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## Introduction

- ❖ Preferential use of horizontal information (horizontal tuning) is correlated with upright face identification accuracy and the size of the face inversion effect (Pachai et al., VSS 2011).
- ❖ Perceptual learning improves identification of inverted faces, though effects are partially stimulus-specific (Hussain et al., *Vis Res* 2009; *Psych Sci* 2011).
- ❖ **Questions:** Does perceptual learning also improve horizontal tuning for inverted faces? Is this change in tuning stimulus specific?

## Methods

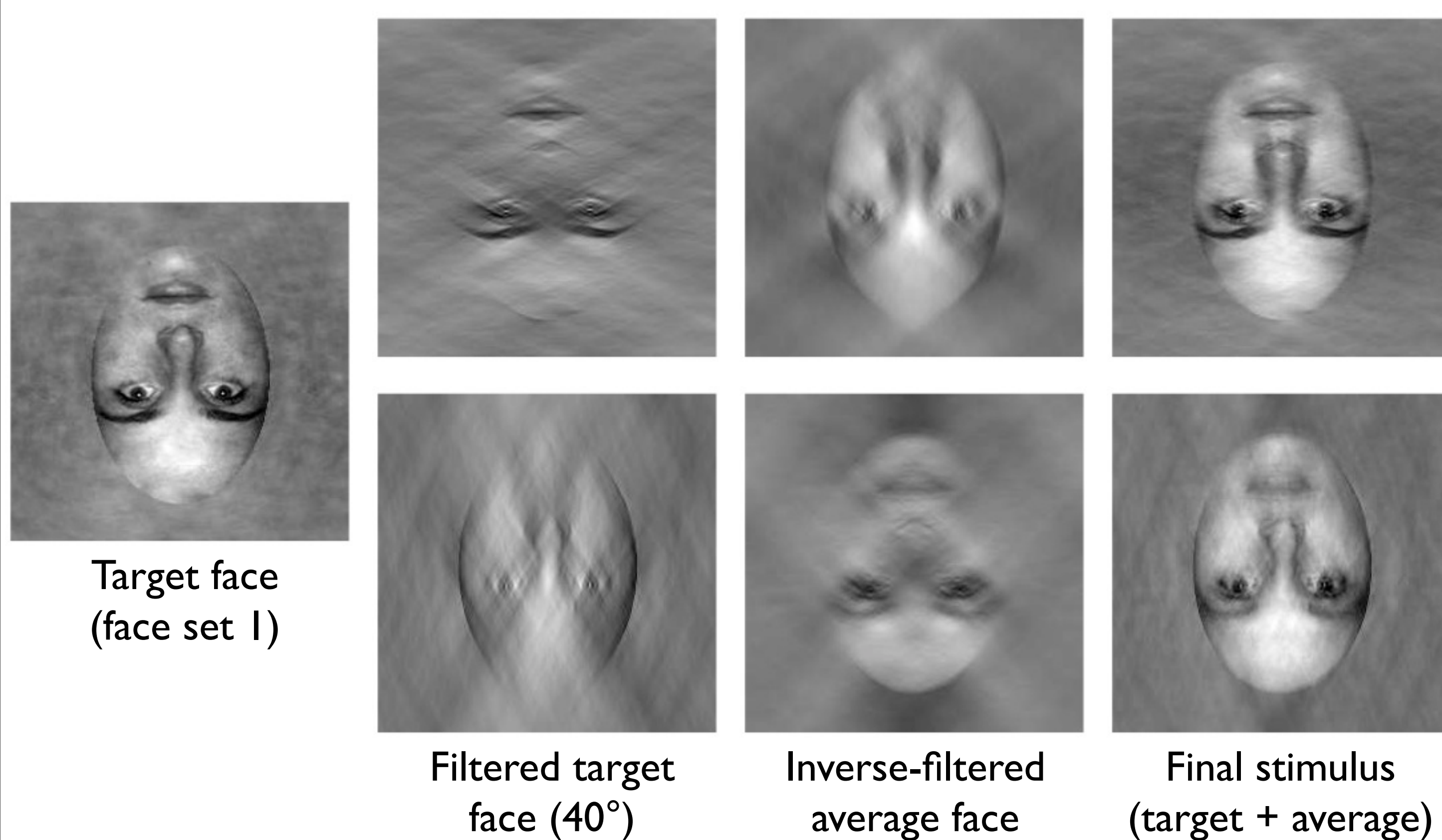
- ❖ 10 AFC identification
- ❖ 250ms stim duration
- ❖ 0.5 RMS contrast
- ❖ All inverted faces

### Orientation Filtering

2 centre orientations (horizontal and vertical)  
18 bandwidths (0° to 180° in 10° steps)

To retain face-like appearance without adding diagnostic information, filtered targets embedded in an average face.

### Example Stimuli



## Training Design

### Day 1 (Pre-Training)

N = 16 per face set  
All filter conditions tested  
360 trials (10 per condition)

### Days 2-4 (Training)

Immediately after pre-training  
Unfiltered, inverted faces  
300 trials per training day

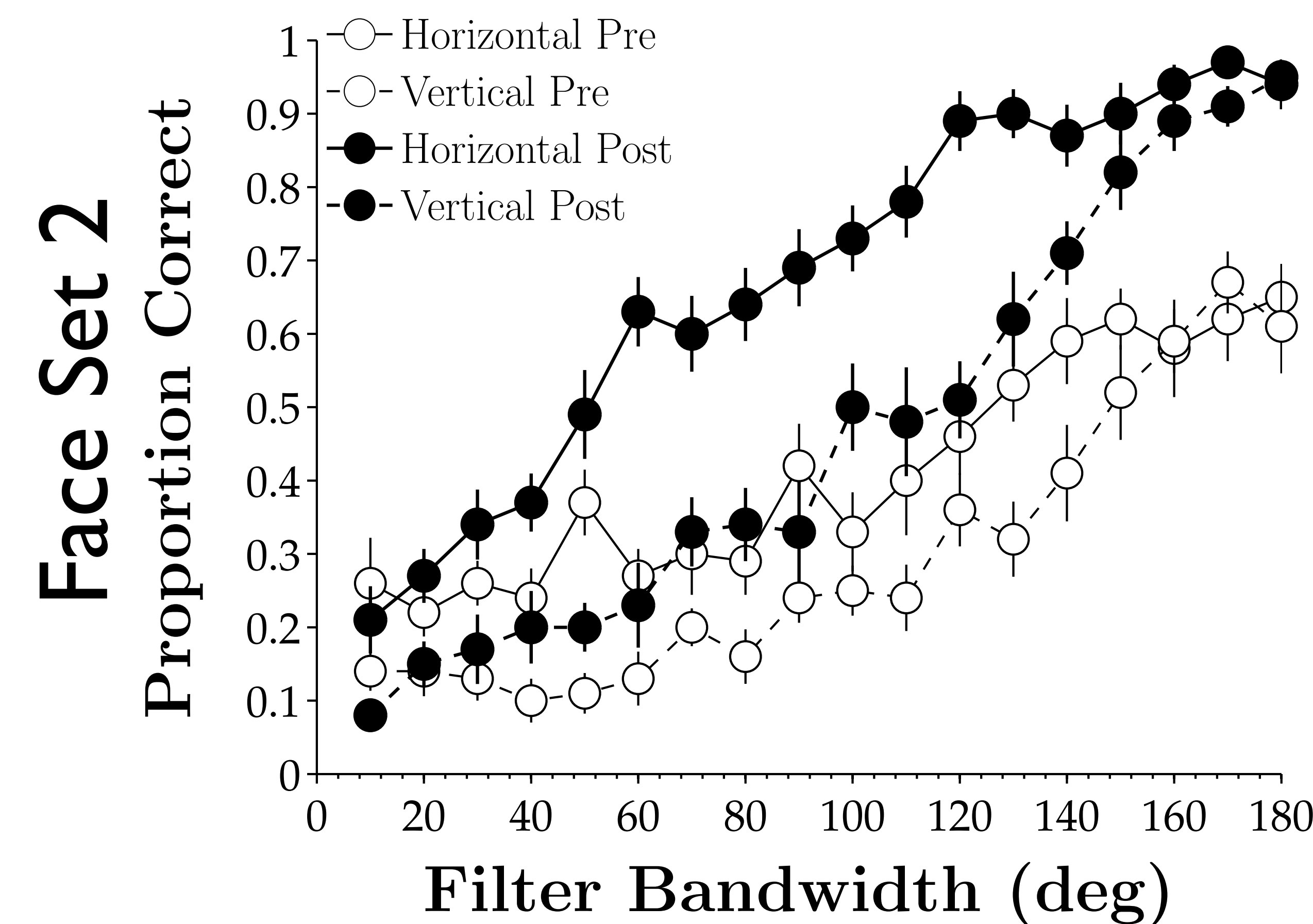
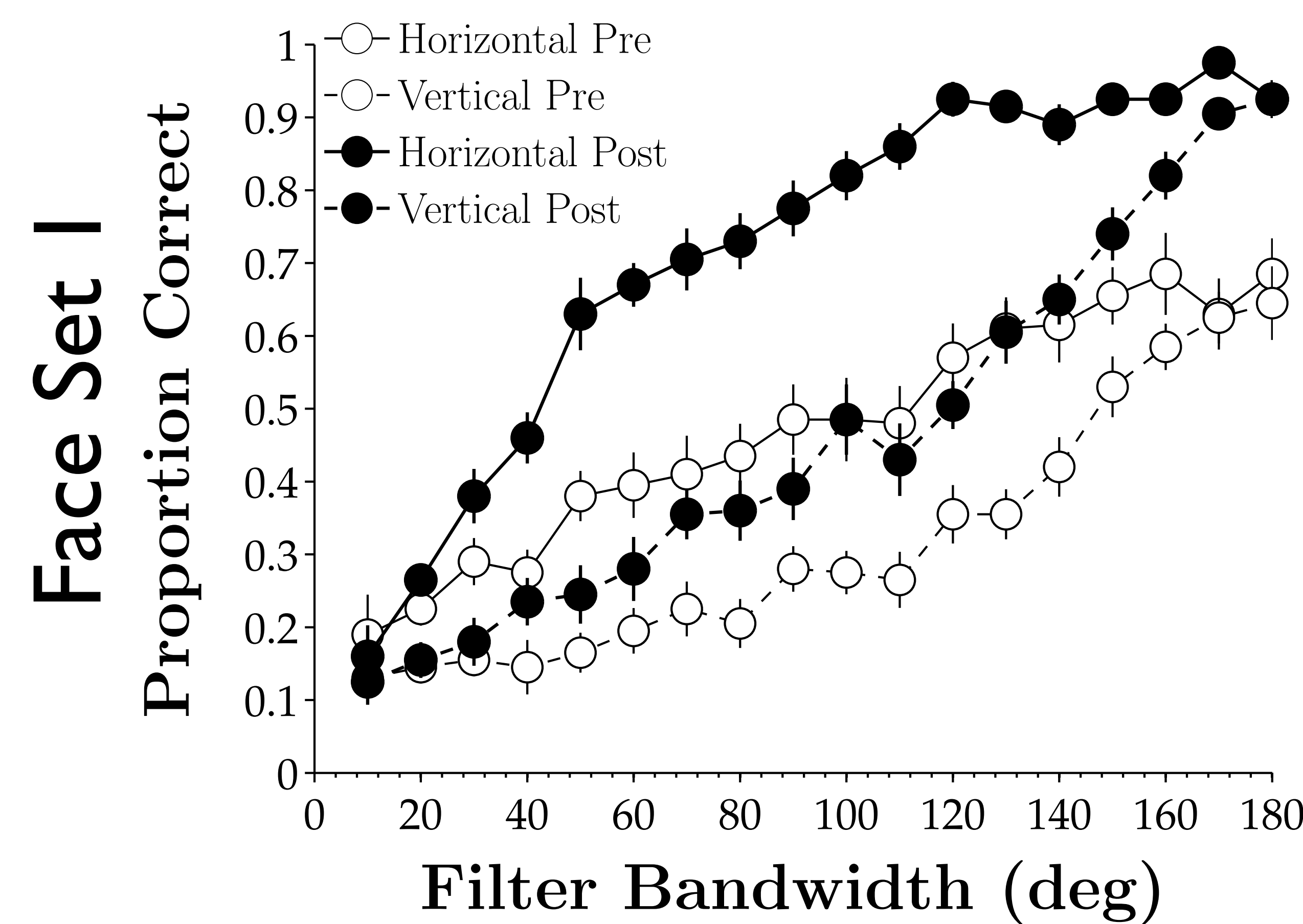
### Day 5 (Post-Training)

One day after training days  
All filter conditions tested  
360 trials (10 per condition)

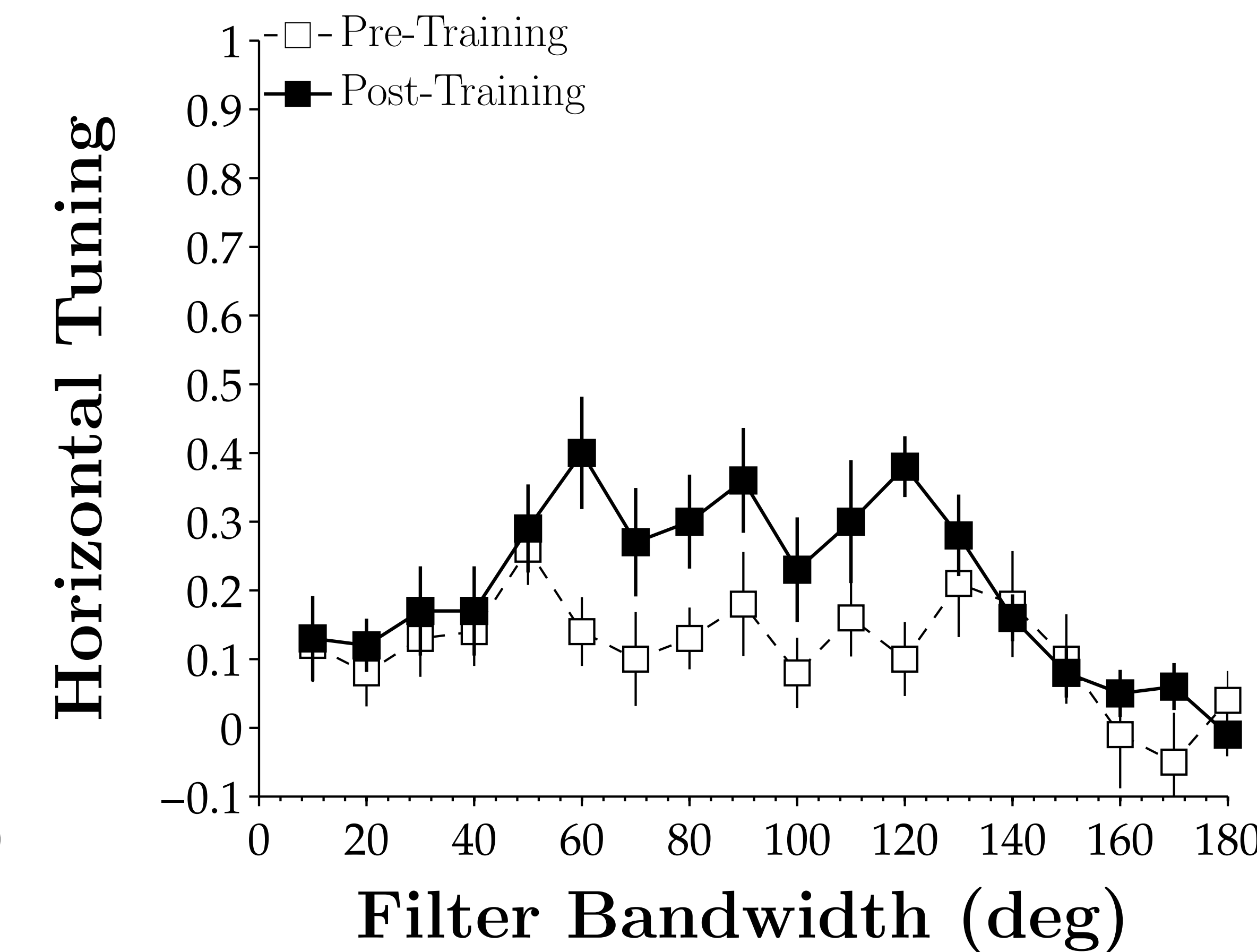
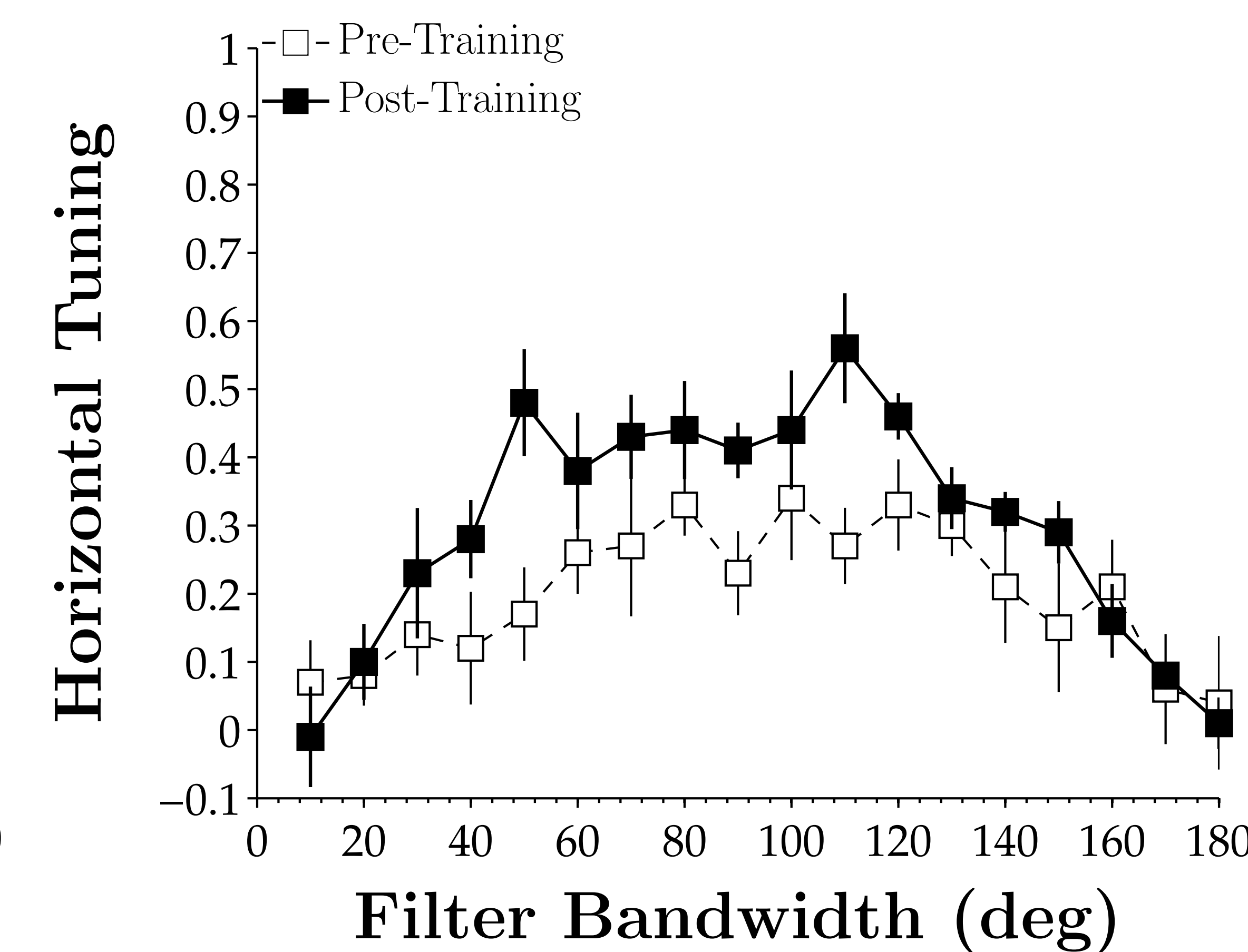
### Day 6 (Transfer)

3-4 days after post-training  
Identical to pre/post  
Tested with *untrained* stimuli

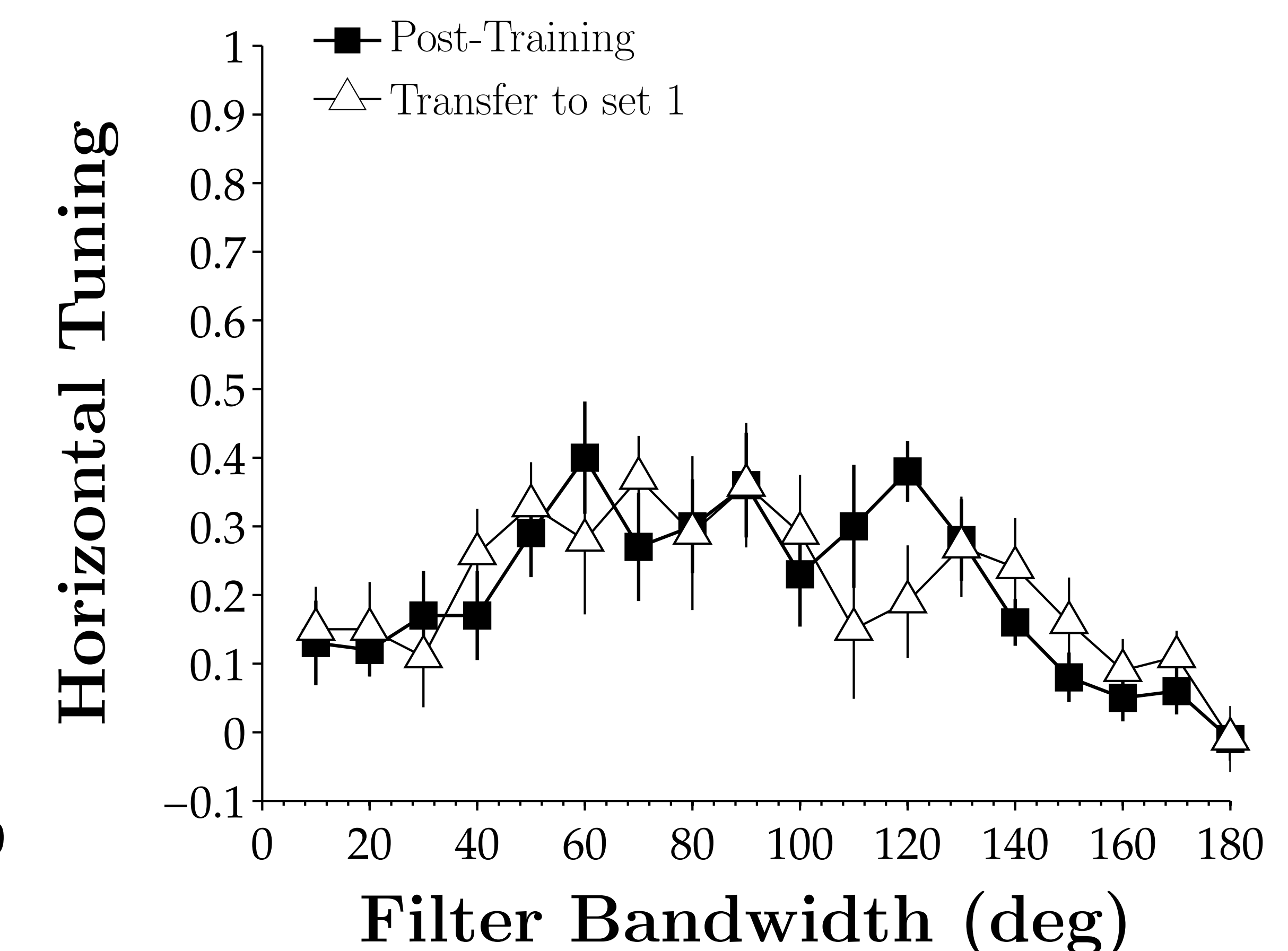
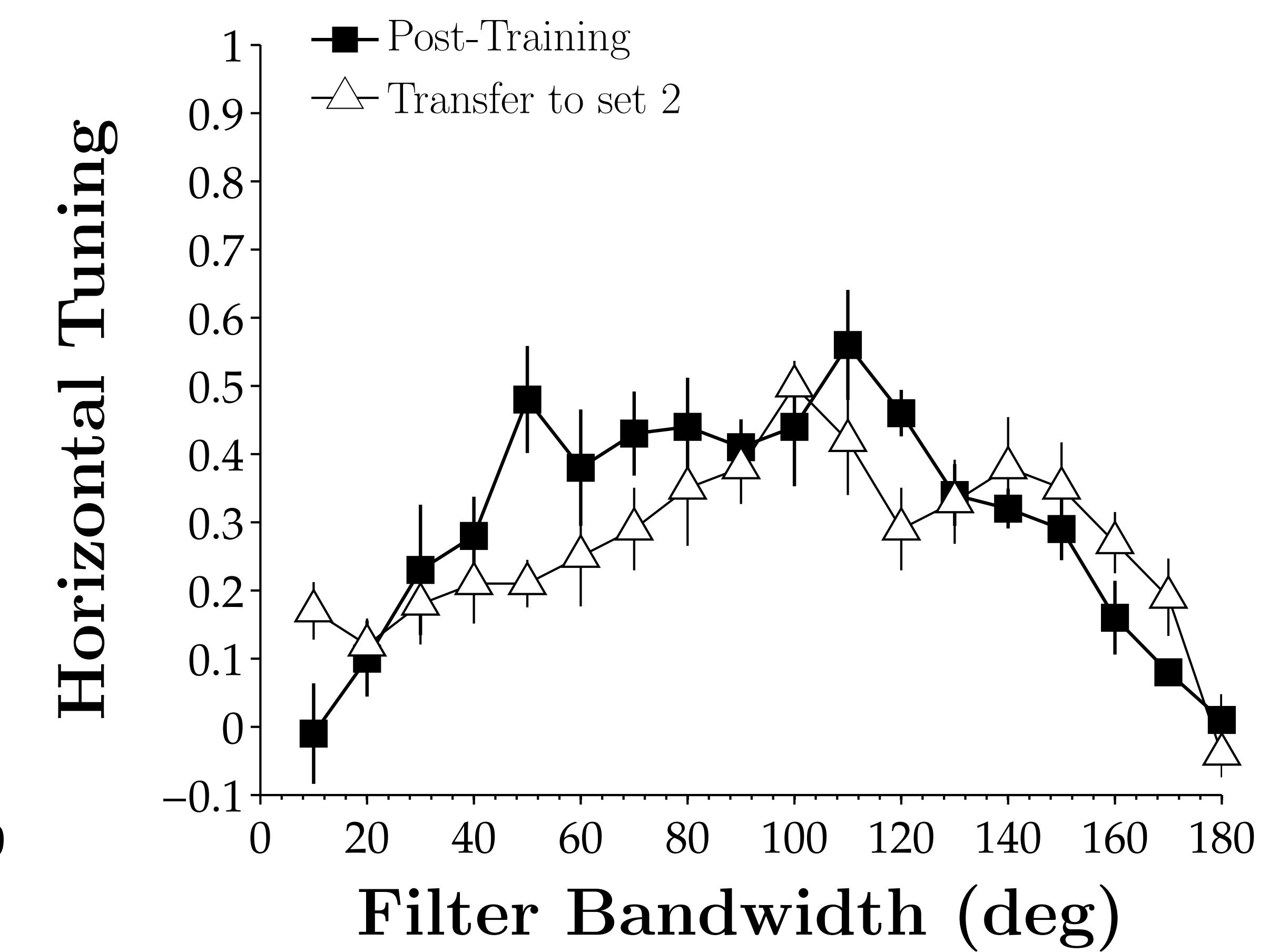
## Results



Proportion Correct as a function of filter before and after 3 days of training with inverted faces. **Note:** Improved overall accuracy post-training, more so for horizontal than vertical



Horizontal Tuning (horizontal - vertical accuracy) as a function of filter before and after training. **Note:** Increased horizontal tuning post-training, particularly from 60° to 120°.



Transfer of tuning from observers trained on the other face set, plotted with post-training data. **Note:** Partial transfer of horizontal tuning. Transfer more complete from set 1 to set 2.

## Acknowledgements

This work was supported by NSERC and the Canada Research Chair program. The authors would like to thank Donna Waxman for her tireless assistance.

## Conclusions

Training with unfiltered, inverted faces significantly improves identification *and* increases horizontal tuning, supporting the claim that horizontal tuning underlies face identification and the face inversion effect. Partial transfer to untrained stimuli suggests learning produced some general improvement in face identification.

## References

- ❖ Hussain et al. (2009). *Vis Res*, 49(18), 2273-2284.
- ❖ Hussain et al. (2011). *Psych Sci*, 22(6), 724-730.
- ❖ Pachai et al. (2011). *VSS*.