4pSC27. Perceiving allophonic alternations in an immersion setting: The case of alveolars and rhotics in Spanish and English. Farrah A. Neumann (Linguist, Univ. of Pittsburgh, 4200 5th Ave, Pittsburgh, PA 15260, fan9@pitt.edu)

Recent research indicates that second language (L2) immersion influences the phonetic production not only of the L2 (Jacobs, Fricke, & Kroll, 2016), but also of the first language (L1) (Chang, 2012). However, less understood is the immediate impact of L2 immersion on cross-language influence in phonetic *perception*. This study tracked L2 Spanish study abroad learners' perceptual shifts due to immersion using auditory-visual cross-modal priming experiments in both Spanish and English. The target phones, [r, ɾ, t, d, ð, ɹ], were chosen for their differing phonemic and allophonic statuses in Spanish and English. For example, Spanish rhotics include the phonemic trilled /r/ and tapped /ɾ/, whereas the tapped /ɾ/ exists phonetically in English, but as an allophone of the alveolar stops /t d/. Because learners must adjust their phonological inventories to accommodate the L2 statuses of these phones, we expect their L1 inventories to also reflect these changes, as evidenced by slower RTs for the prime-target pairs that do not correspond to the L2. This study provides a fuller perspective on how immersion mediates L1-L2 interference, and offers insight as to whether perceptual changes in the two languages are necessarily related. Data analyses are currently underway.

4pSC28. Language experience outweighs perceptual enhancement in category learning. Meng Yang (Linguist, Univ. of California, Los Angeles, 3125 Campbell Hall, Los Angeles, CA 90095, mengyang@ucla.edu)

Some theorists claim that cues that contribute to the same acoustic percept are naturally coupled in category learning. In contrast, others claim that no pairs of cues are privileged in this way, and listeners simply learn cue correlations from language input. We compared the cue weighting and cue-shifting between pitch and breathiness, which are enhancing but do not signal a phonemic contrast in English (Experiment I), and pitch and closure duration, which are not enhancing but are correlated in signaling the English voicing contrast (Experiment II). When the cues were enhancing but not contrastive, English listeners successfully learned to weight the more informative cue higher. In contrast, preliminary results show that listeners have difficulty weighting the informative cue higher when the two cues are not enhancing but only contrastive. Results suggest that language experience outweighs auditory enhancement relationships in the perceptual coupling of cues.

THURSDAY AFTERNOON, 10 MAY 2018 GREENWAY H/I, 1:00 P.M. TO 4:30 P.M.

Session 4pSP

Signal Processing in Acoustics: Topics in Signal Processing in Acoustics

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Contributed Papers

1:00

4pSP1. Analysis of foldable acoustic arrays from piecewise linear, conformal, and tessellated topologies. Chengzhe Zou and Ryan L. Harne (Mech. and Aerosp. Eng., The Ohio State Univ., 201 W 19th Ave, Columbus, OH 43210, zou.258@osu.edu)

Arrays of acoustic sources distributed over the tessellated frameworks of origami-inspired folding patterns demonstrate exceptional and straightforward adaptivity of acoustic wave guiding architecture to contrast to the challenges manifest in digital wave guiding control methods. Yet, when the concept of folding arrays is applied to tessellations formed by single patterns, acoustic fields with distinct distributions of energy delivery cannot be realized. To overcome this limitation, here multiple folding patterns are assembled by piecewise geometries that permit the array to conform to unique topologies when reconfigured by physical folding actions. An analytical model is developed to predict the acoustic pressure radiated from the acoustic sources arranged on piecewise-continuous surfaces, while experiments are conducted to demonstrate the concept and validate the model. Parametric investigations are then undertaken to uncover the relations of modularity and folding of the acoustic array and the resulting acoustic energy delivery and distributions. The results find that the assembly of tessellated arrays from multiple distinct folding pattern sub-elements may replicate the acoustic wave guiding of complex acoustic sources that traditionally do not enable adaptive wave radiation properties.

1:15

4pSP2. Cross-correlation method for acoustic detection of small unmanned aerial vehicles. Alexander Sedunov, Hady Salloum, Alexander Sutin, and Nikolay Sedunov (Maritime Security Ctr., Stevens Inst. of Technol., One Castle Point on Hudson, Stevens Inst. of Technol., Hoboken, NJ 07030, asedunov@stevens.edu)

The availability of Unmanned Aerial System (UAS) to consumers has increased in the recent years, with it came the potential for negligent or nefarious misuse of them. Stevens Institute of Technology has built a passive acoustic system for low flying aircraft detection, the application of the developed principles and algorithms for UAS acoustic detection and tracking is presented in this paper. The application of the developed principles and algorithms for UAS acoustic detection and tracking is presented in this paper. Several experiments were conducted aiming to establish the characteristics of the emitted noise of UAVs of various sizes while airborne and demonstrate the processing required to detect and find the direction toward the source. The vehicles tested included popular quadrotors: DJI Phantom 2 Vision+, 3DR Solo, DJI Inspire 1 as well as larger semi-professional vehicles: Freefly Alta 6, DJI S1000. The small array of 16 microphones was used for data collection in the tests near local NJ airport. Acoustic signatures of the tested UAS were collected for stationary and flying UAS. We applied the algorithm for detection and direction finding based on fusing time difference of arrival (TDOA) estimates computed by finding peaks in the output