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Original Article

Development of Questionnaire for Auditory Localization

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OBJECTIVE: Localization plays an important role in identifying the source of the stimuli. Aural localization is based on the phase (period-related time), intensity level, and spectral differences between the sounds at each ear. Various behavioral measures are available to check the interaural level, time, and frequency differences, which provide information on an individual's ability to localize the sound source. This might vary depending on the audibility and amplification devices. Although these behavioral measures are available, the perceptual quality of localization cannot be obtained using these measures. This study aimed to develop a questionnaire for auditory localization.

MATERIALS and METHODS: A questionnaire was prepared, the content validated, and administered on 120 individuals in the age range of 18–50 years who were divided into three different groups.

RESULTS: The results of the descriptive and item analysis revealed a significant difference between the groups, with group I showing better localization ability. No significant difference was observed between the groups II and III. The receiver operating curve and cut-off scores were obtained. Individuals with a score of <42.5 on the questionnaire have better or good localization ability. The area covered under the curve is 0.987; therefore, the sensitivity and specificity of the questionnaire is also high.

CONCLUSION: It can be concluded that this questionnaire is a simple, valid, and preliminary measure for the auditory localization ability of an individual.

KEYWORDS: Hearing aid, cut-off, localization ability

INTRODUCTION

Localization is the ability of an individual to be in tune with the direction of the sound source. It provides us with a more natural and comfortable listening experience. Our localization ability also acts as an alerting device against danger. The human brain is highly sophisticated in its computations; i.e., once a sound is heard, our auditory system processes the stimuli by primarily locating the sound source and then collecting the information from other senses and previous reminiscences. Therefore, localization plays a considerable role by alerting to anticipate dangerous situations. However, it typically involves the use of two ears. Binaural normal hearing individuals are consistently accurate in localization, whereas for individuals with hearing loss, there is a reduction in the performance of localization, which might lead to several psycho-social aspects in life, including stress and isolation [1, 2]. The degree of the inability to localize the sound source increases in individuals who have normal hearing in one ear and hearing loss in the other ear. For such individuals, their cognitive ability also plays an important role [3]. Although the use of amplification may not always restore localization to a normal level, an appropriate amplification device might help an individual to localize to some extent. A review has reported poorer performance than normal even with an appropriate hearing aid, which may be poorer than unaided localization when tested at the same sensation level. The reason could be that natural interaural differences, in terms of time and level, are difficult to be provided from the hearing aid even with wide dynamic range compression (WDRC) hearing aids [4].

The complex auditory system utilizes various acoustic cues to localize the sound source [5]. This includes a combination of cues to determine the source of a sound in space caused by the spatial separation of the ears on either side of the head and interaural level and timing differences (ILDs and ITDs, respectively). These cues help a normal auditory system to localize the sound source both horizontally and vertically. According to previous theories, ILD and ITSs serve as keys for azimuthal sound localization, and spectral shaping of the sound by the outer ear and torso are primary cues for altitude localization and front-back discrimination [5-7].

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Although these theories are conceptual and behaviorally measured, there are fewer studies on correlation between conceptual and perceptual facts (self-reports) on auditory localization abilities, which brings about the need for self-reporting questionnaire studies on auditory localization abilities to supplement the behavioral correlation. There are fewer questionnaire-based studies on auditory localization. The widely used and adapted ones is the Spatial and Qualities of Hearing Scale (SSQ), which contains 49 questions on speech perception in quiet conditions and special hearing abilities, along with localization tasks, and rating the quality of speech perceived on a scale of 0–10 [8]. The questionnaire 'The Spatial Hearing Questionnaire' (SHQ) was also reviewed, which comprises 29 questions with similar domains of questions as in SSQ but does not include questions on the quality of speech or music [9]. It has a rating scale from 0 to 100. Both these questionnaires have more weightage on spatial hearing and speech perception in noise and quiet situations but do not specifically focus on localization abilities alone. Further, the existing questionnaires have a wide range of rating scale to be scored which is difficult to adapt in the Indian context. Studies have reported that localization and speech in noise perception have a large contribution to the acceptance of using a hearing aid for an individual. Thus, there is a need for the development and standardization of a questionnaire that will precisely focus on auditory localization abilities of an individual in the Indian context. However, with respect to localization, there is dearth of literature on the Indian context to measure the localization ability of individuals. Although other measures can be used, the response scales are more tedious for the analysis of problems faced because of localization inability. Therefore, a simple and cost effective tool is required to measure the degree of problem encountered because of poor localization ability. The present study aimed to develop a questionnaire for auditory localization and to administer the developed questionnaire on individuals with normal hearing, those with hearing loss (binaural), and those using binaural hearing aids.

MATERIALS and METHODS

Participants (age range, 18–50 years) were divided into three groups. Group I comprised 60 individuals with normal hearing (mean age, 34.4 and SD, 15.9 years; male:female, 27:33), group II comprised 30 individuals with binaural moderate sensorineural hearing loss for the frequency range of 250 Hz–8 KHz (mean age, 40.4 and SD, 9.8 years; male:female, 19:11), and group III comprised 30 individuals with binaural moderate sensorineural hearing loss for the frequency range of 250 Hz–8 KHz and binaural behind-the-ear hearing aid users (mean age, 38.9 and SD, 16.9 years; male:female, 17:13). The mean pure tone threshold (PTA) and speech recognition scores were 45.3 dB (SD, 4.6 dB) and 48 dB (SD, 5 dB), respectively, for participants in group II and 48.3 dB (SD, 3.3 dB) and 52 dB (SD, 3 dB), respectively, for those in group III. Participants in groups II and III were included if there were no otological or neurological problems and if speech identification scores were ≥70% for participants in group II and aided speech recognition scores were ≥70% for those in group III.

All participants were explained the purpose and nature of the study, and written consent was individually taken. The study was conducted in two phases: phase I included the development and validation of the questionnaire and phase II included the administration of the developed questionnaire. This study adhered to the Ethical guidelines for bio-behavioral research involving human subjects.

Phase I

To develop the questionnaire, information was obtained from the SSQ and SHQ [8,9]. Few other relevant questions were also added by the researcher, with additional inputs from individuals with hearing loss with difficulty in localization. The developed questionnaire comprised questions on individuals' localization in noisy and quiet situations, and psychological problems that might be encountered because of poor localization were also included. This questionnaire was evaluated by 10 experts in the field of audiology and 10 experts in the field of speech language pathology for content evaluation. Based on their suggestions, the questions were deleted or modified with 75% criteria of the average scores for each question. The modified final developed questionnaire comprised 22 questions with various subsections and was rated on a 5-point rating scale as "1: never, 2: almost never, 3: sometimes, 4: almost always, and 5: always". The different sections included 15 questions on localization in noisy situations and 7 questions on localization in quiet situations. The 4 subsections under localization in noisy situations where traffic zone (5), outdoor (4) indoor, and near your locality situations (2), and psychological aspects (4) were also included (Annexure A).

Phase II

All participants were instructed on the procedure to rate the questionnaire. The questions in the questionnaire were orally presented either in English or in Kannada to the participants, and their responses were filled verbatim by researcher. The questionnaire was individually presented. Data obtained were tabulated and entered in the Statistical Package for Social Sciences (SPSS) software version 17 (SPSS Inc., Chicago, IL, USA).

RESULTS

The item analysis of the questionnaire was descriptively conducted. Shapiro-Wilk test of normality was administered. As the test reported of non-normal distribution non-parametric test was done for further analysis of the obtained data. Table 1 presents the mean, standard deviation, and median for the raw scores of the item analysis for administered questionnaire on auditory localization abilities.

Table 1 shows that participants in group I procured the least scores of mean value ranging from 1.05 to 1.76 in all questions within the subsections than those in groups II and III, except for question A3 on traffic situations in the subsection A that showed the highest score of 2.15, which was suggestive of the difficulty faced by individuals with normal hearing in attending to speech in noise situations, particularly in traffic zones. The extent of difficulty faced by individuals with hearing loss and hearing aid users in traffic situations was evident by the observed highest scores of 3.63 for A3 in the traffic subsection by hearing aid users and a yet closer score of 3.41 by individuals with hearing loss in the same domain. Apart from the traffic subsection, the observed mean values of participants in group II in psychological effects subsection D had elevated scores of 3.68 for D3 than those in the other subsections, which indicated that individuals with hearing loss endure the problem of focusing on sound stimuli in noisy situations and also have the perception of losing concentration when the sound seem confusing because of the difficulty in localization. Further, the total scores indicated that, among the three groups, group I had lesser scores in all subsections of noisy and quiet situations, more principally had the least score of 4.43 for subsection D, and had

Table 1. Mean, standard deviation, and median for the raw scores of the analysis for questionnaire on auditory localization abilities

Questions			Group I			Group II			Group III		
			Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
Noisy situation	A. Traffic situation	A1	1.20	1.00	0.51	3.13	3.00	1.21	2.80	3.00	1.47
		A2	1.70	2.00	0.74	3.24	4.00	1.35	3.50	4.00	1.35
		A3	2.15	2.00	0.87	3.41	3.00	1.32	3.63	4.00	1.32
		A4	1.16	1.00	0.45	3.37	3.00	1.34	3.03	3.00	1.42
		A5	1.58	1.00	0.80	3.44	4.00	1.21	3.43	4.00	1.54
		TA	7.86	7.00	2.05	16.68	17.00	5.58	16.33	5.04	17.00
	B. Outdoor situation	B1	1.70	1.00	0.80	3.41	3.00	1.35	3.33	4.00	1.42
		B2	1.31	1.00	0.53	2.86	3.00	1.32	2.09	2.00	1.32
		B3	1.76	2.00	0.81	3.06	3.00	1.43	3.73	4.00	1.31
		B4	1.21	1.00	0.52	3.20	3.00	1.56	3.10	3.00	1.34
		TB	5.91	6.00	1.38	12.62	13.00	5.38	13.00	12.50	4.05
	C. Indoor situation	C1	1.28	1.00	0.69	3.24	3.00	1.50	2.96	3.00	1.37
		C2	1.46	1.00	0.70	3.10	3.00	1.42	3.23	3.00	1.50
		TC	2.71	2.00	1.02	6.34	6.00	2.62	6.23	6.00	2.38
	D. Psychological effect	D1	1.08	1.00	0.33	2.82	3.00	1.22	3.16	3.00	1.48
		D2	1.06	1.00	0.25	3.44	4.00	1.21	3.23	3.50	1.47
		D3	1.03	1.00	0.18	2.82	3.00	1.13	2.8	3.00	1.39
		D4	1.50	1.00	0.91	3.68	4.00	1.31	3.46	3.50	1.38
		TD	4.43	4.00	1.79	25.00	25.00	10.16	28.26	29.00	5.72
Quiet situation	Q. At home situation	Q1	1.11	1.00	0.41	2.72	3.00	1.22	3.30	3.00	1.41
		Q2	1.45	1.00	0.69	3.00	3.00	1.33	2.90	3.00	1.39
		Q3	1.00	1.00	0.00	2.34	2.00	1.34	3.06	3.00	1.63
		Q4	1.13	1.00	1.00	2.65	2.00	1.34	3.16	3.00	1.36
		Q5	1.05	1.00	0.28	2.48	2.00	1.32	2.833	3.00	1.44
		Q6	1.06	1.00	0.31	2.62	2.00	1.42	3.20	3.00	1.47
		Q7	1.26	1.00	0.54	3.06	3.00	1.43	2.96	3.00	1.35
		Q8	1.36	1.00	0.73	3.10	3.00	1.65	3.36	4.00	1.49
		Q9	1.40	1.00	0.69	3.17	3.00	1.53	3.46	4.00	1.54
		TQ	10.83	10.00	1.79	25.00	25.00	10.16	28.26	29.00	9.51

Note: A1–A5, B1–B4, C1–C2, D1–D4, and Q1–Q9 indicate the raw scores of each item of the questions in sections A, B, C, D, and Q of the questionnaire. TA, TB, TC, TD, and TQ indicate the total of the raw scores in the respective section of the questionnaire.

no psychological dilemma; the groups II and III incurred more scores of 25 and 28, respectively. However, the same trend was followed in all subsections.

Pearson's chi-square test of association was conducted to examine the association between groups of participants and the responses obtained. The results revealed a significant difference between the groups [$\chi^2(8) = 24.980$, $p<0.05$] for all the responses to the questions in the questionnaire. Although differences were observed between the groups, the responses of participants in group I were superior than those of the other groups. A non-parametric Friedman test of differences among repeated measures was conducted for all groups of participants, which rendered a chi-square value of 44.086 with statistical significance ($p<0.001$) for group I. The chi-square value of Friedman test for groups II and III were 0.378 and 1.054, respectively, which were not significant ($p>0.05$). Pairwise analysis was performed within the subsection of the total scores for quiet and noise situations of the questionnaire using the Wilcoxon signed rank test for group I (Table 2).

Table 2 shows a significant difference between all scores of the subsections, except for the section A vs. B and C vs. D of participants in

Table 2. Results of Wilcoxon signed rank test for the total scores of the subsection of the response to the questionnaire for group I

Subsections of the questionnaires	Z	p
TB–TA	−1.117	0.264
TC–TA	−2.782	0.005
TD–TA	−6.028	0.000
TC–TB	−1.958	0.050
TD–TB	−5.440	0.000
TD–TC	−3.245	0.001

Note: TA, TB, TC, and TD indicates the total raw scores of the subsections of the questionnaire on auditory localization abilities.

Table 3. Pairwise comparison across the subsection of questionnaire for all three groups

Localization in quiet vs. noisy situations	Z	Asymp. Sig.
Group I	−4.80	0.000
Group II	−3.30	0.001
Group III	−0.853	0.394

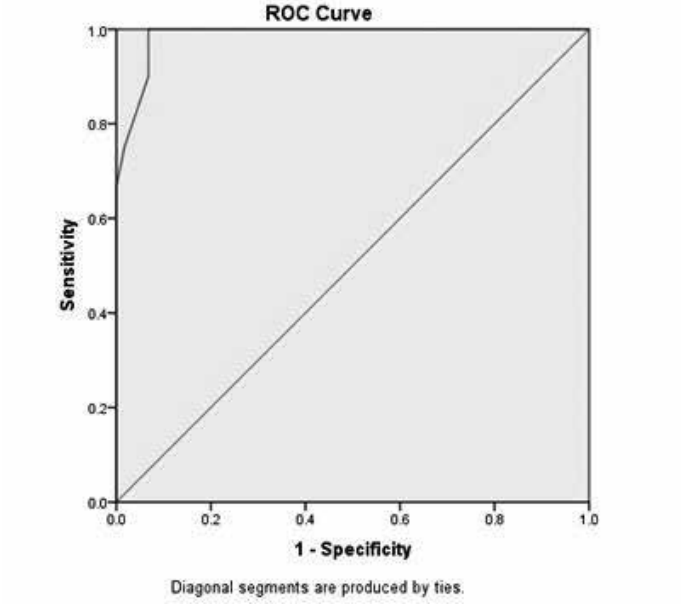

Figure 1. Sensitivity and specificity of the questionnaire for the responses obtained between the participants with normal hearing and those with hearing loss

group I. Wilcoxon signed rank test was also conducted for all groups to compare between the total scores of quiet and noise situations. Table 3 reveals the pairwise comparison across the subsections of the questionnaire for all three groups.

Table 3 shows a significant difference in the perception of sound localization for groups I and II between the source of stimuli in quiet and noisy situations. No significant difference was observed for participants in group III between localization in quiet and noisy situations. Localization abilities were better in quite situations than in noisy situations. However, measuring their localization ability with the degrees of error along with this self-reporting questionnaire could have strengthened the study. Mann–Whitney test was conducted to compare between the groups I and II, groups II and III, and groups I and III across all categories and within the subsections of the questionnaire evaluating the localization in quiet and noise situations; the results revealed a significant difference ($p<0.001$) between groups I and II and between groups I and III but no significant difference between groups II and III ($p>0.001$). However, there was an overlap of responses obtained from participants in groups II and III. The questionnaire was also re-administered on five participants in each of the groups to check for the test–retest reliability, which revealed a good correlation between the responses obtained across the questions at different time.

Further the cut-off scores for scores of the questionnaire and the sensitivity and specificity were analyzed using the receiver operating characteristic (ROC) curve. In the present study, the scores of groups II and III were combined to analyze the sensitivity and specificity of the questionnaire because there was no significant difference between these groups. Figure 1 depicts the sensitivity and specificity of the questionnaire for the responses obtained between participants in group I and those in groups II and III.

From the above figure the closer the curve of the blue that follows the left-hand border and then the top border of the ROC space, the more accurate the test. The area under the curve was 0.987. Considering the raw scores, the cut-off would be 42.5. Thus, if the total score of the questionnaire is <42.5, then it indicates that the individual has a good localization ability, whereas if the total scores are >42.5, then it indicates that the individual has difficulty in the localization of the sound source. Therefore, depending on the cut-off scores obtained by individuals, training regimens can be developed to enhance the sound localization performance in individuals with impaired localization abilities.

DISCUSSION

The results of the present study revealed that the ability to correctly localize sounds is an important feature of the auditory system, which is directly linked to the ability of binaural listening that is helpful in difficult listening situations, such as during noisy and reverberation situations. However, with regard to individuals with hearing loss, this information is diminished and the localization is poor. The reason that the participants in group I outperformed could be that these individuals could use ILDs, ITDs, and monaural spectral cues compared with individuals with impaired ears. Similar differences have been reported were the individuals with normal hearing have better localization than impaired use due to the better ILD, ITD and spectral cues of the signal through the measurement of degree and errors of localization [10]. Through the application of digital signal processing, WDRC and wireless transmission techniques in hearing aids the cues for localization are preserved to a certain extent. However, in the present study, the group III participants though they were hearing aid users the reported poorer ability for localization in the self rated questionnaire. There are also reports that DLI did not improve between unaided and aided conditions [11]. Aided localization is reported to be still poorer than that of individuals with normal hearing, and in some individuals, aided localization ability may be even poorer than unaided localization at the same sensation level [12]. This revealed that the cues for localization might be affected because of impairments but is difficult to cope even with hearing aids. Although there are improvement to be reported in measures of localizations due to training and other

factors, self satisfaction for localization might be lesser [13-15]. Therefore, a questionnaire in simpler form might help to probe in detail regarding different issues related to the poor localization ability and satisfaction in localizing the source in individuals with hearing loss.

CONCLUSION

The study provides a useful tool in understanding the degree of localization problems that are faced by individuals with hearing loss. Although, several individuals use hearing aids for a longer duration, they are still not completely satisfied with their localization ability in noisy situations. This questionnaire can be used as a simple tool to check for difficulties faced in localization and can further help in investigating possible upbringings to be implemented for better output resolutions in amplification devices, and tailoring these fine tunings in hearing aids would fetch more comfortable and lively experience in individuals using hearing aids. This questionnaire also severs as a simple tool to assess the pre- and post-outcome measures of the use of amplification device and can be used for measuring the outcomes of the auditory localization training.

Ethics Committee Approval: This study adhered to the "Ethical Guidelines for Bio-Behavioral Research Involving Human Subjects" set by All India Institute of Speech and Hearing Ethics Committee (Venkatesan, 2009).

Informed Consent: Written informed consent was obtained from the patient who participated in this study.

Peer-review: Externally peer-reviewed.

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REFERENCES

1. Slattery WH 3rd, Middlebrooks JC. Monaural sound localization: acute versus chronic unilateral impairment. Hear Res 1994; 75: 38-46. [CrossRef]
2. Byrne D, Noble W. Optimizing sound localization with hearing aids. Trends Amplif 1998; 3: 51-73. [CrossRef]
3. Durlach N I. Binaural signal detection: Equalization and cancellation theory. Foundations of Modern Auditory Theory. 1972 Vol. II, edited by J. V. Tobias Academic, New York.
4. Köbler S, Rosenhall U. Horizontal localization and speech intelligibility with bilateral and unilateral hearing aid amplification. Int J Audiol 2002; 41: 395-400. [CrossRef]
5. Middlebrooks JC, Green DM. Sound localization by human listeners. Annu Rev Psychol 1991; 42: 135-59. [CrossRef]
6. J. Blauert, 1997. Spatial Hearing. The MIT Press, Cambridge, pp. 372–392.
7. Nodal FR, Kacelnik O, Bajo VM, Bizley JK, Moore DR, King AJ. Lesions of the auditory cortex impair azimuthal sound localization and its recalibration in ferrets. J Neurophysiol 2009 23; 103: 1209-25.
8. Gatehouse S, Noble W. The speech, spatial and qualities of hearing scale (SSQ). Int J Audiol 2004; 43: 85-99. [CrossRef]
9. Tyler RS, Perreau AE, Ji H. The validation of the Spatial Hearing Questionnaire. Ear Hear 2009; 30: 466-74. [CrossRef]
10. Lorenzi C, Gatehouse S, Lever C. Sound localization in noise in hearing-impaired listeners. J Acoust Soc Am 1999; 105: 3454-63. [CrossRef]
11. Amritha G, Devi N. Comparison of Difference limen for Frequency, Intensity and Duration with and without amplification device. (Thesis). University of Mysore 2015.
12. Keidser G, Rohrseitz K, Dillon H, Hamacher V, Carter L, Rass U, et al. The effect of multi-channel wide dynamic range compression, noise reduction, and the directional microphone on horizontal localization performance in hearing aid wearers: Int J Audiol 2006; 45: 563-79. [CrossRef]
13. Firszt JB, Reeder RM, Dwyer NY, Burton H, Holden LK. Localization training results in individuals with unilateral severe to profound hearing loss. Hear Res 2015; 319: 48-55. [CrossRef]
14. Clifton RK, Gwiazda J, Bauer JA, Clarkson MG, Held RM. Growth in head size during infancy: Implications for sound localization. Dev Psychol 1988; 24: 477-83. [CrossRef]
15. Dobreva MS, O'Neill WE, Paige GD. Influence of aging on human sound localization. J Neurophysiol 2011; 105: 2471-86. [CrossRef]

ANNEXURE A

Questionnaire on auditory localization ability

Name: **Age/Sex:** **Education:Phone no:**

Case number: **PD:** **HA user:** Yes/No

Instruction: Read the questions and indicate your choice by ticking against the appropriate column.

Localization in noisy situations						
A.	**Traffic zone**	**Never**	**Almost Never**	**Sometimes**	**Almost Always**	**Always**
1.	When you are standing on the footpath of a busy street, do you have difficulty in telling from which direction or side is a bus or truck or any other vehicle coming from before you see it?					
2.	When you are standing on the footpath of a busy street, do you have difficulty in telling how far away a bus or truck is by the sound alone?					
3.	When you are driving a two wheeler wearing a helmet, do you have difficulty to hear what the other person sitting behind you is saying?					
4.	When you are driving two wheeler wearing a helmet, do you have difficulty in finding from which side is the sound of an ambulance coming?					
5.	When you are driving two wheeler (wearing a helmet) or a four wheeler (windows closed), do you have difficulty in finding from which side is the sound of another vehicle coming?					
B. Outdoor situations		**Never**	**Almost Never**	**Sometimes**	**Almost Always**	**Always**
1.	You are outside. You can hear an airplane. Do you find it hard to tell where the plane is in the sky by the sound alone?					
2.	You are outdoors in an unfamiliar place. You can hear the sound of a dog barking. You cannot see where it is. Do you find it hard to tell where it is without having a look?					
3.	In the street, you can hear pedestrians walking. Do you find it difficult to judge the direction of sound by their footsteps alone?					
4.	Do you find it difficult to determine the location of a music source, say orchestra or a music band procession, when you cannot see it?					
C. Indoor and near your locality						
1.	When you are watching TV at your house, if there is a bang of a window door due to wind, do you have difficulty in identifying which door is it?					
2.	You are in a high-rise apartment or in the second floor of a building/balcony/bridge. You can hear sound from another floor or from the ground floor. Do you have difficulty in telling whether the sound is coming from above or below you?					
D. Psychological aspects						
1.	Do you become nervous in a strange place due to localization difficulty?					
2.	Do you avoid busy areas, such as noisy areas?					
3.	Do you avoid shopping alone in markets outside?					
4.	Do you lose your concentration when the sound seems confusing?					
Localization in quiet situations		**Never**	**Almost Never**	**Sometimes**	**Almost Always**	**Always**
1.	Do you turn the wrong way when someone that you cannot see calls out to you when in a quiet room?					
2.	You are in an unfamiliar house. It is quiet. You hear a door slam. Do you have difficulty in identifying the door from which the sound came?					
3.	You are sitting between two people. One of them starts speaking. Do you have difficulty to identify whether the person is on your left or your right without having to look?					
4.	Do you have difficulty to identify the location of a man's voice when you cannot see him in a quiet room?					
5.	Do you have difficulty to identify a woman's voice when you cannot see her in a quiet room?					
6.	Do you have difficulty to identify a child's voice when you cannot see him/her in a quiet room?					
7.	You are at home in a quiet room. There are other people in the house (friends or family). They are talking in another room and you can hear them. Do you have difficulty in telling which part of the house those people are in?					
8.	You are in a quiet room and your mobile phone rings at a certain distance far from you. Do you have difficulty in easily reaching your phone by hearing the ringtone?					
9.	You are at home and you hear the running water sound from an open tap in one of the rooms. Do you have difficulty in finding the leaking tap?					