

# Poster 2aPP15. Sensitivity to Changing Stimulus Distribution Characteristics in Auditory Categorization

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Hook 'Em Horns!

## 1 Introduction

### Statistical Learning

A number of recent attempts have been made to describe phonetic acquisition as a statistical learning task<sup>1</sup>.

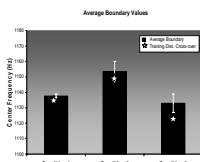
Specifically, it has been suggested that acoustic features can be matched with phonemes probabilistically, based on previous experience with distributions of speech sounds<sup>2</sup>.

Research by several investigators suggests that infant and adult humans are sensitive to auditory distributional information<sup>3</sup>.

Unfortunately, most of the published work suggesting the existence of statistical learning provides little or no description of the requirements of and constraints on distribution characteristics about learning.

### Previous Findings

Listeners retain and utilize specific distribution information (e.g., distribution crossover and distribution ratios) when making categorization choices under uncertainty. The resulting category decision criteria are near optimal.



One question of interest is how plastic these criteria are with changes in distributional characteristics. Can listeners quickly update categorization boundaries in light of new evidence?

### Purpose of Current Study

Determine whether listeners' categorization responses reflect sensitivity to changes in stimulus distribution characteristics.

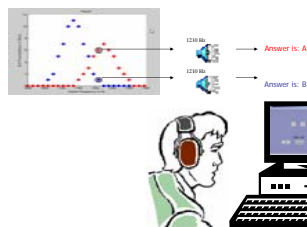
## 2 Experimental Methods

### Participants

15 UT undergraduates

### Task

Participants were presented non-speech sounds sampled from 2 overlapping distributions; categories "A" and "B". Subjects were asked to identify the distribution from which each sound was drawn and feedback was provided.



### Stimuli

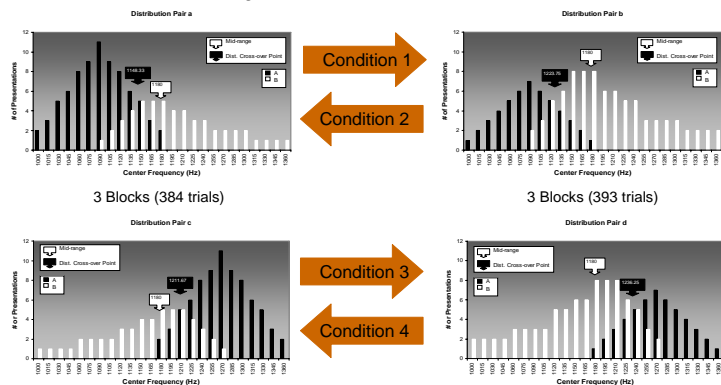
25 narrow-band noise bursts varying in center freq. from 1000-1360 Hz (15 Hz steps). Each sample had a BW of 200 Hz and was 100 ms in length.

### Dist. Characteristics

4 sets of distribution pairs were created by varying the ratio of stimuli in each category (i.e., prior probabilities), resulting in different distribution crossover points.

## 3 Conditions

Subjects participated in 6 Blocks (777 trials). The distribution pairs were **switched** mid-session without alerting listeners.

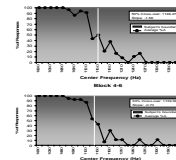


## 4 Results

### DVs

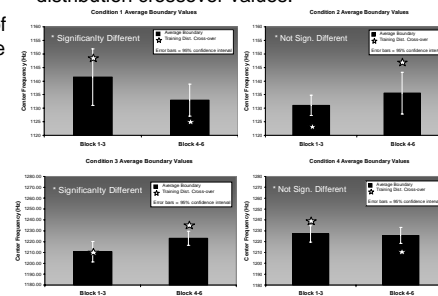
The # and % of "A" and "B" responses were documented for each subject across the 6 training blocks.

Categorization functions (% of "A" responses across cf) were plotted for each subject, averaged across Block 1-3 and Block 4-6.



### Boundary Values

Boundary values were calculated for each categorization function by linear interpolation. These values were compared to the training distribution crossover values.



## 5 Discussion

### Summary

Subjects were able to learn optimal or near-optimal boundary placement for overlapping distributions only when the dist. crossover point was near the mid-range **and** only when those distributions were presented during the initial blocks of training.

In the conditions in which the "harder" (farther from midpoint) categorization was presented first, it may be that listeners never established a strong criterion and thus the change in distribution characteristics did not offer sufficient evidence for a new criterion to be established.

### References

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### Acknowledgements

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