

## Introduction

The study of low-level visual properties such as spatial frequencies and orientations (SFO) typically involves precise control of external parameters such as viewing distance. Consequently, the study of presented on successful trials were given a positive weight, whereas filters presented on failed trials SFO has mostly been constrained to the laboratory, which can be an important obstacle to were assigned a negative weight. A one-sample pixel test<sup>3</sup> was performed on CIs for each condition recruiting diverse and representative samples of participants. In this project, we aimed to evaluate whether SFO tunings for face recognition can successfully be measured via online testing. To do so, we tested 80 participants online using VPixx Pack & Go<sup>1</sup> and compared their results to those of 28 participants tested in a controlled laboratory setting.

# Method

#### Lab Study

- 28 participants
- 2000 trials each (1000 White/Asian faces)
- Recruited in Canada

Participants completed a same/different face matching task. The first face was presented broadband, but the second face was filtered using SFO Bubbles<sup>2</sup>. This method allows random sampling of the SFO spectrum, while preserving global face structure.

To ensure online participants completed the task properly, they first had to reach 80% performance on a practice task before starting the experiment. Attention check trials using unfiltered stimuli were also included in the experiment. To ensure they maintained an appropriate distance from the screen, the credit card test was used. At the end of the experiment, they were asked if they kept the appropriate distance at all time.



# **Using Online Testing to Measure Spatial Frequency** and Orientation Tuning in Face Processing

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(1)

Classification images (CIs) were computed using a weighted sum of SFO sampling filters. Filters (LAB:  $t_{crit} = 7.66, p < .001;$  ONLINE:  $t_{crit} = 6.22, p < .001;$ ). SFO tuning profiles for the Lab sample include only trials with White faces. An independent pixel-test detected a significant difference in tunings between the two samples ( $t_{Crit} = 5.12, p < .025$ ). However, when accounting for the different number of trials between the Lab and Online sample by only considering the first 600 trials per subject in the lab condition, this difference becomes non-significant. (Figure 3;  $t_{Crit} = 5.12$ , p > .025,  $t_{Max} = 3.48$ ).

#### **Online Study**

- 80 participants
- 600 trials each (White, Asian & Black faces)
- Recruited in CAN, US, UK, NZ, AUS, IRE through Prolific.

*Figure 2*. Image filtering The SFO process. Bubble is applied on the Fourier transform of the image. 3 sample trials are shown using the same base stimulus.



The present study shows that SFO tuning profiles for face recognition can indeed be measured in an online experiment. This means laboratory studies could be quickly replicated online on bigger and more diverse samples. This could for instance boost researcher confidence in their results. This also provides for more nuanced claims by accounting for factors that are hard to control in laboratory psychophysical experiments, such as for instance cultural influences. While our study shows quality results can be obtained at the group level, it remains unknown whether online testing yields the same quality when investigating individual differences. Data collection to compare samples from different cultures is currently ongoing.

1) Run MATLAB/Psychtoolbox Experiments Online with LabMaestro Pack&Go (V-VSS 2021)—VPixx Technologies. (n.d.). Retrieved May 5, 2023, from https://vpixx.com/vocal/psychtoolbox-online-with-labmaestro-packngo-v-vss-2021/ 2) Gingras, F., Limoges, J., Justin, D., Gosselin, F., Fiset, D., & Blais, C. (2022). Joint Sampling of the Full Spectrum of Spatial Frequencies and Orientations During Face Recognition. *Journal of Vision*, 22(14), 4131-4131. 3) Chauvin, A., Worsley, K. J., Schyns, P. G., Arguin, M., & Gosselin, F. (2005). Accurate statistical tests for smooth classification images. *Journal of Vision*, 5(9), 1–1.

### Results



Figure 3. Pixel test results when considering 600 Lab trials per subject. The figure shows the distribution of T scores across Fourier space. Horizontal orientations are on the vertical axis & lower SFs are closer to the center. Significant pixels are circled in black.

#### Conclusion

