Establishing Normative for Click Rate Induced Facilitation for Assessing Temporal Integration

by Rajalakshmi K

RE/RP/01

PROJECT PROPOSAL FORMAT

Part -A

1.0 Title of the Project:

Establishing Normative for Click Rate Induced Facilitation for Assessing Temporal Integration

Area of Research:

Audiology

1.1 Principal Investigator: Dr. Rajalakshmi K

1.2 Principal Co-Investigator(s): Mr. Prashasti P. Poovaiah

1.4 Collaborating Institution: AIISH and SRC-ISH, Bangalore

1.5 Total Grants Required: 4,95,000 INR (four lakhs ninety five thousand Indian rupees only)

1.6 Duration of the Project: 12 months

2.0 Project Summary (Max. 300 words)

One of the processes of auditory temporal processing is temporal integration which has received less importance. Temporal processing in the auditory system is defined, broadly, as the ability of the auditory system to represent and process, changes in the acoustic signal that occurs over time, and its ability to process brief transient acoustic events.

Temporal processing is a critical to a wide variety of everyday listening tasks, including speech perception and perception of music (Hirsh, 1959). In speech perception, temporal processing is one of the factors necessary for discrimination of subtle cues such as voicing and discrimination of similar words (Musiek and Chermark. 2007). An objective test which was developed to assess temporal integration was click -Rate Induced Facilitation (RIF). This test utilizes acoustic reflexes as a medium to check temporal integration. Rate induced facilitation of acoustic reflex threshold refers to improvement in the acoustic reflex threshold apparent with increase in stimulus rate (Fielding & Rawool. 2002: Rawool. 1995).

3.0 Introduction (under the following heads)

3.1 Definition of the problem:

Assessment of (C)APD is crucial in understanding the complexity of this heterogeneous disorder. Not one clinical test will give us appropriate results as there are several known and unknown process to be assessed. Several subjective tests are used to diagnose the condition. A very few objective test have been designed, but clinical application of the tests has not been a totally achieved due to various reasons.

3.2 Objectives:

1. Establishing normative for click Rate induced facilitation in individuals with normal hearing.
2. To test Click rate Induced Facilitation among individuals diagnosed as having (C)APD or at risk of (C)APD and comparing the results with non-native data

3.3 Review of status of research and development in the subject:

Rate induced facilitation has been done on young adults and older individuals. The rate- induced facilitation was reduced in older individuals probably due to slower processing which may lead to lack processing of some of the stimuli at higher rates (Rawool, 1996).

3.4 International and national status:

Rate induced facilitation has been studied in individuals with normal hearing. It has been done using two methods, first presenting clicks at different rates and the second is to keep the number of clicks constant but vary the rate at which it is presented (Rawool, 1996). Both the studies have been done on normal hearing adult population.

2

3.5 Importance of the proposed project in the context of current status:

Objective tests for APD are limited and temporal integration being an important process in auditory processing needs to be assessed using subjective and objective assessment. There is no evidence of clinically approved test tool for assessing temporal integration that we (author) are aware of So the aim of the study is to develop normative data for Click Rate induced facilitation in normal hearing individuals and to compare it with individuals diagnosed as having CAPD so eventually it can serve as an objective measure in the currently used protocol.

4.0 Work Plan

4.1 Method

4.1.1 Subjects / Participants:

Participants would be grouped into control and experimental group:

Group I (control group):

'N' number of participants will be considered for the study, ranging in age group from 7-13 years of age and will be divided in to 6 subgroups.

7.00-7.11 years

8.00-8.11 years

9.00-9.11 years

10.00-10.11 years

11.00-11.11 years

12.00-12.11 years

Participants would be selected based on the following inclusion criteria:

1. Hearing sensitivity within 20 dB HL in the frequency range of 0.25 kHz to 8.0 kHz.
2. Type 'A' tympanogram with static admittance between 0.3 to 1.5ml for 226Hz probe tone.
3. Acoustic reflexes needs to be present for 500Hz, 1.0 kHz, 2.0 kHz, and 4.0 KHz showing a shift in admittance of 0.3ml from baseline.
4. No known history of neurological abnormalities
5. No known history of subsequent conductive hearing loss.

Group II (Experimental group):

'N' number of participants will be considered for the study, ranging in age group from 7-13 years.

Participants would be selected based on the following inclusion criteria:

The participants need to have pure tone thresholds below 2odB HL at all frequencies from 0.25 kHz to 8.0 kHz.

2. They should not have any underlying middle ear pathology.

3. No history of neurological abnormalities (i.e. tumour, auditory neuropathy)

4. Participants should be diagnosed as having Central Auditory Processing Disorder or at risk for CAPD.

5. They need to have a detailed case history with the following criteria's answered

   a) Auditory and/or communication difficulties experienced by the individual
   b) Family history of hearing loss and/or central auditory processing deficits
   c) Medical history, including birth, otological and neurologic history, general health history, and medications
   d) Speech and language development and behaviours
   e) Educational history and/or work history
   f) Existence of any known comorbid conditions, including cognitive, intellectual, and/or medical disorders
   g) Social development
   h) Linguistic and cultural background

6. Diagnosis of CAPD or at risk of CAPD to be done using the following protocol
   a) Screening Test of Auditory Processing (Yathiraj and Maggu,2013)
   b) Test for assessing temporal abilities(with age matched normative)
   c) Dichotic listening test/tests (with age matched normative)
   d) Electrophysiological test
7. Should have age appropriate cognitive functioning.

4.1.2 Material:

Commercially available GSI-Tympstar version 2 will be used for the generation and control of stimuli and for recording reflexes.

4.1.3 Procedure:

The instrument would be calibrated in enclosed volume cavity representing a known value of static admittance. Probe tone used for the measurement will be 226Hz. Clicks will be delivered ipsilateral to the right and left ears separately. Repetition rates for the click stimulus will be 50/s, 100/s, 150/s, 200/s, and 300/s. Number of clicks will be kept constant at 300. The click train duration will be varied

by adjusting the time duration for each rate presented. So the click train duration will be 6s for 50/s, 3s for 100/s, 2s for 150/s, 1.5s for 200/s and 1s for 300/s rate. Baseline data will be obtained 1.5s following the termination of the stimuli.

If there is no recovery of reflex to baseline in any of the tracings, successive stimuli will be presented when the meter reading returns to baseline admittance.

All the testing will be done in a double walled sound proof room with the ambient noise level set to standards of ANSI S3.1, 1999(revised).All the subjects will be instructed not to swallow, move, chew or talk during stimulus presentation. The pattern of the reflexes post stimulus presentation will be monitored on the display screen. An acoustic reflex is considered to be present if it occurs with a minimum value of 0.03ml change of admittance on at least 2 out of 3 trails.

The initial presentation level will be kept at 70dB SPL. If the reflex is elicited at the above mentioned criteria, it will be repeated to look for consistency of the response. If reflex is recorded at this level then the intensity will be reduced by 5dB, or if the reflex is absent then the intensity will be increased by 5dB till the reflex pattern is elicited. All the reflex tracings will be printed on a thermal paper for future reference.

4.1.4 .Analyses:

Data obtained for both the groups will be analysed appropriately using commercially used SPSS software. Sensitivity and specificity measures will also be done.

6.0 Implications of the results of the study (Illustrative)

a) Presentation of scientific papers in professional seminars / publication of articles:

b) Discussion with professionals:

c) To utilize the results in the development of remediation:

7.0 Utilization of results of the study:

- It can be used as one of the objective test for (C)APD and Learning Disability assessment
- For monitoring management programme for (C)APD and Learning disability

Establishing Normative for Click Rate Induced Facilitation for Assessing Temporal Integration

ORIGINALITY REPORT

16%	10%	10%	8%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.audiology.org Internet Source	5%
2	www.aiishmysore.in Internet Source	4%
3	Rawool, V. W.. "Effect of Aging on the Click-Rate Induced Facilitation of Acoustic Reflex Thresholds", The Journals of Gerontology Series A Biological Sciences and Medical Sciences, 1996. Publication	2%
4	Barbosa Filho, Valter Cordeiro, Wagner de Campos, Ricardo Rosa Fagundes, Adair da Silva Lopes, and Evanice Avelino de Souza. "Presença isolada e combinada de indicadores antropométricos elevados em crianças: prevalência e fatores sociodemográficos associados", Ciência & Saúde Coletiva, 2016. Publication	1%
5	Submitted to All India Institute of Speech & Hearing	1%

Student Paper

6	Vishakha W. Rawool. "Effect of Probe Frequency and Gender on Click-Rate-Induced Facilitation of the Acoustic Reflex Thresholds", Scandinavian Audiology, 8/6/1998 Publication	1%
7	tanfu.fhw.oka-pu.ac.jp Internet Source	1%
8	www.china3gship.org.cn Internet Source	1%
9	Vinay N/A. "Prevalence of Dead Regions in Subjects with Sensorineural Hearing Loss", Ear and Hearing, 04/2007 Publication	1%

EXCLUDE QUOTES ON

EXCLUDE BIBLIOGRAPHY ON

EXCLUDE MATCHES < 7 WORDS