

Development of a Clinical Test of Musical Perception: Appreciation of Music in Cochlear Implantees (AMICI)

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Jaclyn B. Spitzer*†
Dean Mancuso†
Min-Yu Cheng‡

Abstract

The purpose of this study was to develop a test to assess the ability of persons with cochlear implants (CIs) to interpret musical signals. Up to this time, the main direction in outcomes studies of cochlear implantation has been in relation to speech recognition abilities. With improvement in CI hardware and processing strategies, there has been a growing interest in musical perception as a dimension that could improve greatly users' quality of life. The Appreciation of Music in Cochlear Implantees (AMICI) test was designed to measure the following abilities: discrimination of music versus noise; identification of musical instruments (from a closed set); identification of musical styles (from a closed set); and recognition of individual musical pieces (open set). The first phase of the study was test development and recording. The second phase entailed presentation of a large set of stimuli to normal listeners. Based on phase 2 findings, an item analysis was performed to eliminate stimuli that were confusing or resulted in high error rates in normals. In phase 3, hearing-impaired participants, using cochlear Implants, were assessed using the beta version of the AMICI test.

Key Words: Cochlear implants, hearing loss, music perception, sensorineural hearing loss

Abbreviations: AMICI = Appreciation of Music in Cochlear Implantees test; CIs = cochlear implants

Sumario

El propósito de este estudio fue desarrollar una prueba para evaluar la capacidad de las personas con implantes cocleares (CI) para interpretar señales musicales. Hasta ahora, el enfoque principal en estudios de desempeño de implantación coclear se ha concentrado las habilidades de reconocimiento del lenguaje. Con el mejoramiento del hardware y de las estrategias de procesamiento de los CI, ha existido un interés creciente en la percepción de la música, como una dimensión que podría incrementar importantemente la calidad de vida de los usuarios. La Prueba de Apreciación Musical en Implantados Cocleares (AMICI) fue diseñado para medir las siguientes aptitudes: discriminación de la música vs. ruido; identificación de instrumentos musicales (de un grupo cerrado); identificación de estilos musicales (de un grupo cerrado); y reconocimiento de piezas musicales independientes (grupo abierto). La primera fase de la prueba fue evaluar desarrollo y registro. La segunda fase

*Columbia University College of Physicians and Surgeons; †Columbia University Medical Center of New York Presbyterian Hospital; ‡Department of Biobehavioral Sciences, Teachers College, Columbia University

J. Spitzer, Ph.D., Columbia University College of Physicians and Surgeons, 180 Ft. Washington Avenue, HP 811, New York, NY 10032; Fax: 212-305-2249; E-mail: Jbs50@columbia.edu

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involucró la presentación de un amplio grupo de estímulos a oyentes normales. Con base en los hallazgos de la fase 2, se realizó un análisis de ítems para eliminar estímulos que eran confusos o producían una alta tasa de errores en los normales. En la fase 3, los participantes hipoacúsicos, usando sus implantes cocleares, fueron evaluados usando la versión beta de la Prueba AMICI.

Palabras Clave: implantes cocleares, pérdida auditiva, percepción musical, hipoacusia sensorineural

Abreviaturas: AMICI = Prueba de Apreciación Musical en Implantados Cocleares; CI = implantes cocleares

When cochlear implants (CIs) were first developed, an improvement in ability to detect a speech signal by a profoundly deaf individual was considered a triumph. Speech understanding for the early implantees was minimal, but the sounds served as a significant support to lipreading. The situation has evolved rapidly and radically. Development of speech processing strategies and improved internal and external hardware has led to outcomes that have exceeded previously anticipated communication abilities. For example, Staller et al (2000) showed speech recognition performance in open-set sentences of 79.6% in quiet using the Nucleus 24 Contour electrode and ear-level speech processor. Similar outcomes have been obtained with the other two FDA-approved cochlear implants (Shapiro et al, 2000; Valimaa et al, 2000; Hamzavi et al, 2001). With such improvements in speech recognition performance, other aspects of performance, including the appreciation of music, are becoming more important than previously thought. The field now acknowledges the value of musical perception to quality of life (McDermott, 2004).

Gfeller and colleagues (Gfeller and Lansing 1991; Gfeller et al 1997, 2000, 2003, 2005) have pursued a line of research regarding the musical perception of CI users. Among their conclusions were the following: timbre measures were weakly correlated with speech perception measures; performance on a recognition and timbre test improved with training; and music was enjoyed more before implantation than after. These studies confirmed the difficulty of assessing musical perception and highlighted the need for a clinically relevant measure of

musical recognition and performance.

Gfeller et al (2002) investigated the perception of timbre by implantees. Timbre, or tone quality, is a key element in differentiating among musical instruments. Normal listeners and implantees rated eight musical instruments. The implantees rated higher-pitched instruments more favorably than stringed instruments. The authors found that timbre measures were weakly correlated with speech perception measures.

In a related study, Leal et al (2003) evaluated accuracy for pitch, timbre and rhythmic patterns, and song identification in a group of 24 Nucleus CI24 users. In their homogeneous group of implantees, chiefly long-term (<10 years) deafened, they found that discrimination of pitch, rhythm, timbre, and identification of nursery songs were correlated to duration of deafness, duration of implantation, speech discrimination, and music perception skills. The authors reported on listener satisfaction: 38% of participants indicated they did not enjoy listening to music, 86% indicated that they listened less frequently after implantation. The escalating interest in musical perception accuracy and enjoyment is also reflected in publication of a variety of investigations utilizing synthesized signals (Koelsch et al, 2004; Kong et al, 2004) or alternative processing strategies to those currently implemented (Vandali et al, 2005; Laneau et al, 2006) in relation to musical tasks. As advanced processing strategies are introduced clinically, their impact on musical performance has become an assessment of interest (Buckler et al, 2006). The preceding studies underline the complexity of musical perception assessment; it is clear that many dimensions, such as pitch, timbre,

rhythmic perception, melody recognition, and listening satisfaction may be evaluated.

The purpose of the present study was to develop a clinical listening test that assesses various practical aspects of musical perception. The Appreciation of Music in Cochlear Implantees (AMICI) test assesses several facets: discrimination of music versus noise; identification of musical instruments from a list of choices; recognition of musical styles from a list of choices; and recognition of individual musical pieces. We were thus able to test the hypothesis that it is possible to develop a series of musical tasks of graded difficulty. Through the alpha version (containing items ultimately determined to be unnecessary), we obtained insight into the graded difficulty of the tasks in the four subtests. A shorter, more clinically appropriate form was the ultimate goal of this study.

METHOD

Study Design

In order to develop a measurement tool for perception of music, three study phases were planned. In Phase 1, AMICI test development (alpha version) and recording took place, as described below. During Phase 2, trials with normal-hearing participants were performed, followed by item analysis to eliminate items that had high error rates. Three forms of the beta version of the test were derived from the original longer version. Phase 3 is ongoing, entailing administration of the AMICI to hearing-impaired listeners and cochlear implantees. Some early Phase 3 findings are presented in this report. The following sections provide detail about test development and procedures.

Test Development: Alpha Version

The two senior authors generated a list of musical and noise selections in the following categories:

1. Noise versus music discrimination: 20–30 sec selections from a wide variety of recorded musical sources have been enlisted. Noise stimuli have been selected from commercial recordings as well. The noise stimuli (such as an airplane taking off, gunshots, running water) were required to have rhythmic and

tonal characteristics commonly found in environmental noises. In those instances where the noise was of very short duration (such as an impact noise like closing a desk drawer), the sample was recorded multiple times for presentation as a single item.

2. Identification of instruments: 20–30 sec selections from commercial musical recordings were identified. The selections were required to have the target instrument played without accompaniment or with accompaniment at a much reduced intensity relative to the target instrument. The target instruments were: trumpet, piano, flute, drums/tympani, tuba, guitar, violin/strings, female vocal, and male vocal.
3. Identification of musical style: 20–30 sec selections were identified in the categories: classical, Latin, country and western, jazz, rock and roll/popular.
4. Identification of musical pieces: 20–30 sec selections were identified that were deemed part of the American cultural mainstream. Two alternative versions were constructed, one with popular musical selections and one with classical items. The boundaries between these categories were deemed inexact, as many “classical” selections (such as the opening passage of Beethoven’s 5th Symphony) have been used in popular contexts or performed in modern styles, thus increasing their familiarity for the general population. Likewise, some “popular” selections (such as “White Christmas” sung by Bing Crosby) were considered so pervasive in our society that they were included in the “classical” version.

A full item list of the alpha version is in Appendix A. Recording of the four test sections was accomplished in a professional audio studio. Selections were taken from commercially produced music and noise compact discs. An alerting phrase, “Ready,” was inserted prior to each stimulus. A calibration tone was inserted at the beginning of the recording. Recognizing that music is highly variable in intensity, effort was made to maintain a minimum intensity level within 10 dB of the calibration tone. Some items were repeated in different sections or within the same section.

Participants

The 34 normal-hearing individuals who participated in Phase 2 met the following criteria: hearing thresholds for octave frequencies between 250–8000 Hz at ≤ 25 dB HL bilaterally, no history of aural or neurologic disease, and English language proficiency. No minimal musical background or experience level was required. Mean age was 33.3 years (range, 22–60 years).

To demonstrate the feasibility of this test for the clinical application, a group of 11 hearing-impaired participants, CI users with ≥ 1 year experience, was also recruited for Phase 3. They were four men and seven women. CI participants used either Nucleus 24 Contour, or Advanced Bionics CII or 90K electrode, or Med-El Combi Plus, and the associated speech processors for each. Participant H9N did not complete Step 4 of the beta version, so the sample size is ten in the analysis of Step 4 only. See Table 1 for a complete description of the hearing-impaired sample. The average age was 57.4 years (range, 40–77 years). The group was mixed in

terms of postlingual versus pre-/peri-lingual onset of severe or profound sensorineural hearing loss. Two participants' etiology of deafness was sudden hearing loss; two were attributed to Meniere's disease; two were autoimmune causes; and five were unknown.

Procedures

Participants were seated in an audiometric test suite, facing the speaker at 0° azimuth, at a distance of 3–4 ft. The stimuli were played on a CD player and presented via a clinical audiometer Grason-Stadler GSI61 to calibrated speakers. The presentation level was 60 dB HL for the calibration tone. The participant held a set of written instructions for each test section, along with the foils that were used for the closed-set portions of the test (Appendix B). The same equipment, physical set-up of the suite, and instructions were used in Phase 2 (alpha version) and 3 (beta version).

A verbal response was required for each stimulus in Steps 1 through 3. In Step 1, the patient was instructed to indicate whether

Table 1. Description of Cochlear Implantee Participants (N = 11)

| Subject | Implant type | Age (years) | Etiology of hearing loss | Pre-/peri-lingual or post-lingual HL? ^a | Speech processor used | Speech processing strategy used | Unilaterally (U) or bilaterally (B) implanted? |
|---------|------------------------------|-------------|------------------------------|--|--------------------------|---------------------------------|--|
| H1N | Nucleus 24 Contour | 41 | Unknown | Pre/peri | 3G BTE ^b | CIS | U |
| H3N | Nucleus 24 Contour | 47 | Sudden SNHL ^c | Post | 3G BTE | ACE | U |
| H4ABC | Advanced Bionics 90K | 40 | Sudden SNHL | Pre/peri | Auria BTE | HiRes-S | U |
| H5ABC | Advanced Bionics CII and 90K | 55 | Autoimmune (Cogan's) disease | Post | CII BTE processor; Auria | HiRes-P | B |
| H6N | Nucleus 24 Contour | 54 | Meniere's | Post | 3G BTEs | ACE | B |
| H8ABC | Advanced Bionics CII | 61 | Unknown | Post | Auria BTE | HiRes-P | U |
| H9N | Nucleus 24 Contour | 77 | Unknown | Post | 3G BTE | SPEAK | U |
| H11N | Nucleus 24 Contour | 65 | Meniere's | Post | 3G BTE | ACE | U |
| H12M | Med-El | 67 | Autoimmune disease | Post | Tempo+ BTE | CIS | U |
| H13ABC | Advanced Bionics CII | 62 | Unknown | Pre/peri | Auria BTE | HiRes-P | U |
| H14ABC | Advanced Bionics CII | 62 | Unknown | Post | Platinum body processor | HiRes-P | U |

^aSubjects were considered pre-/peri-lingual in onset of hearing loss if some degree of impairment was known during childhood. All participants were aural/oral in communication. See text. ^bBTE = behind-the-ear processor. ^cSNHL = sensorineural hearing loss.

the stimulus was a noise or music. For example, in item 28, the stimulus was 20 sec of water running, and the expected response was "Noise." In contrast, for item 3, the stimulus was 20 sec of "Syrinx" by Claude Debussy (flute solo), and the expected response was "Music."

For Step 2, identification of musical instruments, the participant held a list of the closed set of instruments and vocal stimuli (trumpet, piano, flute, drums/tympani, tuba, guitar, violin/strings, female vocal, and male vocal). The response for each item was drawn from the entire list of possibilities (selection with replacement). For example, item 4 was Aram Khachaturian's "Sabre Dance" and the expected response "Trumpet."

Step 3, identification of musical styles, was similar to Step 2, in that the participant was free to choose from any of the five stimuli (classical, Latin, country and western, jazz, rock and roll/popular) for each stimulus item (selection with replacement). Therefore, when presented with item 11, Buena Vista Social Club's "Dos Gardenias," the participant responded correctly, "Latin."

For Step 4, identification of musical pieces, either popular or classical excerpts, acceptable responses were naming the song, its composer, a context in which it was used (such as a movie or advertisement), or singing or humming the melody. Participants were permitted to self-select which version of Step 4 they wished to hear. Responses were recorded by the examiner on a score sheet. Thus, for item 54, the "William Tell Overture," the acceptable responses included "the William Tell Overture," Gioachino Rossini, *The Lone Ranger* theme, and singing along with or humming along with the melody.

RESULTS

The results of normal-hearing controls in Phase 2 are summarized in Table 2. The mean percent correct was 99.8% for Step 1 (noise vs. music), 93.7% for Step 2 (identification of musical instruments), and 88.4% for Step 3 (identification of musical styles). For the popular version of Step 4 (identification of melodies), 29 participants performed at an average of 86.8% correct. Only five participants selected the classical listening task, and their mean performance was 73.7% correct.

Five errors on any single item were defined on a practical basis as a high error rate for normal listeners (15% of the sample). Step 1 had only one error for the noise versus music task. Nine items in Step 2 were found to have a high error rate. In Step 3, ten items were found to have a high rate of error. Sixteen items were at a high error rate in the "popular" version of Step 4, whereas the entire "classical" option was selected so infrequently that it was not considered useful for further testing. These items were eliminated in constructing the beta version.

The beta version (Appendix C) consisted of three forms, A, B, and C, which are constructed with a total of 100 items each, as: Step 1, 25 items; Step 2, 30 items; Step 3, 25 items; and Step 4, 20 items. A separate report (Cheng et al, 2007) provided test-retest reliability and interform equivalence. Scores for the combinations of equivalent forms were highly correlated (Form A to B, $r = 0.91$; Form B to C, $r = 0.92$; Form C and A, $r = 0.91$). Phase 3, in which Form A of the beta test items was administered to CI users, is summarized in Table 3. The CI users were able to complete the AMICI with

Table 2. Error Rates and Percent Correct for Four Sections of the Alpha Version of the AMICI Test for Normal Hearers (N = 34)

| Section | N | Maximum # responses (# items X N) | Group total errors | Group total correct (%) |
|---------------|----|--------------------------------------|-----------------------|----------------------------|
| 1 | 34 | 40 X 34 = 1360 | 3 | 1357 (99.8%) |
| 2 | 34 | 60 X 34 = 2040 | 128 | 1912 (93.7%) |
| 3 | 34 | 50 X 34 = 1700 | 197 | 1503 (88.4%) |
| 4 (Popular) | 29 | 60 X 29 = 1740 | 230 | 1510 (86.8%) |
| 4 (Classical) | 5 | 60 X 5 = 300 | 73 | 221 (73.7%) |

the following mean scores for each section: Step 1, 91.6%; Step 2, 62.4%; Step 3, 61.8%; Step 4, 43.6%. Their mean overall or total

score for the CI group was 67.4%, with a range of 48–89. Figures 1 through 4 illustrate the individual performance on AMICI steps. Figure 5 illustrates the total scores for each CI user.

Table 3. Error Rates and Percent Correct on AMICI Beta Version by Cochlear Implantees (N = 11)

| Step | Maximum # responses (# items X N) | Group total errors | Group total correct (%) |
|-------------|-----------------------------------|--------------------|-------------------------|
| 1 | 25 X 11 = 275 | 23 | 252 (91.6%) |
| 2 | 30 X 11 = 330 | 124 | 206 (62.46%) |
| 3 | 25 X 11 = 275 | 105 | 170 (61.8%) |
| 4 | 20 X 10 = 200 | 124 | 96 (43.6%) |
| Total Score | | | 67.4% |

Note: One subject did not complete Step 4.

DISCUSSION

The development of a musical test for CI users, in which there is a stepwise, graded range of difficulty, was feasible, based on the present findings. AMICI results demonstrated that each step entailed a different challenge level and that difficulty increased as one proceeded through the test, though the present findings demonstrated that Steps 2 and 3 were close in difficulty in both the normal listeners and the present, limited CI user sample.

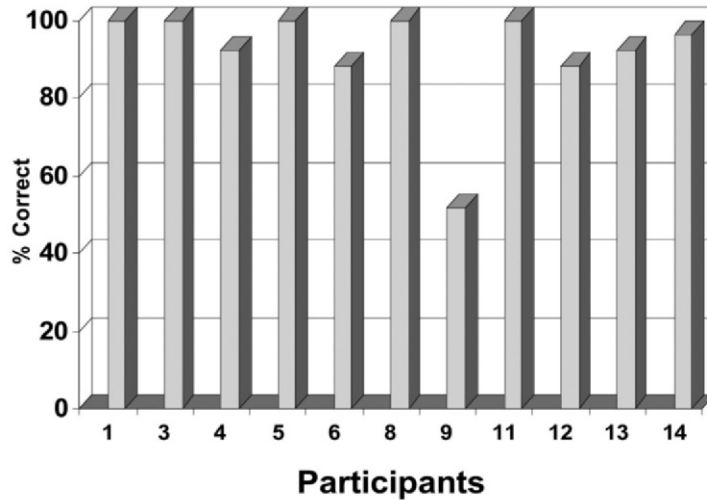


Figure 1. Step 1: Noise versus Music Discrimination (N = 11).

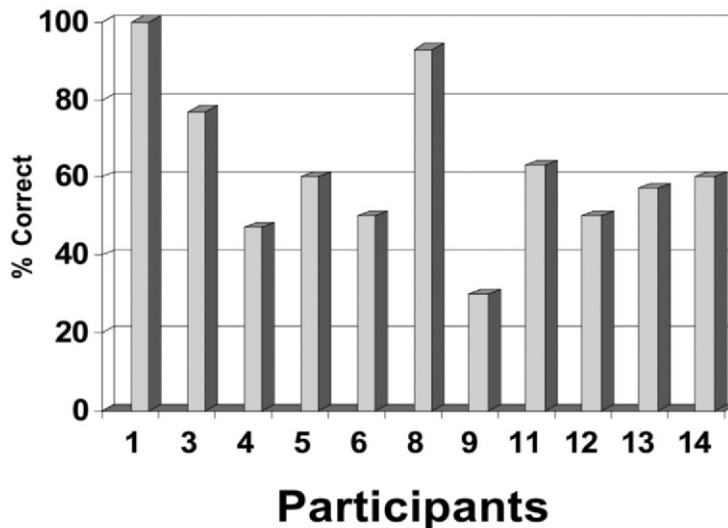


Figure 2. Step 2: Closed-Set Instrument Identification (N = 11).

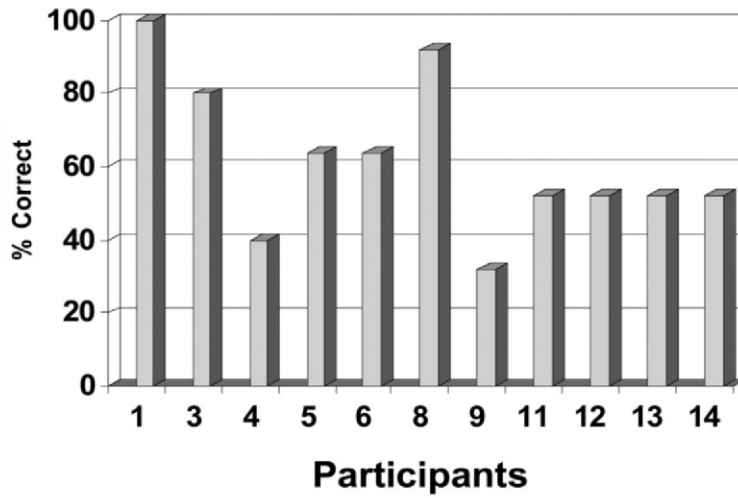


Figure 3. Step 3: Closed-Set Musical Style Identification (N = 11).

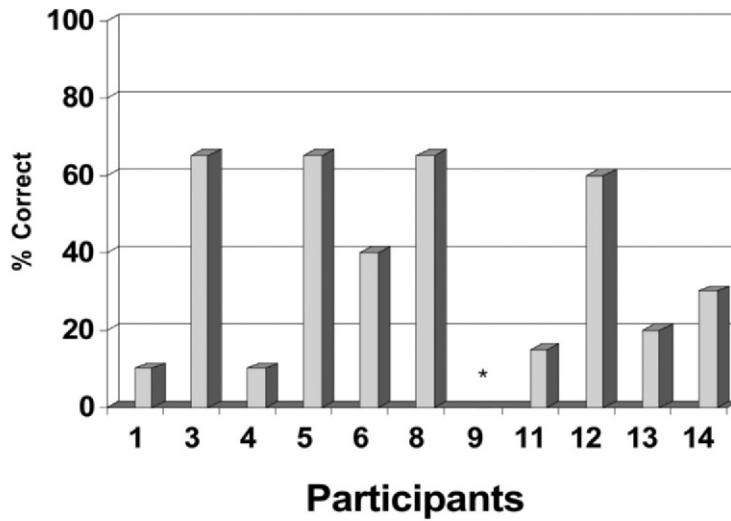


Figure 4. Step 4: Open-Set Identification of Musical Pieces (N = 10).
*Participant H9N did not complete this step.

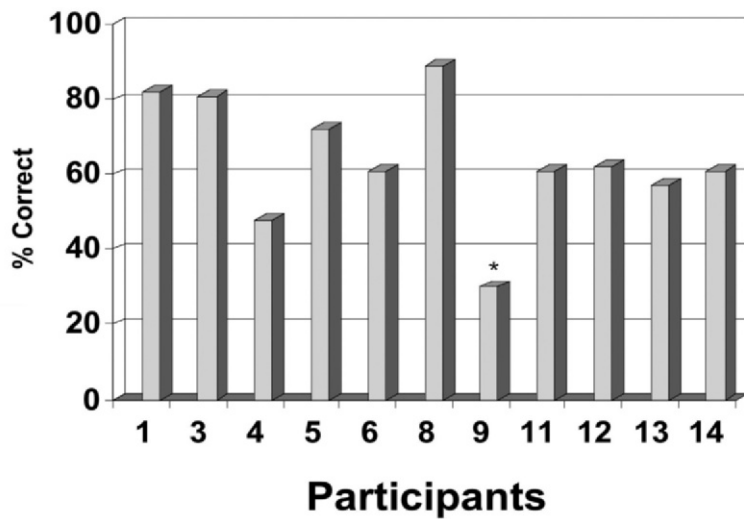


Figure 5. Individual total scores for CI participants (N = 11).
*The score for participant H9N is based on completion of Steps 1, 2, and 3.

With a small, heterogeneous group of CI users in the present sample, a few observations were made. First, the entire sample was able to perform the four steps of the AMICI tasks. None of the participants was confused by the tasks or unable to participate. Figure 1 reflects that the discrimination of music versus noise was an easy task for all but one participant (H9N), who performed at the chance level for this section. Despite the complaint that CI users may assert to their clinicians, music does not appear to sound the same as noise as determined by this task.

Performance by the CI sample on Steps 2 and 3 was quite variable. On Step 2, identification of instruments, the range of scores was from 30% (participant H9N) to 100%; that is, no one performed at chance level in Step 2. Step 3, identification of musical style, yielded performance ranging from 32% (participant H9N again) to 100%; in this section as well, performance for all CI users exceeded chance. Step 4 presented the greatest challenge. For this step, the range of performance was from 5% to 65%. It is also noteworthy that the participants identified as pre-/peri-lingual (H1N, H4ABC, H7ABC), all fluent aural/oral communicators with aided residual hearing through at least childhood, were able to perform well above chance on each of the closed-set steps, and two of the three were able to identify one item each in Step 4. As the purpose of examining a CI user sample was to demonstrate that participants using CIs can perform the AMICI tasks, we do not draw larger conclusions here about the performance of CI users in general.

The four steps are intended to provide an insight into different aspects of music appreciation. The possible value of discussing the outcome of each step with the patient is that it may allow better understanding of the types of musical information being heard, so that a patient may grasp his or her strengths and weaknesses. Further, as a counseling tool in the context of altering maps to enhance music perception, AMICI may be useful to demonstrate how different strategies have an impact on outcomes.

The use of a test like the AMICI may have pitfalls. Most notably, there is likely a cultural specificity to the items selected (Spitzer and Mancuso, 2006). Familiarity with melodies may be affected by access, both on the basis of national origin as well as listen-

ing experience resulting from hearing loss or other factors. Thus, AMICI should probably be used with caution when the test participant is not originally from the United States or not part of the American cultural mainstream. Very early onset of deafness may effectively eliminate the ability to respond to Steps 2, 3, and 4 of this examination, although our pre-/peri-lingual participants were able to respond.

Another issue is that the ability to perform well on the AMICI does not imply musical satisfaction. The impact of alterations in processing strategies or specific characteristics that should be included in maps designed to enhance musical perceptual performance or satisfaction are major areas that remain important for additional exploration.

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Appendix A.
Detailed Item Description of AMICI Alpha Test Version
 Step 1 (Music vs. Noise)

| Item | Category/ Response | Description | Detail (Composer/Performer, if applicable) |
|--------------------------|-----------------------|---|---|
| Calibration tone 1000 Hz | | | |
| 1 | Noise | Gas station air hose | |
| 2 | Noise | Can dropping in vending machine | |
| 3 | Music | Flute solo | Claude Debussy, "Syrinx" |
| 4 | Noise | Shovel scraping pavement | |
| 5 | Music | Piano solo | Chick Correa, "Lush life" |
| 6 | Noise | Running in hallway | |
| 7 | Music | Female voice | Pierre Certon, "La, la, la, la, je ne l'ose dire" |
| 8 | Music | Saxophone solo | Paul Winter, "Fanfare" |
| 9 | Noise | Filing cabinet drawer opening and closing | |
| 10 | Music | Female voice | "Do Re Mi", from "Sound of music" |
| 11 | Noise | Pouring soda into a glass | |
| 12 | Music | Flute solo | Claude Debussy, "Prelude to the Afternoon of a Faun" |
| 13 | Music | Male rock and roll group | Beatles, "All you need is love" |
| 14 | Noise | Electric can opener | |
| 15 | Noise | Chain saw cutting tree | |
| 16 | Noise | Thunder | |
| 17 | Music | Saxophone solo | Paul Winter, "On the river" |
| 18 | Music | String quartet | Franz Schubert, "String quartet in C minor" |
| 19 | Music | String quartet | Franz Schubert, "String quartet in C minor" |
| 20 | Noise | Airplane taking off | |
| 21 | Noise | Tray of dishes dropping | |
| 22 | Music | Brass ensemble | Aram Khachaturian, "Sabre dance" |
| 23 | Noise | Explosion with falling debris | |
| 24 | Music | Brass ensemble | J.S. Bach, "Cantata no. 40", Wachet auf, ruft uns die " |
| 25 | Music | Guitar | Joaquín Rodrigo, "Concierto de Aranjuez" (Adagio) |
| 26 | Noise | Eating potato chips | |
| 27 | Music | Drum solo | Kiss, "Carr Jam 1981" |
| 28 | Noise | Water running | |
| 29 | Music | Flute solo | Claude Debussy, "Syrinx" |
| 30 | Noise | Dog growling | |
| 31 | Noise | Jet plane taking off | |
| 32 | Music | Drum solo | Carlos Santana, "El nicoya" |
| 33 | Music | Male rock and roll group | Beatles, "Lucy in the sky with diamonds" |
| 34 | Music | Male vocal | Simon and Garfunkel, "Feeling groovy" |
| 35 | Noise | Thunder | |
| 36 | Music | Brass Ensemble | "Alligator crawl" |
| 37 | Noise | Machine gun burst | |
| 38 | Noise | Truck engine starting and departing | |
| 39 | Noise | Water draining from a sink | |
| 40 | Music | Brass Ensemble | Gioachino Rossini, "Largo al factotum" |

Step 2

| Item | Category/ Response | Description | Detail (Composer/Performer, if applicable) |
|--------------------------|----------------------------|------------------------------|--|
| Calibration tone 1000 Hz | | | |
| 1 | Flute | Flute solo | Claude Debussy, "Syrinx" |
| 2 | Piano | Piano solo | Chick Correa, "Lush life" |
| 3 | Female voice | Soprano | Pierre Certon, "La, la, la, je ne l'ose dire" |
| 4 | Trumpet | Brass ensemble | Aram Khachaturian, "Sabre dance" |
| 5 | Saxophone | Saxophone solo | Paul Winter, "Fanfare" |
| 6 | Guitar | Guitar solo | Russell Donnellon, "Laura" |
| 7 | Drums | Drum solo | Carlos Santana, "Wham!" |
| 8 | Male vocal | Latin ensemble | Buena Vista Social Club, "Dos gardenias para ti" |
| 9 | Strings | Stringed instrument ensemble | Samuel Barber, "Adagio for strings" |
| 10 | Tuba | Tuba solo | "Tuba Polka" |
| 11 | Piano | Piano solo | Chick Correa, "I didn't know what time it was" |
| 12 | Trumpet | Brass ensemble | J.S. Bach, "Little Fugue" |
| 13 | Male vocal | Male vocal ensemble | Boyz II Men, "It's so hard to say goodbye to yesterday" |
| 14 | Male vocal | Male vocal | Simon and Garfunkel, "Feeling groovy" |
| 15 | Female vocal | Soprano | Wolfgang Mozart, "Die Zauberflote" [Queen of the Night solo] |
| 16 | Drums | Drum solo | Kiss, "Carr Jam 1981" |
| 17 | Saxophone | Saxophone solo | Paul Winter, "On the river" |
| 18 | Piano | Piano solo | Claude Debussy, "Reverie" |
| 19 | Violin | Violin solo | Itzhak Perlman, "Jewish town" |
| 20 | Tuba | Brass ensemble | "Tuba polka" |
| 21 | Piano/flute | Piano and flute duet | Claude Bolling, "Suite for flute and jazz piano: baroque and blue" |
| 22 | Male vocal | Male rock and roll group | Beatles, "Lucy in the sky with diamonds" |
| 23 | Drums | Drums solo | Dream Theater, "6:00" |
| 24 | Guitar | Guitar solo | Simon and Garfunkel, "For Emily" |
| 25 | Violin/Stringed instrument | String Quartet | Felix Mendelssohn, "String quartet number 4 in E minor" |
| 26 | Male vocal | Tenor | Giacomo Puccini, from "La boheme" |
| 27 | Piano | Piano solo | George Winston, "Some children see him" |
| 28 | Female vocal | Soprano | Giacomo Puccini, from "Turandot" |
| 29 | Trumpet | Brass ensemble | Georges Bizet, "Carmen suite" |
| 30 | Saxophone | Saxophone solo | Jesse Davis, "Stardust" |
| 31 | Male vocal | Male group [drums] | Simon and Garfunkel, "Patterns" |
| 32 | Guitar | Guitar solo | Simon and Garfunkel, "For Emily" |
| 33 | Drums | Drum solo | Kiss, "I love it loud" |
| 34 | Violin/strings | String ensemble | Tchaikovsky, "Serenade in C for strings" |
| 35 | Piano | Piano solo | Chick Correa, Charlie Chaplin, "Smile" |
| 36 | Female vocal | Soprano | Wolfgang Amadeus Mozart, "Die Zauberflote" [Queen of the Night solo] |
| 37 | Tuba | Brass ensemble | "Tuba polka" |
| 38 | Flute | Flute solo | Claude Debussy, "Prelude to the afternoon of a faun" |
| 39 | Trumpet | Brass ensemble | J.S. Bach, "Little fugue" |
| 40 | Trumpet | Jazz ensemble | Louis Armstrong, "Ain't misbehaving" |
| 41 | Female vocal | Jazz ensemble | Billie Holiday, "God bless the child" |
| 42 | Saxophone | Saxophone solo | Jesse Davis, "Stardust" |
| 43 | Piano/male vocal | Piano with vocal | Elton John, "Candle in the wind" |
| 44 | Piano/flute | Piano and flute duet | Claude Bolling, "Suite for flute and jazz piano: baroque and blue" |
| 45 | Male vocal | Male vocal solo | Harry Belafonte, "Day-O", Alan Arkin (composer) |
| 46 | Guitar | Guitar solo | Joaquín Rodrigo, "Concierto de Aranjuez" (Adagio) |
| 47 | Drums | Drum solo | Black Label Society, "We live no more" |
| 48 | Flute | Flute/strings | Claude Debussy, "Sonata" |
| 49 | Female vocal | Jazz ensemble | Billie Holiday, "God bless the child" |
| 50 | Violins/Strings | String quartet | Franz Schubert, "String quartet in C minor" |
| 51 | Guitar | Guitar solo | Russell Donnellon, "Laura" |
| 52 | Tuba | Brass ensemble | "Tuba polka" |
| 53 | Trumpet | Jazz ensemble | Louis Armstrong, "I'm in the mood for love" |
| 54 | Violin/strings | String quartet | Franz Schubert, "String quartet in C minor" |
| 55 | Saxophone | Saxophone solo | Jesse Davis, "Stardust" |
| 56 | Male vocal | Male rock and roll group | Beatles, "All you need is love" |
| 57 | Drums | Drum solo | Black Label Society, "We live no more" |
| 58 | Flute | Flute solo | Claude Debussy, "Syrinx" |
| 59 | Female vocal | Female vocal solo | Sound of music "Do Re Mi" |
| 60 | Saxophone | Saxophone solo | Chris Potter, "Every time we say goodbye" |

Step 3

| Item | Category/ Response | Description | Detail (Composer/Performer, if applicable) |
|--------------------------|---------------------------|--------------------------|---|
| Calibration tone 1000 Hz | | | |
| 1 | Classical | Flute solo | Claude Debussy, "Syrinx" |
| 2 | Jazz | Piano solo | Chick Correa, "Lush life" |
| 3 | Latin | Latin ensemble | Carlos Santana, "Africa bamba" |
| 4 | Rock 'n' Roll | Male vocal | Simon and Garfunkel, "Feeling groovy" |
| 5 | Country & Western [CW] | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 6 | Latin | Latin ensemble | Carlos Santana, "Corazon espinado" |
| 7 | Jazz | Jazz ensemble | Louis Armstrong, "Jeepers creepers" |
| 8 | CW | CW ensemble | Patsy Cline, "I fall to pieces" |
| 9 | Classical | Guitar solo | Joaquín Rodrigo, "Concierto de Aranjuez" (Adagio) |
| 10 | Rock 'n' Roll | Rock band | Beatles, "All you need is love" |
| 11 | Latin | Latin ensemble | Buena Vista Social Club, "Dos gardenias" |
| 12 | CW | CW ensemble | Kitty Wells, "It wasn't God who made honky tonk angels" |
| 13 | Classical | Piano solo | Claude Debussy, "Reverie" |
| 14 | Classical | Brass ensemble | Georges Bizet, "Carmen suite" |
| 15 | Jazz | Piano solo | Chick Correa, "Smile", Charlie Chaplin |
| 16 | Rock 'n' Roll | Rock band | Beatles, "Eleanor Rigby" |
| 17 | Latin | Latin ensemble | Buena Vista Social Club, "El cuarto de Tula" |
| 18 | CW | CW ensemble | Conway Twitty, "Hello darling" |
| 19 | Jazz | Piano solo | Chick Correa, "Someone to watch over me" |
| 20 | Rock 'n' Roll | Rock ensemble | Jim Croce, "Operator" |
| 21 | CW | CW ensemble | Conway Twitty, "Hello darling" |
| 22 | Latin | Latin ensemble | Buena Vista Social Club, "Chan Chan" |
| 23 | Classical | Flute solo | Claude Debussy, "Prelude to the afternoon of a faun" |
| 24 | CW | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 25 | Jazz | Male vocal | Nat King Cole, "Unforgettable" |
| 26 | Rock 'n' Roll | Piano with vocal | Elton John, "Candle in the wind" |
| 27 | Rock 'n' Roll | Male rock and roll group | Beatles, "Lucy in the sky with diamonds" |
| 28 | CW | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 29 | Latin | Latin ensemble | Buena Vista Social Club, "La Buena Vista Social Club" |
| 30 | Classical | Piano and harp | Claude Debussy, "Arabesque" |
| 31 | Classical | Brass ensemble | Aram Khachaturian, "Sabre dance" |
| 32 | Jazz | Piano solo | George Winston, "Some children see him" |
| 33 | Rock 'n' Roll | Rock group | Righteous Brothers, "Unchained Melody" |
| 34 | Latin | Latin ensemble | Buena Vista Social Club, " Amor de loca juventud" |
| 35 | Rock 'n' Roll | Rock group | Elvis, "Hound dog" |
| 36 | CW | CW ensemble | Patsy Cline, "I fall to pieces" |
| 37 | Jazz | Jazz ensemble | Billie Holiday, "God bless the child" |
| 38 | Latin | Latin ensemble | Ricky Martin, "Jamás" |
| 39 | Classical | Brass ensemble | Georges Bizet, "Carmen suite" |
| 40 | Rock 'n' Roll | Rock band | Beatles, "Sergeant Pepper's Lonely Hearts Band" |
| 41 | Latin | Latin ensemble | Ricky Martin, "Besos de fuego" |
| 42 | CW | CW ensemble | Kitty Wells, "It wasn't God who made honky tonk angels" |
| 43 | Classical | Tenor | Giacomo Puccini, from "La boheme" |
| 44 | Latin | Latin ensemble | Buena Vista Social Club, "Buena Vista Social Club" |
| 45 | Jazz | Jazz ensemble | Louis Armstrong, "Ain't misbehaving" |
| 46 | Rock 'n' Roll | Rock band | Beatles, "Eleanor Rigby" |
| 47 | CW | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 48 | Classical | Tenor/orchestra | Giusseppe Verdi, "Celeste Aida" |
| 49 | Jazz | Saxophone | Paul Winter, "Fanfare" |
| 50 | Jazz | Jazz band | Bill Evans, "You and the night and the music" |

Step 4 (Popular Version)

| Item | Stimulus | Acceptable responses [also included singing or humming along] |
|--------------------------|--|---|
| Calibration tone 1000 Hz | | |
| 1 | Beatles, "Lucy in the Sky with Diamonds" | Beatles, "Lucy in the sky with diamonds" |
| 2 | Rodgers and Hammerstein, "Do Re Mi" | "Do Re Mi", Julie Andrews, "Sound of Music" movie, Rodgers and Hammerstein |
| 3 | John Williams, "Star Wars" theme | John Williams, "Star Wars", sci-fi movie |
| 4 | Glenn Miller, "In the mood" | Glenn Miller, "In the mood" |
| 5 | Elvis, "Hound dog" | Elvis, "Hound dog" |
| 6 | Elvis, "Jailhouse rock" | Elvis, "Jailhouse rock", "Blues Brothers" movie |
| 7 | Bill Haley, "Rock around the clock" | Bill Haley, "Rock around the clock", "Happy Days" TV show |
| 8 | Bing Crosby, "White Christmas" | Bing Crosby, "White Christmas", Movie |
| 9 | Chick Correa, "I didn't know what time it was" | Chick Correa, "I didn't know what time it was" |
| 10 | Chick Correa, "Someone to watch over me" | Chick Correa, "Someone to watch over me", "Mr. Holland's opus", George Gershwin |
| 11 | Simon and Garfunkel, "Parsley, sage, rosemary and thyme" | Simon and Garfunkel, "Parsley, sage, rosemary and thyme" |
| 12 | Louis Armstrong, "Jeepers Creepers" | Louis Armstrong, "Jeepers creepers", Satchmo |
| 13 | John Denver, "Leaving on a jet plane" | John Denver, "Leaving on a jet plane" |
| 14 | Barbra Streisand, "Memories" | Barbra Streisand, "Memories", "Cats", Andrew Lloyd Webber |
| 15 | Simon and Garfunkel, "Feeling groovy" | Simon and Garfunkel, "Feeling groovy" |
| 16 | Righteous Brothers, "Unchained melody" | Righteous Brothers, "Unchained melody", "Ghost" movie |
| 17 | Elvis, "Love me tender" | Elvis, "Love me tender" |
| 18 | Chick Correa, "Smile" | Chick Correa, "Smile", Charlie Chaplin |
| 19 | "Michael row the boat ashore" | "Michael row the boat ashore" |
| 20 | John Denver, "Rocky Mountain high" | John Denver, "Rocky Mountain high" |
| 21 | John Williams, "Superman march" | John Williams, "Superman" |
| 22 | Sonny and Cher, "I got you, babe" | Sonny and Cher, "I got you, babe" |
| 23 | Beatles, "Yesterday" | Beatles, "Yesterday" |
| 24 | Beatles, "She loves you" | Beatles, "She loves you" |
| 25 | Georges Bizet, "Carmen Suite" | Georges Bizet, "Carmen" |
| 26 | Righteous Brothers, "You've lost that loving feeling" | Righteous Brothers, "You've lost that loving feeling" |
| 27 | Stevie Wonder, "Isn't she lovely" | Stevie Wonder, "Isn't she lovely" |
| 28 | Otis Redding, "My Girl" | Otis Redding, "My girl" |
| 29 | Nat King Cole, "Unforgettable" | Nat King Cole, "Unforgettable" |
| 30 | Beatles, "Nowhere man" | Beatles, "Nowhere man", "Yellow submarine" soundtrack, "Sergeant Pepper" movie |
| 31 | Bing Crosby, "White Christmas" | Bing Crosby, "White Christmas", Irving Berlin, "White Christmas" movie |

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|----|--|--|
| 32 | Billy Joel, "New York State of Mind" | Billy Joel, "New York State of mind" |
| 33 | Harry Belafonte, "Day-O" | Harry Belafonte, "Day-O", "Beetlejuice" movie, Alan Arkin [composer] |
| 34 | Glenn Miller, "In the mood" | Glenn Miller, "In the mood" |
| 35 | Elvis, "Hound dog" | Elvis, "Hound dog" |
| 36 | Elvis, "Jailhouse rock" | Elvis, "Jailhouse rock", "Blues Brothers" movie |
| 37 | Bill Haley, "Rock around the clock" | Bill Haley, "Rock around the clock", "Happy Days" TV show |
| 38 | Bing Crosby, "White Christmas" | Bing Crosby, "White Christmas", Irving Berlin, "White Christmas" movie |
| 39 | Elton John, "Candle in the wind" | Elton John, "Candle in the wind" |
| 40 | Billy Joel, "Pressure" | Billy Joel, "Pressure" |
| 41 | Otis Redding, "My Girl" | Otis Redding, "My girl" |
| 42 | Elvis, "Love me tender" | Elvis, "Love me tender" |
| 43 | Otis Redding, "Sitting on the dock of the bay" | Otis Redding, "Sitting on the dock of the bay", "Pretty in Pink" movie |
| 44 | Henry Mancini, "Peter Gunn" | Henry Mancini, "Peter Gunn", "Blues Brothers" movie |
| 45 | Barbra Streisand, "Memory" | Barbra Streisand, "Memory", "Cats", Andrew Lloyd Webber |
| 46 | Barbra Streisand, "The way we were" | Barbra Streisand, "The way we were" |
| 47 | "Odd couple theme" | "Odd couple", Neal Hefti, Neil Simon play |
| 48 | Rodgers and Hammerstein, "Hello Dolly" | Rodgers and Hammerstein, "Hello Dolly" |
| 49 | Rodgers and Hammerstein, "Do Re Mi" | "Do Re Mi", Julie Andrews, "Sound of Music" movie, Rodgers and Hammerstein |
| 50 | Billy Joel, "Piano man" | Billy Joel, "Piano man" |
| 51 | Beethoven, Symphony 5 | Ludwig von Beethoven, Symphony 5 |
| 52 | Wagner, "Flight of the Valkyries" | Richard Wagner, "Flight of the Valkyries", "Apocalypse Now" movie, "Blues Brothers" movie |
| 53 | Mancini, "Pink panther" theme | Henry Mancini, "Pink panther" theme, Inspector Clouseau movies, TV commercial with a cartoon panther |
| 54 | Gioachino Rossini, "William Tell" overture | Gioachino Rossini, "William Tell" overture, theme from the "Lone Ranger" |
| 55 | "Twinkle, twinkle, little star" | "Twinkle, twinkle, little star", Raffi, Mozart |
| 56 | Carpenters, "We've only just begun" | Carpenters, "We've only just begun" |
| 57 | Michael Jackson, "Billie Jean" | Michael Jackson, "Billie Jean" |
| 58 | Bette Midler, "Wind beneath my wings" | Bette Midler, "Wind beneath my wings", "Beaches" movie |
| 59 | Beach Boys, "California girls" | Beach Boys, "California girls" |
| 60 | Georges Bizet, "Toreador song" | Georges Bizet, "Carmen", "Toreador song" |

Step 5 (Classical Version)

| Item | Stimulus | Acceptable responses [also included singing or humming along] |
|------|--|---|
| | Calibration tone 1000 Hz | |
| 1 | George Gershwin, "American in Paris" | George Gershwin, "American in Paris" |
| 2 | Aram Khachaturian, "Sabre dance" | Aram Khachaturian, "Sabre dance" |
| 3 | Richard Wagner, "Tannhauser" march | Richard Wagner, "Tannhauser" |
| 4 | J. S. Bach, "Little fugue" | J. S. Bach, "Little fugue" |
| 5 | Claude Debussy, "Reverie" | Claude Debussy, "Reverie" |
| 6 | Bing Crosby, "White Christmas" | Bing Crosby, "White Christmas", Irving Berlin, "White Christmas" movie |
| 7 | Giacomo Puccini, "Nessum dorma" | Giacomo Puccini, "Nessum dorma", "Turandot", Pavarotti, "Bend it like Beckham" movie |
| 8 | "Michael row the boat ashore" | "Michael row the boat ashore" |
| 9 | Harry Belafonte, "Day-O" | Harry Belafonte, "Day-O", "Beetlejuice" movie, Alan Arkin [composer] |
| 10 | Rodgers and Hammerstein, "Do Re Mi" | "Do Re Mi", Julie Andrews, "Sound of Music" movie, Rodgers and Hammerstein |
| 11 | Wolfgang Amadeus Mozart, "La ci darem la mano" | Wolfgang Amadeus Mozart, "La ci darem la mano", "Don Giovanni" |
| 12 | Chick Corea, "Someone to watch over me" | Chick Corea, "Someone to watch over me", "Mr. Holland's opus" movie, George Gershwin |
| 13 | Maurice Ravel, "Rhapsodie espagnol" | Maurice Ravel, "Rhapsodie espagnol" |
| 14 | Louis Armstrong, "Jeepers Creepers" | Louis Armstrong, "Jeepers Creepers", Satchmo |
| 15 | John Denver, "Leaving on a jet plane" | John Denver, "Leaving on a jet plane" |
| 16 | Barbra Streisand, "Memory" | Barbra Streisand, "Memory", "Cats", Andrew Lloyd Webber |
| 17 | Simon and Garfunkel, "Feeling groovy" | Simon and Garfunkel, "Feeling groovy" |
| 18 | Georges Bizet, "La Habenera" | Georges Bizet, "La habenera", "Carmen" |
| 19 | Elvis, "Love me tender" | Elvis, "Love me tender" |
| 20 | Rodgers and Hammerstein, "Hello Dolly" | Rodgers and Hammerstein, "Hello Dolly" |
| 21 | Ludwig von Beethoven, Symphony 5 | Ludwig von Beethoven, Symphony 5 |
| 22 | Wolfgang Amadeus Mozart, "Don Giovanni" overture | Wolfgang Amadeus Mozart, "Don Giovanni" overture |
| 23 | Maurice Ravel, "Bolero" | Maurice Ravel, "Bolero", movie "10" |
| 24 | George Gershwin, "Summertime" | George Gershwin, "Summertime", "Porgy and Bess" |
| 25 | Richard Wagner, "Flight of the Valkyries" | Richard Wagner, "Flight of the Valkyries", "Apocalypse Now" movie, "Blues Brothers" movie |
| 26 | Von Suppe, "Poet and peasant" overture | Franz von Suppe, "Poet and peasant" overture |
| 27 | Gioachino Rossini, "William Tell" overture | Gioachino Rossini, "William Tell" overture, thunderstorm |
| 28 | Richard Wagner, "Bridal chorus" | Richard Wagner, "Bridal chorus", wedding march, "Here comes the bride", "Lohengrin" |
| 29 | Wolfgang Amadeus Mozart, "Marriage of Figaro" overture | Wolfgang Amadeus Mozart, "Marriage of Figaro" overture |
| 30 | Luigi Boccherini, "Minuet" | Luigi Boccherini, "Minuet" |

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| 31 | Felix Mendelssohn, "Midsummer's night's dream" scherzo | Felix Mendelssohn, "Midsummer's night's dream" scherzo, Woody Allen movie "Midsummer Night's Sex Comedy" |
| 32 | Wolfgang Amadeus Mozart, "Eine kleine nachtmusik" | Wolfgang Amadeus Mozart, "Eine kleine nachtmusik" |
| 33 | John Williams, "Superman" march | John Williams, "Superman" march |
| 34 | Antonio Vivaldi, "Four Seasons" | Antonio Vivaldi, "Four seasons" |
| 35 | Gioachino Rossini, "William Tell" overture | Gioachino Rossini, "William Tell" overture, calm before the storm |
| 36 | Ludwig von Beethoven, Symphony 5 | Ludwig von Beethoven, Symphony 5 |
| 37 | Georges Bizet, "Carmen" | Georges Bizet, "Carmen" |
| 38 | Samuel Barber, "Adagio for strings" | Samuel Barber, "Adagio for strings", "Platoon" movie |
| 39 | Giacomo Puccini, "Nessum dorma" | Giacomo Puccini, "Nessum dorma", "Turandot", Pavarotti, "Bend it like Beckham" movie |
| 40 | Wolfgang Amadeus Mozart, "Die Zauberflote" [Queen of the Night solo] | Wolfgang Amadeus Mozart, "Die Zauberflote" [Queen of the Night solo] |
| 41 | Joaquin Rodrigo, "Concierto de Aranjuez" (Adagio) | Joaquin Rodrigo, "Concierto de Aranjuez" (Adagio) |
| 42 | Righteous Brothers, "Unchained melody" | Righteous Brothers, "Unchained melody", "Ghost" movie |
| 43 | Soprano | Giacomo Puccini, from "Turandot" |
| 44 | Guisseppe Verdi, "La donna e mobile" | Guisseppe Verdi, "La donna e mobile", "Rigoletto", Enrico Caruso |
| 45 | Giacomo Puccini, "Nessum dorma" | Giacomo Puccini, "Nessum dorma", "Turandot", Pavarotti, "Bend it like Beckham" movie |
| 46 | Wolfgang Amadeus Mozart, "Die Zauberflote" [Queen of the Night solo] | Wolfgang Amadeus Mozart, "Die Zauberflote" [Queen of the Night solo] |
| 47 | Wolfgang Amadeus Mozart, "Don Giovanni" overture | Wolfgang Amadeus Mozart, "Don Giovanni" overture |
| 48 | George Gershwin, "American in Paris" | George Gershwin, "American in Paris" |
| 49 | John Williams, "Superman" march | John Williams, "Superman" march |
| 50 | Georges Bizet, "Toreador song" | Georges Bizet, "Carmen", "Toreador song" |
| 51 | Richard Wagner, "Bridal chorus" | Richard Wagner, "Bridal chorus", wedding march, "Here comes the bride", "Lohengrin" |
| 52 | Antonio Vivaldi, "Four Seasons" | Antonio Vivaldi, "Four Seasons" |
| 53 | Ludwig von Beethoven, Symphony 5 | Beethoven, Symphony 5 |
| 54 | Gioachino Rossini, "William Tell" overture | Gioachino Rossini, "William Tell" overture, theme from the "Lone Ranger" |
| 55 | Wolfgang Amadeus Mozart, "Eine kleine nachtmusik" | Wolfgang Amadeus Mozart, "Eine kleine nachtmusik" |
| 56 | John Williams, "Star Wars" theme | John Williams, "Star Wars" theme |
| 57 | Chick Correa, "I didn't know what time it was" | Chick Correa, "I didn't know what time it was" |
| 58 | Georges Bizet, "Carmen" | Georges Bizet, "Carmen" |
| 59 | Richard Wagner, "Flight of the Valkyries" | Wagner, "Flight of the Valkyries", "Apocalypse Now" movie, "Blues Brothers" movie |
| 60 | Simon and Garfunkel, "Parsley, sage, rosemary and thyme" | Simon and Garfunkel, "Parsley, sage, rosemary and thyme" |

Appendix B.

Instructions for the AMICI (Appreciation of Music in Cochlear Implantees) Test

Step 1. DISCRIMINATION OF MUSIC VS. NOISE

For this test, you will hear a voice say "Ready". Then you will hear sounds, either musical or everyday noises. Tell us whether you hearing **MUSIC** or **NOISE**.

Step 2. IDENTIFICATION OF MUSICAL INSTRUMENTS

For this test, you will hear a voice say "Ready". Then, you will hear a short musical passage featuring one of the instruments or voices listed below. Tells us **which of these instruments you hear**:

FEMALE VOICE
FLUTE
GUITAR
MALE VOICE
PIANO
SAXOPHONE
TRUMPET
TUBA
TYMPANI OR DRUMS
VIOLIN OR STRINGS

Step 3. IDENTIFICATION OF MUSICAL STYLE

For this test, you will hear a voice say "Ready". Then, you will hear a short musical passage featuring one of the musical styles below. Tell us **which of these styles you hear**:

CLASSICAL
COUNTRY WESTERN
JAZZ
LATIN
ROCK 'N' ROLL/POPULAR

Step 4. IDENTIFICATION OF MUSICAL PIECES

For this test, you will hear a voice say "Ready". Then, you will hear a short musical passage featuring some familiar musical pieces. Tell us **which piece of music** you hear. You may identify the composer, the artist, a movie or TV show that used this piece, or you may hum along.

Appendix C.
Detailed Item Description of AMICI Beta Test Version

1. Form A

Step 1 (Music vs. Noise)

| Item | Category/ Response | Description | Detail (Composer/Performer, if applicable) |
|------------------|-----------------------|---|---|
| 1 | Noise | Gas station air hose | |
| 2 | Noise | Can dropping in vending machine | |
| 3 | Music | Flute solo | Claude Debussy, "Syrinx" |
| 4 | Noise | Shovel scraping pavement | |
| 5 | Music | Piano solo | Chick Correa, "Lush life" |
| 6 | Noise | Running in hallway | |
| 7 | Music | Female voice | Pierre Certon, "La, la, la, la, je ne l'ose dire" |
| 8 | Music | Saxophone solo | Paul Winter, "Fanfare" |
| 9 | Noise | Filing cabinet drawer opening and closing | |
| 10 | Music | Female voice | "Do Re Mi", from "Sound of music" |
| 11 | Noise | Pouring soda into a glass | |
| 12 | Music | Flute solo | Claude Debussy, "Prelude to the afternoon of a faun" |
| 13 | Music | Male rock and roll group | Beatles, "All you need is love" |
| 14 | Noise | Electric can opener | |
| 15 | Noise | Chain saw cutting tree | |
| 16 | Noise | Thunder | |
| 17 | Music | Saxophone solo | Paul Winter, "On the river" |
| 18 | Music | String quartet | Franz Schubert, "String quartet in C minor" |
| 19 | Music | String quartet | Franz Schubert, "String quartet in C minor" |
| 20 | Noise | Airplane taking off | |
| 21 | Noise | Tray of dishes dropping | |
| 22 | Music | Brass ensemble | Aram Khachaturian, "Sabre dance" |
| 23 | Noise | Explosion with falling debris | |
| 24 | Music | Brass ensemble | J.S. Bach, "Cantata no. 40, Wachet auf, ruft uns die" |
| 25 | Music | Guitar | Joaquín Rodrigo, "Concierto de Aranjuez" (Adagio) |
| Calibration tone | | 1000 Hz | |

Step 2

| Item | Category/ Response | Description | Detail (Composer/Performer, if applicable) |
|--------------------------|----------------------------|----------------------------|--|
| 1 | Flute | Flute solo | Claude Debussy, "Syrinx" |
| 2 | Piano | Piano solo | Chick Correa, "Lush life" |
| 3 | Female voice | Soprano | Pierre Certon, "La, la, la, je ne l'ose dire" |
| 4 | Guitar | Guitar solo | Russell Donnellon, "Laura" |
| 5 | Drums | Drum solo | Carlos Santana, "Wham!" |
| 6 | Tuba | Brass ensemble | "Tuba polka" |
| 7 | Male vocal | Latin ensemble | Buena Vista Social Club, "Dos gardenias" |
| 8 | Strings | String instrument ensemble | Samuel Barber, "Adagio for strings" |
| 9 | Piano | Piano solo | Chick Correa, "I didn't know what time it was" |
| 10 | Male vocal | Male vocal ensemble | Boyz II Men, "It's so hard to say goodbye to yesterday" |
| 11 | Female vocal | Soprano | Wolfgang Mozart, "Die Zauberflote" [Queen of the Night solo] |
| 12 | Saxophone | Saxophone solo | Jesse Davis, "Stardust" |
| 13 | Drums | Drum solo | Kiss, "Carr Jam 1981" |
| 14 | Piano | Piano solo | Claude Debussy, "Reverie" |
| 15 | Violin | Violin solo | Itzhak Perlman, "Jewish town" |
| 16 | Tuba | Brass ensemble | "Tuba polka" |
| 17 | Piano/flute | Piano and flute duet | Claude Bolling, "Suite for flute and jazz piano: baroque and blue" |
| 18 | Male vocal | Male rock and roll group | Beatles, "Lucy in the sky with diamonds" |
| 19 | Drums | Drums solo | Dream Theater, "6:00" |
| 20 | Guitar | Guitar solo | Simon and Garfunkel, "For Emily" |
| 21 | Violin/Stringed instrument | String Quartet | Felix Mendelssohn, "String Quartet Number 4 in E minor" |
| 22 | Female vocal | Soprano | Giacomo Puccini, from "Turandot" |
| 23 | Trumpet | Brass ensemble | Georges Bizet, "Carmen suite" |
| 24 | Saxophone | Saxophone solo | Jesse Davis, "Stardust" |
| 25 | Flute | Flute/strings | Claude Debussy, "Sonata" |
| 26 | Guitar | Guitar solo | Simon and Garfunkel, "For Emily" |
| 27 | Tuba | Brass ensemble | "Tuba polka" |
| 28 | Trumpet | Brass ensemble | J.S. Bach, "Little Fugue" |
| 29 | Saxophone | Saxophone solo | Chris Potter, "Every time we say goodbye" |
| 30 | Trumpet | Brass ensemble | Georges Bizet, "Carmen suite" |
| Calibration tone 1000 Hz | | | |

Step 3

| Item | Category/ Response | Description | Detail (Composer/Performer, if applicable) |
|------|---------------------------|----------------|---|
| 1 | Classical | Flute solo | Claude Debussy, "Syrinx" |
| 2 | Latin | Latin ensemble | Carlos Santana, "Africa bamba" |
| 3 | Rock 'n' Roll | Male vocal | Simon and Garfunkel, "Feeling groovy" |
| 4 | Country & Western [CW] | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 5 | Jazz | Jazz ensemble | Louis Armstrong, "Ain't misbehaving" |
| 6 | Latin | Latin ensemble | Carlos Santana, "Corazon espinado" |
| 7 | Jazz | Jazz ensemble | Louis Armstrong, "Jeepers creepers" |
| 8 | Rock 'n' Roll | Rock band | Beatles, "All you need is love" |
| 9 | Latin | Latin ensemble | Buena Vista Social Club, "Dos gardenias" |
| 10 | CW | CW ensemble | Kitty Wells, "It wasn't God who made honky tonk angels" |

| | | | |
|--------------------------|---------------|------------------|--|
| 11 | Classical | Piano solo | Claude Debussy, "Reverie" |
| 12 | Classical | Brass ensemble | Georges Bizet, "Carmen suite" |
| 13 | Rock 'n' Roll | Rock band | Beatles, "Eleanor Rigby" |
| 14 | Latin | Latin ensemble | Buena Vista Social Club, "El cuarto de Tula" |
| 15 | CW | CW ensemble | Conway Twitty, "Hello darling" |
| 16 | Jazz | Jazz ensemble | Louis Armstrong, "Ain't msbehaving" |
| 17 | Latin | Latin ensemble | Buena Vista Social Club, "Chan Chan" |
| 18 | Classical | Flute solo | Claude Debussy, "Prelude to the afternoon of a faun" |
| 19 | CW | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 20 | Rock 'n' Roll | Piano with vocal | Elton John, "Candle in the wind" |
| 21 | Jazz | Jazz band | Bill Evans, "You and the night music" |
| 22 | CW | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 23 | Classical | Piano and harp | Claude Debussy, "Arabesque" |
| 24 | Rock 'n' Roll | Rock group | Righteous Brothers, "Unchained melody" |
| 25 | Jazz | Jazz ensemble | Louis Armstrong, "Jeepers creepers" |
| Calibration tone 1000 Hz | | | |

Step 4

| Item | Stimulus | Acceptable responses [also included singing or humming along] |
|--------------------------|--|--|
| 1 | Gioachino Rossini, "William Tell" overture | Gioachino Rossini, "William Tell" overture, theme from the "Lone Ranger" |
| 2 | Bill Haley, "Rock around the clock" | Bill Haley, "Rock around the clock", "Happy Days" TV show |
| 3 | Bing Crosby, "White Christmas" | Bing Crosby, "White Christmas", Movie |
| 4 | Otis Redding, "My Girl" | Otis Redding, "My girl" |
| 5 | Elvis, "Love me tender" | Elvis, "Love me tender" |
| 6 | Otis Redding, "Sitting on the dock of the bay" | Otis Redding, "Sitting on the dock of the bay", "Pretty in Pink" movie |
| 7 | Henry Mancini, "Peter Gunn" | Henry Mancini, "Peter Gunn", "Blues Brothers" movie |
| 8 | Barbra Streisand, "Memory" | Barbra Streisand, "Memory", "Cats", Andrew Lloyd Webber |
| 9 | Barbra Streisand, "The way we were" | Barbra Streisand, "The way we were" |
| 10 | "Odd couple theme" | "Odd couple", Neal Hefti, Neil Simon play |
| 11 | Rodgers and Hammerstein, "Hello Dolly" | Rodgers and Hammerstein, "Hello Dolly" |
| 12 | John Denver, "Leaving on a jet plane" | John Denver, "Leaving on a jet plane" |
| 13 | Billy Joel, "Piano man" | Billy Joel, "Piano man" |
| 14 | Beethoven, Symphony 5 | Beethoven, Symphony 5 |
| 15 | Beatles, "Lucy in the Sky with Diamonds" | Beatles, "Lucy in the sky with diamonds" |
| 16 | John Williams, "Star Wars" theme | John Williams, "Star Wars", sci-fi movie |
| 17 | Louis Armstrong, "Jeepers Creepers" | Louis Armstrong, "Jeepers creepers", Satchmo |
| 18 | John Denver, "Leaving on a jet plane" | John Denver, "Leaving on a jet plane" |
| 19 | Nat King Cole, "Unforgettable" | Nat King Cole, "Unforgettable" |
| 20 | Beatles, "Nowhere man" | Beatles, "Nowhere man", "Yellow submarine" soundtrack, "Sergeant Pepper" movie |
| Calibration tone 1000 Hz | | |

2. Form B

Step 1 (Music vs. Noise)

| Item | Category/ Response | Description | Detail (Composer/Performer, if applicable) |
|--------------------------|-----------------------|-------------------------------------|--|
| 1 | Noise | Jet plane taking off | |
| 2 | Music | Drum solo | Carlos Santana, "El nicoya" |
| 3 | Music | Male rock and roll group | Beatles, "Lucy in the sky with diamonds" |
| 4 | Music | Male vocal | Simon and Garfunkel, "Feeling groovy" |
| 5 | Noise | Thunder | |
| 6 | Music | Brass Ensemble | "Alligator crawl" |
| 7 | Noise | Truck engine starting and departing | |
| 8 | Music | Guitar | Joaquín Rodrigo, "Concierto de Aranjuez" (Adagio) |
| 9 | Noise | Water running | |
| 10 | Music | Flute solo | Claude Debussy, "Syrinx" |
| 11 | Noise | Dog growling | |
| 12 | Noise | Chain saw cutting tree | |
| 13 | Noise | Thunder | |
| 14 | Music | Male rock and roll group | Beatles, "All you need is love" |
| 15 | Music | Saxophone solo | Paul Winter, "On the river" |
| 16 | Noise | Eating potato chips | |
| 17 | Noise | Pouring soda into a glass | |
| 18 | Music | Drum solo | Kiss, "Carr Jam 1981" |
| 19 | Noise | Shovel scraping pavement | |
| 20 | Music | Flute solo | Claude Debussy, "Prelude to the afternoon of a faun" |
| 21 | Noise | Airplane taking off | |
| 22 | Music | String quartet | Franz Schubert, "String quartet in C minor" |
| 23 | Noise | Electric can opener | |
| 24 | Noise | Water draining from a sink | |
| 25 | Music | Brass Ensemble | Gioachino Rossini, "Largo al factotum" |
| Calibration tone 1000 Hz | | | |

Step 2

| Item | Category/ Response | Description | Detail (Composer/Performer, if applicable) |
|------|-----------------------|----------------------|--|
| 1 | Piano | Piano solo | George Winston, "Some children see him" |
| 2 | Male vocal | Tenor | Giacomo Puccini, from "La boheme" |
| 3 | Violin/strings | String quartet | Franz Schubert, "String quartet in C minor" |
| 4 | Saxophone | Saxophone solo | Jesse Davis, "Stardust" |
| 5 | Drums | Drum solo | Black Label Society, "We live no more" |
| 6 | Saxophone | Saxophone solo | Chris Potter, "Every time we say goodbye" |
| 7 | Tuba | Brass ensemble | "Tuba polka" |
| 8 | Flute | Flute solo | Claude Debussy, "Syrinx" |
| 9 | Female vocal | Female vocal solo | Sound of music "Do Re Mi" |
| 10 | Female vocal | Jazz ensemble | Billie Holiday, "God bless the child" |
| 11 | Saxophone | Saxophone solo | Jesse Davis, "Stardust" |
| 12 | Piano/male vocal | Piano with vocal | Elton John, "Candle in the wind" |
| 13 | Piano/flute | Piano and flute duet | Claude Bolling, "Suite for flute and jazz piano: baroque and blue" |
| 14 | Male vocal | Male vocal solo | Harry Belafonte, "Day-O", Alan Arkin [composer] |

| | | | |
|--------------------------|-----------------|--------------------|---|
| 15 | Trumpet | Brass ensemble | J.S. Bach, "Little Fugue" |
| 16 | Guitar | Guitar solo | Joaquín Rodrigo, "Concierto de Aranjuez" (Adagio) |
| 17 | Drums | Drum solo | Black Label Society, "We live no more" |
| 18 | Flute | Flute/strings | Claude Debussy, "Sonata" |
| 19 | Female vocal | Jazz ensemble | Billie Holiday, "God bless the child" |
| 20 | Violins/Strings | String quartet | Franz Schubert, "String quartet in C minor" |
| 21 | Guitar | Guitar solo | Russell Donnellon, "Laura" |
| 22 | Tuba | Brass ensemble | "Tuba polka" |
| 23 | Male vocal | Male group [drums] | Simon and Garfunkel, "Patterns" |
| 24 | Trumpet | Brass ensemble | J.S. Bach, "Little fugue" |
| 25 | Guitar | Guitar solo | Simon and Garfunkel, "For Emily" |
| 26 | Drums | Drum solo | Kiss, "I love it loud" |
| 27 | Violin/strings | String ensemble | Tchaikovsky, "Serenade in C for strings" |
| 28 | Piano | Piano solo | Chick Corea, Charlie Chaplin, "Smile" |
| 29 | Tuba | Brass ensemble | "Tuba polka" |
| 30 | Trumpet | Brass ensemble | Georges Bizet, "Carmen suite" |
| Calibration tone 1000 Hz | | | |

Step 3

| Item | Category/ Response | Description | Detail (Composer/Performer, if applicable) |
|--------------------------|-----------------------|--------------------------|---|
| 1 | Latin | Latin ensemble | Buena Vista Social Club, "Buena Vista Social Club" |
| 2 | Classical | Brass ensemble | Aram Khachaturian, "Sabre dance" |
| 3 | Rock 'n' Roll | Male rock and roll group | Beatles, "Lucy in the sky with diamonds" |
| 4 | CW | CW ensemble | Conway Twitty, "Hello darling" |
| 5 | Rock 'n' Roll | Rock group | Elvis, "Hound dog" |
| 6 | CW | CW ensemble | Patsy Cline, "I fall to pieces" |
| 7 | Jazz | Jazz ensemble | Billie Holiday, "God bless the child" |
| 8 | Latin | Latin ensemble | Ricky Martin, "Jamás" |
| 9 | Classical | Brass ensemble | Georges Bizet, "Carmen suite" |
| 10 | Rock 'n' Roll | Rock band | Beatles, "Sergeant Pepper's Lonely Hearts Club Band" |
| 11 | Jazz | Jazz band | Bill Evans, "You and the night and the music" |
| 12 | Latin | Latin ensemble | Buena Vista Social Club, "Buena Vista Social Club" |
| 13 | Classical | Piano and harp | Claude Debussy, "Arabesque" |
| 14 | Latin | Latin ensemble | Ricky Martin, "Besos de fuego" |
| 15 | CW | CW ensemble | Kitty Wells, "It wasn't God who made honky tonk angels" |
| 16 | Classical | Tenor | Giacomo Puccini, from "La boheme" |
| 17 | Latin | Latin ensemble | Buena Vista Social Club, "Buena Vista Social Club" |
| 18 | Jazz | Jazz ensemble | Louis Armstrong, "Jeepers creepers" |
| 19 | CW | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 20 | Classical | Tenor/orchestra | Guisseppe Verdi, "Celeste Aida" |
| 21 | Jazz | Jazz ensemble | Louis Armstrong, "Ain't misbehaving" |
| 22 | Rock 'n' Roll | Rock band | Beatles, "Eleanor Rigby" |
| 23 | CW | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 24 | Rock 'n' Roll | Piano with vocal | Elton John, "Candle in the wind" |
| 25 | Jazz | Jazz band | Bill Evans, "You and the night and the music" |
| Calibration tone 1000 Hz | | | |

Step 4

| Item | Stimulus | Acceptable responses [also included singing or humming along] |
|--------------------------|---|--|
| 1 | Elvis, "Hound dog" | Elvis, "Hound dog" |
| 2 | Rodgers and Hammerstein, "Do Re Mi" | "Do Re Mi", Julie Andrews, "Sound of Music" movie, Rodgers and Hammerstein |
| 3 | Elvis, "Jailhouse rock" | Elvis, "Jailhouse rock", "Blues Brothers" movie |
| 4 | Bill Haley, "Rock around the clock" | Bill Haley, "Rock around the clock", "Happy Days" TV show |
| 5 | Bing Crosby, "White Christmas" | Bing Crosby, "White Christmas", Movie |
| 6 | Righteous Brothers, "Unchained melody" | Righteous Brothers, "Unchained melody", "Ghost" movie |
| 7 | Elvis, "Love me tender" | Elvis, "Love me tender" |
| 8 | Sonny and Cher, "I got you, babe" | Sonny and Cher, "I got you, babe" |
| 9 | Beatles, "Yesterday" | Beatles, "Yesterday" |
| 10 | Righteous Brothers, "You've lost that loving feeling" | Righteous Brothers, "You've lost that loving feeling" |
| 11 | Stevie Wonder, "Isn't she lovely" | Stevie Wonder, "Isn't she lovely" |
| 12 | Otis Redding, "My Girl" | Otis Redding, "My girl" |
| 13 | Harry Belafonte, "Day-O" | Harry Belafonte, "Day-O", "Beetlejuice" movie, Alan Arkin [composer] |
| 14 | Mancini, "Pink panther" theme | Mancini, "Pink panther" theme, Inspector Clouseau movies, TV commercial with a cartoon panther |
| 15 | "Twinkle, twinkle, little star" | "Twinkle, twinkle, little star", Raffi, Mozart |
| 16 | Michael Jackson, "Billie Jean" | Michael Jackson, "Billie Jean" |
| 17 | Bette Midler, "Wind beneath my wings" | Bette Midler, "Wind beneath my wings", "Beaches" movie |
| 18 | Beach Boys, "California girls" | Beach Boys, "California girls" |
| 19 | Elvis, "Hound dog" | Elvis, "Hound dog" |
| 20 | Beatles, "She loves you" | Beatles, "She loves you" |
| Calibration tone 1000 Hz | | |

3. Form C

Step 1 (Music vs. Noise)

| Item | Category/ Response | Description | Detail (Composer/Performer, if applicable) |
|--------------------------|-----------------------|---|--|
| 1 | Noise | Pouring soda into a glass | |
| 2 | Music | Flute solo | Claude Debussy, "Prelude to the afternoon of a faun" |
| 3 | Music | Male rock and roll group | Beatles, "All you need is love" |
| 4 | Music | Brass ensemble | J.S. Bach, "Wachet auf, ruft uns die..." |
| 5 | Noise | Chain saw cutting tree | |
| 6 | Noise | Water running | |
| 7 | Music | String quartet | Franz Schubert, "String quartet in C minor" |
| 8 | Noise | Tray of dishes dropping | |
| 9 | Music | Brass ensemble | Aram Khachaturian, "Sabre dance" |
| 10 | Noise | Filing cabinet drawer opening and closing | |
| 11 | Music | Drum solo | Kiss, "Carr Jam 1981" |
| 12 | Music | Guitar | Joaquín Rodrigo, "Concierto de Aranjuez" (Adagio) |
| 13 | Noise | Eating potato chips | |
| 14 | Music | Piano solo | Chick Corea, "Lush life" |
| 15 | Noise | Running in hallway | |
| 16 | Music | Female voice | Pierre Certon, "La, la, la, la, je ne l'ose dire" |
| 17 | Noise | Thunder | |
| 18 | Music | Female voice | "Do Re Mi", from "Sound of music" |
| 19 | Noise | Electric can opener | |
| 20 | Music | String quartet | Franz Schubert, "String quartet in C minor" |
| 21 | Noise | Airplane taking off | |
| 22 | Music | Flute solo | Claude Debussy, "Syrinx" |
| 23 | Noise | Dog growling | |
| 24 | Music | Saxophone solo | Paul Winter, "On the river" |
| 25 | Music | Saxophone solo | Paul Winter, "Fanfare" |
| Calibration tone 1000 Hz | | | |

Step 2

| Item | Category/ Response | Description | Detail (Composer/Performer, if applicable) |
|------|--------------------------|--------------------------|--|
| 1 | Female vocal | Soprano | Wolfgang Amadeus Mozart, "Die Zauberflöte" [Queen of the Night solo] |
| 2 | Male vocal | Male rock and roll group | Beatles, "All you need is love" |
| 3 | Flute | Flute/strings | Claude Debussy, "Sonata" |
| 4 | Guitar | Guitar solo | Simon and Garfunkel, "For Emily" |
| 5 | Violin/String instrument | String Quartet | Felix Mendelssohn, "String quartet number 4 in E minor" |
| 6 | Female vocal | Soprano | Giacomo Puccini, from "Turandot" |
| 7 | Piano/flute | Piano and flute duet | Claude Bolling, "Suite for flute and jazz piano: baroque and blue" |
| 8 | Drums | Drums solo | Dream Theater, "6:00" |
| 9 | Saxophone | Saxophone solo | Jesse Davis, "Stardust" |
| 10 | Flute | Flute/strings | Claude Debussy, "Sonata" |
| 11 | Guitar | Guitar solo | Simon and Garfunkel, "For Emily" |
| 12 | Saxophone | Saxophone solo | Chris Potter, "Every time we say goodbye" |
| 13 | Piano | Piano solo | George Winston, "Some children see him" |

| | | | |
|--------------------------|-----------------|--------------------------|--|
| 14 | Tuba | Brass ensemble | "Tuba polka" |
| 15 | Violins/Strings | String quartet | Franz Schubert, "String quartet in C minor" |
| 16 | Trumpet | Brass ensemble | J.S. Bach, "Little fugue" |
| 17 | Drums | Drum solo | Black Label Society, "We live no more" |
| 18 | Piano | Piano solo | Chick Correa, Charlie Chaplin, "Smile" |
| 19 | Female vocal | Jazz ensemble | Billie Holiday, "God bless the child" |
| 20 | Trumpet | Brass ensemble | Georges Bizet, "Carmen suite" |
| 21 | Guitar | Guitar solo | Russell Donnellon, "Laura" |
| 22 | Tuba | Brass ensemble | "Tuba polka" |
| 23 | Male vocal | Male group [drums] | Simon and Garfunkel, "Patterns" |
| 24 | Drums | Drum solo | Kiss, "I love it loud" |
| 25 | Violin/strings | String ensemble | Tchaikovsky, "Serenade in C for strings" |
| 26 | Tuba | Brass ensemble | "Tuba polka" |
| 27 | Trumpet | Brass ensemble | Georges Bizet, "Carmen Suite" |
| 28 | Piano | Piano solo | Chick Correa, "I didn't know what time it was" |
| 29 | Saxophone | Saxophone solo | Jesse Davis, "Stardust" |
| 30 | Male vocal | Male rock and roll group | Beatles, "Lucy in the sky with diamonds" |
| Calibration tone 1000 Hz | | | |

Step 3

| | | | |
|--------------------------|------------------------|------------------|---|
| 1 | Latin | Latin ensemble | Ricky Martin, "Besos de fuego" |
| 2 | CW | CW ensemble | Kitty Wells, "It wasn't God who made honky tonk angels" |
| 3 | Classical | Tenor | Giacomo Puccini, from "La boheme" |
| 4 | Rock 'n' Roll | Rock band | Beatles, "Eleanor Rigby" |
| 5 | Jazz | Jazz ensemble | Louis Armstrong, "Jeepers creepers" |
| 6 | CW | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 7 | Classical | Tenor/orchestra | Guisseppe Verdi, "Celeste Aida" |
| 8 | Jazz | Jazz ensemble | Louis Armstrong, "Ain't misbehaving" |
| 9 | Rock 'n' Roll | Rock band | Beatles, "Eleanor Rigby" |
| 10 | CW | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 11 | Rock 'n' Roll | Piano with vocal | Elton John, "Candle in the wind" |
| 12 | Jazz | Jazz band | Bill Evans, "You and the night music" |
| 13 | Classical | Piano solo | Claude Debussy, "Reverie" |
| 14 | Classical | Flute solo | Claude Debussy, "Syrinx" |
| 15 | Latin | Latin ensemble | Carlos Santana, "Africa bamba" |
| 16 | Rock 'n' Roll | Male vocal | Simon and Garfunkel, "Feeling groovy" |
| 17 | Country & Western [CW] | CW ensemble | Loretta Lynn, "Coal miner's daughter" |
| 18 | Jazz | Jazz ensemble | Louis Armstrong, "Ain't misbehaving" |
| 19 | Latin | Latin ensemble | Carlos Santana, "Corazon espinado" |
| 20 | Jazz | Jazz ensemble | Louis Armstrong, "Jeepers creepers" |
| 21 | Rock 'n' Roll | Rock band | Beatles, "All you need is love" |
| 22 | Latin | Latin ensemble | Buena Vista Social Club, "Dos gardenias" |
| 23 | CW | CW ensemble | Kitty Wells, "It wasn't God who made honky tonk angels" |
| 24 | Latin | Latin ensemble | Buena Vista Social Club, "Buena Vista Social Club" |
| 25 | Classical | Brass ensemble | Georges Bizet, "Carmen suite" |
| Calibration tone 1000 Hz | | | |

Step 4

| Item | Stimulus | Acceptable responses [also included singing or humming along] |
|--------------------------|---|---|
| 1 | Rodgers and Hammerstein, "Hello Dolly" | Rodgers and Hammerstein, "Hello Dolly" |
| 2 | Gioachino Rossini, "William Tell" overture | Gioachino Rossini, "William Tell" overture, theme from the "Lone Ranger" |
| 3 | Billy Joel, "Piano man" | Billy Joel, "Piano man" |
| 4 | Beethoven, Symphony 5 | Beethoven, Symphony 5 |
| 5 | Beatles, "Lucy in the Sky with Diamonds" | Beatles, "Lucy in the sky with diamonds" |
| 6 | John Williams, "Star Wars" theme | John Williams, "Star Wars", sci-fi movie |
| 7 | Louis Armstrong, "Jeepers Creepers" | Louis Armstrong, "Jeepers creepers", Satchmo |
| 8 | John Denver, "Leaving on a jet plane" | John Denver, "Leaving on a jet plane" |
| 9 | Nat King Cole, "Unforgettable" | Nat King Cole, "Unforgettable" |
| 10 | Beatles, "Nowhere man" | Beatles, "Nowhere man", "Yellow submarine" soundtrack "Sergeant Pepper" movie |
| 11 | Elvis, "Hound dog" | Elvis, "Hound dog" |
| 12 | Rodgers and Hammerstein, "Do Re Mi" | "Do Re Mi", Julie Andrews, "Sound of Music" movie, Rodgers and Hammerstein |
| 13 | Bill Haley, "Rock around the clock" | Bill Haley, "Rock around the clock", "Happy Days" TV show |
| 14 | Elvis, "Jailhouse rock" | Elvis, "Jailhouse rock", "Blues Brothers" movie |
| 15 | Bing Crosby, "White Christmas" | Bing Crosby, "White Christmas", Movie |
| 16 | Righteous Brothers, "Unchained melody" | Righteous Brothers, "Unchained melody", "Ghost" movie |
| 17 | Elvis, "Love me tender" | Elvis, "Love me tender" |
| 18 | Sonny and Cher, "I got you, babe" | Sonny and Cher, "I got you, babe" |
| 19 | Beatles, "Yesterday" | Beatles, "Yesterday" |
| 20 | Righteous Brothers, "You've lost that loving feeling" | Righteous Brothers, "You've lost that loving feeling" |
| Calibration tone 1000 Hz | | |