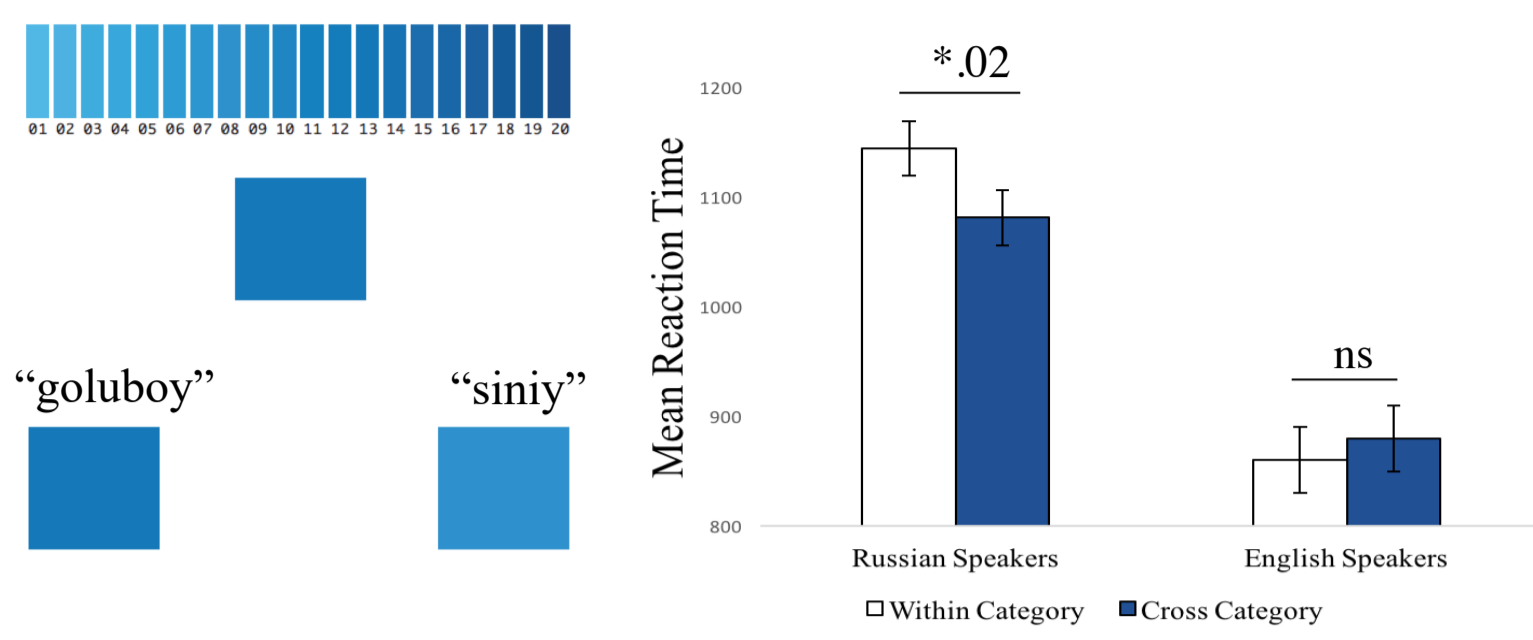


## Background

How many colors do you see?

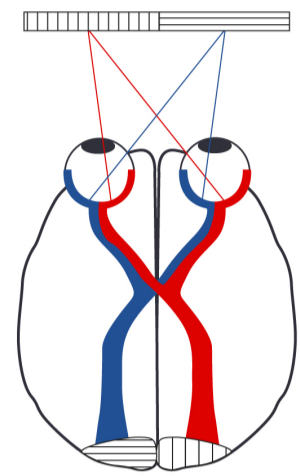
Categorical perception (CP) occurs when items on a continuum are divided into discrete categories, and this category knowledge influences perception.



CP effects have been shown to exist for basic stimuli properties, such as color (Winawer et al., 2007).

### Left Hemisphere (LH)

- Language (Dehaene and Cohen, 2011)
- CP (Holmes and Wolff, 2012)



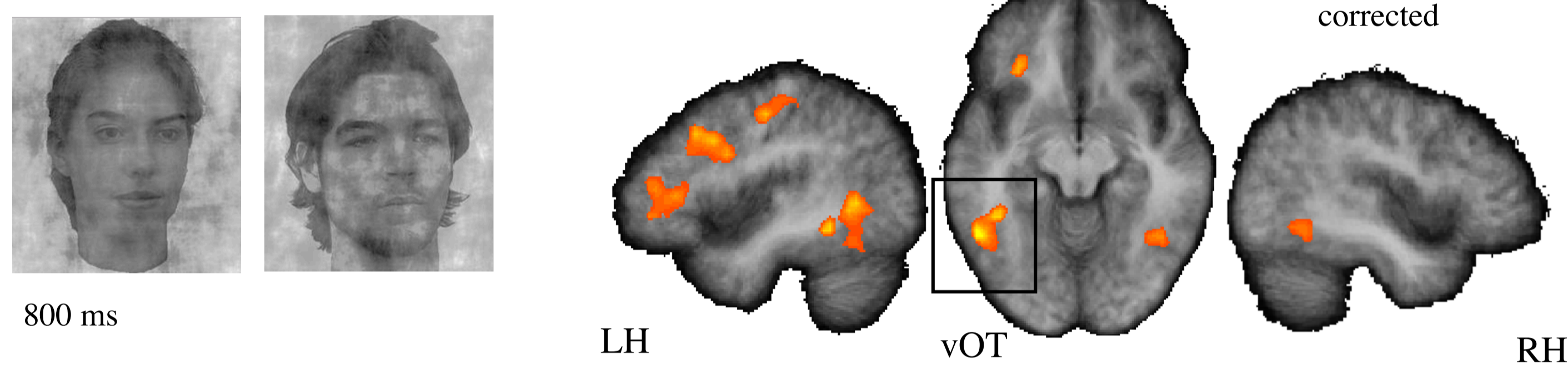
### Right Hemisphere (RH)

- Face-selective visual cortex (Kanwisher & Yovel, 2006)
- Face identity processing (Rotshtein et al., 2005)

Studies of color and shape perception showed a relationship between CP and cerebral laterality: CP effects were stronger in the right visual field (RVF) (Gilbert et al., 2006, 2007).

To test the effects of CP for face perception, we combined the divided field (DVF) method (Gilbert et al., 2006, 2007) with a face-morphing approach in which equal physical change in a face either results in identity/gender change or not (Rotshtein, 2005).

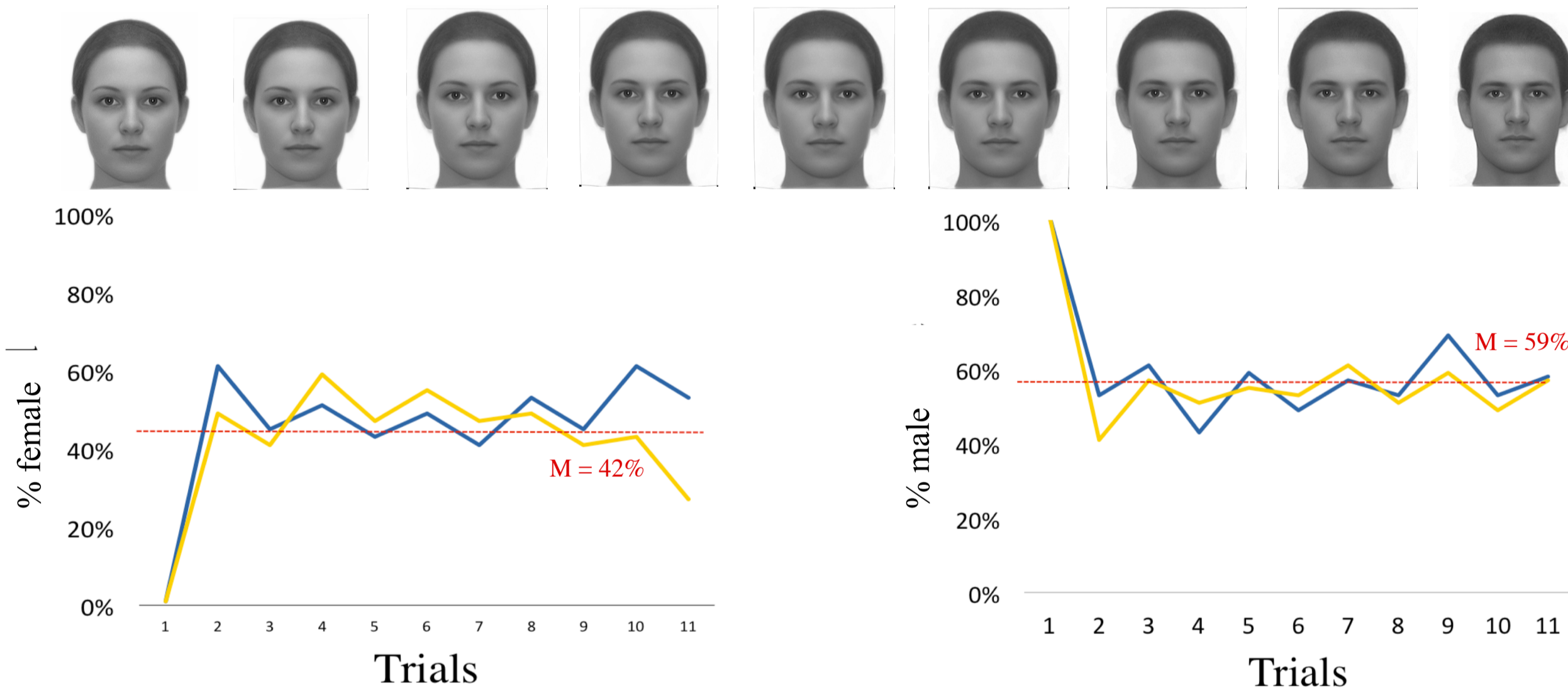
## fMRI decoding of gender (unpublished results)



- LH is more engaged than RH in discriminating face gender – consistent with the results from experiment 1.
- Above chance gender classification was observed in the left ventral occipito-temporal (vOT) region.

## Participant screening

Goal: Confirm individual thresholds ~50%

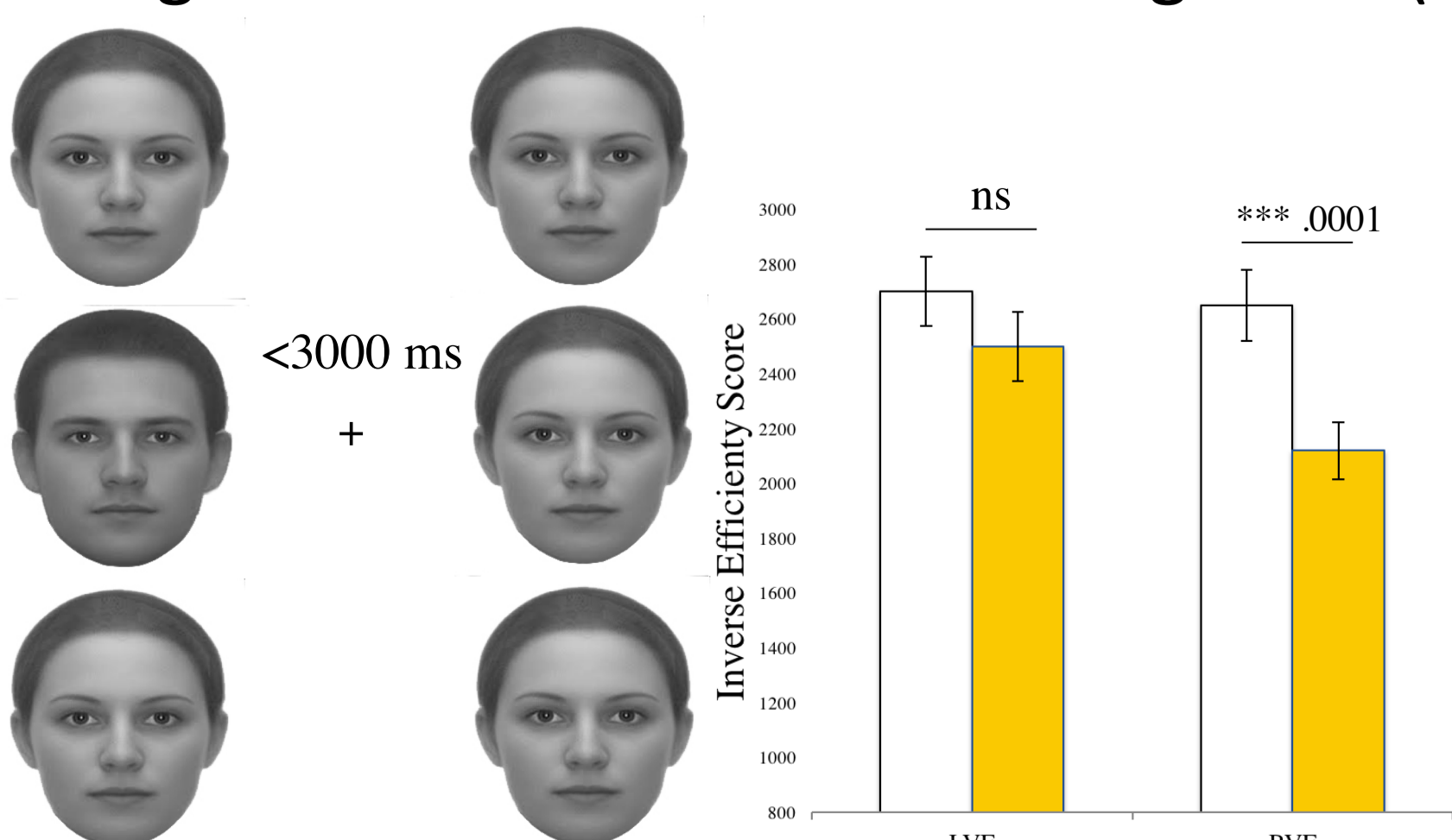


## Experiment 1 (DVF - Gender)\*

Goals: Test for CP in face recognition and potential LVF/RH-RVF/LH asymmetry (predicted by fMRI result)



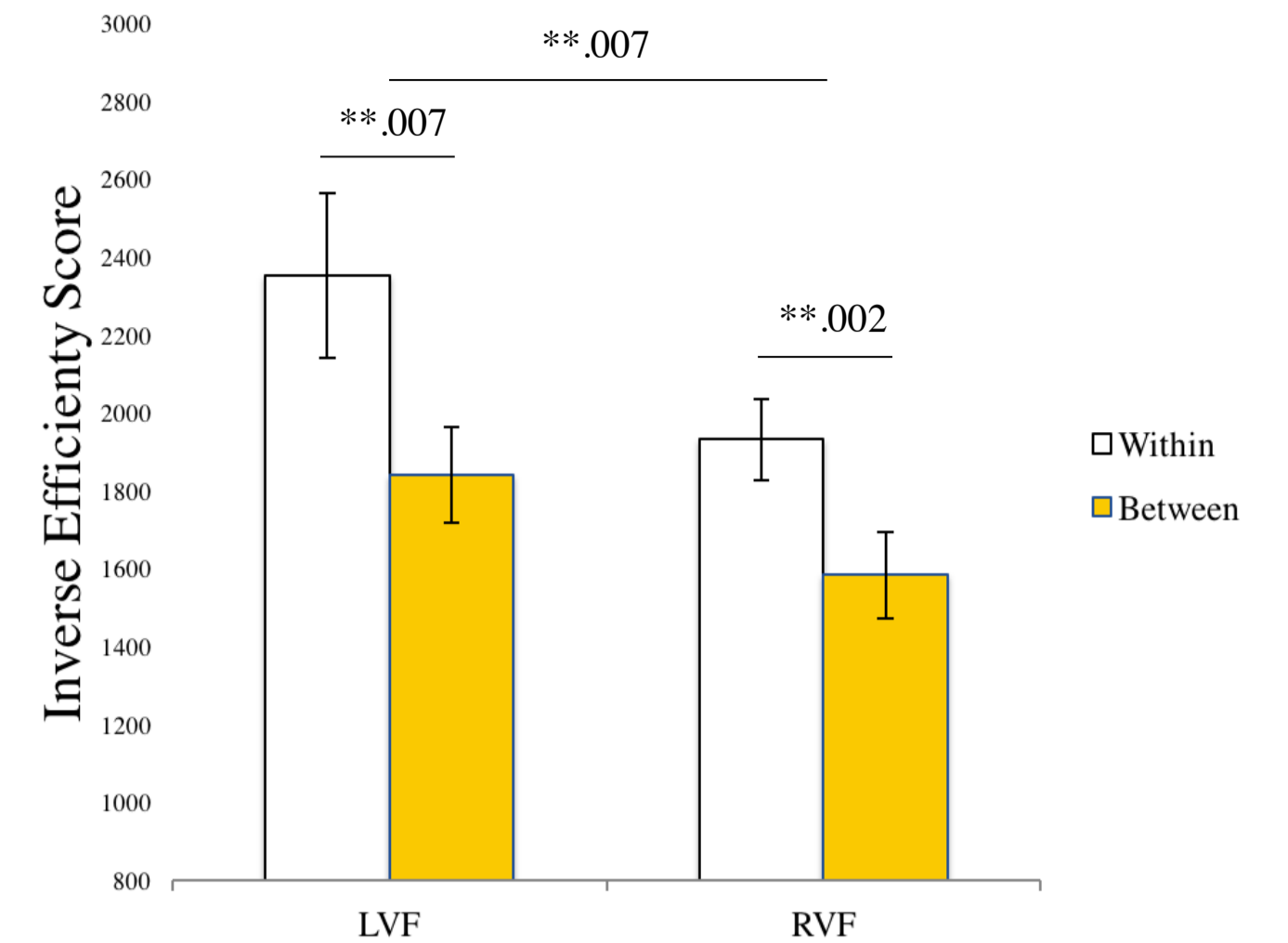
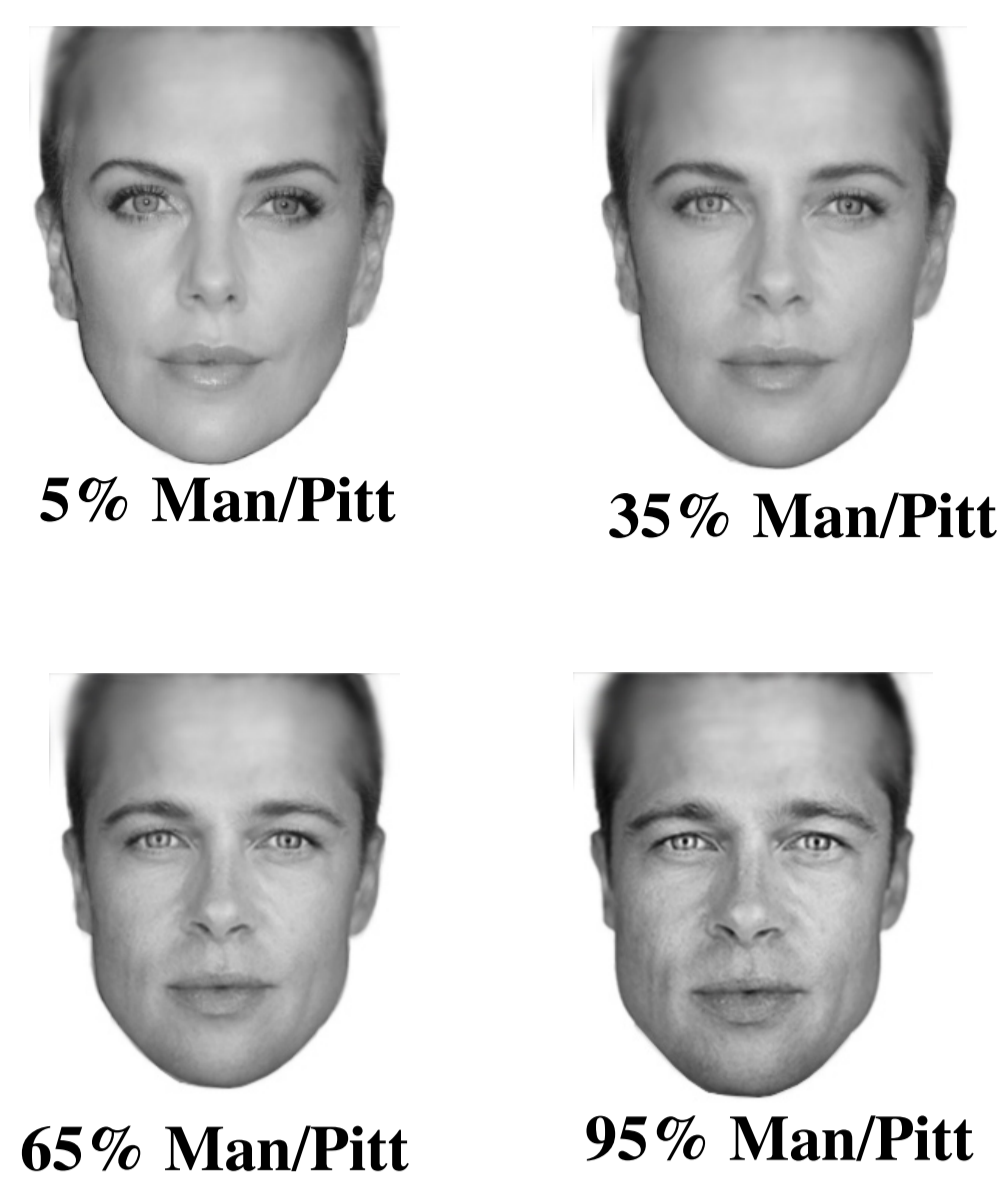
- The four stimuli for the **DVF experiment** were chosen according to the staircase results. Physical change was constant (step size = 30%).
- Participants had to find an 'oddball' face that was either in LVF or RVF and was either of the same gender (non-categorical change) as background stimuli or of different gender (categorical change).



- We showed CP effects for face gender processing.
- The effect is stronger in RVF, even though face processing is thought to be lateralized to the RH.

## Experiment 2 (DVF – Primed Gender)\*

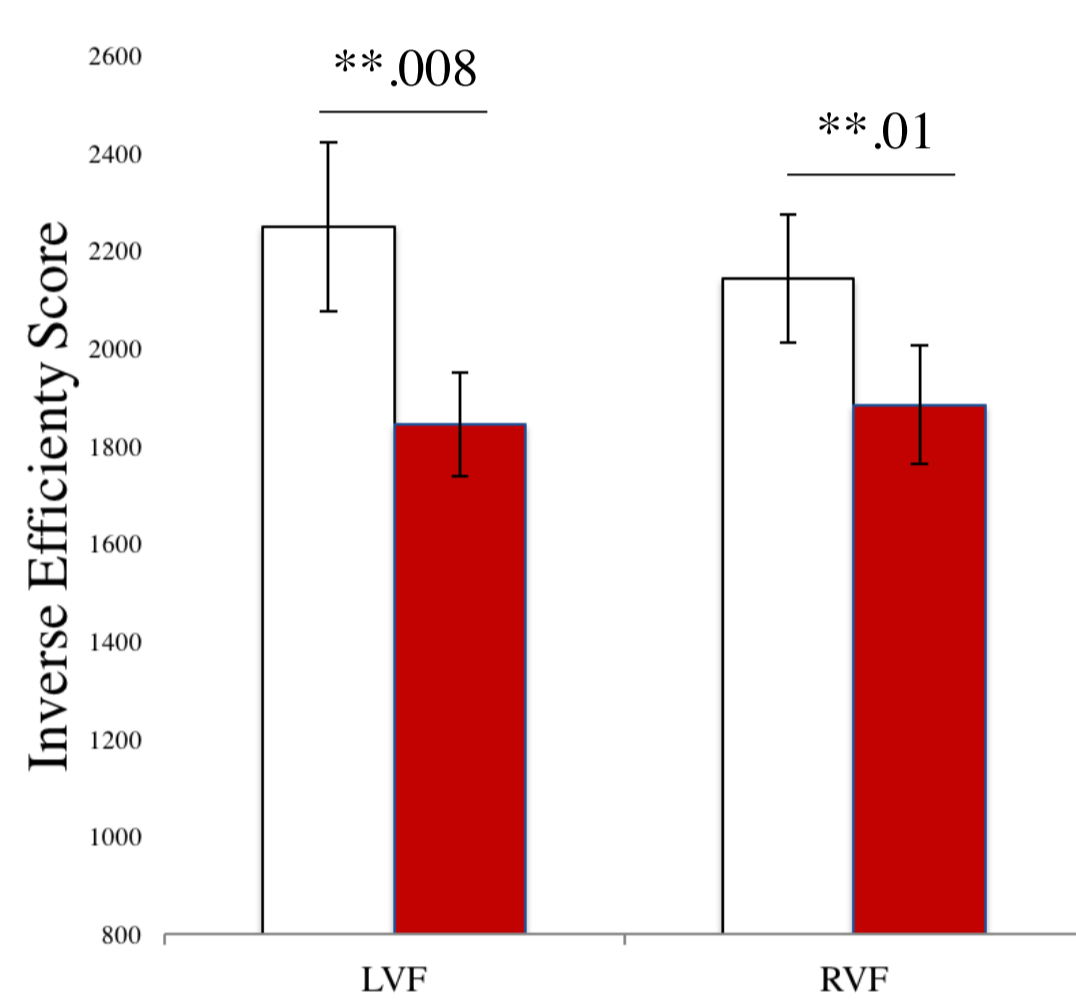
Goal: See if hemifield asymmetry persists/changes.



- CP effects exist in both hemifields when familiar faces are used.
- The overall performance is better in RVF as subjects are performing gender task.

## Experiment 3 (DVF – Primed Identity)\*

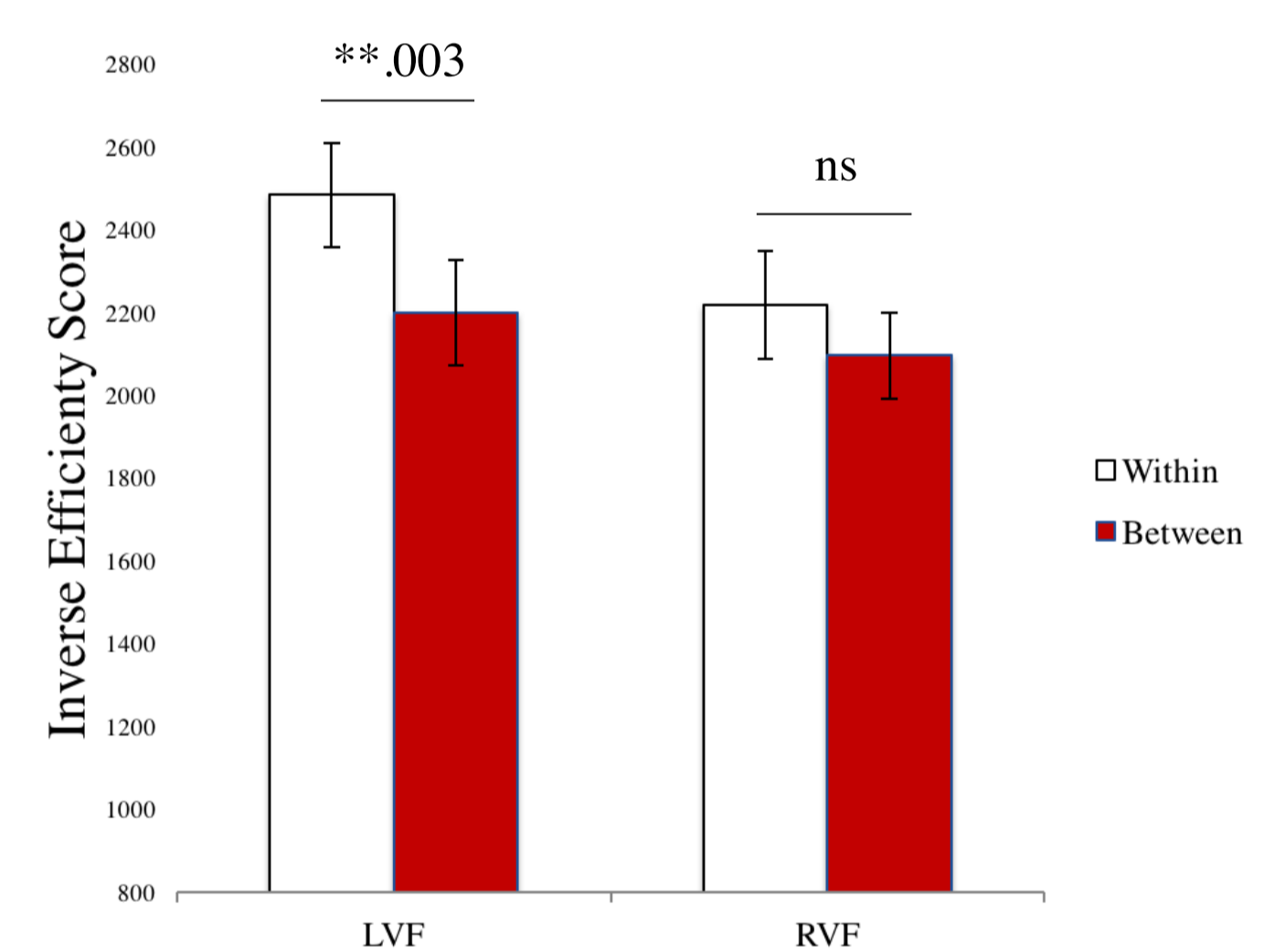
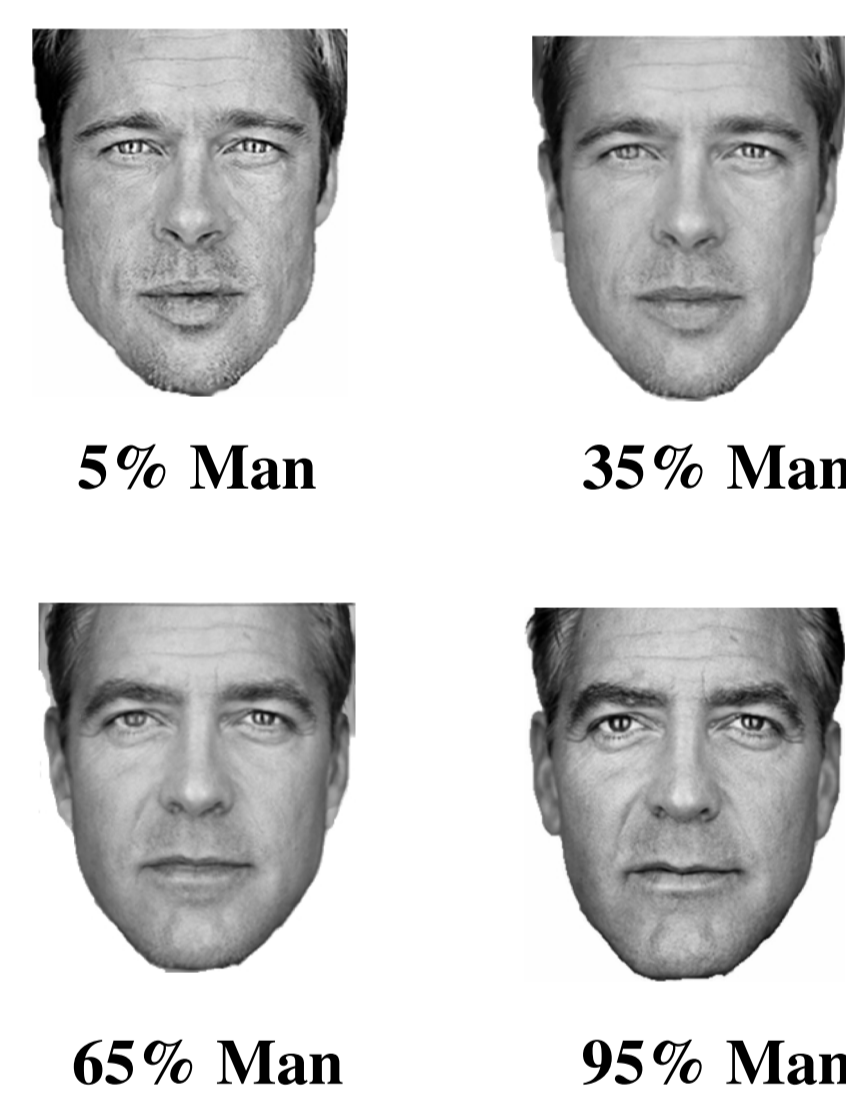
Goal: See if CP/hemifield effect(s) occur for identity.



- CP effects exist in both hemifields when familiar faces are used.
- The RVF advantage is gone.

## Experiment 4 (DVF - Identity)\*

Goal: See if CP/hemifield effect occurs for identity alone (i.e. while gender is held constant)



- We showed CP effects for face identity processing.
- The effect is lateralized to the RH.

## Take Home Messages

- CP facilitates gender recognition for faces.
- CP effects are different for identity and gender
- CP and lateralization depend on stimulus and task.
- For gender, CP is stronger in RVF and may entail LH-RH differences in vOT. Identity effects (between-within) were more apparent in LVF – we think this may reflect different mechanism than CP (unlike gender, which we think is CP).

## Future Directions

- Investigate if CP effects seen during face processing are linguistic:
- Check how lateralization patterns change in the same experiments with verbal and nonverbal interference.

## References

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Kanwisher, N., & Yovel, G. (2006). The fusiform face area: a cortical region specialized for the perception of faces. *Philos. Trans. R. Soc. Lond. B. Biol. Sci.*, 361(1476), 2109-2128.

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Winawer, J., Witthoft, N., Frank, M. C., Wu, L., Wade, A. R., & Boroditsky, L. (2007). Russian blues reveal effects of language on color discrimination. *PNAS*, 104(19), 7780-5.

\*Eye-tracker was used in experiments 1, 2, 3, & 4