

Training on Isolated vs Integrated Acoustic Features Impacts Participants' Ability to Reproduce Target Sounds

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Highlights

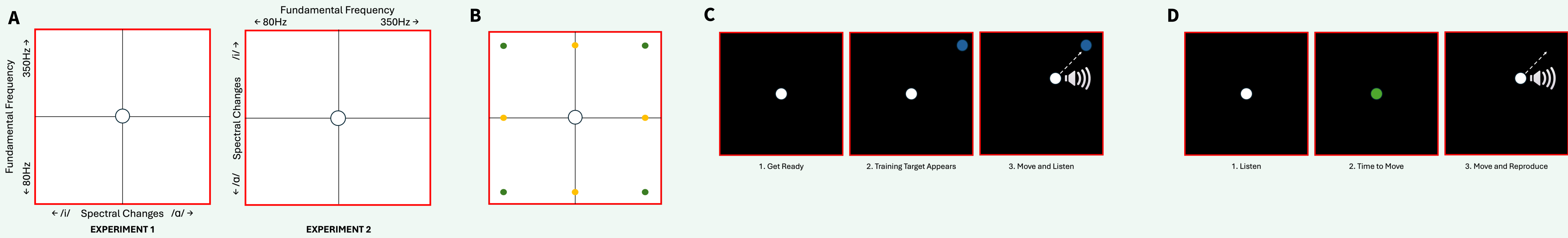
- We developed a 2D web-based instrument. One dimension mapped to pitch, the other to spectral changes (formant-like features).
- Participants were trained on either feature-isolated trajectories or feature-integrated trajectories using visual cues and tested on their ability to reproduce sounds with acoustic-only cues.
- Participants were able to perform the task and were biased toward reproducing trained trajectories.

Methods

- We adapted a graphical user interface (GUI) to produce a unique auditory stimulus at each x,y position.
- Participants were trained on 4 of 8 target trajectories with either feature-isolated or feature-integrated sounds.
- Testing was randomized blocks of all 8 targets with only auditory cues.
- Auditory feedback played with cursor movement but participants received no performance feedback (i.e. right/wrong).

Summary of Factors Influencing Acquisition of the OnPoint Music Auditory Map

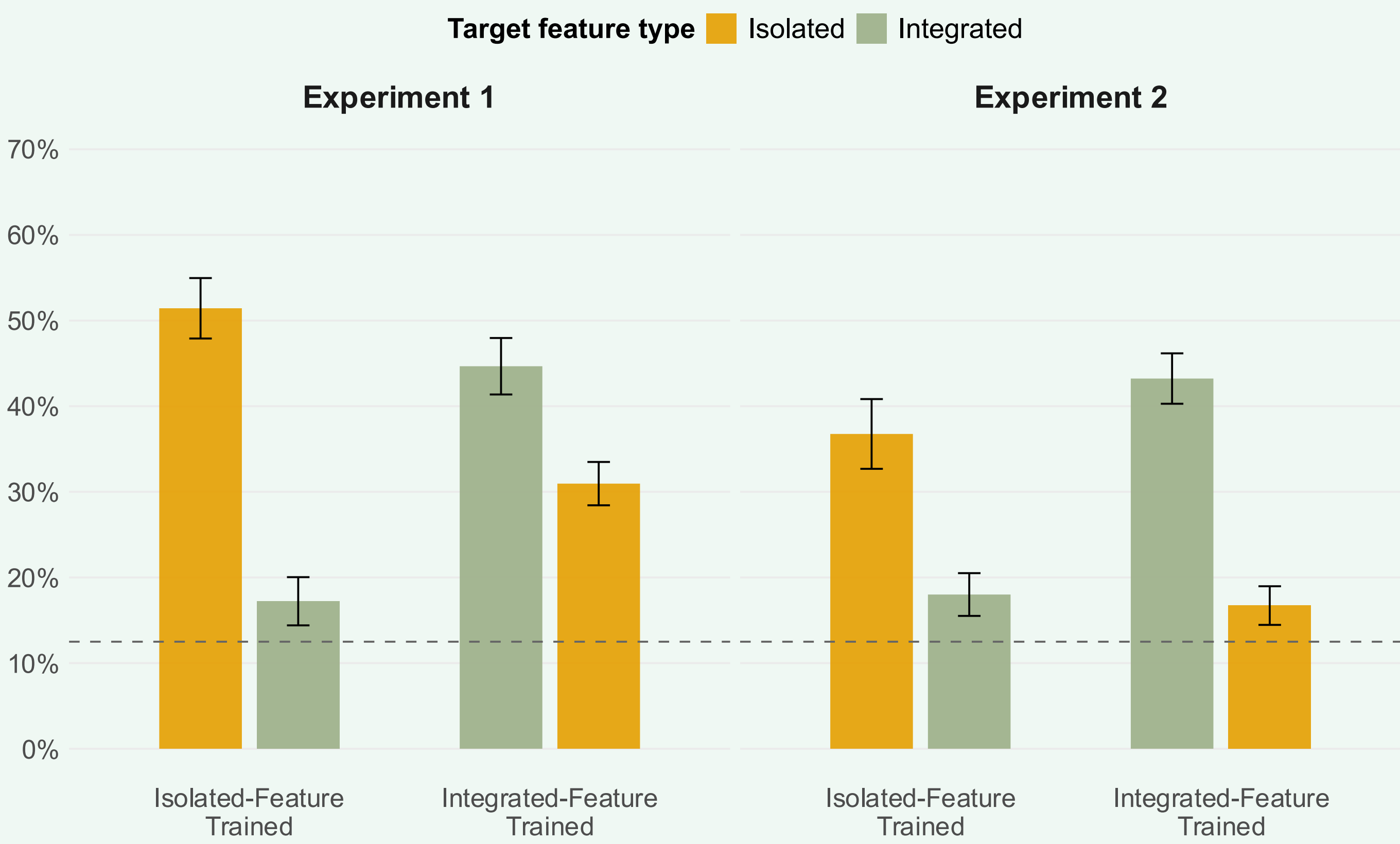
1. Each additional 5 years of musical experience predicted approximately 5% points higher accuracy on the task (from a baseline of ~32% to ~37%).
2. Speaking two or more languages seemed to have a negative effect on accuracy. This excludes analysis for tonal languages.
3. Training improved accuracy on trained targets to 48% (Exp 1) and 40% (Exp 2), representing gains of 35.5% and 27.5% points above chance.
4. Accuracy on trained targets (40–48%) was roughly double that of untrained targets (17–24%).
5. Integrated-Feature Trained participants seem to have a physical map-bias, unrelated to a target's sound features.



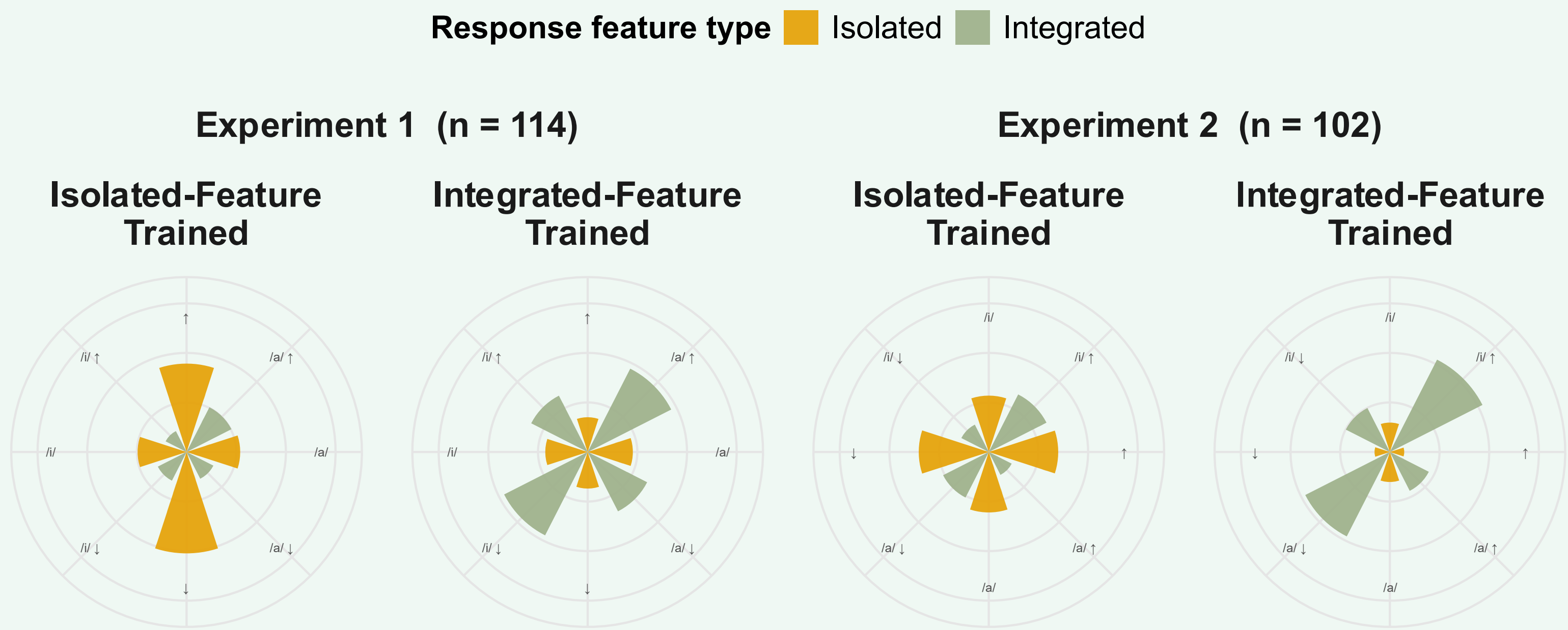
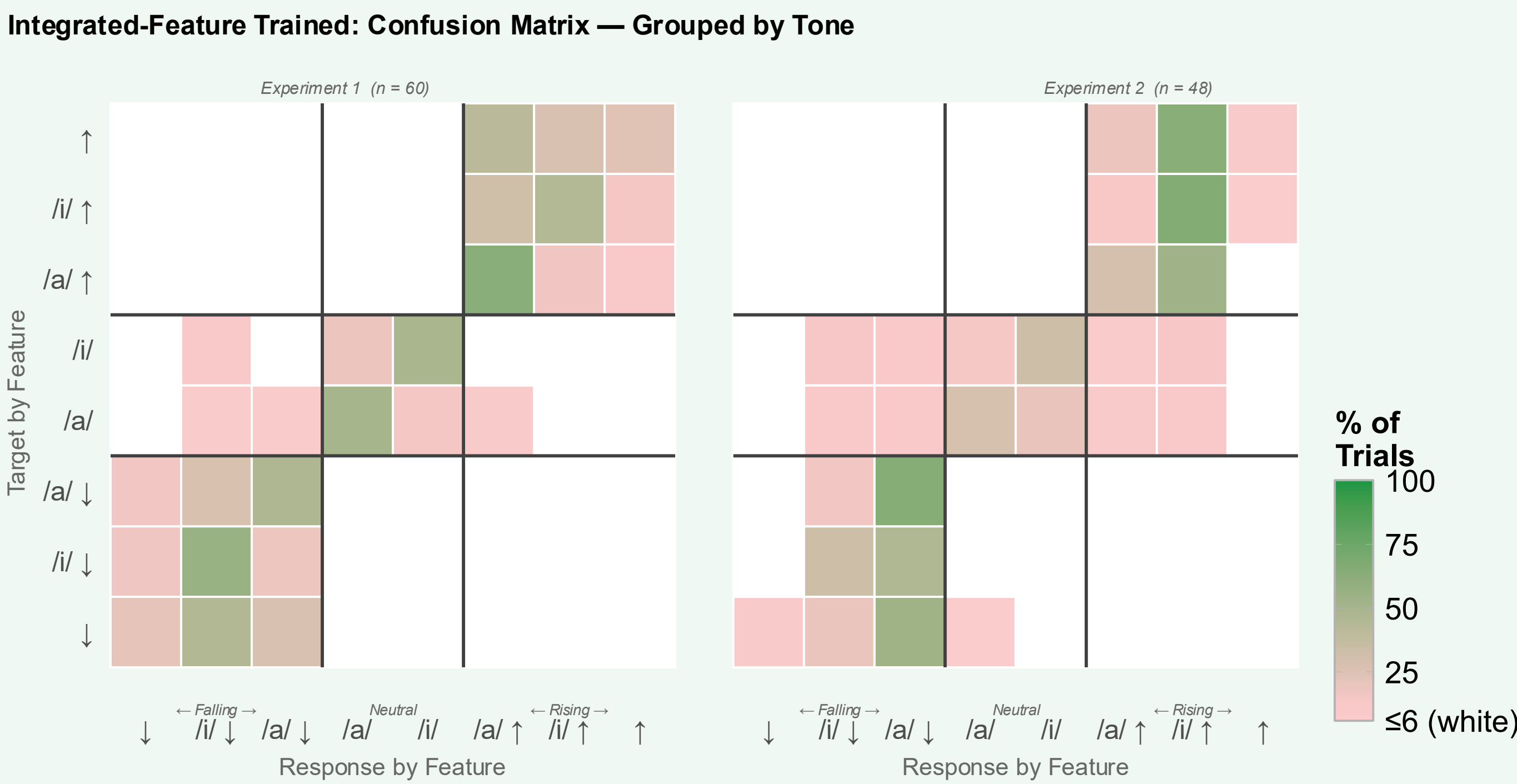
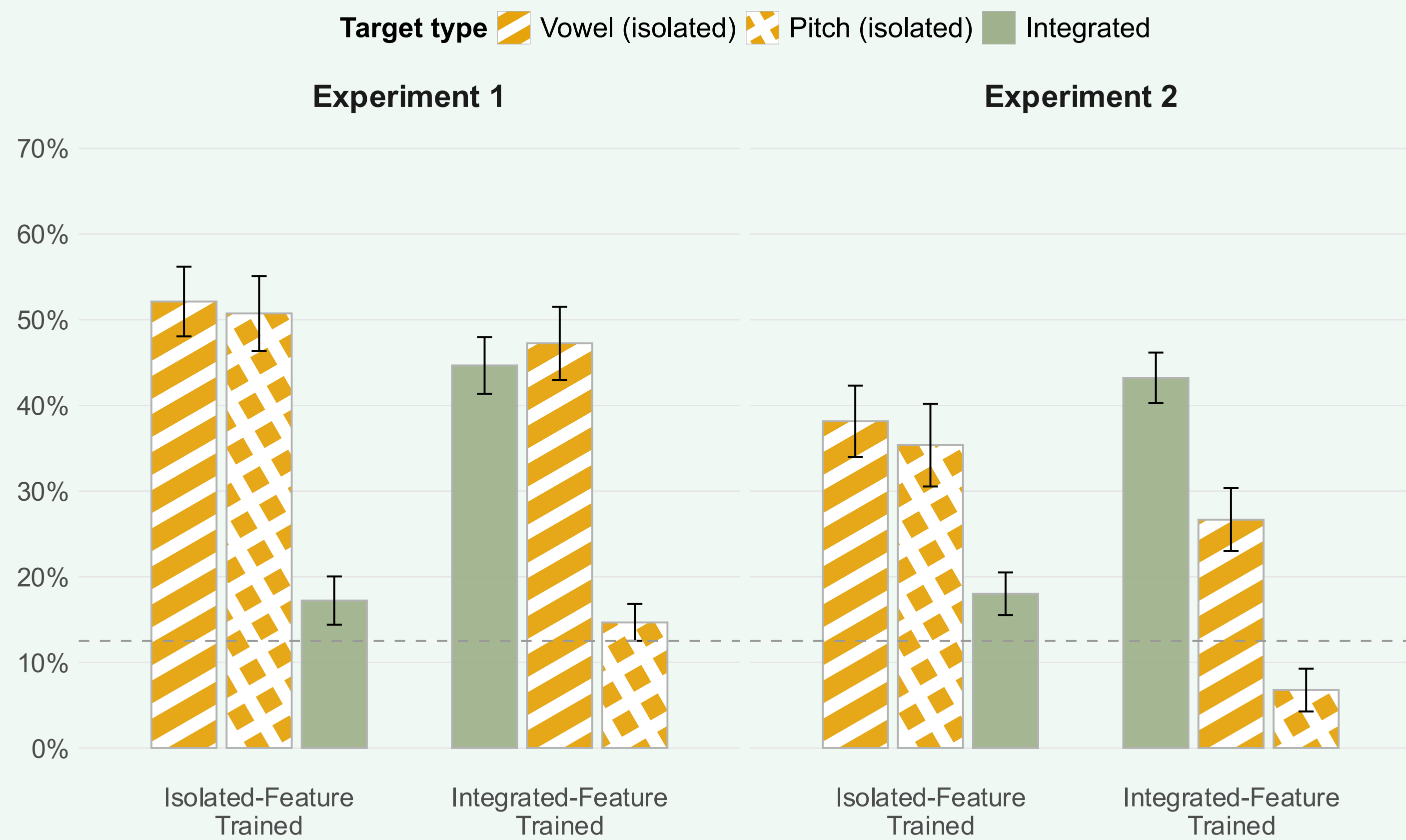
Schematics of OnPoint Music platform.
(A) The underlying auditory map for Exp 1 and Exp 2.
(B) 8 target locations: Feature-Isolated (yellow) and Feature-Integrated (green).

(C) Example of one training trial: the cursor starts in the center, then a target appears along the periphery, then the participant moves their cursor and hears the sound produced by their movement at each x,y location.
(D) Example of one testing trial: the cursor starts in the center, then an auditory cue plays, then the participant chooses a direction to move to try to match the target sound.

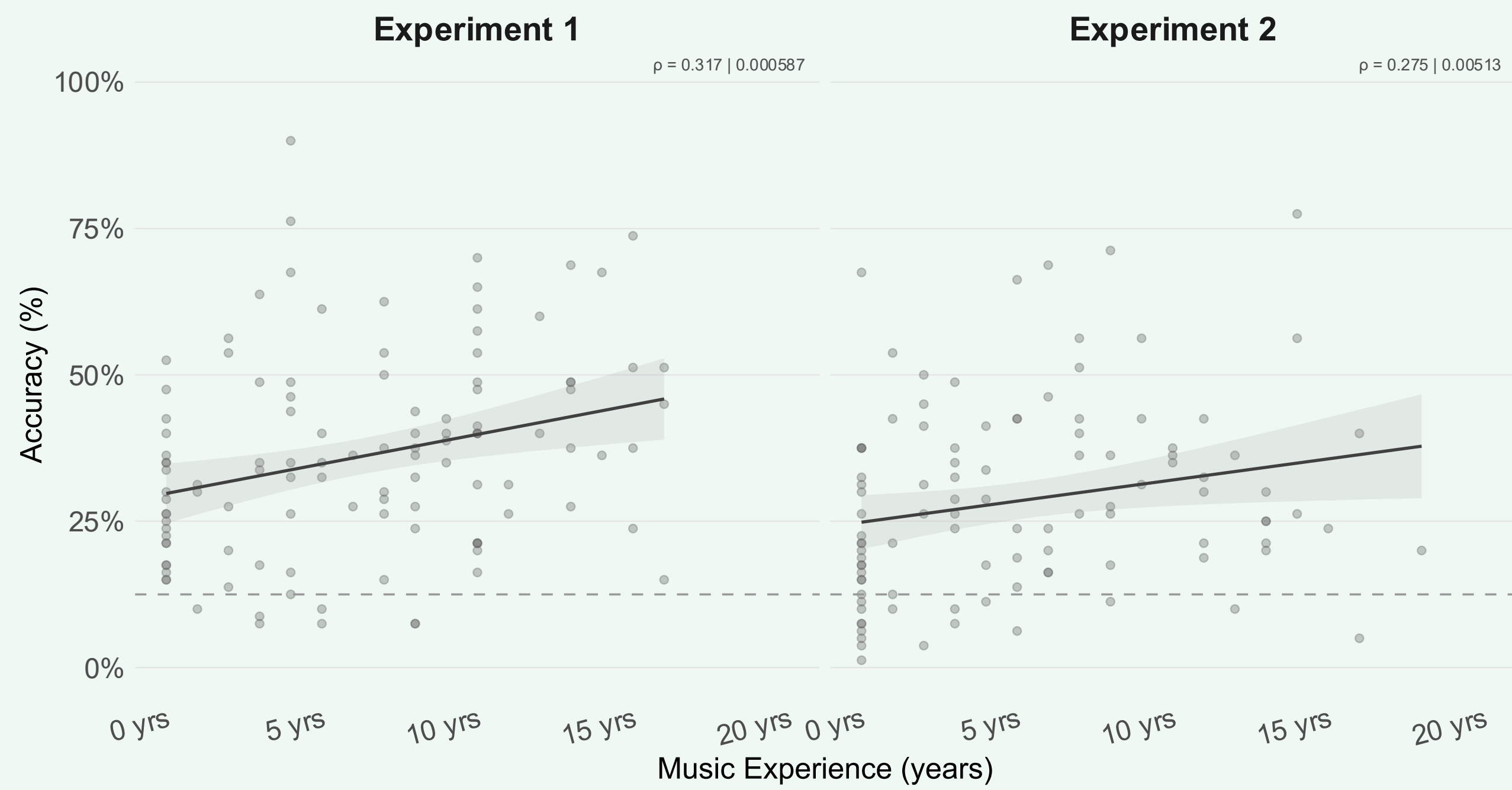
Training Strongly Influences Acquisition



Untrained Isolated-Feature Targets Vary Widely



Musical Experience Predicts Higher Accuracy Overall



Null predictors: Training Over Time, Multilingualism

