

Target-dependent network–behavior associations following intermittent theta burst stimulation in MCI

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1. Describe target-dependent changes in network segregation following intermittent theta burst stimulation in mild cognitive impairment
2. Analyze the association between network segregation and behavioral scores following intermittent theta burst stimulation in mild cognitive impairment

INTRODUCTION

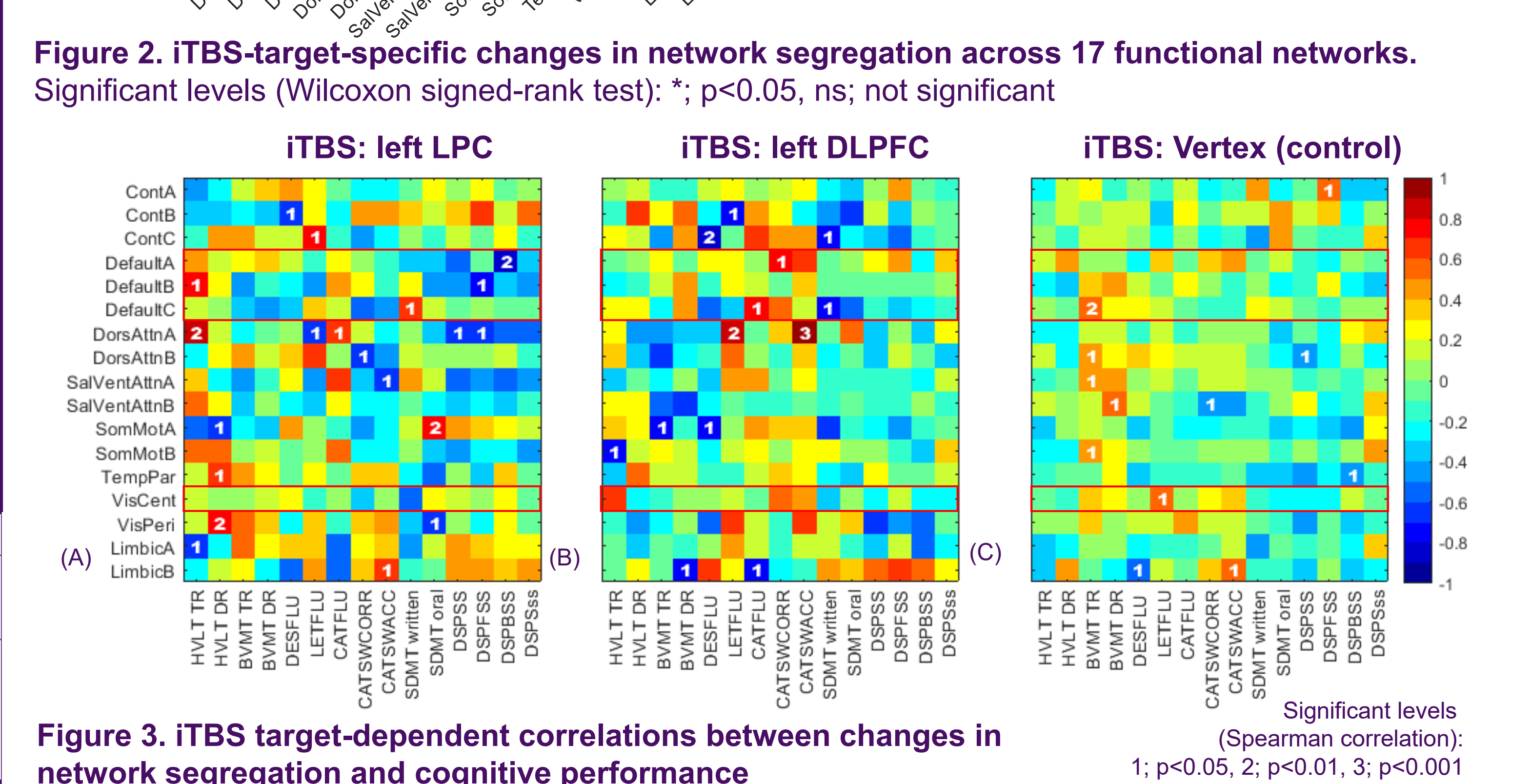
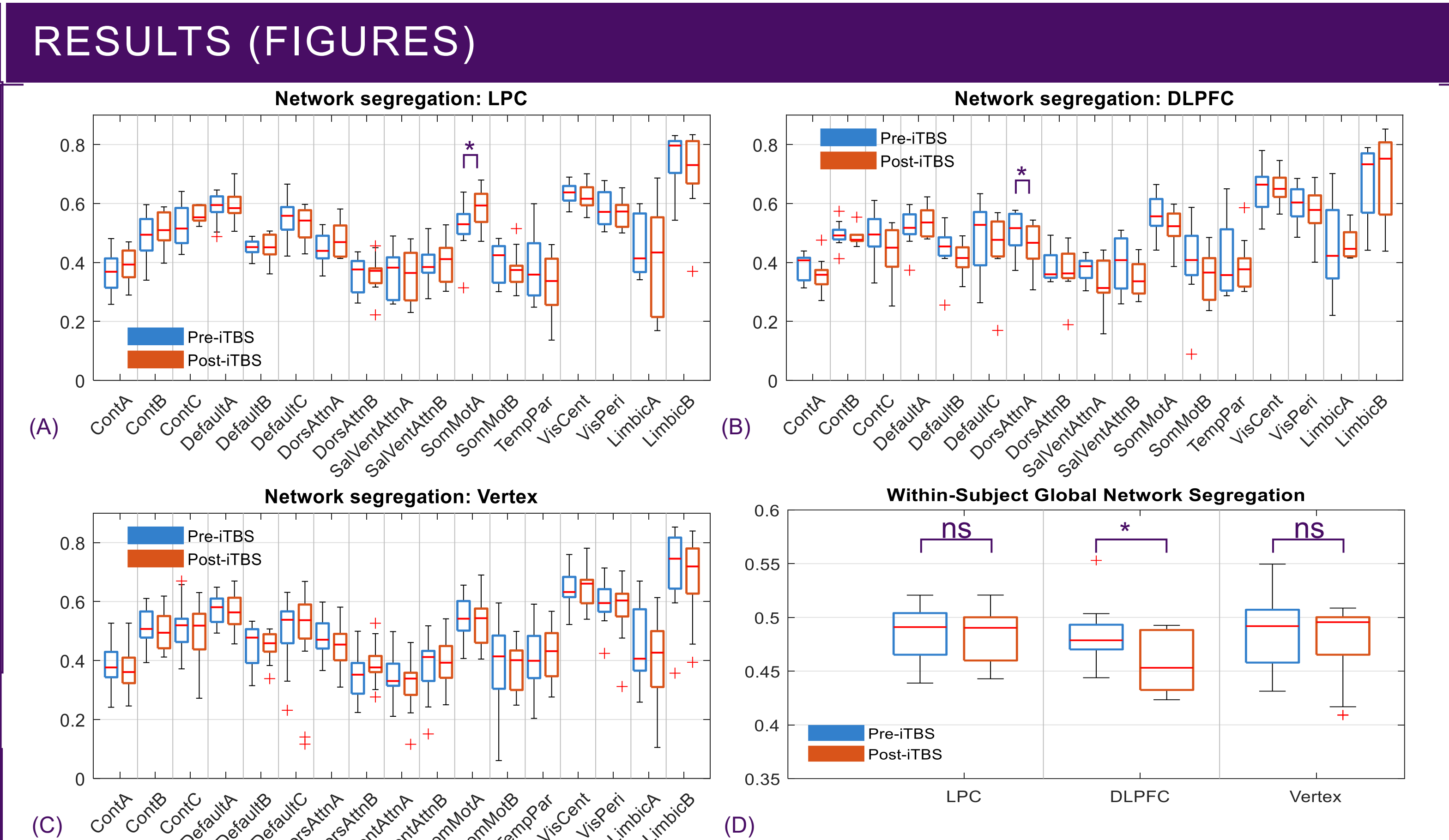
- Intermittent theta burst stimulation (iTBS)’s cognitive benefits across neurological and psychiatric disorders.
- In previous studies, stimulation location was on either the left dorsolateral prefrontal cortex (L-DLPFC) or left lateral parietal cortex (L-LPC) - a direct comparison remain limited.
- Network segregation (NS) as resting-state fMRI metric, providing a compact measure of large-scale brain organization.
- We examined **target-dependent effects of iTBS on NS** and their **associations with cognitive scores** in mild cognitive impairment (MCI).

METHODS

- (IRB-approved protocol) **MCI** participants underwent **10 daily iTBS** (Nexstim NBS®System) session, targeting the **L-LPC, L-DLPFC, or vertex** (control) (Table 1A).
- Multi-echo Resting-state fMRI on Compact 3T MRI** and **cognitive assessments** (Table 1B, not presented in this poster), acquired before and after iTBS session.
- NS across 17 functional networks (Yeo and Schaefer’s atlas).
- To examine associations between pre-post changes in NS and cognitive assessments (Spearman correlation).

Table 1A. Demographic and clinical characteristics of the study groups

Group	rTMS-iTBS location	# of subjects (F/M)	Age (±std)
MCI	LPC	10 (4/6)	71.7 ± 6.8
MCI	DLPFC	9 (0/9)	71.9 ± 6.9
MCI	Vertex (sham)	18 (4/14)	71.9 ± 6.9



RESULTS & CONCLUSIONS

- Network-wise NS change**
 - L-LPC: SomMotA increased**
 - L-DLPFC: DorsAttnB decreased**
- Global NS decreasing by L-DLPFC**
- Δ NS versus Δ Cognitive scores (correlation).
- Both **LPC and DLPFC stimulation** were associated with more **pronounced NS-cognitive correlations**, compared with vertex stimulation.
- The observed patterns indicate that individual variability in NS changes was differentially coupled with cognitive changes in a target-dependent manner.

Conclusions

- LPC- and DLPFC-iTBS exhibited distinct, target-dependent patterns of network segregation.
- A modest reduction in global NS observed following DLPFC stimulation.
- Importantly, target-dependent associations were observed between individual differences in NS changes and cognitive changes.

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