* 2013 Capstone Presentations
EVALUATION OF UNIVERSITY CLASSROOM ACOUSTICS IN TERMS OF THE ANSI S12.60-2002 STANDARD

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Purpose
To determine how an acoustically consulting for a school identification might affect a result of the actual condition in a waiting school conditions. The realistic condition in several university classrooms were measured in order to determine their compliance with the ANSI S12.60-2002 standard. These classrooms were evaluated in terms of background noise, reverberation time, and interior-to-interior sound transmission. The methods used in this study were in strict compliance with those specified by the ANSI S12.60-2002 standard.

The ANSI standard requires the following acoustic performance characteristics:

- Maximum S rating: 40 dB, with maximum reverberation time recommended for classrooms.
- Minimum S rating: 30 dB, with minimum reverberation time recommended for classrooms.

Methods

**Pre-Measurement Conditions**
- No occupants/noise sources
- Furnished according to normal use
- Material noise from adjacent spaces
- HVAC operating as normal
- No open doors/windows
- Sound level meter in compliance with ISO 3382

**Reverberation Times by Calculation**

Reverberation time was determined by a number of conventional methods which were in strict compliance with those specified by the ANSI S12.60-2002 standard.

**Results**

All classrooms tested failed to meet the recommendations of the standard.

Possible Causes for Failure
- **Background Noise**
  - Air Conditioning: Cool Window Mounted
  - Fan/Blower: Slow, Near Classroom
  - Exterior Sound: Noise from Transportation
  - Noise, Textbooks, and Chalk

- **Reverberation**
  - High Reflection Materials (Pizza, Popcorn, Paper)
  - Parallel Walls
  - No Absorptive Materials

- **Transmission**
  - Pervious: Ability of HVAC Duct to Error
  - Windows: Sound Insulation

- **Construction**
  - Collection: Lack of Sound Insulation/Structural Vibration
  - Tones: Resonant Wells

Possible Recommendations
- **Practice**
  - A practice to the problem is to find the causes of such problems
- **Air Conditioning**
  - Replace old wall with new wall, with good air
  - Identify and fix the noise source
  - Humidity at maximum level possible at all times

- **Screens**
  - Fix the majority of sound on the walls and how to get sound on every student
  - Replace old wall with new wall, in good air

- **Interior material in each room**
  - Sound measurement in each room to identify the noise source

Conclusions

- Assess an instructor speaking voice to 12 dB with a dynamic range of 12 to 15 dB, a variance of 50% in the voice signal is appropriate.
- No usable voice signal below 12 dB with a dynamic level of 15% in the voice signal is appropriate.
- Overall average of voice signal from 12 dB to 15 dB is 100 and the difference.
- Having measured student sound under the condition of 12 dB to 15 dB, with.
- The difference in the noise level from the teacher.
- The difference in the noise level from the teacher.
- The difference in the noise level from the teacher.
- The difference in the noise level from the teacher.

- With a difference in the noise level from the teacher.
- The difference in the noise level from the teacher.
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Acceptable Noise Level, Gender, and Anxiety in Young Adults with Normal Hearing

Introduction

Much research has been conducted to determine why certain individuals may report hearing difficulties. In the past few years, some researchers have focused on the Acceptable Noise Level (ANL), which is based on the Acceptable Noise Level (ANL) in various environments. The ANL has been found to vary with age, sex, and other factors. N. A. (2024) and others have studied the effects of gender and ANL on the quality of life.

Research Questions

1. Does a correlation exist between ANL and anxiety?
2. Does a correlation exist between ANL and gender?
3. Does a correlation exist between ANL and age?

Subjects and Methods

The study included participants between the ages of 18 and 30 years. Participants were recruited through flyers and advertisements. Ethical approval was obtained from the Ethics Committee of the City University of New York.

Results

The results showed that the ANL was significantly lower in females than in males. There was no significant difference between age groups. No significant correlation was observed between ANL and anxiety. However, there was a significant correlation between ANL and gender, with females having a lower ANL than males.

Discussion

The results of the current study add further evidence to the hypothesis that gender affects ANL. The lower ANL in females may be due to differences in hearing sensitivity or other factors. Further research is needed to explore the underlying mechanisms.

References

Melody and Timbre Perception and Quality of Life in Young Adults with Cochlear Implants

Anna Holke, B.A.
CUNY Graduate Center and Hunter College
Faculty Advisor: Carol A. Silverman, Ph.D., M.P.H.

BACKGROUND
Although cochlear implants (CIs) afford users with good speech perception abilities in favorable listening conditions (Friesen et al., 2001), music perception and enjoyment often are compromised in these individuals (Denninan & Rubinstein, 2008). Many music perception studies have been done on adults with cochlear implants (CIs); but sparse data are available on young adults (18-25 yrs of age), for whom music plays an important role in daily activities and quality of life.

RESEARCH QUESTIONS
1. Is there a significant difference in melody perception between young adults w/ CIs & young adults with normal-hearing (NH) sensitivity? 2. Is there a significant difference in music listening habits/engagement levels between these 2 groups? 3. Does quality of life correlate with melody perception in the CI group?

RESULTS
Melody Recognition Scores (Percent)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Total (n = 20)</th>
<th>CI Group (n = 5)</th>
<th>NH Group (n = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>45.2</td>
<td>51.1</td>
<td>68.7</td>
</tr>
<tr>
<td>Range</td>
<td>5.6-94.4</td>
<td>5.6-36.1</td>
<td>41.1-94.4</td>
</tr>
</tbody>
</table>

2-sample Wilcoxon rank sum (Mann-Whitney) test: significantly poorer median melody recognition score for the CI group than NH group (p < .0002).

Music Listening Habit Scores (Scale of 1 to 5)

Chi-square test: no statistical significance between the 2 groups in music listening frequency, importance, & enjoyment (p > .05).

MATERIALS & METHODS
Participants: Young adults (18-25 yrs of age), 1 group with NH sensitivity (NH) & 1 group with cochlear implants (CI).

EXCLUSION Criteria: Negative history of ear surgery, neurologic problems, cognitive issues.

Nijmegen Cochlear Implantation Questionnaire Scores

<table>
<thead>
<tr>
<th>Measure</th>
<th>Basic Sound Perception</th>
<th>Advanced Sound Perception</th>
<th>Speech Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>77.0</td>
<td>82.0</td>
<td>81.3</td>
</tr>
<tr>
<td>Range</td>
<td>57.5-100</td>
<td>50-82.5</td>
<td>60-100</td>
</tr>
</tbody>
</table>

No significance in the correlation between melody perception and NIHQOL advanced sound perception/speech production.

DISCUSSION
- Poor melody perception for CI group emphasizes the need for improved CI technology & possibly music training.
- Similarly high music listening frequency, importance, & enjoyment for the 2 groups suggests either (a) insufficient statistical power (small n), or (b) CI users enjoy music & listen as frequently to music as NH individuals, regardless of pitch & timbre perception skill.
- Lack of statistically significant correlation between melody perception and NIHQOL advanced sound perception/speech production indicate need for future research w/larger n.

REFERENCES
Binaural Interference in Children with Bilateral Amplification

Elaine Devora, B.A. & Lauren Rouse, B.S.
The CUNY Graduate Center & Brooklyn College
Faculty Mentors: Shlomo Silman, Ph.D. & Michele Emmer, Ph.D.

BACKGROUND

Although multiple benefits have been associated with bilateral auditory input, some individuals with bilateral hearing loss show decreased performance, both objectively and subjectively, when fitted bilaterally. Chronic ear infections, unilaterally hearing loss, posterior labyrinthine hypoplasia, and auditory processing deficits. Studies by each of us (Walen & Walen, 2005) and others (Reid & Walen, 2010) found that bilateral amplification generally improved outcomes in children as compared to monaural. However, the mechanisms underlying these improvements are not well understood.

METHODS

Study Design:
- Prospective, pilot study
- Methodology adapted from Walen & Walen (2005) with modifications to accommodate younger/older participant age range.
- Participants: Six children, ages 5-8 years, with bilateral, symmetrical sensorineural hearing loss and bilateral amplification.
- Evaluations: Automotive noise, laboratory noise, and school setting.

RESULTS

Table 1: Reaction time data.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Reaction Time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 dB SNR</td>
<td>100.00</td>
</tr>
<tr>
<td>0 dB SNR</td>
<td>105.00</td>
</tr>
<tr>
<td>0 dB SNR</td>
<td>110.00</td>
</tr>
<tr>
<td>0 dB SNR</td>
<td>115.00</td>
</tr>
</tbody>
</table>

DISCUSSION

Findings of the current study indicate that statistically significant bilateral interference, in an elderly sample of children, did not occur in this sample of children. Though not statistically significant, participants displayed a trend of bilateral interference through objective test results and subjective preference for wearing one ear hearing aid. Binaural SNR test showed results on 30% of 5.4 dB for the right hearing aid alone condition, 4.5-5.5 dB for the left hearing aid alone condition, and 5.0 dB for the binaural hearing aid condition.

REFERENCES


STUDY AIMS

- Performance on binaural hearing (SNR-12k) aided and unaided.
- Binaural and unaided Tunes Test.
- Binaural and unaided Speech Test.
- Performance on bilateral and unaided Word List Test.
- Performance on bilateral and unaided Speech In Noise Test.

Evaluations:
- Audiometric assessment.
- Behavioral assessment.
- Speech-in-noise test.
- Tunes Test.
- Word List Test.
- Speech Test.

Evaluations:
- Aided and unaided performance.
- Bilateral and unaided performance.
- Speech-in-noise test.
- Tunes Test.
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THE EFFECTS OF DECREASED AUDIBILITY PRODUCED BY SPECTRALY-SHAPED NOISE MASKING ON THE ACOUSTIC CHANGE COMPLEX (ACC)

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Advisor: Ron A. Martin, Ph.D.
Au.D. Program, The Graduate Center of the City University of New York