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APPENDIX A: LETTER OF INFORMED CONSENT

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
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1908 - 2008

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Department of Communication Pathology

5 February 2010

Dear Participant,

REQUEST FOR YOUR VOLUNTARY PARTICIPATION IN A RESEARCH PROJECT

I am registered for the degree D.Phil in Communication Pathology in the Dept of Communication Pathology at the University of Pretoria. As part of the requirements for my degree I am conducting research with the aim of determining the influence of non-linear frequency compression on music perception.

There are many people with a hearing loss whose hearing thresholds at the higher frequencies preclude the perception of any useful amplified sound at these points. In order for them to receive usable information about incoming high frequency sounds, a different approach is needed. One way this can be accomplished is by employing a different concept in hearing amplification, one that processes and delivers high frequency speech sounds to the lower frequencies, where people are likely to have more residual hearing. Various signal processing strategies such as non-linear frequency compression have emerged to allow high frequency information to be moved to a lower frequency region so that it can be more easily accessed by the listener. Although some research about the influence of non-linear frequency compression on speech recognition and speech understanding have already been done, there still is no studies to prove whether non-linear frequency compression is suitable for music listening or not, or how non-linear frequency compression will influence the perception of listening to music. This is probably because traditional approaches by the hearing aid industry focused on hearing speech and not music. The determination of the influence of non-linear frequency compression on music perception will assist in more evidence-based hearing aid fittings to improve these skills for persons with a severe hearing loss.

Your participation in this study will assist in collecting valuable information that will enable audiologists to improve service delivery to this population. It will be much appreciated if you will take part in this research project. During the research project you will undergo a hearing test. Thereafter you will be fitted with the non-linear frequency compression hearing aids and requested to wear the hearing aids for a period of four weeks. On returning to the practice you will participate in a music perception test and you will be asked to complete a short questionnaire. You will then be asked to

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www.up.ac.za

wear the hearing aids for another four weeks, this time with the settings differing from the previous. The same music perception test will be conducted when you return to the practice and you will be asked to complete another short questionnaire. Please take note that by agreeing to participate in this study, your personal records in your file at the practice will be reviewed in order to obtain your biographical information. The estimated time that the test procedures will take is approximately one hour per appointment (three appointments). Please do not leave any question in the questionnaire unanswered.

Participation is entirely voluntary and you can withdraw from the study at any time so you wish. Please note that, to take part in this study, you must be within the ages of 18 years 0 months and 64 years 11 months and have no experience with hearing aids that make use of non-linear frequency compression.

Results of this study will be stored on a CD for 15 years and published in a scientific article as well as in the format of a report (hard copy) in the Academic Information Centre of the University of Pretoria. The data collected will be stored for research purposes. All results will be treated in a strictly confidential manner.

Please complete the agreement below and keep it as a reference for the participation of this study.

Your participation is highly appreciated.

Kind regards,

Marinda Uys
Student number: 21071871
Researcher

Dr C. van Dijk
Research Supervisor

Dr L. Pottas
Research Co-supervisor

Dr M. Soer
Acting Head: Dept of Communication Pathology

Contact Details:

Email: marinda.uys@gmail.com
Tel No: 072 2110 140

APPENDIX B: ETHICAL CLEARANCE

UNIVERSITEIT VAN PRETORIA
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YUNIBESITHI YA PRETORIA

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YUNIBESITHI YA PRETORIA

Faculty of Humanities
Research Ethics Committee

24 February 2010

Dear Dr van Dijk

Project:	**The influence of non-linear frequency compression on music perception for adults with a moderate to severe hearing loss**
Researcher:	**M Uys**
Supervisor:	**Dr C van Dijk**
Department:	**Communication Pathology**
Reference number:	**21071871**

Thank you for your response to the Committee's letter of 10 February 2010.

I have pleasure in informing you that the Research Ethics Committee formally **approved** the above study at an *ad hoc* meeting held on 23 February 2010. Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should your actual research depart significantly from the proposed research (as sometimes happens for a variety of possible reasons), it would be necessary to apply for a new research approval and ethical clearance.

The Committee requests you to convey this approval to Ms Uys.

We wish you success with the project.

Sincerely

Prof. John Sharp
Chair: Research Ethics Committee
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: john.sharp@up.ac.za

APPENDIX C: LETTER TO REQUEST PERMISSION FROM THE PRIVATE AUDIOLOGY PRACTICE

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UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Department of Communication Pathology

30 May 2009

Dear Mrs A van der Merwe,

PERMISSION TO CONDUCT A RESEARCH PROJECT INVOLVING CLIENTS OF THE A. VAN DER MERWE INC. AUDIOLOGY PRACTICE IN PRETORIA

I am registered for the degree D.Phil in Communication Pathology in the Dept of Communication Pathology at the University of Pretoria. As part of the requirements for my degree I am conducting research with the aim of determining the influence of non-linear frequency compression on music perception.

There are many people with a hearing loss whose hearing thresholds at the higher frequencies preclude the perception of any useful amplified sound at these points. In order for them to receive usable information about incoming high frequency sounds, a different approach is needed. One way this can be accomplished is by employing a different concept in hearing amplification, one that processes and delivers high frequency speech sounds to the lower frequencies, where people are likely to have more residual hearing. Various signal processing strategies such as non-linear frequency compression have emerged to allow high frequency information to be moved to a lower frequency region so that it can be more easily accessed by the listener. Although some research about the influence of non-linear frequency compression on speech recognition and speech understanding have already been done, there still is no studies to prove whether non-linear frequency compression is suitable for music listening or not, or how non-linear frequency compression will influence the perception of listening to music. This is probably because traditional approaches by the hearing aid industry focused on hearing speech and not music. The determination of the influence of non-linear frequency compression on music perception will assist in more evidence-based hearing aid fittings to improve these skills for persons with a moderate to severe hearing loss.

Participants:
Voluntary participation of as many clients with a bilateral, severe, sensory neural hearing loss. Participants must be able to understand English and be between the ages of 18 years 0 months and 64 years 11 months. Furthermore participants should not have had hearing aids that made use of the non-linear frequency compression strategy before.

Procedure:
This study involves the audiological testing of participants to determine their hearing status. Thereafter they will be fitted with hearing aids with the non-linear frequency compression algorithm inactive. After the participants had been wearing the hearing aids

University of Pretoria
Pretoria, 0002
South Africa

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Facsimile : 00 27 12 420-3517

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www.up.ac.za

for a period of four weeks, they will be asked to return to the practice where a self-compiled music perception test will be performed. They will also be asked to complete a short questionnaire. The non-linear frequency compression algorithm will then be activated and the participants will be asked to wear the hearing aids again for four weeks. On returning to the practice the same music perception test will be performed. The results obtained with the non-linear frequency compression algorithm disabled and enabled will be evaluated and compared for each participant. The participants will again be asked to complete a short questionnaire to indicate the benefit (if any) with the non-linear frequency compression algorithm activated. Please take note that patients' personal records in their files will be reviewed in order to obtain their biographical information.

Results of this study will be stored on a CD for 15 years and published in a scientific article as well as in the format of a report (hard copy) in the Academic Information Centre of the University of Pretoria. The data collected will be stored for research purposes. All results will be treated in a strictly confidential manner.

Time when study will be conducted:
The data collection will take place as soon as possible after the necessary permission for the conduction of this study was granted by your institution and ethical clearance have been obtained by the University of Pretoria.

It will be highly appreciated if permission can be obtained to conduct this research project at the A. van der Merwe Inc. Audiology practice in Pretoria and if clients of the practice can be used as participants in the study. I am aware of the ethical implications of such a study and am willing to subdue myself to the rules and regulations of your institution.

I trust that you will favourably consider my application.

Kind regards,

Marinda Uys
Student number: 21071871
Researcher

Dr. C van Dijk
Research Supervisor

Dr L. Pottas
Research Co-supervisor

Dr M. Soer
Acting Head: Dept of Communication Pathology

Contact Details:
Email: marinda.uys@gmail.com
Tel No: 072 2110 140

APPENDIX D: PERMISSION OBTAINED FROM THE PRIVATE AUDIOLOGY PRACTICE

A van der Merwe Inc.
Group Practice No. 5002508

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Ballito (KZN)
Tel: (032) 946-3987

Bloemfontein
Tel: (051) 444-1596

Bellville (CPT)
Tel: (012) 949-2900

Bryanston (JHB)
Tel: (011) 463-9051

Claremont (CPT)
Tel: (021) 683-5590

George
Tel: (044) 884-1956

Hillcrest (KZN)
Tel: (031) 765-7501

Middelburg
Tel: (013) 282-0773

Nelspruit
Tel: (013) 752-6680

Pietermaritzburg (KZN)
Tel: (033) 345-1060

Polokwane
Tel: (015) 291-5989

Potchefstroom
Tel: (018) 290-5579

Pretoria
Tel: (012) 333-3155

Rosebank (JHB)
Tel: (011) 880-4585

Shelly Beach (KZN)
Tel: (039) 315-0893

Umhlanga (KZN)
Tel: (031) 566-4727

Witbank
Tel: (013) 656-1775

4 June 2009

To whom it may concern:

PERMISSION FOR CONDUCTION OF A RESEARCH PROJECT AT THE A. VAN DER MERWE INC. AUDIOLOGY PRACTICE IN PRETORIA

Hereby the directors of the A. van der Merwe Inc. Audiology practice grant permission for the conduction of the doctoral research study by Marinda Uys at the premises. We also grant permission that Mrs Uys may use the clients of this practice as participants in the study.

It will be appreciated if the results of this research project will be shared with the directors and audiologists at the practice.

Please feel free to contact me if you require any further assistance or would like to make arrangements for the conduction of the research project.

Kind regards

A v d. Merwe.

ANITA VAN DER MERWE

DIRECTOR

APPENDIX E: FINAL VERSION OF THE MUSIC PERCEPTION TEST

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

MUSIC PERCEPTION EVALUATION

ANSWER SHEET

NAME: ..... DATE OF BIRTH: D D M M Y Y Y Y

DATE: ..... (MM/DD/YYYY)

Welcome to the Music Perception Test. Over the course of the next hour, you will be required to respond to various questions relating to music perception.

The test is divided into four sections - A, B, C and D - and each section focuses on a a different aspect of music perception. These aspects are: Rhythm, Timbre, Pitch and Melody.

Please make sure that you are comfortable and remember to put your name, today's date as well as your date of birth on this answer sheet. Also remember that once a question is completed, you cannot return to it.

Your participation is much appreciated.

Please turn this page over to start with the evaluation.

NOTES:

.....

.....

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.....

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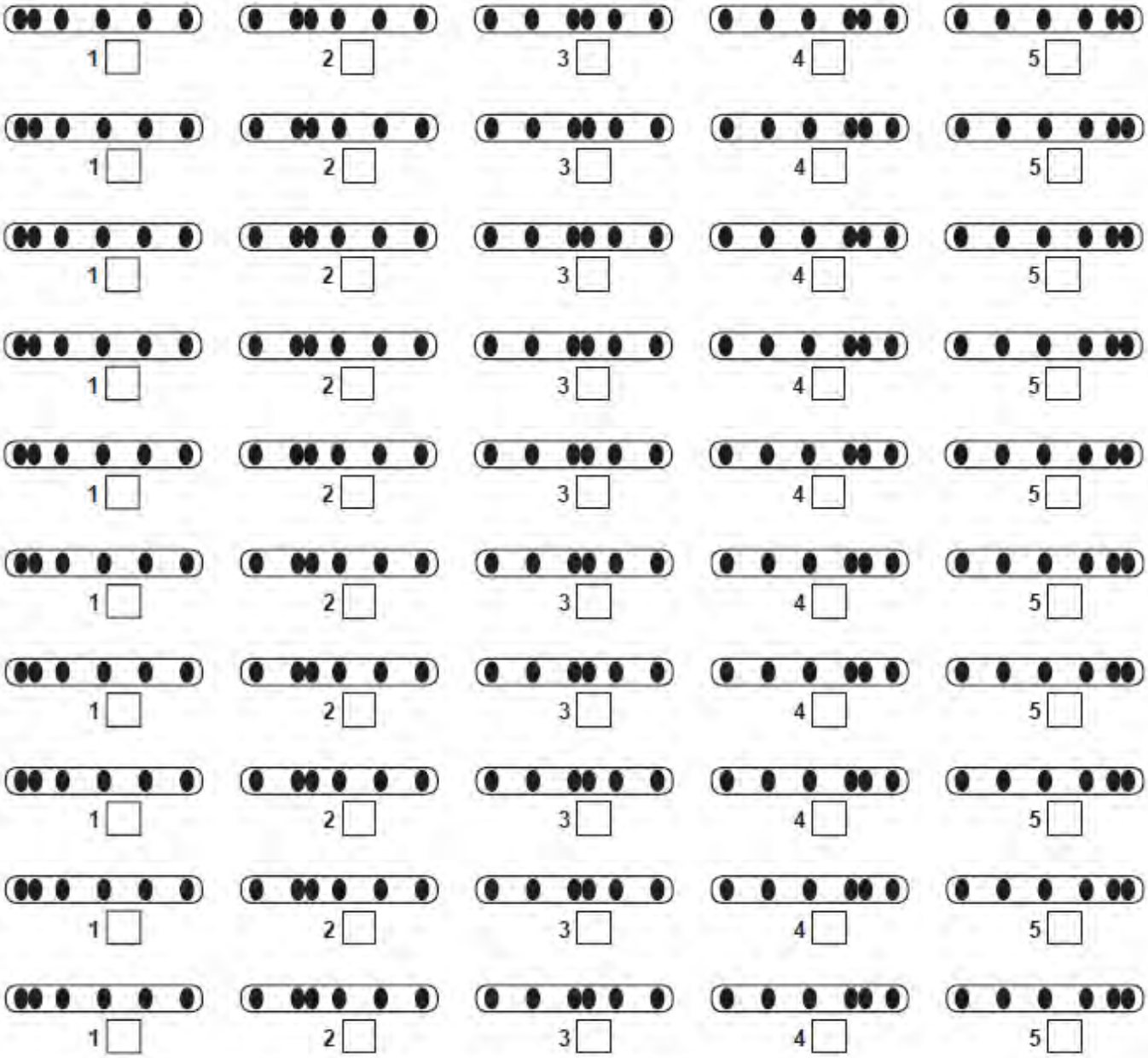
.....

.....

GRAND TOTAL:
140

TEST 1 - RHYTHM IDENTIFICATION

In this test you will be presented with a series of pulse tones, of which two in the series will sound closer together than the rest. (See the graphical representation of this, below). After hearing each series of pulse tones, you must indicate which graphical representation you just heard. There are five in total. Indicate your answer by selecting which one of the five graphical representations you hear.



TOTAL: ☐

TEST 2 - RHYTHM DIS

In this test you will be presented with ten pairs of short melodic patterns. After listening to each pair in turn, you must indicate whether the rhythm of the patterns is the same, or different. Indicate by selecting either 'YES' if they are the same, or 'NO' if they are different.

1. YES ☐ NO ☐	2. YES ☐ NO ☐	3. YES ☐ NO ☐	4. YES ☐ NO ☐	5. YES ☐ NO ☐
6. YES ☐ NO ☐	7. YES ☐ NO ☐	8. YES ☐ NO ☐	9. YES ☐ NO ☐	10. YES ☐ NO ☐

TOTAL: ☐

TEST 3 - RHYTHM RECOGNITION

In this test, you will be presented with ten melodies which are rhythmically structured as either a WALTZ or a MARCH. After listening to each in turn, you must indicate which of the two rhythmical structures you just heard. Indicate your answer by selecting 'WALTZ' or 'MARCH'.

1. WALTZ ☐ MARCH ☐	2. WALTZ ☐ MARCH ☐	3. WALTZ ☐ MARCH ☐	4. WALTZ ☐ MARCH ☐	5. WALTZ ☐ MARCH ☐
6. WALTZ ☐ MARCH ☐	7. WALTZ ☐ MARCH ☐	8. WALTZ ☐ MARCH ☐	9. WALTZ ☐ MARCH ☐	10. WALTZ ☐ MARCH ☐

TOTAL: ☐

TEST 4 - SENSING RHYTHM

In this test, you will be presented with ten pairs of melodic sequences. In each pair, either the FIRST or the SECOND melody may be played out of time and will therefore, not be musically rhythmical. Indicate which melodic sequence is played rhythmically in time by selecting 'FIRST', 'SECOND' or 'BOTH'.

1. FIRST ☐ SECOND ☐ BOTH ☐	2. FIRST ☐ SECOND ☐ BOTH ☐	3. FIRST ☐ SECOND ☐ BOTH ☐	4. FIRST ☐ SECOND ☐ BOTH ☐	5. FIRST ☐ SECOND ☐ BOTH ☐
6. FIRST ☐ SECOND ☐ BOTH ☐	7. FIRST ☐ SECOND ☐ BOTH ☐	8. FIRST ☐ SECOND ☐ BOTH ☐	9. FIRST ☐ SECOND ☐ BOTH ☐	10. FIRST ☐ SECOND ☐ BOTH ☐

TOTAL: ☐

SECTION B - TIMBRE

TEST 5 - TIMBRE IDENTIFICATION (Single Instruments)

Before we begin with this test, we'd like to invite you to look at the following section. You will notice graphical representations of eight musical instruments, below. Indicate in the space provided whether you know how each of these eight instruments sounds.

CELLO

☐ YES, I know what this sounds like.

CLARINET

☐ YES, I know what this sounds like.

PIANO

☐ YES, I know what this sounds like.

PICCOLO FLUTE

☐ YES, I know what this sounds like.

SAXOPHONE

☐ YES, I know what this sounds like.

TROMBONE

☐ YES, I know what this sounds like.

TRUMPET

☐ YES, I know what this sounds like.

VIOLIN

☐ YES, I know what this sounds like.

In this test, you will be presented with sixteen musical phrases, played by each of these eight instruments. Indicate which instrument played which phrase by writing the name of the instrument in the space provided.

1.	6.	11.
2.	7.	12.
3.	8.	13.
4.	9.	14.
5.	10.	15.
		16.

TOTAL:

TEST 5 - TIMBRE IDEN Multiple Instruments)

In this test, you will be presented with the same sixteen musical phrases you heard in the previous test. The phrases, however, will be played as an ensemble - more than one instrument playing at the same time. Indicate which instruments you hear in each collection by writing down their respective names in the space provided.

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

TOTAL:

TEST 6 - THE IDENTIFICATION OF THE NUMBER OF INSTRUMENTS

In this test, you will be presented with five different instruments. A Cello, a Piccolo Flute, a Snare Drum, a Xylophone and a Trumpet. Indicate the number of instruments you can hear playing together by writing the number in the space provided.

1. *2.* *3.* *4.*

5. *6.* *7.* *8.*

TOTAL:

SECTION C - PITCH

TEST 7 - PITCH IDENTIFICATION

In this test you will be presented with ten pairs of musical notes. After listening to each pair in turn, you must indicate whether the second note is higher or lower in tone than the first. Indicate by selecting either 'HIGH' or 'LOW'.

1. HIGH ☐ LOW ☐	2. HIGH ☐ LOW ☐	3. HIGH ☐ LOW ☐	4. HIGH ☐ LOW ☐	5. HIGH ☐ LOW ☐
6. HIGH ☐ LOW ☐	7. HIGH ☐ LOW ☐	8. HIGH ☐ LOW ☐	9. HIGH ☐ LOW ☐	10. HIGH ☐ LOW ☐

TOTAL: ☐

TEST 8 - PITCH DISCRIMINATIOIN

In this test you will be presented with ten pairs of short melodic sequences. After listening to each pair in turn, you must indicate whether the melodic sequences are the same, or different. Indicate by selecting 'YES' if they are the same, or 'NO' if they are different.

1. YES ☐ NO ☐	2. YES ☐ NO ☐	3. YES ☐ NO ☐	4. YES ☐ NO ☐	5. YES ☐ NO ☐
6. YES ☐ NO ☐	7. YES ☐ NO ☐	8. YES ☐ NO ☐	9. YES ☐ NO ☐	10. YES ☐ NO ☐

TOTAL: ☐

SECTION D - MELODY

TEST 9 - MUSICALITY

In this test you will be presented with ten pairs of tonal phrases played on the piano. You must indicate which phrase in each pair you consider to be the more musical or pleasant to listen to - as determined by a structured sequence of notes. Please bear in mind that some phrases in a pair may BOTH be musical or unmusical. Indicate which of the tonal phrases in each pair you think are more musical by selecting the appropriate answer.

1.
- FIRST WAS MUSICAL ☐
- SECOND WAS MUSICAL ☐
- BOTH WERE MUSICAL ☐
- NONE WERE MUSICAL ☐

2.
- FIRST WAS MUSICAL ☐
- SECOND WAS MUSICAL ☐
- BOTH WERE MUSICAL ☐
- NONE WERE MUSICAL ☐

3.
- FIRST WAS MUSICAL ☐
- SECOND WAS MUSICAL ☐
- BOTH WERE MUSICAL ☐
- NONE WERE MUSICAL ☐

4.
- FIRST WAS MUSICAL ☐
- SECOND WAS MUSICAL ☐
- BOTH WERE MUSICAL ☐
- NONE WERE MUSICAL ☐

5.
- FIRST WAS MUSICAL ☐
- SECOND WAS MUSICAL ☐
- BOTH WERE MUSICAL ☐
- NONE WERE MUSICAL ☐

6.
- FIRST WAS MUSICAL ☐
- SECOND WAS MUSICAL ☐
- BOTH WERE MUSICAL ☐
- NONE WERE MUSICAL ☐

7.
- FIRST WAS MUSICAL ☐
- SECOND WAS MUSICAL ☐
- BOTH WERE MUSICAL ☐
- NONE WERE MUSICAL ☐

8.
- FIRST WAS MUSICAL ☐
- SECOND WAS MUSICAL ☐
- BOTH WERE MUSICAL ☐
- NONE WERE MUSICAL ☐

9.
- FIRST WAS MUSICAL ☐
- SECOND WAS MUSICAL ☐
- BOTH WERE MUSICAL ☐
- NONE WERE MUSICAL ☐

10.
- FIRST WAS MUSICAL ☐
- SECOND WAS MUSICAL ☐
- BOTH WERE MUSICAL ☐
- NONE WERE MUSICAL ☐

TOTAL: ☐

TEST 10 - MELODY IDE

Please look at the following section. You will see an alphabetical list of ten well-known melodies. Please go through the list and indicate next to the title of each melody whether you are familiar with it. If you are not, just leave the applicable space blank.

1. ☐ '7de Laan' Theme
2. ☐ Happy Birthday To You
3. ☐ Jingle Bells
4. ☐ Mary Had A Little Lamb
5. ☐ Nkosi Sikelel' iAfrika
6. ☐ Nokia Ring Tone
7. ☐ Old MacDonald Had A Farm
8. ☐ Twinkle, Twinkle Little Star
9. ☐ Wedding March
10. ☐ We Wish You A Merry Christmas

In this test, you will be presented with various melodies from the list above. You must indicate the name of the melody that is playing when you hear it by writing down the corresponding number. Bear in mind that any particular melody may be played more than once and it's rhythmical structure may be changed. If you need more time to consider your choice, please indicate this to your examiner by raising your hand.

1.	Melody Number ◄	11.	Melody Number ◄
2.	Melody Number ◄	12.	Melody Number ◄
3.	Melody Number ◄	13.	Melody Number ◄
4.	Melody Number ◄	14.	Melody Number ◄
5.	Melody Number ◄	15.	Melody Number ◄
6.	Melody Number ◄	16.	Melody Number ◄
7.	Melody Number ◄	17.	Melody Number ◄
8.	Melody Number ◄	18.	Melody Number ◄
9.	Melody Number ◄	19.	Melody Number ◄
10.	Melody Number ◄	20.	Melody Number ◄

TOTAL: ☐

TEST 11 - MUSIC IN NO NTIFICATION

Please look at the section below. You will see an alphabetical list of twenty well-known songs of which all have been used in the popular films listed. Go through the list and indicate next to the title of each song or film whether you are familiar with it. If you are not, just leave the applicable space blank.

1. ☐ **A Whole New World** *from "Aladdin"*
2. ☐ **Beauty And The Beast** *from "Beauty and the Beast"*
3. ☐ **Chariots Of Fire** *from "Chariots Of Fire"*
4. ☐ **Climb Every Mountain** *from "The Sound of Music"*
5. ☐ **Don't Cry For Me Argentina** *from "Evita"*
6. ☐ **Hungry Eyes** *from "Dirty Dancing"*
7. ☐ **I Finally Found Someone** *from "The Mirror Has Two Faces"*
8. ☐ **I Say A Little Prayer For You** *from "My Best Friend's Wedding"*
9. ☐ **I've Had The Time Of My Life** *from "Dirty Dancing"*
10. ☐ **Diamonds Are Forever** *from "Diamonds Are Forever"*
11. ☐ **Leaving On A Jet Plane** *from "Armageddon"*
12. ☐ **Lara's Theme** *from "Doctor Zhivago"*
13. ☐ **My Heart Will Go On** *from "Titanic"*
14. ☐ **The Pink Panther Theme** *from "The Pink Panther"*
15. ☐ **Purple Rain** *from "Purple Rain"*
16. ☐ **Singing In The Rain** *from "Singing In The Rain"*
17. ☐ **Stayin' Alive** *from "Saturday Night Fever"*
18. ☐ **Summer Nights** *from "Grease"*
19. ☐ **Take My Breath Away** *from "Top Gun"*
20. ☐ **Unchained Melody** *from "Ghost"*

In this test, you will be presented with a portion of various songs from the list that will be played in a simulated noisy environment - that of a motor car driving in traffic. Please indicate which song you hear playing, or the movie it's from, by writing down the corresponding number in the space provided.

1. Melody Number ☐
2. Melody Number ☐
3. Melody Number ☐
4. Melody Number ☐
5. Melody Number ☐
6. Melody Number ☐
7. Melody Number ☐
8. Melody Number ☐
9. Melody Number ☐
10. Melody Number ☐

TOTAL: ☐

This concludes our Music Perception Evaluation. Thank you for your participation.

APPENDIX F: MARKING SHEET FOR THE FINAL VERSION OF THE MUSIC PERCEPTION TEST

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

MUSIC PERCEPTION EVALUATION

ANSWER SHEET

MARKING SHEET

NAME: ..... DATE OF BIRTH: D D M M Y Y Y Y

DATE: ..... (MM/DD/YYYY)

Welcome to the Music Perception Test. Over the course of the next hour, you will be required to respond to various questions relating to music perception.

The test is divided into four sections - A, B, C and D - and each section focuses on a a different aspect of music perception. These aspects are: Rhythm, Timbre, Pitch and Melody.

Please make sure that you are comfortable and remember to put your name, today's date as well as your date of birth on this answer sheet. Also remember that once a question is completed, you cannot return to it.

Your participation is much appreciated.

Please turn this page over to start with the evaluation.

NOTES:

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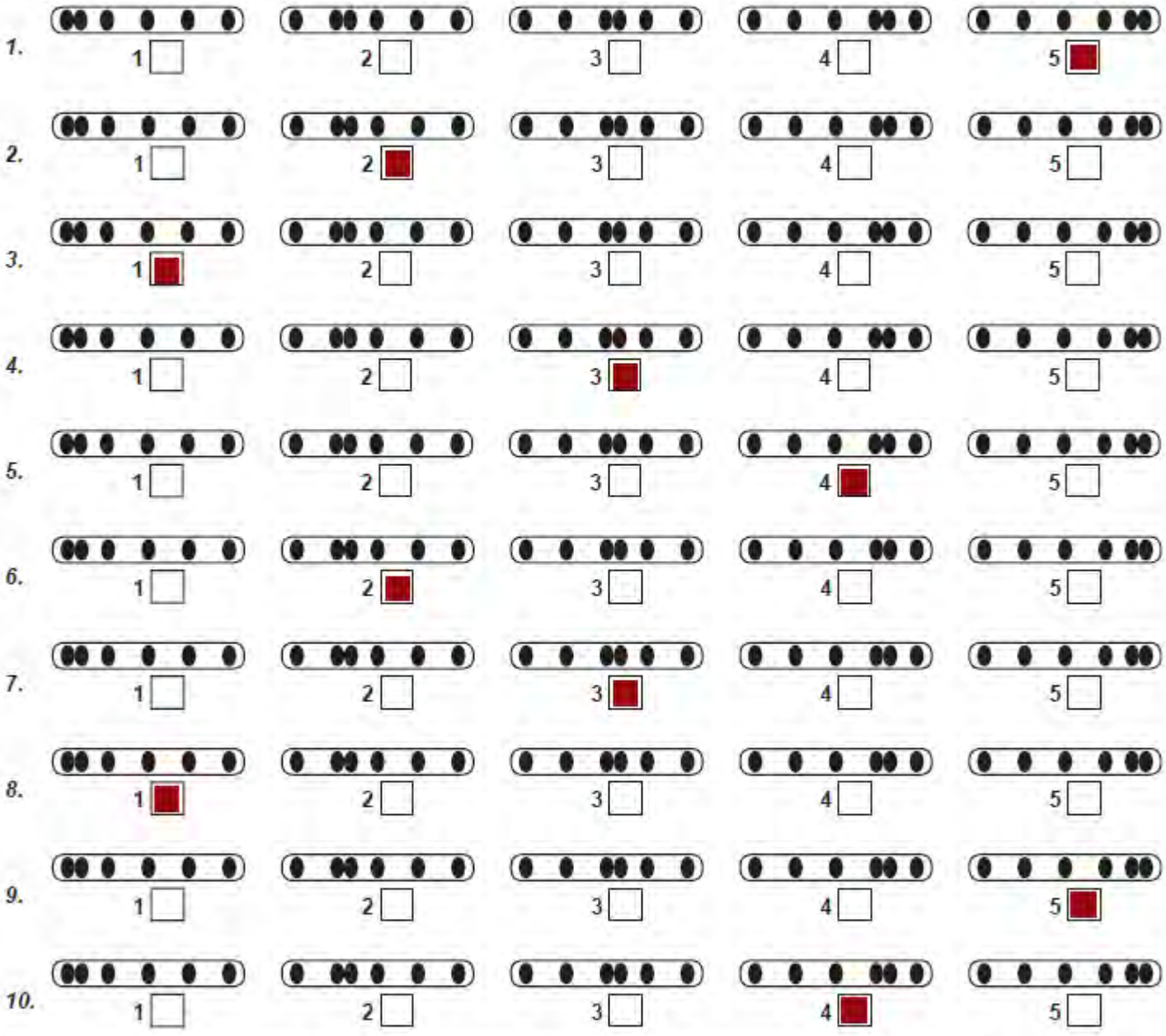
GRAND TOTAL:
140

SECTION A - RHYTHM

TEST 1 - RHYTHM IDENTIFICATION

In this test you will be presented with a series of pulse tones, of which two in the series will sound closer together than the rest. (See the graphical representation of this, below). After hearing each series of pulse tones, you must indicate which graphical representation you just heard. There are five in total. Indicate your answer by selecting which one of the five graphical representations you hear.



TOTAL:

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

TEST 2 - RHYTHM DIS

In this test you will be presented with ten pairs of short melodic patterns. After listening to each pair in turn, you must indicate whether the rhythm of the patterns is the same, or different. Indicate by selecting either 'YES' if they are the same, or 'NO' if they are different.

1. YES ■ NO ☐	2. YES ☐ NO ■	3. YES ■ NO ☐	4. YES ■ NO ☐	5. YES ☐ NO ■
6. YES ☐ NO ■	7. YES ☐ NO ■	8. YES ■ NO ☐	9. YES ☐ NO ■	10. YES ■ NO ☐

TOTAL: ☐

TEST 3 - RHYTHM RECOGNITION

In this test, you will be presented with ten melodies which are rhythmically structured as either a WALTZ or a MARCH. After listening to each in turn, you must indicate which of the two rhythmical structures you just heard. Indicate your answer by selecting 'WALTZ' or 'MARCH'.

1. WALTZ ■ MARCH ☐	2. WALTZ ■ MARCH ☐	3. WALTZ ☐ MARCH ■	4. WALTZ ☐ MARCH ■	5. WALTZ ☐ MARCH ■
6. WALTZ ■ MARCH ☐	7. WALTZ ■ MARCH ☐	8. WALTZ ☐ MARCH ■	9. WALTZ ■ MARCH ☐	10. WALTZ ☐ MARCH ■

TOTAL: ☐

TEST 4 - SENSING RHYTHM

In this test, you will be presented with ten pairs of melodic sequences. In each pair, either the FIRST or the SECOND melody may be played out of time and will therefore, not be musically rhythmical. Indicate which melodic sequence is played rhythmically in time by selecting 'FIRST', 'SECOND' or 'BOTH'.

1. FIRST ■ SECOND ☐ BOTH ☐	2. FIRST ■ SECOND ☐ BOTH ☐	3. FIRST ☐ SECOND ■ BOTH ☐	4. FIRST ☐ SECOND ☐ BOTH ■	5. FIRST ☐ SECOND ■ BOTH ☐
6. FIRST ■ SECOND ☐ BOTH ☐	7. FIRST ☐ SECOND ☐ BOTH ■	8. FIRST ■ SECOND ☐ BOTH ☐	9. FIRST ☐ SECOND ☐ BOTH ■	10. FIRST ☐ SECOND ■ BOTH ☐

TOTAL: ☐

TEST 5 - TIMBRE IDENTIFICATION (Single Instruments)

Before we begin with this test, we'd like to invite you to look at the following section. You will notice graphical representations of eight musical instruments, below. Indicate in the space provided whether you know how each of these eight instruments sounds.

CELLO

☐ YES, I know what this sounds like.

CLARINET

☐ YES, I know what this sounds like.

PIANO

☐ YES, I know what this sounds like.

PICCOLO FLUTE

☐ YES, I know what this sounds like.

SAXOPHONE

☐ YES, I know what this sounds like.

TROMBONE

☐ YES, I know what this sounds like.

TRUMPET

☐ YES, I know what this sounds like.

VIOLIN

☐ YES, I know what this sounds like.

In this test, you will be presented with sixteen musical phrases, played by each of these eight instruments. Indicate which instrument played which phrase by writing the name of the instrument in the space provided.

1.	PIANO	6.	PIANO	11.	SAXOPHONE
2.	PICCOLO FLUTE	7.	CLARINET	12.	TRUMPET
3.	TRUMPET	8.	SAXOPHONE	13.	VIOLIN
4.	CELLO	9.	VIOLIN	14.	PICCOLO FLUTE
5.	TROMBONE	10.	CELLO	15.	TROMBONE
				16.	CLARINET

TOTAL: ____

TEST 5 - TIMBRE IDEN Multiple Instruments)

In this test, you will be presented with the same sixteen musical phrases you heard in the previous test. The phrases, however, will be played as an ensemble - more than one instrument playing at the same time. Indicate which instruments you hear in each collection by writing down their respective names in the space provided.

1.	PICCOLO FLUTE/SAXOPHONE	9.	SAXOPHONE/VIOIN
2.	CLARINET/PIANO	10.	PICCOLO FLUTE/PIANO
3.	SAXOPHONE/VIOIN	11.	CELLO/PIANO/TROMBONE
4.	CELLO/CLARINET	12.	CLARINET/PIANO/TROMBONE
5.	CELLO/PIANO/VIOLIN	13.	CLARINET/PICCOLO FLUTE
6.	CLARINET/PICCOLO FLUTE	14.	PIANO/SAXOPHONE/TRUMPET
7.	CELLO/PIANO/TROMBONE	15.	CELLO/PIANO
8.	PIANO/TRUMPET	16.	CELLO/TRUMPET

TOTAL:

TEST 6 - THE IDENTIFICATION OF THE NUMBER OF INSTRUMENTS

In this test, you will be presented with five different instruments. A Cello, a Piccolo Flute, a Snare Drum, a Xylophone and a Trumpet. Indicate the number of instruments you can hear playing together by writing the number in the space provided.

1.	4	2.	3	3.	4	4.	2
5.	3	6.	5	7.	3	8.	2

TOTAL:

SECTION C - PITCH

TEST 7 - PITCH IDENTIFICATION

In this test you will be presented with ten pairs of musical notes. After listening to each pair in turn, you must indicate whether the second note is higher or lower in tone than the first. Indicate by selecting either 'HIGH' or 'LOW'.

1. HIGH ■ LOW ☐	2. HIGH ☐ LOW ■	3. HIGH ■ LOW ☐	4. HIGH ■ LOW ☐	5. HIGH ☐ LOW ■
6. HIGH ☐ LOW ■	7. HIGH ■ LOW ☐	8. HIGH ☐ LOW ■	9. HIGH ■ LOW ☐	10. HIGH ☐ LOW ■

TOTAL: ☐

TEST 8 - PITCH DISCRIMINATIOIN

In this test you will be presented with ten pairs of short melodic sequences. After listening to each pair in turn, you must indicate whether the melodic sequences are the same, or different. Indicate by selecting 'YES' if they are the same, or 'NO' if they are different.

1. YES ■ NO ☐	2. YES ☐ NO ■	3. YES ☐ NO ■	4. YES ■ NO ☐	5. YES ☐ NO ■
6. YES ☐ NO ■	7. YES ☐ NO ■	8. YES ■ NO ☐	9. YES ■ NO ☐	10. YES ■ NO ☐

TOTAL: ☐

SECTION D - MELODY

TEST 9 - MUSICALITY

In this test you will be presented with ten pairs of tonal phrases played on the piano. You must indicate which phrase in each pair you consider to be the more musical or pleasant to listen to - as determined by a structured sequence of notes. Please bear in mind that some phrases in a pair may BOTH be musical or unmusical. Indicate which of the tonal phrases in each pair you think are more musical by selecting the appropriate answer.

	FIRST WAS MUSICAL ■		FIRST WAS MUSICAL ☐		FIRST WAS MUSICAL ☐
1.	SECOND WAS MUSICAL ☐	2.	SECOND WAS MUSICAL ■	3.	SECOND WAS MUSICAL ☐
	BOTH WERE MUSICAL ☐		BOTH WERE MUSICAL ☐		BOTH WERE MUSICAL ■
	NONE WERE MUSICAL ☐		NONE WERE MUSICAL ☐		NONE WERE MUSICAL ☐
	FIRST WAS MUSICAL ☐		FIRST WAS MUSICAL ■		FIRST WAS MUSICAL ☐
4.	SECOND WAS MUSICAL ■	5.	SECOND WAS MUSICAL ☐	6.	SECOND WAS MUSICAL ☐
	BOTH WERE MUSICAL ☐		BOTH WERE MUSICAL ☐		BOTH WERE MUSICAL ☐
	NONE WERE MUSICAL ☐		NONE WERE MUSICAL ☐		NONE WERE MUSICAL ■
	FIRST WAS MUSICAL ■		FIRST WAS MUSICAL ☐		FIRST WAS MUSICAL ☐
7.	SECOND WAS MUSICAL ☐	8.	SECOND WAS MUSICAL ☐	9.	SECOND WAS MUSICAL ■
	BOTH WERE MUSICAL ☐		BOTH WERE MUSICAL ■		BOTH WERE MUSICAL ☐
	NONE WERE MUSICAL ☐		NONE WERE MUSICAL ☐		NONE WERE MUSICAL ☐

FIRST WAS MUSICAL	☐
10. SECOND WAS MUSICAL	☐
BOTH WERE MUSICAL	☐
NONE WERE MUSICAL	■

TOTAL: ☐

TEST 10 - MELODY IDI

Please look at the following section. You will see an alphabetical list of ten well-known melodies. Please go through the list and indicate next to the title of each melody whether you are familiar with it. If you are not, just leave the applicable space blank.

1. ☐ '7de Laan' Theme
2. ☐ Happy Birthday To You
3. ☐ Jingle Bells
4. ☐ Mary Had A Little Lamb
5. ☐ Nkosi Sikelel' iAfrika
6. ☐ Nokia Ring Tone
7. ☐ Old MacDonald Had A Farm
8. ☐ Twinkle, Twinkle Little Star
9. ☐ Wedding March
10. ☐ We Wish You A Merry Christmas

In this test, you will be presented with various melodies from the list above. You must indicate the name of the melody that is playing when you hear it by writing down the corresponding number. Bear in mind that any particular melody may be played more than once and it's rhythmical structure may be changed. If you need more time to consider your choice, please indicate this to your examiner by raising your hand.

1.	Melody Number	2	11.	Melody Number	7
2.	Melody Number	5	12.	Melody Number	6
3.	Melody Number	7	13.	Melody Number	9
4.	Melody Number	9	14.	Melody Number	4
5.	Melody Number	8	15.	Melody Number	5
6.	Melody Number	4	16.	Melody Number	8
7.	Melody Number	1	17.	Melody Number	10
8.	Melody Number	3	18.	Melody Number	3
9.	Melody Number	6	19.	Melody Number	2
10.	Melody Number	10	20.	Melody Number	1

TOTAL: ☐

TEST 11 - MUSIC IN NOISE NOTIFICATION

Please look at the section below. You will see an alphabetical list of twenty well-known songs of which all have been used in the popular films listed. Go through the list and indicate next to the title of each song or film whether you are familiar with it. If you are not, just leave the applicable space blank.

1. **A Whole New World** *from "Aladdin"*
2. **Beauty And The Beast** *from "Beauty and the Beast"*
3. **Chariots Of Fire** *from "Chariots Of Fire"*
4. **Climb Every Mountain** *from "The Sound of Music"*
5. **Don't Cry For Me Argentina** *from "Evita"*
6. **Hungry Eyes** *from "Dirty Dancing"*
7. **I Finally Found Someone** *from "The Mirror Has Two Faces"*
8. **I Say A Little Prayer For You** *from "My Best Friend's Wedding"*
9. **I've Had The Time Of My Life** *from "Dirty Dancing"*
10. **Diamonds Are Forever** *from "Diamonds Are Forever"*
11. **Leaving On A Jet Plane** *from "Armageddon"*
12. **Lara's Theme** *from "Doctor Zhivago"*
13. **My Heart Will Go On** *from "Titanic"*
14. **The Pink Panther Theme** *from "The Pink Panther"*
15. **Purple Rain** *from "Purple Rain"*
16. **Singing In The Rain** *from "Singing In The Rain"*
17. **Stayin' Alive** *from "Saturday Night Fever"*
18. **Summer Nights** *from "Grease"*
19. **Take My Breath Away** *from "Top Gun"*
20. **Unchained Melody** *from "Ghost"*

In this test, you will be presented with a portion of various songs from the list that will be played in a simulated noisy environment - that of a motor car driving in traffic. Please indicate which song you hear playing, or the movie it's from, by writing down the corresponding number in the space provided.

1.	Melody Number	15	6.	Melody Number	16
2.	Melody Number	5	7.	Melody Number	20
3.	Melody Number	17	8.	Melody Number	2
4.	Melody Number	9	9.	Melody Number	11
5.	Melody Number	13	10.	Melody Number	3

TOTAL:

This concludes our Music Perception Evaluation. Thank you for your participation.

APPENDIX G: FIRST VERSION OF THE MUSIC PERCEPTION TEST

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

MUSIC PERCEPTION EVALUATION

ANSWER SHEET

NAME: ..... DATE OF BIRTH: D D M M Y Y Y Y

DATE: ..... (MM/DD/YYYY)

Welcome to the Music Perception Test. Over the course of the next hour, you will be required to respond to various questions relating to music perception.

The test is divided into four sections - A, B, C and D - and each section focuses on a a different aspect of music perception. These aspects are: Rhythm, Timbre, Pitch and Melody.

Please make sure that you are comfortable and remember to put your name, today's date as well as your date of birth on this answer sheet.

Your participation is much appreciated.

Please turn this page over to start with the evaluation.

NOTES:

.....

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.....

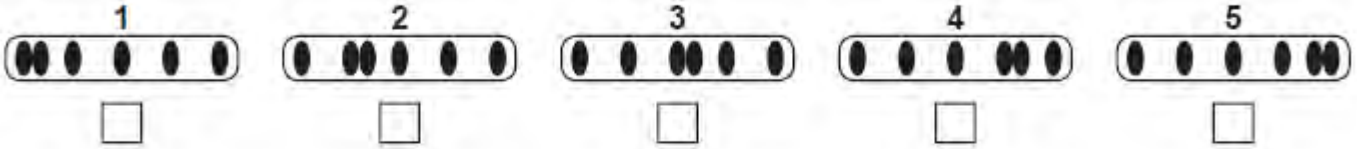
.....

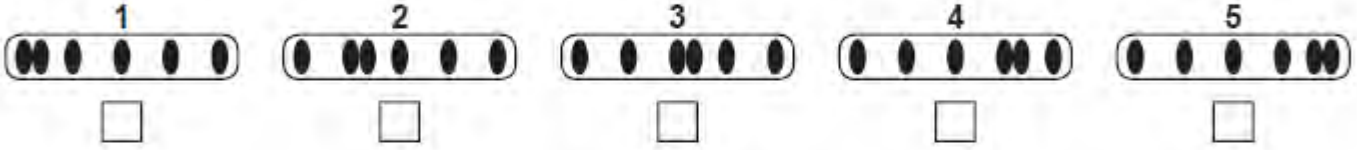
GRAND TOTAL:

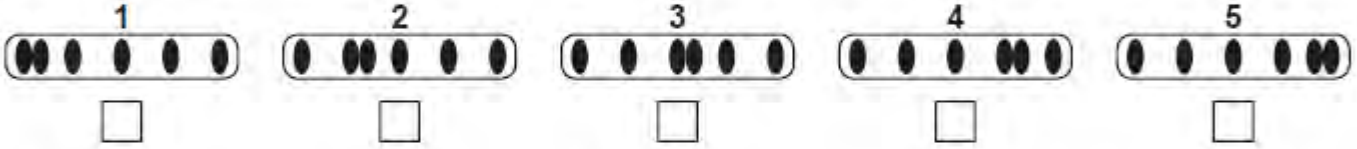
SECTION A

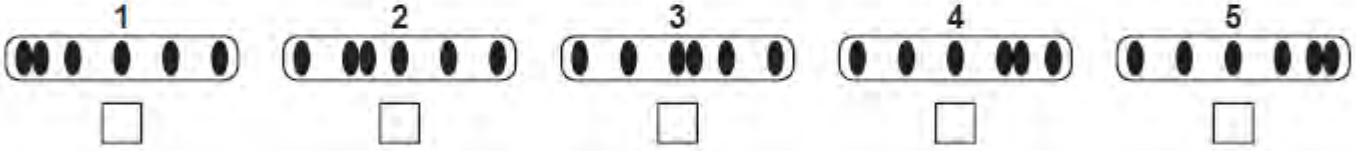
TEST 1 - RHYTHM IDENTIFICATION

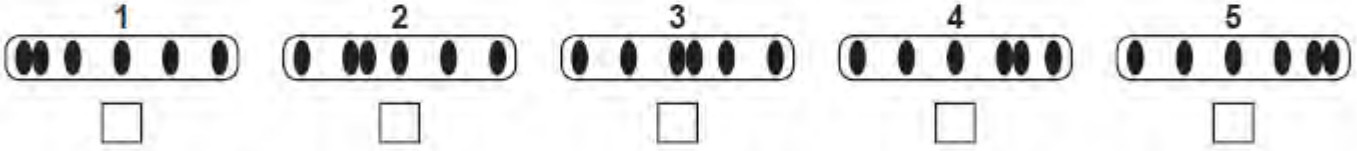
In this test you will be presented with a series of pulse tones, of which two in the series will sound closer together than the rest. (See the graphical representation of this, below) After hearing each series of pulse tones, you must indicate which graphical representation you just heard. There are five in total. Indicate your answer by selecting which one of the five graphical representations you hear.

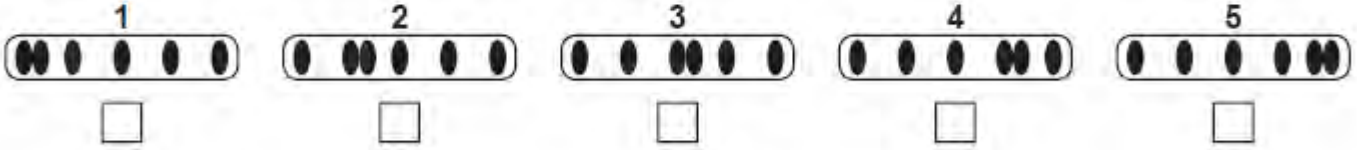
1. 

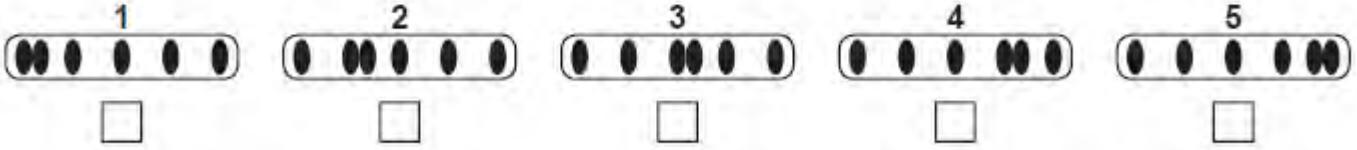
2. 

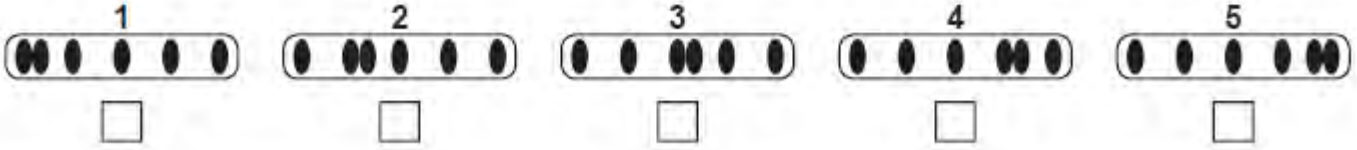
3. 

4. 

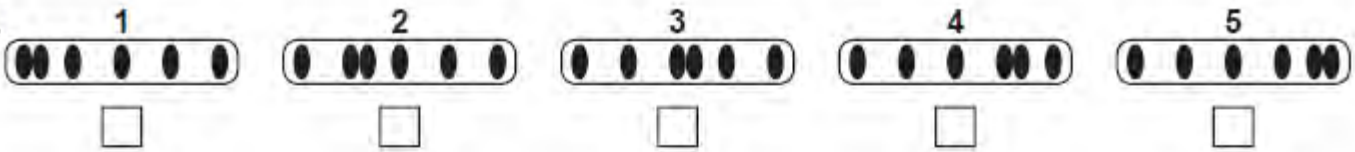
5. 

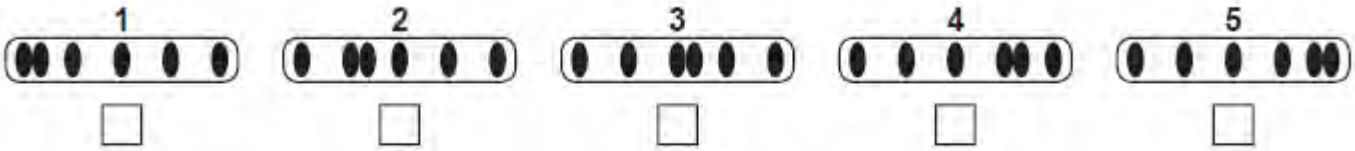
6. 

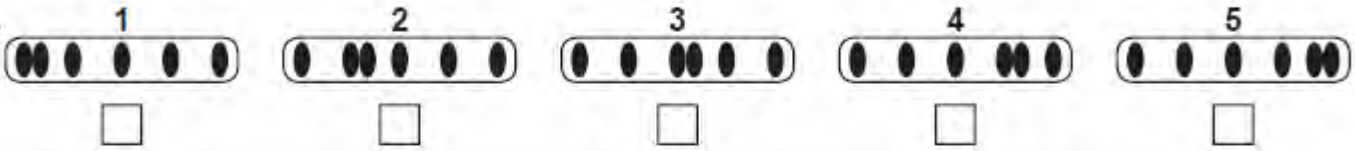
7. 

8. 

9. 

10. 

11. 

12. 

TOTAL: ☐

TEST 2 - RHYTHM DISCRIMINATION

In this test you will be presented with twelve pairs of short melodic patterns. After listening to each pair in turn, you must indicate whether the rhythm of the patterns are the same, or different. Indicate by selecting either 'YES' if they are the same, or 'NO' if they are different.

1.	**YES** ☐ **NO** ☐	2.	**YES** ☐ **NO** ☐	3.	**YES** ☐ **NO** ☐	4.	**YES** ☐ **NO** ☐
5.	**YES** ☐ **NO** ☐	6.	**YES** ☐ **NO** ☐	7.	**YES** ☐ **NO** ☐	8.	**YES** ☐ **NO** ☐
9.	**YES** ☐ **NO** ☐	10.	**YES** ☐ **NO** ☐	11.	**YES** ☐ **NO** ☐	12.	**YES** ☐ **NO** ☐

TOTAL: ☐

TEST 3 - RHYTHM REC

In this test, you will be presented with twelve melodies which are rhythmically structured as either a WALTZ or a MARCH. After listening to each in turn, you must indicate which of the two rhythmical structures you just heard. Indicate your answer by selecting 'WALTZ' or 'MARCH'.

1. WALTZ ☐ MARCH ☐	2. WALTZ ☐ MARCH ☐	3. WALTZ ☐ MARCH ☐	4. WALTZ ☐ MARCH ☐
5. WALTZ ☐ MARCH ☐	6. WALTZ ☐ MARCH ☐	7. WALTZ ☐ MARCH ☐	8. WALTZ ☐ MARCH ☐
9. WALTZ ☐ MARCH ☐	10. WALTZ ☐ MARCH ☐	11. WALTZ ☐ MARCH ☐	12. WALTZ ☐ MARCH ☐

TOTAL: ☐

TEST 4 - RHYTHM PERCEPTION

In this test, you will be presented with twelve pairs of melodic sequences. In each pair, either the FIRST or the SECOND melody may be played out of time and will therefore, not be musically rhythmical. Indicate which melodic sequence is played rhythmically in time by selecting 'FIRST', 'SECOND' or 'BOTH'.

1. FIRST ☐ SECOND ☐ BOTH ☐	2. FIRST ☐ SECOND ☐ BOTH ☐	3. FIRST ☐ SECOND ☐ BOTH ☐	4. FIRST ☐ SECOND ☐ BOTH ☐
5. FIRST ☐ SECOND ☐ BOTH ☐	6. FIRST ☐ SECOND ☐ BOTH ☐	7. FIRST ☐ SECOND ☐ BOTH ☐	8. FIRST ☐ SECOND ☐ BOTH ☐
9. FIRST ☐ SECOND ☐ BOTH ☐	10. FIRST ☐ SECOND ☐ BOTH ☐	11. FIRST ☐ SECOND ☐ BOTH ☐	12. FIRST ☐ SECOND ☐ BOTH ☐

TOTAL: ☐

SECTION B

TEST 5 - TIMBRE IDENTIFICATION PART ONE

Before we begin with this test, we'd like to invite you to look at the following section. You will notice graphical representations of eight musical instruments, below. Indicate in the space provided whether you know how each of these eight instruments sounds.

CELLO

☐ YES, I know what this sounds like.

CLARINET

☐ YES, I know what this sounds like.

PIANO

☐ YES, I know what this sounds like.

PICCOLO FLUTE

☐ YES, I know what this sounds like.

SAXOPHONE

☐ YES, I know what this sounds like.

TROMBONE

☐ YES, I know what this sounds like.

TRUMPET

☐ YES, I know what this sounds like.

VIOLIN

☐ YES, I know what this sounds like.

In this test, you will be presented with sixteen musical phrases, played by each of these eight instruments. Indicate which instrument played which phrase by writing the name of the instrument in the space provided.

1.	6.	11.
2.	7.	12.
3.	8.	13.
4.	9.	14.
5.	10.	15.
		16.

TOTAL:

TEST 5 - TIMBRE IDEN ART TWO

In this test, you will be presented with the same sixteen musical phrases you heard in Part ONE. The phrases, however, will be played as an ensemble - more than one instrument playing at the same time. Indicate which instruments you hear in each ensemble by writing down their respective names in the space provided.

1.		9.	
2.		10.	
3.		11.	
4.		12.	
5.		13.	
6.		14.	
7.		15.	
8.		16.	

TOTAL:

TEST 6 - NUMBER OF INSTRUMENTS

In this test, you will be presented with five different instruments. A Cello, a Piccolo Flute, a Snare Drum, a Xylophone and a Trumpet. Indicate the number of instruments you can hear playing together by writing the number in the space provided.

1.	2.	3.	4.
5.	6.	7.	8.

TOTAL:

SECTION C

TEST 7 - PITCH IDENTIFICATION

In this test you will be presented with twelve pairs of musical notes. After listening to each pair in turn, you must indicate whether the second note is higher or lower in tone than the first. Indicate by selecting either 'HIGH' or 'LOW'.

1.	HIGH ☐ LOW ☐	2.	HIGH ☐ LOW ☐	3.	HIGH ☐ LOW ☐	4.	HIGH ☐ LOW ☐
5.	HIGH ☐ LOW ☐	6.	HIGH ☐ LOW ☐	7.	HIGH ☐ LOW ☐	8.	HIGH ☐ LOW ☐
9.	HIGH ☐ LOW ☐	10.	HIGH ☐ LOW ☐	11.	HIGH ☐ LOW ☐	12.	HIGH ☐ LOW ☐

TOTAL: ☐

TEST 8 - PITCH DISCRIMINATIOIN

In this test you will be presented with twelve pairs of short melodic sequences. After listening to each pair in turn, you must indicate whether the melodic sequences are the same, or different. Indicate by selecting 'YES' if they are the same, or 'NO' if they are different.

1.	YES ☐ NO ☐	2.	YES ☐ NO ☐	3.	YES ☐ NO ☐	4.	YES ☐ NO ☐
5.	YES ☐ NO ☐	6.	YES ☐ NO ☐	7.	YES ☐ NO ☐	8.	YES ☐ NO ☐
9.	YES ☐ NO ☐	10.	YES ☐ NO ☐	11.	YES ☐ NO ☐	12.	YES ☐ NO ☐

TOTAL: ☐

TEST 9 - MUSICALITY PERCEPTION

In this test you will be presented with twelve pairs of tonal phrases played on the piano. You must indicate which phrase in each pair you consider to be the more musical - as determined by a structured sequence of notes. Please bear in mind that some phrases in a pair may BOTH be musical or unmusical. Indicate which of the tonal phrases in each pair you think are more musical by selecting the appropriate answer.

1.	**FIRST** WAS MUSICAL ☐	2.	**FIRST** WAS MUSICAL ☐
	SECOND WAS MUSICAL ☐		**SECOND** WAS MUSICAL ☐
	BOTH WERE MUSICAL ☐		**BOTH** WERE MUSICAL ☐
	NONE WERE MUSICAL ☐		**NONE** WERE MUSICAL ☐

3.	**FIRST** WAS MUSICAL ☐	4.	**FIRST** WAS MUSICAL ☐
	SECOND WAS MUSICAL ☐		**SECOND** WAS MUSICAL ☐
	BOTH WERE MUSICAL ☐		**BOTH** WERE MUSICAL ☐
	NONE WERE MUSICAL ☐		**NONE** WERE MUSICAL ☐

5.	**FIRST** WAS MUSICAL ☐	6.	**FIRST** WAS MUSICAL ☐
	SECOND WAS MUSICAL ☐		**SECOND** WAS MUSICAL ☐
	BOTH WERE MUSICAL ☐		**BOTH** WERE MUSICAL ☐
	NONE WERE MUSICAL ☐		**NONE** WERE MUSICAL ☐

7.	**FIRST** WAS MUSICAL ☐	8.	**FIRST** WAS MUSICAL ☐
	SECOND WAS MUSICAL ☐		**SECOND** WAS MUSICAL ☐
	BOTH WERE MUSICAL ☐		**BOTH** WERE MUSICAL ☐
	NONE WERE MUSICAL ☐		**NONE** WERE MUSICAL ☐

9.	**FIRST** WAS MUSICAL ☐	10.	**FIRST** WAS MUSICAL ☐
	SECOND WAS MUSICAL ☐		**SECOND** WAS MUSICAL ☐
	BOTH WERE MUSICAL ☐		**BOTH** WERE MUSICAL ☐
	NONE WERE MUSICAL ☐		**NONE** WERE MUSICAL ☐

11.	**FIRST** WAS MUSICAL ☐	12.	**FIRST** WAS MUSICAL ☐
	SECOND WAS MUSICAL ☐		**SECOND** WAS MUSICAL ☐
	BOTH WERE MUSICAL ☐		**BOTH** WERE MUSICAL ☐
	NONE WERE MUSICAL ☐		**NONE** WERE MUSICAL ☐

TOTAL: ☐

TEST 10 - MELODY IDI

Please look at the the following section. You will see an alphabetical list of twelve well-known melodies. Please go through the list and indicate next to the title of each melody whether you are familiar with it. If you are not, just leave the applicable space blank.

1. ☐ '7de Laan' Theme
2. ☐ Baa Baa Black Sheep
3. ☐ For He's A Jolly Good Fellow
4. ☐ Happy Birthday To You
5. ☐ Jingle Bells
6. ☐ Mary Had A Little Lamb
7. ☐ Nokia Ring Tone
8. ☐ Old MacDonald Had A Farm
9. ☐ Nkosi Sikelel' iAfrika
10. ☐ Twinkle, Twinkle Little Star
11. ☐ We Wish You A Merry Christmas
12. ☐ Wedding March

In this test, you will be presented with various melodies from the list above. You must indicate the name of the melody that is playing when you hear it by writing down the corresponding number. Bear in mind that any particular melody may be played more than once and it's rhythmical structure may be changed.

1. Melody Number ☐
2. Melody Number ☐
3. Melody Number ☐
4. Melody Number ☐
5. Melody Number ☐
6. Melody Number ☐
7. Melody Number ☐
8. Melody Number ☐
9. Melody Number ☐
10. Melody Number ☐
11. Melody Number ☐
12. Melody Number ☐
13. Melody Number ☐
14. Melody Number ☐
15. Melody Number ☐
16. Melody Number ☐
17. Melody Number ☐
18. Melody Number ☐
19. Melody Number ☐
20. Melody Number ☐
21. Melody Number ☐
22. Melody Number ☐
23. Melody Number ☐
24. Melody Number ☐

TOTAL: ☐

TEST 11 - MUSIC IN NOTIFICATION

Please look at the section below. You will see an alphabetical list of twenty well-known songs or melodies, all of which have been used in popular films. Go through the list and indicate next to the title of each melody or song whether you are familiar with it. If you are not, just leave the applicable space blank.

1. ☐ A Whole New World
2. ☐ Beauty And The Beast
3. ☐ Chariots Of Fire
4. ☐ Climb Every Mountain
5. ☐ Don't Cry For Me Argentina
6. ☐ Hungry Eyes
7. ☐ I Finally Found Someone
8. ☐ I Say A Little Prayer For You
9. ☐ I've Had The Time Of My Life
10. ☐ Diamonds Are Forever
11. ☐ Leaving On A Jet Plane
12. ☐ Lara's Theme
13. ☐ My Heart Will Go On
14. ☐ The Pink Panther Theme
15. ☐ Purple Rain
16. ☐ Singing In The Rain
17. ☐ Stayin'Alive
18. ☐ Summer Nights
19. ☐ Take My Breath Away
20. ☐ Unchained Melody

In this test, you will be presented with a portion of various songs from the list that will be played in a simulated noisy environment - that of a motor car driving in traffic. Please indicate which song or melody you hear playing at any given moment by writing down the corresponding number in the space provided.

1. Melody Number ◄ ☐
2. Melody Number ◄ ☐
3. Melody Number ◄ ☐
4. Melody Number ◄ ☐
5. Melody Number ◄ ☐
6. Melody Number ◄ ☐
7. Melody Number ◄ ☐
8. Melody Number ◄ ☐
9. Melody Number ◄ ☐
10. Melody Number ◄ ☐
11. Melody Number ◄ ☐
12. Melody Number ◄ ☐

TOTAL: ☐

This concludes our Music Perception Evaluation. Thank you for your participation.

APPENDIX H: MUSIC PERCEPTION TEST MANUAL

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

MUSIC PERCEPTION TEST: USER GUIDE

INDEX **PAGE**

1. BACKGROUND TO THE TEST

Aim: This test was compiled with the purpose of obtaining objective information regarding hearing aid users' perception of music.

Rationale: The ability to enjoy music is often adversely affected by a hearing loss (Glista & McDermott, 2008:2) and the majority of people wearing hearing instruments complain of the reduced sound quality of music heard through their personal amplification devices (Chasin & Russo, 2004:35). This may be due to the fact that most hearing instruments are designed with the focus on hearing speech sounds and not music, which is often problematic as there are several differences between speech and music.

More and more people with hearing problems are expressing an equal need for their hearing instruments to be fitted optimally for listening to music (Chasin, 2004:10). The escalating interest in musical perception accuracy and enjoyment is also reflected in publications of a variety of investigations utilizing different experiments to assess performance on musical tasks (Fujita & Ito, 1999; Gfeller *et al.*, 2005, 2002, 1997 & 1991; Looi *et al.*, 2008; Nimmons *et al.*, 2008). Most of these studies were however done on cochlear implantees and not hearing aid users. To complicate matters there is no standard test of music perception and different musical styles thrive in striking different acoustical environments (Wessel *et al.*, 2007:1). A further limitation to the choice of measures to access musical skills that are currently available is that most music tests are designed to examine the skills of individuals undergoing formal musical training (Don *et al.*, 1999:158). The aforementioned information highlights the need for a clinically relevant measure of musical recognition and performance by hearing aid users in order to improve the quality of life of these people as well as the services delivered to them.

Conclusion: Not only is the technology for music input still in its infancy, but the research and clinical knowledge of what music lovers need to hear is also still in its early stages of understanding (Chasin & Russo, 2004:35) and clearly, more research is required in this area. This test was designed to address the abovementioned and included different aspects of music perception including rhythm, timbre, pitch and melody.

2. REQUIREMENTS AND SETUP

Requirements

The test is available on CD and therefore you need a **CD player** for presentation. The CD player has to be connected to a **two channel clinical audiometer** as it is presented through the audiometer to the participant sitting inside the soundproof room. The soundproof room should therefore be equipped with **speakers** as the test is presented in free field inside the soundproof room.

Furthermore a copy of the Music Perception Test's answer sheet and a pen/pencil should be provided to the participant as all answers are written directly on the answer sheet.

Setup

Ensure before hand that the CD player and speakers are in good working order to avoid any difficulties during the test procedures and to avoid distortion. Connect the CD player to the audiometer with the cords provided from the CD player manufacturers. The chords from the CD player should be connected to the audiometer in the following manner:

- The chord from the CD player with only one fitting should be entered into the audiometer at the opening marked "1761-9621 (5VDC.2A)".
- The other chord from the CD player consists of two fittings (red and white). The red fittings should be entered into the audiometer at the opening marked "A" and the white fitting just next to it, at the opening marked "B".

The participant should be seated inside the soundproof room, facing the speaker at 45 degrees, at a distance of approximately one meter.

3. RUNNING THE TEST

To present the Music Perception Test through the audiometer, the following settings should be selected on the audiometer:

Channel 1	**Channel 2**
Speaker	Speaker
External A	External B
Right	Left
Interrupt on	Interrupt on
75 dB	75 dB

After the above mentioned settings were selected, the test administer should press “play” on the CD player to start the test. No further selections on the CD player are necessary as the different sub-tests continuously follow on to one another.

It is suggested that a presentation level of 75 dB is selected for the presentation of the test and that hearing aid users are permitted to adjust the volume on their hearing aids for maximum comfort.

The participant will have an answer sheet with a set of written instructions for each test section. All instructions are also presented via the speakers before the onset of each test. A written response from the participant is required for each stimulus in the test. Every test includes two practice items which precede the actual test items.

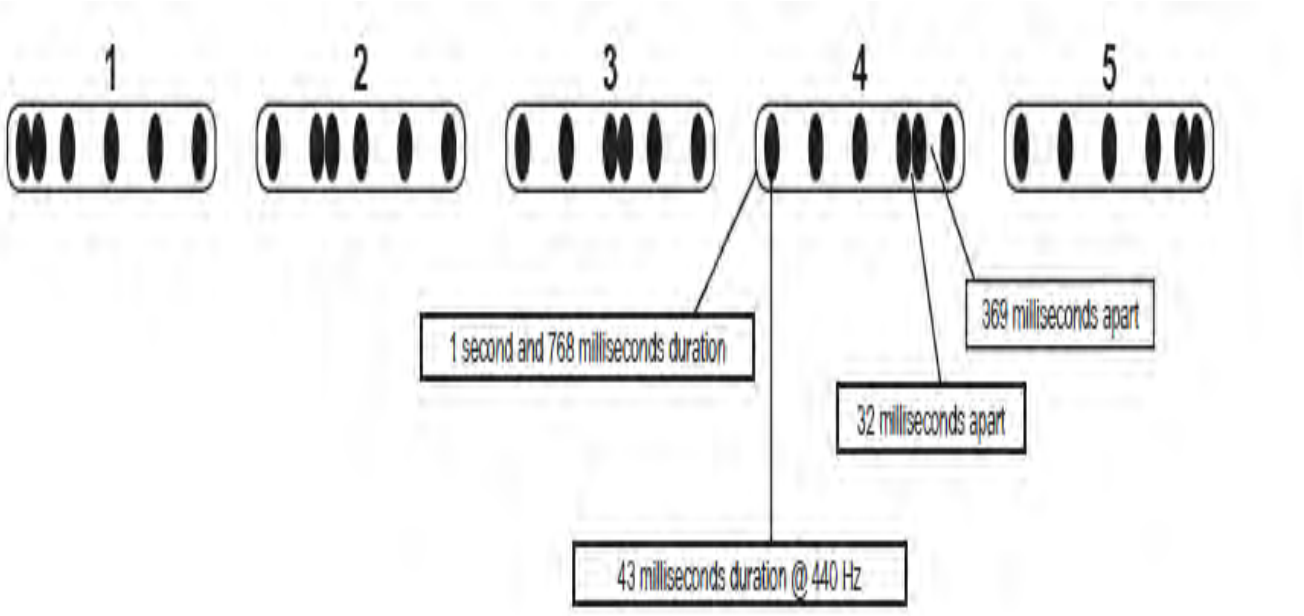
4. THE SPECIFIC SUB-TESTS

Section A - Rhythm

Test 1 – Rhythm identification

In this test the participant is presented with a series of pulse tones, of which two in the series will sound closer together than the rest. After hearing each series of pulse tones, the participant must indicate which graphical representation he/she just heard. There are five in total. The participant indicates his/her answer by selecting which one of the five visual representations on the answer sheet corresponded to the rhythmic pattern they heard. A total of ten items were included in this sub-test.

The following figure is for the visual presentation of the short inter-pulse interval at position four as used in item five:



Test 2 – Rhythm discrimination

In this test the participant will be presented with ten pairs of short melodic patterns. After listening to each pair in turn, the participant must indicate whether the rhythm of the patterns is the same, or different. The participant indicate his/her answer by selecting either "YES" if they are the same, or "NO" if they are different.

The example below is to indicate that the pairs of rhythms are the same, as presented in item one.

Test 3 – Rhythm recognition

In this test, the participant will be presented with ten melodies which are rhythmically structured as either a WALTZ or a MARCH. After listening to each in turn, the participant must indicate which of the two rhythmical structures he/she just heard. The answer is indicated by selecting either "WALTZ" or "MARCH".

The example below is to indicate that the rhythmical structure was that of a march, as presented in item five.

Test 4 – Sensing rhythm

In this test, the participant will be presented with ten pairs of melodic sequences. In each pair, either the FIRST or the SECOND melody may be played out of time and will therefore, not be musically rhythmical. The participant should indicate which melodic sequence is played rhythmically in time by selecting "FIRST", "SECOND" or "BOTH".

The example below is to indicate that BOTH melodic sequences were played in time, as presented in item seven.

Section B - Timbre

Test 5 – Timbre identification (Single instruments)

Participants are asked to indicate which of the musical instruments represented by graphical representations are familiar to them before the onset of the test. They are then presented with sixteen musical phrases, played by each of the eight instruments demonstrated and are asked to indicate which instrument played which phrase by writing the name of the instrument in the space provided.

The example below is to indicate that the participant was familiar with a cello and wrote it's name on the answer sheet as presented in item ten.

Test 5 – Timbre identification (Multiple instruments)

In this test, participants are presented with the same sixteen musical phrases heard in the previous test. The phrases, however, will be played as an ensemble – more than one instrument playing at the same time. The participant is required to indicate which instruments he/she hears in each collection by writing down their respective names in the space provided.

The example below is to indicate that the following three instruments played together during item seven:

Test 6 – The identification of the number of instruments

In this test, participants are presented with five different instruments. A Cello, a Piccolo flute, a Snare drum, a Xylophone and a trumpet. They are required to indicate the number of instruments they can hear playing together by writing down the number in the space provided.

The example below is to indicate that four instruments played together as presented in item one:

Section C - Pitch

Test 7 – Pitch identification

In this test participants will be presented with ten pairs of musical notes. After listening to each pair in turn, they must indicate whether the second note is higher or lower in tone than the first. The answer is indicated by selecting either "HIGH" or "LOW".

The example below is to indicate that the second note was higher in tone than the first, as presented in item nine:

Test 8 – Pitch discrimination

In this test participants will be presented with ten pairs of short melodic sequences. After listening to each pair in turn, they must indicate whether the melodic sequences are the same, or different. The answer is indicated by selecting "YES" if they are the same, or "NO" if they are different.

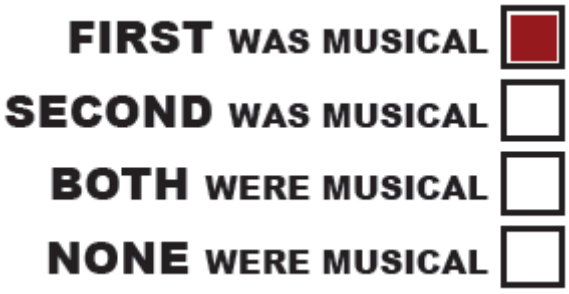
The example below is to indicate that the pair of melodic sequences were different, as presented in item six:

Section D - Melody

Test 9 – Musicality

In this test participants are presented with ten pairs of tonal phrases played on the piano. They must indicate which phrase in each pair they consider to be the more musical or pleasant to listen to – as determined by a structured sequence of notes. Some phrases in a pair may BOTH be musical or unmusical. The answer to which of the tonal phrases in each pair are more musical is indicated by selecting the appropriate answer on the answer sheet.

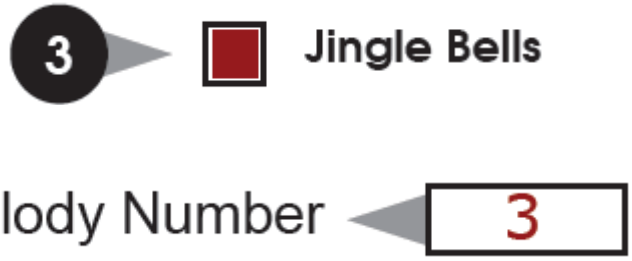
The example below is to indicate that the first musical phrase were musical, as presented in item one:



Test 10 – Melody identification

Participants are presented with an alphabetical list of ten well-known melodies and are asked to indicate next to the title of each melody whether they are familiar with it. If they are not familiar with it, they are instructed to leave the applicable space blank. They are then presented with various melodies from the above-mentioned list and asked to indicate the name of the melody that is playing when they hear it by writing down the corresponding number. Any particular melody can be played more than once and it's rhythmical structure may be changed. If participants need more time to consider their choice, they should indicate this to the examiner by raising a hand.

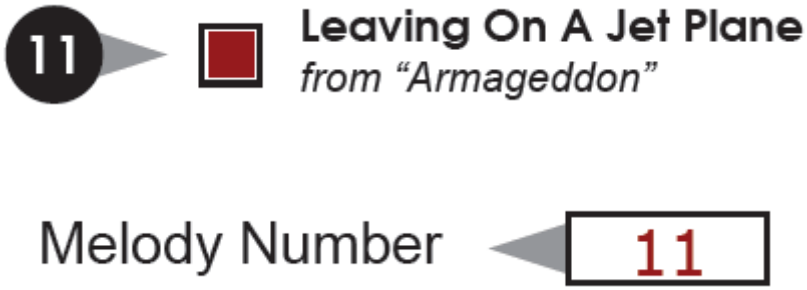
The example below is to indicate that the participant was familiar with the melody, "Jingle bells", and wrote the corresponding number on the answer sheet as presented in item eight.



Test 11 – Music in noise: Song identification

Participants will see an alphabetical list of twenty well-known songs of which all have been used in popular films. They are required to go through the list and indicate next to the title of each song or film whether they are familiar with it. If they are not familiar with it, they are instructed to leave the applicable space blank. Participants are then presented with a portion of various songs from the list that will be played in a simulated noisy environment – that of a motor car driving in traffic. They should indicate which song they hear playing or the movie it's from, by writing down the corresponding number in the space provided.

The example below is to indicate that the participant was familiar with the song, “Leaving on a jet plane”, and wrote the corresponding number on the answer sheet as presented in item nine.



5. CD TRACKS

The test consists of 14 tracks and takes in total 57.17 minutes to complete.

Track 1	Introduction	1.19
Track 2	Test 1: Rhythm identification	2.42
Track 3	Test 2: Rhythm discrimination	4.09
Track 4	Test 3: Rhythm recognition	3.15
Track 5	Test 4: Sensing rhythm	4.24
Track 6	Test 5: Timbre identification (Single instruments)	5.19
Track 7	Test 5: Timbre identification (Multiple instruments)	5.39
Track 8	Test 6: Identification of number of instruments	5.10
Track 9	Test 7: Pitch identification	2.39
Track 10	Test 8: Pitch discrimination	4.00
Track 11	Test 9: Musicality	4.51
Track 12	Test 10: Melody identification	5.58
Track 13	Test 11: Music in noise: Song identification	7.26
Track 14	End	0.19

APPENDIX I: MUSIC PERCEPTION TEST PEER REVIEW EVALUATION SHEET

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

MUSIC PERCEPTION TEST EVALUATION SHEET

Please read the following questions carefully *and answer them by encircling the applicable answer. Should you wish to add any comments, space has been provided at the end of the evaluation sheet.* ***Please do not leave any question unanswered.***

1. Do you feel that the test appears to measure music perception based on its appearance (in other words, does it look like a music perception test)?

Yes 5 4 3 2 1 No

2. In your opinion, does the test represent a complete assessment of music perception and include the assessment of a whole spectrum of musical skills?

Yes 5 4 3 2 1 No

3. Are you satisfied that the stimuli included in the test, is suitable for the assessment of music perception in hearing aid users?

Yes 5 4 3 2 1 No

4. In your opinion, do the included stimuli have various levels of difficulty and therefore are not too easy or too difficult?

Yes 5 4 3 2 1 No

5. Do you feel that the instructions are clear and precise and therefore enable examinees to understand what is expected of them?

Yes 5 4 3 2 1 No

6. Are you satisfied that the language used in the test is unbiased?

Yes 5 4 3 2 1 No

7. In your opinion, is the test logically organized?

Yes 5 4 3 2 1 No

8. Do you feel that sufficient time is provided to answer questions?

Yes 5 4 3 2 1 No

9. Are you satisfied that the test recording is of a high quality?

Yes 5 4 3 2 1 No

10. Do you feel that the test and test items are appropriate for the South African context and does not consist of culturally biased items, phrases or situations that might be offensive to some individuals?

Yes 5 4 3 2 1 No

Please state any additional comments you may have regarding the test.

APPENDIX J: QUESTIONNAIRE 1

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

THE INFLUENCE OF NON-LINEAR FREQUENCY COMPRESSION ON MUSIC PERCEPTION

QUESTIONNAIRE 1: BACKGROUND INFORMATION **For office use only**

V1 ☐☐ 1
Respondent number

V2 ☐☐ 4
☐☐
☐☐
Pt Date of birth

Please read the following questions carefully *and answer them by placing a written response in the space provided or tick in the appropriate column/columns. Should you wish to add any comments, space has been provided at the end of the questionnaire.* ***Please do not leave any question unanswered****.*

1. For approximately how many years did you receive musical training (instrument and/or voice lessons)?

_____ V3 ☐☐ 11

2. Please specify the musical instruments that you are currently playing, or have played before:

_____ V4 ☐☐ 14
_____ V5 ☐☐ 17

3. Do you currently sing, or have you ever sung, in a choir or on social/professional gatherings?

YES ☐ **NO** ☐ V6 ☐ 20

4. Please specify your highest musical qualification:

_____ V7 ☐☐ 22

5. Do you consider yourself to be a person with musical talent or musical sense?

YES ☐ **NO** ☐ V8 ☐ 25

6. Do other people consider you to be a person with musical talent or musical sense?

YES ☐ **NO** ☐ V9 ☐ 27

7. Please specify the relationship to you of any persons in your immediate family with an extraordinary musical talent?

_____ V10 ☐☐ 29
_____ V11 ☐☐ 32

8. What role does music play in your life? Please circle the applicable answer.

A big role 5 4 3 2 1 Does not play a role V12 ☐ 35

9. How often do you listen to music? Please circle the applicable answer.

A lot 5 4 3 2 1 Never V13 ☐ 37

10. How many hours do you usually listen to music on a work day?

_____ V14 ☐☐ 39

11. How many hours do you usually listen to music on a day that you are not working (for example over weekends)?

_____ V15 ☐☐ 42

12. In which situations do you listen to music? Please tick all the applicable answers.

Over the television	☐	At formal music events	☐	V16 ☐☐	45
On the computer	☐	On the radio in the car	☐	V18 ☐☐	49
At social events	☐	Hi-Fi/Ipod/MP3	☐	V20 ☐☐	53

13. Which musical genre(s) do you listen to?

Classical music	☐	Opera/Operetta	☐	V22 ☐☐	57
Pop music	☐	Choir music	☐	V24 ☐☐	61
Rock music	☐	Jazz/Blues	☐	V26 ☐☐	65
Folk/Country music	☐	Music to dance to	☐	V28 ☐☐	69
Ballad singing	☐			V30 ☐	73

14. Do you feel that your enjoyment of music has decreased since you started experiencing hearing problems?

YES ☐ **NO** ☐ V31 ☐ 75

15. Do you usually remove your hearing aid when you listen to music?

YES ☐ **NO** ☐ V32 ☐ 77

16. What do you find most annoying when you listen to music with your hearing aid?

_____ V33 ☐☐ 79
_____ V34 ☐☐ 82

17. Please state any additional comments you may have regarding this subject.

_____ V35 ☐☐ 85
_____ V36 ☐☐ 88

PLEASE READ THROUGH THE QUESTIONNAIRE TO ENSURE THAT ALL THE QUESTIONS WERE ANSWERED.

THANK YOU FOR YOUR CO-OPERATION

APPENDIX K: QUESTIONNAIRE 2

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

THE INFLUENCE OF NON-LINEAR FREQUENCY COMPRESSION ON MUSIC PERCEPTION

QUESTIONNAIRE 2: IMPRESSION OF MUSIC PERCEPTION

For office use only

V1			1

Respondent number

V2		4

Compression on/off

Please read the following questions carefully *and answer them by placing a written response in the space provided or tick in the appropriate column/columns. Should you wish to add any comments, space has been provided at the end of the questionnaire.* ***Please do not leave any question unanswered****.*

The following questions are regarding your musical experience with the hearing aids as used during the last four weeks.

1. To which musical genre do you listen to mostly (your favorite musical genre)?

Classical music		Opera/Operetta		V3		6
Pop music		Choir music		V5		10
Rock music		Jazz/Blues		V7		14
Folk/Country music		Music to dance to		V9		18
Ballad singing				V11		22

2. How does listening to your favorite musical genre generally sound with the hearing aid? Please circle the applicable answer.

2.1 **Loudness**: The music is sufficiently loud, as opposed to soft or faint.

Loud	5	4	3	2	1	Soft	V12	24

2.2 **Fullness**: The music is full, as opposed to thin.

Full	5	4	3	2	1	Thin	V13	26

2.3 **Crispness**: The music is clear and distinct, as opposed to blurred and diffuse.

Crisp/ Clear	5	4	3	2	1	Blurred	V14	28

2.4 **Naturalness**: The music seems to be as if there is no hearing aid, and the music seems as "I remember it".

Natural	5	4	3	2	1	Unnatural	V15	30

2.5 **Overall fidelity**: The dynamics and range of the music is not constrained or narrow.

Dynamic	5	4	3	2	1	Constrained Narrow	V16	32

2.6 **Pleasantness**: A feeling of enjoyment or satisfaction, as opposed to annoying or irritating.

Pleasant	5	4	3	2	1	Unpleasant	V17	34

2.7 **Tinniness**: Hearing the quality of tin or metal, a sense of a cheap, low quality sound.

Less tinny	5	4	3	2	1	More tinny	V18	36

2.8 **Reverberant**: The persistence of sound after the original sound is removed, a series of echoes.

Un-reverberant 5 4 3 2 1 Echoing V19 ☐ 38

3. If you listen to music, which elements can you hear? Please tick all the applicable answers.

Pleasant tones, but no melody	☐	Melody	☐	V20 ☐☐	40
Only unpleasant sounds	☐	Lyrics	☐	V22 ☐☐	44
Rhythm	☐			V24 ☐	48

4. Can you distinguish between high and low notes?

YES ☐ **NO** ☐ V25 ☐ 50

5. Can you detect different musical instruments in a musical piece?

YES ☐ **NO** ☐ V26 ☐ 52

6. Can you discriminate the lyrics (words) in a song?

YES ☐ **NO** ☐ V27 ☐ 54

7. What did you find most annoying when you listened to music with the hearing aid?

_____ V28 ☐☐ 56
_____ V29 ☐☐ 59

8. Please state any additional comments you may have regarding this subject. If you require the results of this study, please indicate it here.

_____ V30 ☐☐ 62
_____ V31 ☐☐ 65

9. Do you require the results of this study?

YES ☐ **NO** ☐ V32 ☐ 68

PLEASE READ THROUGH THE QUESTIONNAIRE TO ENSURE THAT ALL THE QUESTIONS WERE ANSWERED.

THANK YOU FOR YOUR CO-OPERATION