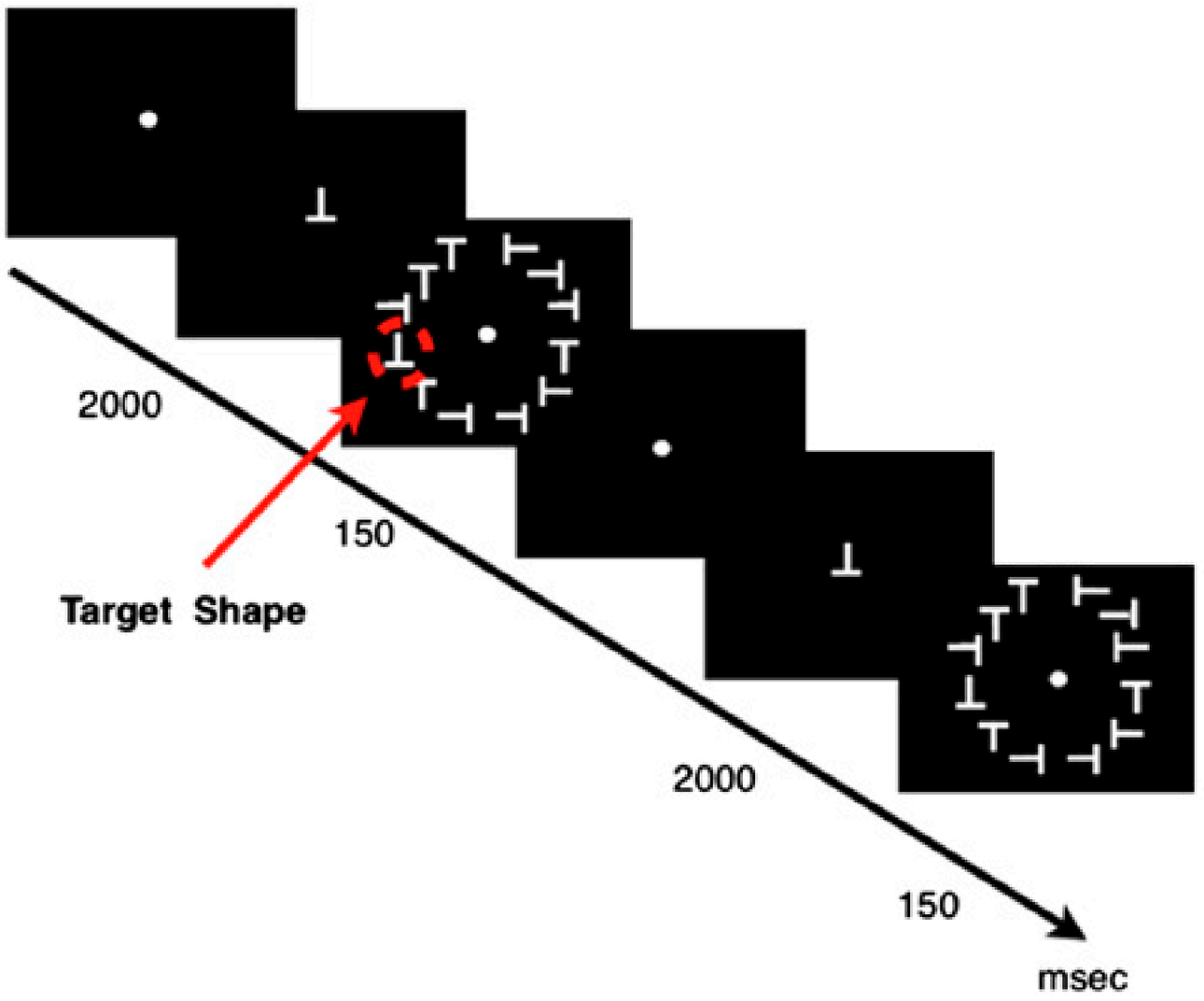
Orientation Discrimination task



- 16 soggetti sani
- Stimoli: 12 T con diverso orientamento
- Durata stimolo: 150 msec
- Target: T rovesciata solo nel quadrante inferiore sx
- 80% casi presente; 20% assente
- Distrattori: T diverso orientamento
- Compito: mantenere la fissazione e prestare attenzione quadrante inferiore sx per identificare la forma target
- Risposta: presente/assente
- Registrazione dell'accuratezza e dei tempi di reazione (RTs)
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- Risposte "pesate" per i falsi positivi

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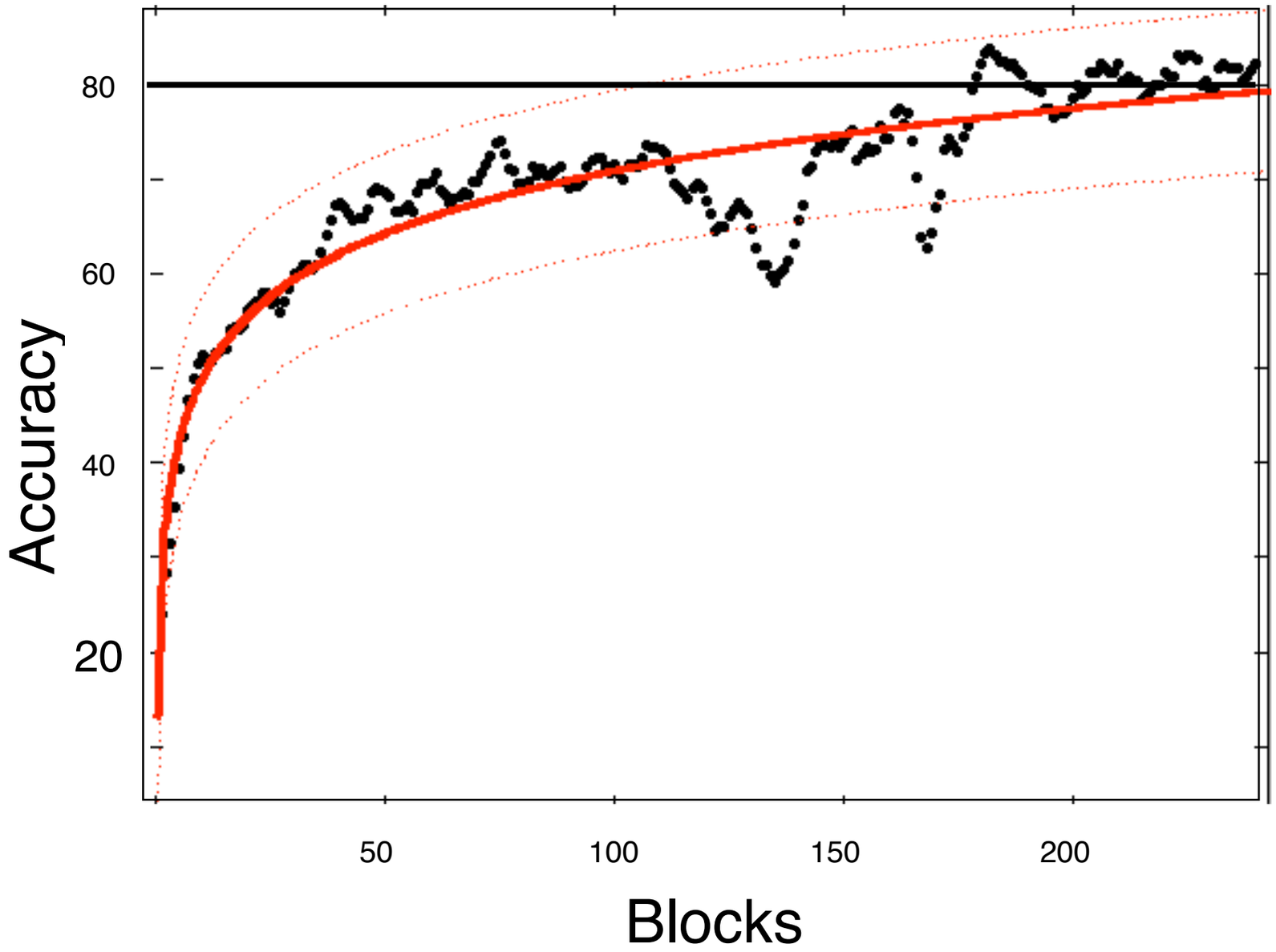

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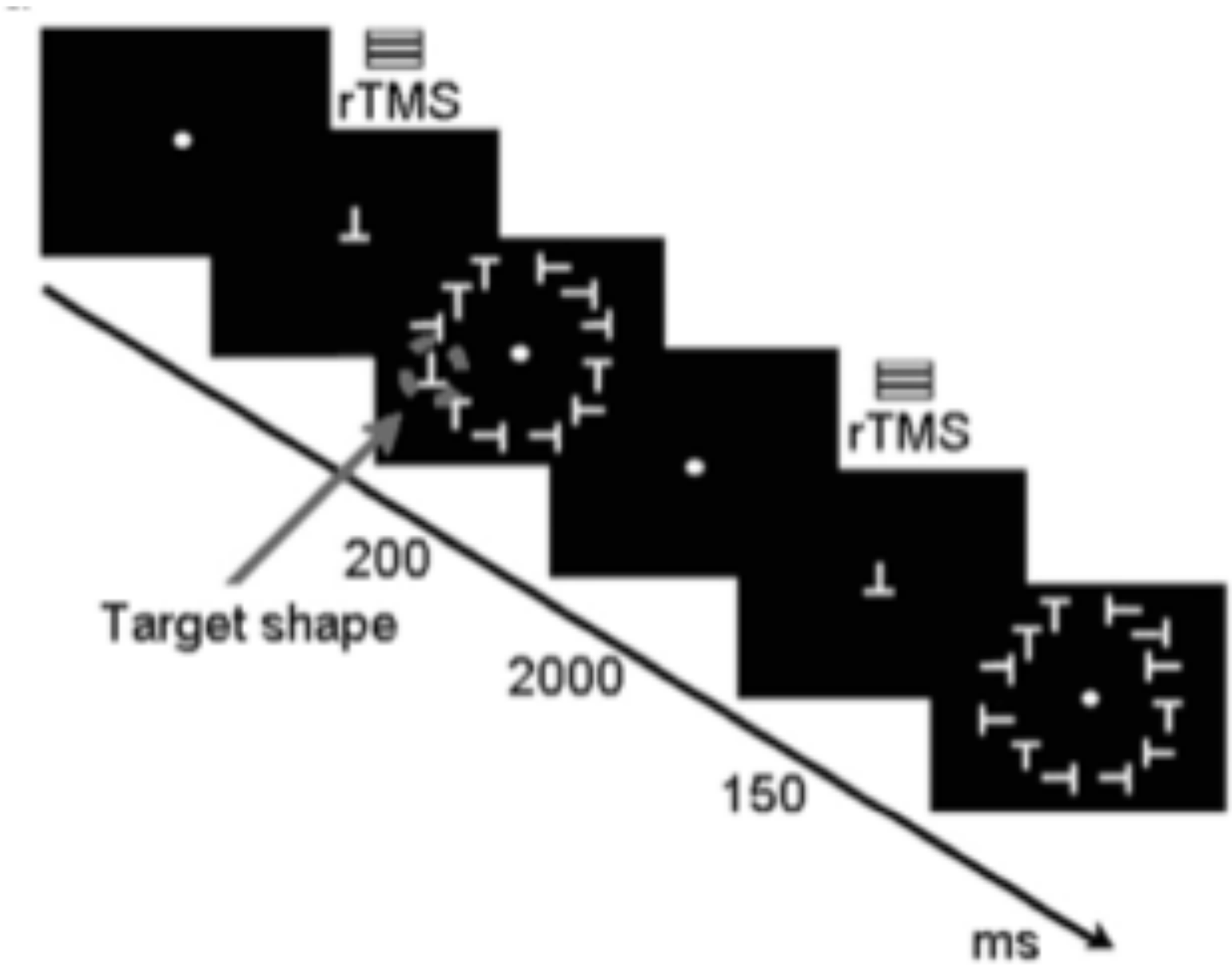

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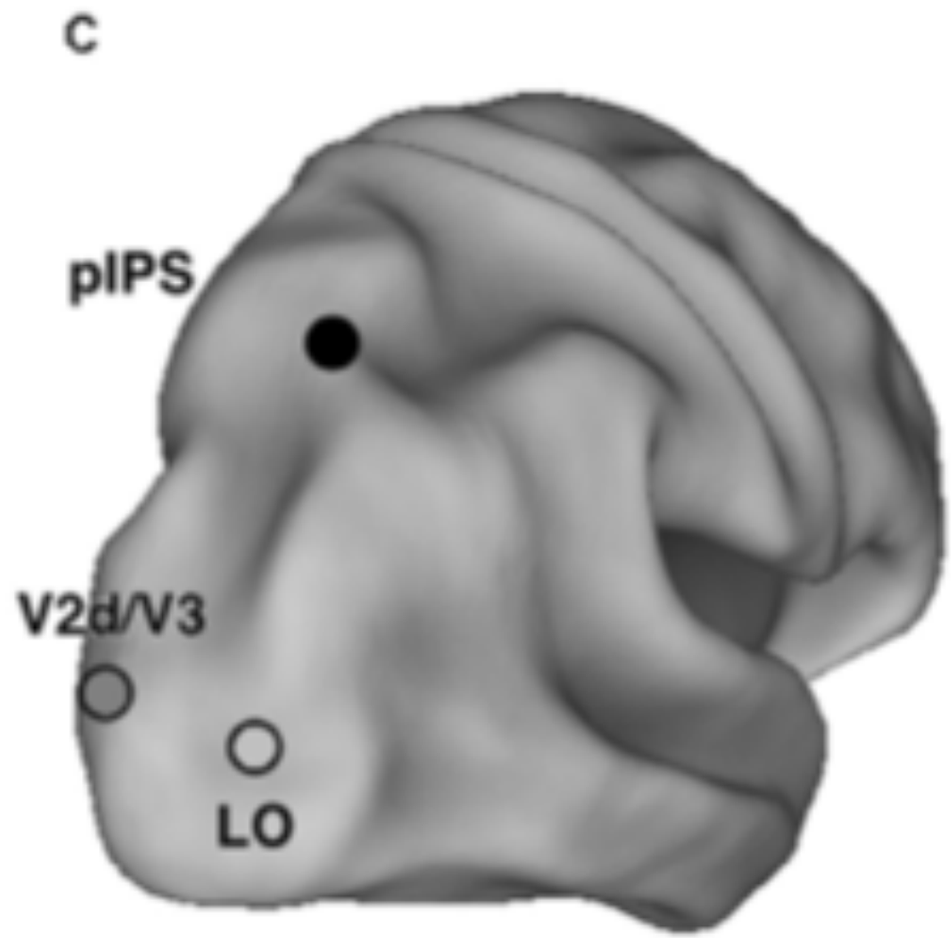
La TMS e’ stat applicata in maniera attivia su 3 siti: V2d/3, LO e IPS piu’ una stimolazione ‘finta' (Sham)



Results

3. Results

3.1 Main analyzes

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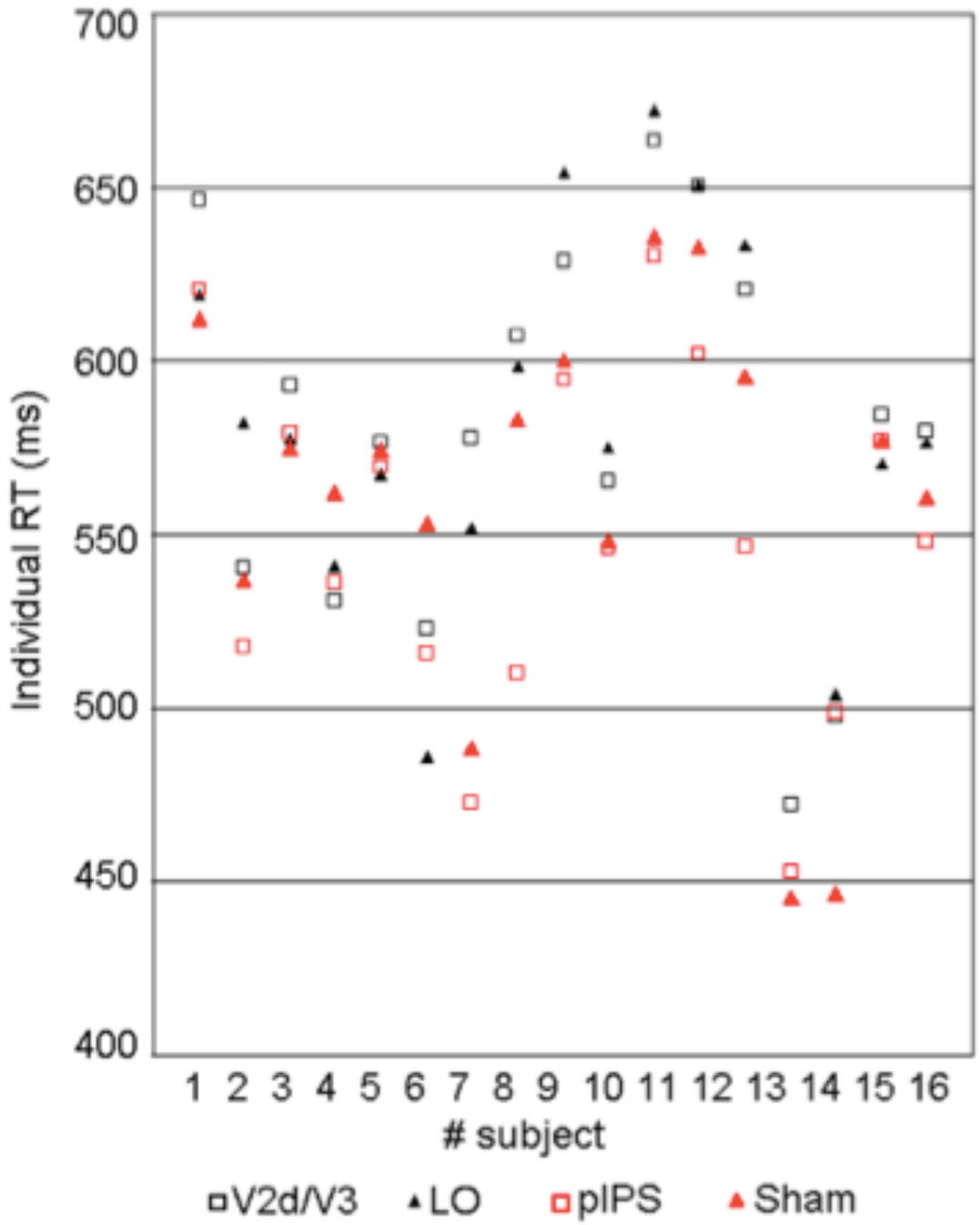

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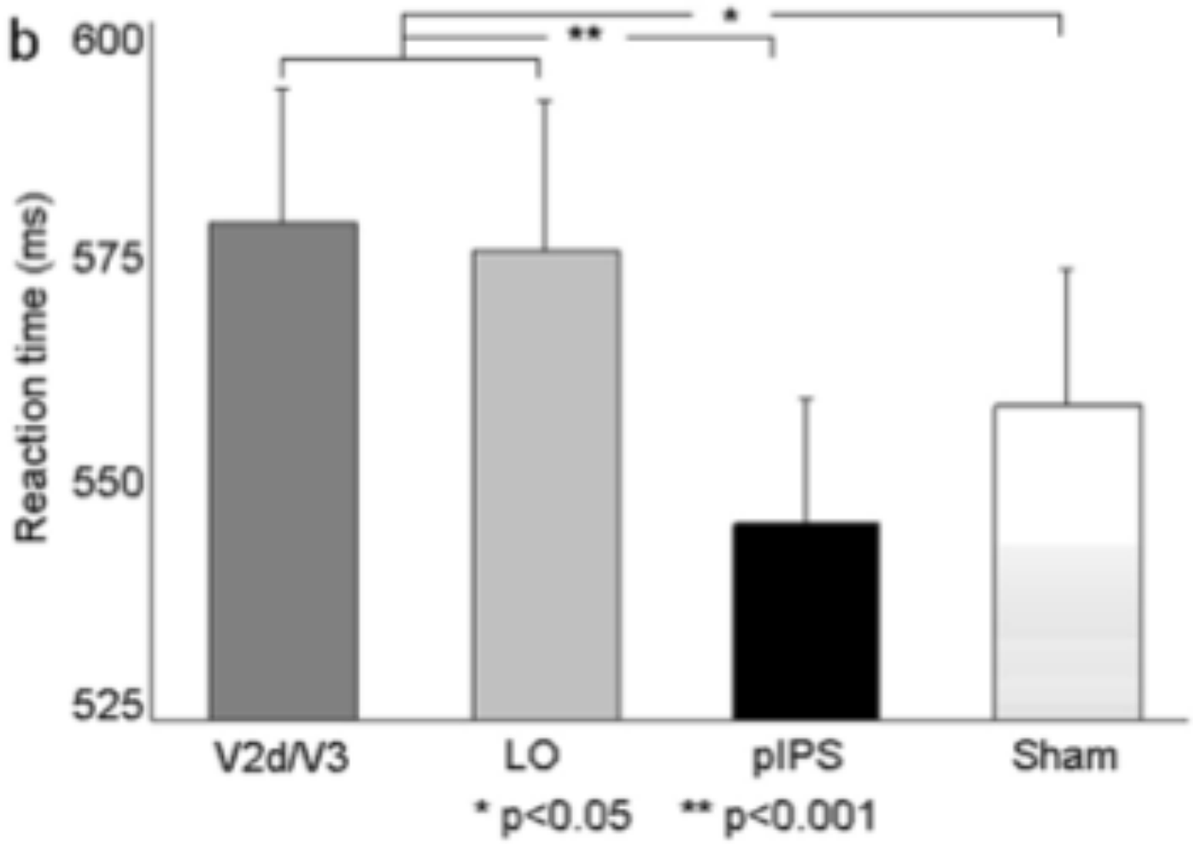

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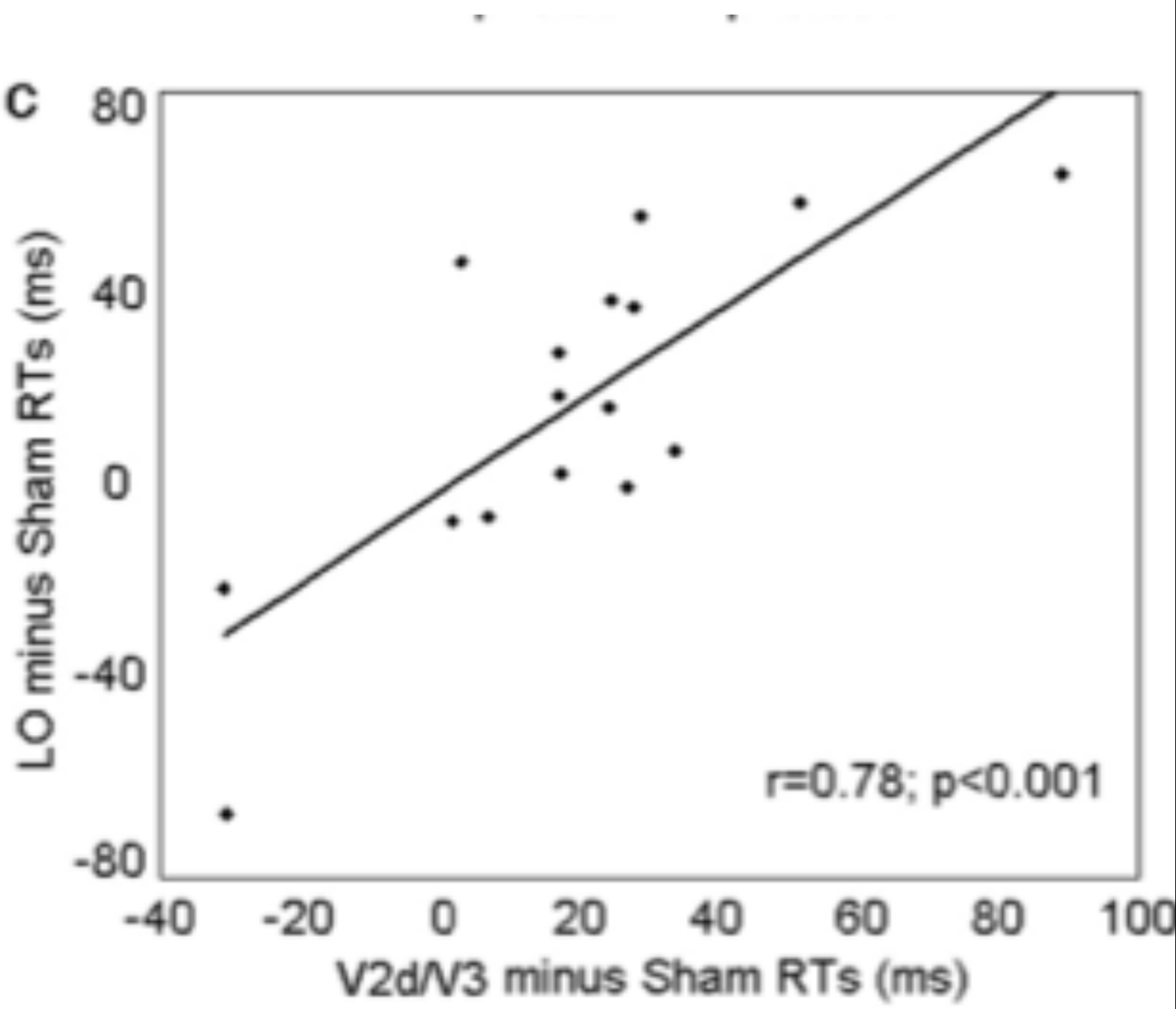

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