A questionnaire survey on noise problems with elderly people

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1. Introduction
The number of elderly people is increasing in our society and as it is well known, the hearing ability is becoming deteriorated according to the age (e.g. [1,2]). This may bring difficulties to elderly people in various situations. It is important to improve the sound environment taking the elderly people into considerations. In this study, a questionnaire survey was conducted to elderly people and the results were compared with those of young people [3].

2. Questionnaire survey
2.1. Questions
Six questions were asked. They were, (1) satisfaction with the environment, (2) audibility and annoyance of various sounds in the environment, (3) most annoying sound source, (4) opinions concerning auditory warning signals, (5) habituation to noise, and (6) face sheet. Q1 to Q3 are the items proposed by the committee of the Acoustical Society of Japan [4,5].

2.2. Respondents
There were 1,930 respondents in total. They were the participants of a lecture sponsored by Kobe city and the survey was conducted in the lecture hall. Therefore the respondents of this survey were not sampled at random and may possibly be more healthy than the average of people of the same age. Their ages and genders are shown in Table 1. The results of the surveys conducted with young people were used for the comparison [3]. The respondents of young people were 506 females and 265 males with the average age of 19.2. It is noted that Q4 and Q5 were not included in all the questionnaires conducted with young people.

3. Results and discussion
Satisfaction with the environment was asked in 5-step categories. Since the results may differ depending on the place where the respondents lived, cross analysis was conducted using the satisfaction with the quietness as a key item. Those who answered that they were satisfied with quietness (categories 1 and 2) were classified as a group "Q" and those who answered that they were dissatisfied with quietness (categories 4 and 5) were classified as a group "N." The results are shown in Fig. 1(a). There was little difference between two groups in the satisfaction with the convenience of shopping. However, there was a significant difference in the satisfaction with the convenience of transportation \( p < 0.05 \), richness of greens \( p < 0.001 \), clean air \( p < 0.001 \) and public facilities \( p < 0.001 \). Those who were satisfied with quietness tended to be dissatisfied with the convenience of transportation more than the other group. On the other hand, those who were not satisfied with quietness tended to be dissatisfied with richness of greens, clean air or public facilities more than the other group. This suggests that the environment is not satisfactory where there is a convenient transportation system and it would be important to improve the transportation systems without destroying the environment. Similar tendency was found with young people as shown in Fig. 1(b).

Thirty-seven sounds often heard in our environment were listed in Q2 and the respondents were asked whether each sound was audible or not and whether each sound was annoying or not. The percentages with which each sound was annoying when it was audible were calculated and plotted against the results with young people in Fig. 2. Good agreement can be seen between the two groups except for the sounds No. 4 (noise from motorcycle gangs) and No. 9 (helicopter noise). Idling sounds of cars (No. 21), construction noise (No. 11), cries of pets (No. 28), noise from factories (No. 10) and commercials from a loudspeaker car (No. 15) were the sounds which were selected as annoying by both groups and should be carefully taken.

Cross analysis was conducted with Q2 using habituation as a key item. In Q5 the respondents were asked whether it is easy for them to be habituated to noise or not in 5-step categories. The respondents were classified into 2 groups; group A included the respondents who answered that it was easy to be habituated to noise (categories 1 and 2) and group B those who answered that it was difficult to be habituated to noise (categories 4 and 5). The percentages with which each sound was selected as being annoying in Q2 by each group are plotted in Fig. 3(a). It can be seen that the percentages are higher in group B than in group A. This suggests that those who felt it difficult to be habituated to noise tend to be more annoyed by noise than the other group. Similar results were found with young people as shown in Fig. 3(b).
Recently auditory warning signals are often used in home electric appliances [6–8]. Also they are used at train stations. Sometimes it is said that it is not easy for elderly people to detect the signals since the frequency of signals is high [9] and the effect of background noise is considerable. The opinions about auditory warning signals were asked in Q4. The percentages with which the signals were selected as being ‘necessary’, ‘annoying’ and ‘easily audible’ to the respondents who used the washing machines and rice cookers with auditory warning signals were calculated. The results with washing machines and rice cookers are shown in Figs. 4(a) and (b), respectively. There were significant differences between the results with elderly and young people except for the annoyance of the signals from rice cookers. It is noticed that elderly people judged the auditory warning signals of these appliances as being easily audible with higher percentages than young people.

Different tendency was found with the signals at train stations. The results are shown in Fig. 5. There was no significant difference with the announcement at stations. However, in the case of auditory warning signals at stations, there was a tendency that the elderly people felt it more

Table 1 Number of respondents.

<table>
<thead>
<tr>
<th>Age</th>
<th>Female</th>
<th>Male</th>
<th>Unidentified</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>50–59</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>60–69</td>
<td>528</td>
<td>320</td>
<td>1</td>
<td>849</td>
</tr>
<tr>
<td>70–79</td>
<td>445</td>
<td>395</td>
<td>2</td>
<td>842</td>
</tr>
<tr>
<td>80–89</td>
<td>49</td>
<td>55</td>
<td>1</td>
<td>105</td>
</tr>
<tr>
<td>90–</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Unidentified</td>
<td>6</td>
<td>3</td>
<td>113</td>
<td>122</td>
</tr>
<tr>
<td>Total</td>
<td>1,036</td>
<td>777</td>
<td>117</td>
<td>1,930</td>
</tr>
</tbody>
</table>

Fig. 1 (a) Satisfaction with the environment. The results of cross analysis using satisfaction with quietness as a key item (‘Q’: group satisfied with quietness, ‘N’: dissatisfied with quietness). This figure shows the results with elderly people. (b) Satisfaction with the environment. This figure shows the results with young people. The same analysis was conducted as in Fig. 1(a).
4. Summary

A questionnaire survey was conducted with 1930 elderly people and the results were compared with those with young people [3]. The following results were found:

1. It is sometimes said that the elderly people are more sensitive to noise and tend to be more annoyed by noise than young people. However, in many questions in this survey

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similar results were found between the results of the surveys conducted with elderly and young people.

(2) There were some differences in the opinion about auditory warning signals between elderly and young people. Especially careful considerations would be necessary to the warning signals at train stations.

(3) It was found with both elderly and young people that there were individual differences in the habituation to noise and that those who answered that it was difficult for them to be habituated to noise tended to be more annoyed by noise than the other group. It is important to take the individual difference into account when noise problems are considered.

References