



# Specificity of Repetition Priming: An Investigation of Category- and Item-Specificity for Morphed Faces and Similar Scenes Using High-Resolution fMRI.

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## INTRODUCTION

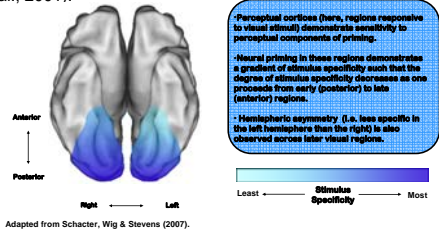
> **Behavioral Priming (BP)**: improvement or change in performance as a result of repeated encounters with the same or related stimuli.

> **Neural Priming (NP)**: reduced neural activity in specific cortical regions that typically accompanies **BP**.

> **NP** may reflect category-specificity, e.g., in right-lateralized fusiform cortex (**FC**) for repeated faces, and bilateral parahippocampal cortex (**PHC**) for repeated scenes

> Further, changes in the specific exemplar that is repeated between study and test reveal cortical sensitivity to perceptual properties of primed items.

> Neural priming in ventral visual cortex is hypothesized to show a posterior to anterior gradient for form-specific to form-abstract effects, respectively (Schacter et al., 2007). There may also be hemispheric asymmetry: right vs. left for form-specific vs. form-abstract priming, respectively (Koutstaal et al., 2001):



Here we used high-resolution fMRI (12-channel coil; 2mm isotropic voxels) of ventral visual cortex to investigate perceptual specificity for different categories and similar exemplars of visual stimuli.

## METHODS & RESULTS

### Subjects

30 right-handed healthy young participants (17 female, mean age = 24.4 ± 3.7 yrs)

### fMRI

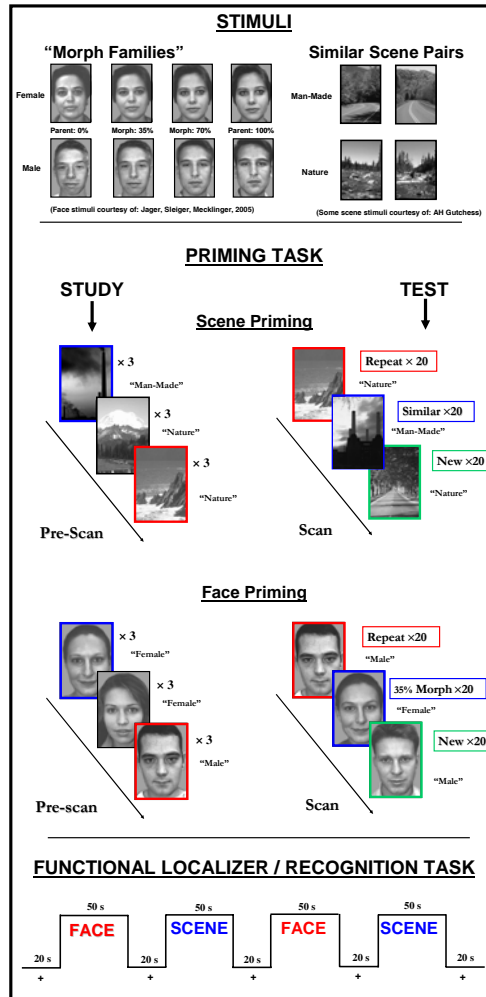
Images collected on a Siemens Trio 3 Tesla scanner with 12-channel coil

Functional priming runs (test) acquired in 4 sets of 88 axial images (2 mm isotropic contiguous voxels; TR = 2.5 s; rapid event-related design)

Functional localizer runs (recognition) acquired in 2 sets of 138 axial images (4 mm isotropic contiguous voxels; TR = 2.5 s; block design (50 s task; 20 s fix))

Statistical analyses conducted using FSL and SPM2 software.

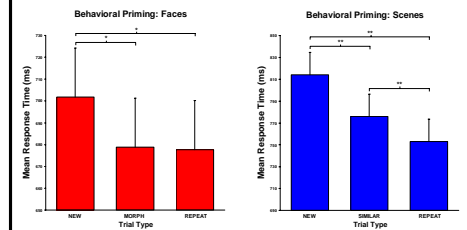
## Study Design Overview



## Behavioral Priming

> Response Times (RTs) faster for **MORPH & REPEAT** faces, which did not differ, relative to **NEW** faces ((REPEAT = MORPH) < NEW)

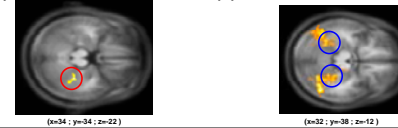
> RTs for scenes showed graded priming (REPEAT < SIMILAR < NEW)



## Neural Priming: Category- & Item-Specificity

> **NP** (REPEAT < NEW) was category-specific for:

(a) Faces in the right FC (b) Scenes in bilateral PHC



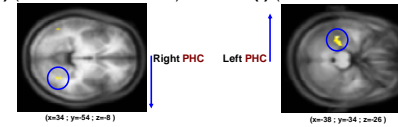
> Form-specific vs. form-abstract priming for faces observed in posterior vs. anterior FC, respectively:

(c) (REPEAT < MORPH) (d) (MORPH < NEW)



> Form-specific vs. form-abstract priming for scenes observed in right vs. left PHC, respectively:

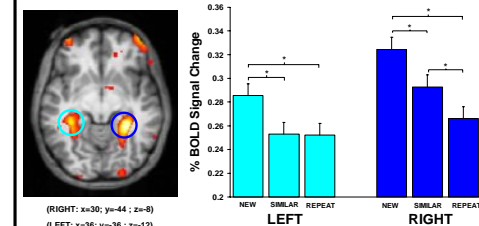
(e) (REPEAT < SIMILAR) (f) (SIMILAR < NEW)



## Neural Priming: Functional ROI Analyses

> Functional Localizer used to define scene-preferential ROIs in individual participants:

Scene-preferential ROI in bilateral PHC (n = 30):



> A 2 (Hemisphere: RIGHT; LEFT) × 3 (Trial-Type: NEW; SIMILAR; REPEAT) repeated measures ANOVA revealed a significant Hemisphere × Trial-Type interaction [F(2, 58) = 5.19, p < .01].

> Therefore, scene-preferential PHC showed form-specific priming in the right hemisphere, and form-abstract priming on the left.

## CONCLUSIONS

> Scene-preferential PHC shows form-abstract priming for similar scenes, and right vs. left asymmetry for form-specific vs. form-abstract processing, respectively.

> Face-preferential right FC shows form-abstract priming, consistent with face-identification processes, while more posterior FC showed form-specific processing.

> These results support the view that neural priming reflects both form-specific and form-abstract processes, and provide preliminary evidence that form-specificity decreases from posterior to anterior regions, and from right to left hemisphere in ventral visual cortex.

References:  
Schacter, D.L.S, Wig, G.S, Stevens, W.D. (2007) Reductions in cortical activity during neural reductions in behavioral priming. *Curr Opin Neurobiol.* 17, 171-6  
Koutstaal, W, et al. (2001). Perceptual specificity in visual object priming: functional magnetic resonance imaging evidence for a laterality difference in fusiform cortex. *Neuropsychologia*, 39, 184-99.  
Jaeger, T, Seler, KH, & Mecklinger, A. (2005). Picture database of morphed faces (MoFa): Technical Report. Psychol Online. URL: <http://psydoc.su.ub.uni-saarland.de/volltexte/2005/40/>

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