Music Therapy 2

GOWEN 201, 11:00 – 12:30, Tuesday 24 Aug 2010

Music Perception in Cochlear Implant Users

Ward R. Drennan [1], Grace Liu Nimmons [2], Robert Kang [1], Jillian Crosson [3], Jong Ho Won [1], Jay T. Rubinstein [1]; [1]University of Washington, USA; [2]University of Iowa, USA; [3]Cochlear, USA

PA012, Time: 11:00

The cochlear implant provides a sense of hearing to people with severe hearing loss. The device encodes sounds according to frequency (place), but largely fails deliver the fine spectral and timing information which contributes to good music perception. Engineering efforts are ongoing to improve music perception ability in cochlear implant users. The aim of this study was to develop a validated clinical test of music perception in cochlear implant users. Three tests were conducted to evaluate musical-pitch perception, timbre perception and rhythmless melody perception with 97 cochlear implant users at multiple sites. The pitch perception test used a psychophysical adaptive tracking procedure to measure the smallest semitone increase cochlear implant users can hear. In the timbre and melody tests, listeners identified items from a closed set. The timbre test required listeners to identify recordings of 8 different musical instruments playing the same melody at the same tempo. The melody test involved identification of 12 familiar melodies presented with synthesized piano tones in a repeated eighth-note pattern. This eliminated rhythm cues. Pitch discrimination difference limens averaged 2.64 semitones ranging from < 1 semitone to an octave. Timbre scores averaged 42.9% ranging from chance levels to 83% correct. Melody scores averaged 26.2% correct ranging from chance levels to 94% correct. The test allows clinicians to evaluate a large range of abilities with easy elements (pitch discrimination) and more challenging elements (melody discrimination), and provides a means to evaluate the effect of innovative treatments for severe hearing loss on music perception.

Musical Methods for Little Digital Ears — Musical Learning with Preschool Cochlear Implant Users

B. Petersen [1], R.H. Hansen [1], K. Beyer [2], M.V. Mortensen [1], Peter Vuust [3]; [1]Aarhus University Hospital, Denmark; [2]Center of Guidance & Special Pedagogy, Denmark; [3]Royal Academy of Music, Denmark

PA019, Time: 11:30

Prelingually deaf children who receive cochlear implants (CI) early can successfully develop age-appropriate language skills provided sufficient intervention measures are initiated. However, little is known about the music perception and enjoyment of these children, though the enhanced development in the central auditory system in early-implanted children may benefit music processing. We hypothesized that early-implanted, prelingually deaf children with CI's, who were exposed to group-oriented music learning activities, would increase their music discrimination skills and — as a potential near transfer effect- their linguistic skills too. We also expected to observe music enjoyment and increased musical activity as reported in parental feedback. Ten preschool CI users participated in weekly music sessions for three months, while eleven CI-children acted as controls. Music and speech perception was measured objectively at the beginning and end of the intervention period. For a musical performance reference, test data were collected from a group of normally hearing peers. *Results*: The children in the music group outperformed the controls in all tests. Their musical discrimination abilities improved particularly and approached the normal hearing level in timbre and pitch detection. The feedback from the parents indicated a positive impact on the children's musical interest and activity. *Conclusion*: Music learning activities can be beneficial for the auditory development of child CI users. In sum, the subjects' response, the feedback, and the test results indicate that music offers an enjoyable supplement to standard auditory-oral therapy, with a potential long term impact on the linguistic, cultural, social, and personal development of these children.

Sending Better Music to the Brain via Electrical Stimulation of the Auditory Nerve

Kaibao Nie, Xing Li, Les Atlas, Jay T. Rubinstein; University of Washington, USA

PA024, Time: 12:00

Profoundly deaf people can restore speech perception ability with cochlear implants which directly stimulate the auditory nerve by electrical currents. However, music perception with cochlear implants is a significant challenge partially because of the inability of existing sound processing strategies in encoding pitch and timbre cues. We have developed a novel sound coding strategy — Harmonic Single Sideband Encoding or HSSE — that can potentially deliver better musical pitch and timbre through electrical stimulation. Developing the new coding strategy was inspired by the recently-established coherent demodulation theory that transforms a band-limited signal to a low-frequency oscillating signal perceivable to cochlear implant patients. Two cochlear implant patients have been tested acutely with the HSSE strategy and both showed significant performance improvement in recognizing familiar melodies and perceiving musical instrument timbre in our closed-set evaluation experiments. These results suggest that the HSSE strategy holds high potential in restoring music perception with cochlear implants.

Performance 1

GOWEN 301, 11:00 – 12:30, Tuesday 24 Aug 2010

A Comparison of Blocked and Random Practice Orders with University Wind Players

Laura A. Stambaugh; Georgia Southern University, USA

PA176, Time: 11:00

Motor learning research defines a blocked practice order as highly repetitive (AAA BBB CCC) and contrasts it with a random practice order that constantly switch tasks (ABC CAB BCA). The purpose of this study was to examine the effects of these practice orders in a musical context. Thirty-eight university wind students practiced three seven-note tasks in either a blocked or random order during practice sessions on two consecutive days. All participants performed the same number of trials of each task; only the order of trials differed between practice groups. In addition, participants were asked to predict how well they expected to perform the examples on the following day (judgment of learning) by predicting the metronome speed for each task. Retention and transfer testing occurred twenty-four hours and one week after the second practice session. Performances were scored for pitch accuracy, speed, and temporal evenness. Between groups ANCOVAs compared group differences at the end of practice, twenty-four hour retention and one-week retention. Repeated measures ANCOVAs examined within group changes from the end of practice to the two retention sessions. Results of performance analysis will inform recommendations for practice and be examined in relation to previous music-motor research. Judgment of learning predictions were compared with actual performance results. These results will be discussed in the context of self-paced practice and cognitive load while practicing multiple tasks.

The Effect of Instrumental Experience on the Communication of Phrasing and Tension in Music Performance

Bryony Buck, Nick Bailey; University of Glasgow, UK

PA143, Time: 11:30

Movement in time is the very basis of human cognition. Through movement we communicate meaning, understanding our world and those around us. Music performance is seen to comprise groups of movements communicating a performer's structural and emotional interpretation of a score (Davidson, 1993; Vines, 2006; Gabrielsson, 2009 for review). The ability to perceive coherent motion, social intent, and affect from point-light displays is applied here to piano performance to further assess structural information communicated through motion.