CHAPTER III

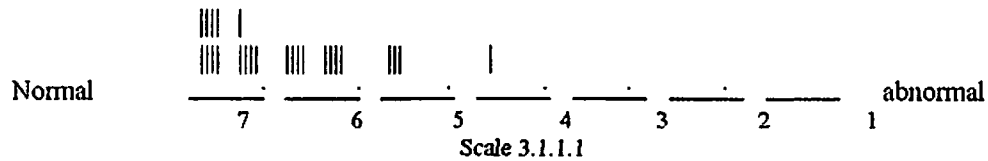
PRESENTATION AND ANALYSIS OF THE DATA

3.1 Presentation of the Data

3.1.1 Listeners' perception Toward Speakers' Voice Quality of Speech

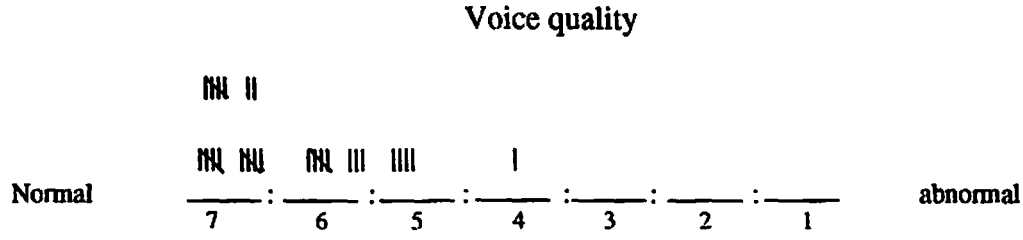
Listeners' perception toward speakers' voice quality can be defined from their ratings on semantic differential scales. The following data display the perception of the listeners toward the speakers' voice quality of speech. The speakers are arranged in an order from the first to the seventh speakers based on their age. The first speaker represents the age between 30-39 years while the second represents the age between 40-49 years. The third speaker represents the age between 50-59 years while the fourth speaker represents the age between 60-69 years. The fifth speaker represents the age between 70-79, the sixth represents the age between 80-89, and the last the seventh speaker represents the age between 90 and above.

Voice quality



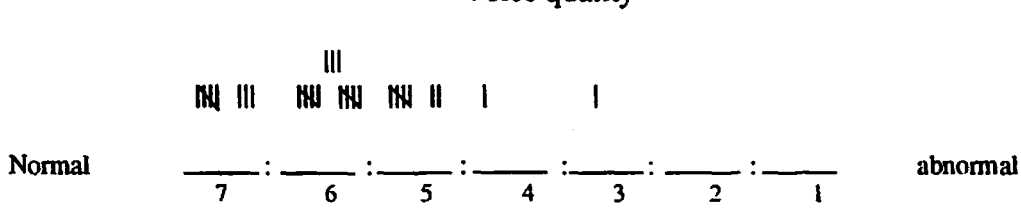
Scale 3.1.1.1
Listeners' ratings on the first speaker's voice quality

From the scale above, we could see that sixteen people choose value seven, ten people choose value 6, three people choose value 5, and only 1 people choose value 4. In this case we may conclude that according to the listeners' perception, speaker 1 is considered as having a normal voice quality.



Scale 3.1.1.2
Listeners ratings on the second speaker's voice quality

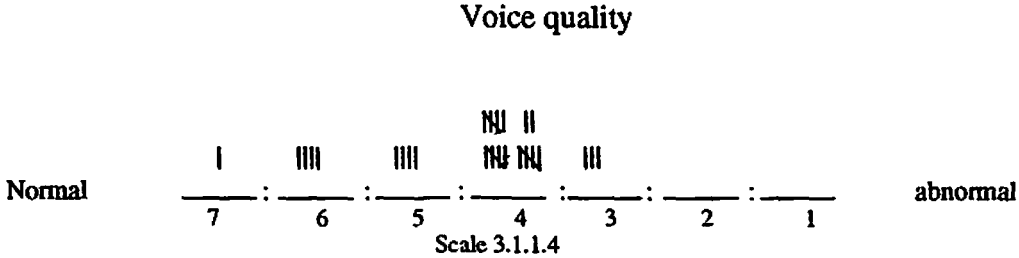
Listeners' ratings on the second speaker's voice quality show that there are seventeen people who choose value 7, eight people choose value 6, four people choose value 5, and 1 person choose value 4. We can conclude that speaker 2 is considered as having normal voice quality.



Scale 3.1.1.3

Listeners ratings on the third speaker's voice quality

From the third person, we could see that he is still considered as having normal voice quality since there are eight people who choose 7, thirteen people choose 6, seven people choose 5, I person choose 4, and only I person who choose 3



Scale 3.1.1.4
Listeners ratings on the fourth speaker's voice quality

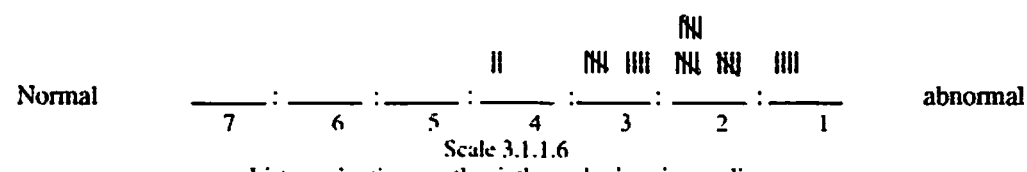
Based on the scale above, we could see that the listeners' perceptions toward the fourth speaker are varied. In that scale, we see that I person choose 7, five people choose 6, four people choose 5, seventeen people choose 4, and three people choose 3.

Voice quality

Scale 3.1.1.5
Listeners ratings on the fifth speaker's voice quality

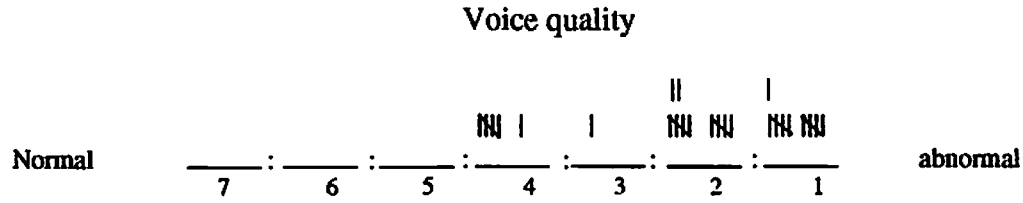
Listeners' ratings on the fifth speaker's voice quality show that there are fifteen people who choose 5, seven people choose 4, six people choose 6, and two people choose 2. In this case, we can consider that speaker five is a person having a bit abnormal voice quality.

Voice quality



Scale 3.1.1.6
Listeners' ratings on the sixth speaker's voice quality

Listeners' ratings on the sixth speaker's voice quality display that there are two people who choose 4, nine people choose 3, fifteen people choose 2, and four people choose 1. From this we can assume that speaker six is considered as a person having abnormal voice quality.

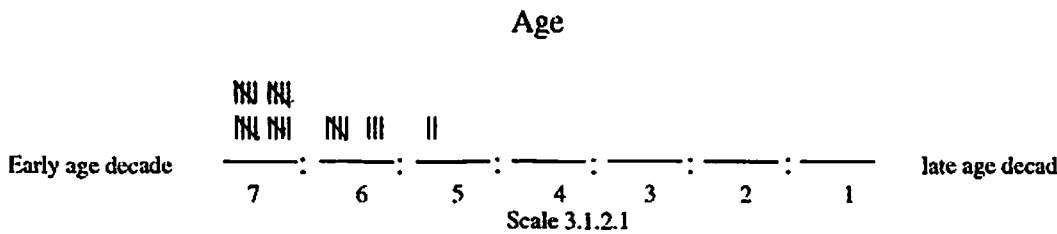


Scale 3.1.1.7
Listeners' ratings on the seventh speaker's voice quality

From the scale above, we can see that speaker seven is considered as a person having abnormal voice quality since there are six people choose 4, 1 person choose 3, twelve people choose 2, and eleven people choose 1.

3.1.2 Listeners' Decade Judgment Upon the age of Speakers

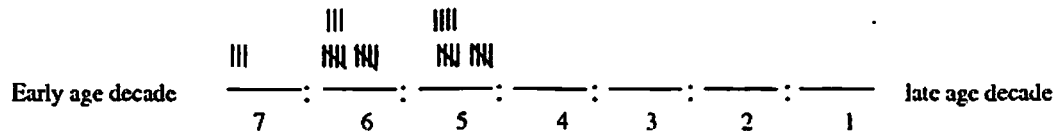
On the basic of the speakers' voice quality, listeners are asked to make such judgment upon the age of the speakers, in this case to determine the age decade. Listeners' decade judgment are represented by their ratings about the closest speakers' age decade on semantic differential scale as presented on the following.



Scale 3.1.2.1
Listeners' decade judgment on the first speaker's age

From the scale above, we could see that twenty people choose 7, eight people choose 6, and only two people who choose 5. It can be said that according to listeners' judgment, speaker 1 is considered in the early age decade.

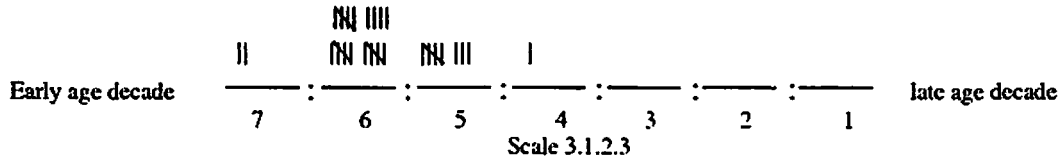
Age



Scale 3.1.2.2
Listeners' decade judgment on the second speaker's age

From the second scale, we can conclude that the second speaker is still in the early age decade since there are three people who choose 7, thirteen people choose 6, and fourteen people choose 5.

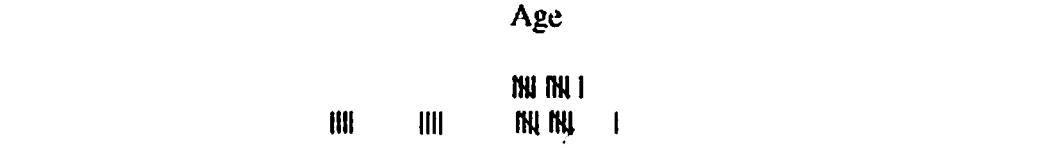
Age



Scale 3.1.2.3
Listeners' decade judgment on the third speaker's age

Listeners' ratings on the third speaker's age show that there is two people choose 7, nineteen people choose 6, and eight people choose 5, and only one person who choose 4. It can be said that according to the listeners' judgment, the third speaker is still considered in the early age decade since 28 people choose the value up to value 4.

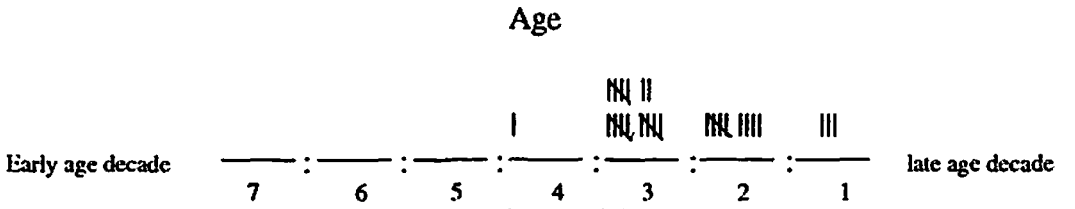
Age



Scale 3.1.2.4
Listeners' decade judgment on the fourth speaker's age

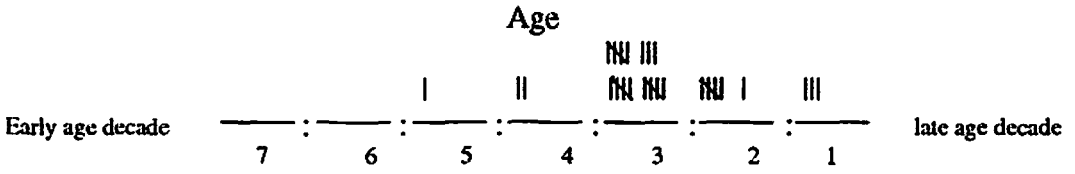
Based on the scale above, we could see that the listener' judgment toward the fourth speakers are varied. In that scale, there are four people choose 6, twenty-

one choose 4, four people choose 5, and one person choose 3. It can be said that speaker four is considered in the middle age decade since there are 21 people who choose value 4.



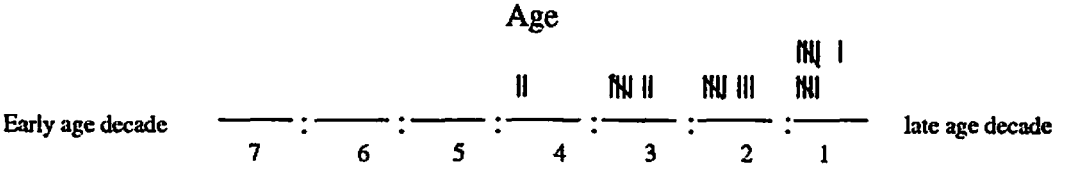
Scale 3.1.2.5
Listeners' decade judgment on the fifth speaker's age

We can see from the scale above that according to the most listeners' judgment, speaker five is considered in the late age decade because only one person who choose 4, while 29 people choose the value under 4, those are seventeen people choose 3, nine people choose 2, and three people choose 1.



Scale 3.1.2.6
Listeners' decade judgment on the sixth speaker's age

We can learn from the scale above that there are only I person who choose 5, two people choose 4, eighteen people choose 3, six people choose 2, and three people choose 1. It can be said that according to listeners' judgment, the sixth speaker is including in the late age decade.



Scale 3.1.2.7
Listeners' decade judgment on the seventh speaker's age

Based on the scale above, it could be considered that the seventh speaker is also in very late age decade since most of the listeners choose the under the 3 values, while only two people choose 4.

Besides rating the speakers' voice quality on the semantic differential scale, the listeners also give interesting comments toward the other characteristic of the speakers' speeches and language or toward the speakers' health conditions. For instance, some listeners think that the fifth speaker has a little bit imprecise articulation, high pitch although her loudness is normal. They also think that physically, the fifth speaker has problem in her teeth. The same comments are also given to the sixth and the seventh speakers. The listeners think that speaker six and speaker seven have imprecise articulation, high pitches, and excessive variable of loudness and also have problem in dentition. Moreover, the listeners also see the uncertainty behavior of their language. These include revisions, unfinished utterances not revised, hesitations, interjections, and fillers. All of the listeners' comments upon the three speakers are indicator of the condition of the increasing age. For the first speaker, the listeners think that all of her speech characteristics are in normal condition.

3.2 Quantitative Analysis

3.2.1 The Mean Value of the Semantic Differential Scale on the Speakers' Voice Quality

Listeners' ratings on the speakers' voice quality varies from normal to abnormal. For the purpose of statistical analysis the mean values of the listeners' rating on speakers' voice quality need to be found.

To find the mean value for each speaker's voice quality from the semantic differential scale, we have to multiply the value in each space with the number of marks at that space. The result are then totaled and divided by the total number of listeners. In shorts the formulae for calculating the mean value of semantic differential scale is:

$$\frac{[(mxn)+(mxn)+...]}{r}$$

n = number of marks at each space

m = value for the space

r = total number of listeners

Thus, using the formula above, the mean value of semantic differential scale for each speaker is as follows:

Scale I = first speaker's voice quality: 6.3

Scale II = second speaker's voice quality: 5.8

Scale III = third speaker's voice quality: 5.8

Scale IV = fourth speaker's voice quality: 4.4

Scale V = fifth speaker's voice quality: 4.1

Scale VI = sixth speaker's voice quality: 2.3

Scale VII = seventh speaker's voice quality: 2.06

The mean of the first scale for the first speaker's voice quality is 6.3. It could be said that, on the average, the speaker is judged to have voice quality to the degree of a bit more than 6 on a seven-point scale by the listeners.

The mean of the second scale is 5.8. Then, it can be said that, on the average, the second speaker is judged to have voice quality to the degree of almost 6 on a seven-point scale by the listeners.

Next, on the voice quality scale, the mean evaluation for the speaker three is the same as the second speaker.

The fourth scale for the fourth speaker has the mean value of 4.4. It indicates that, on the average, the fourth speaker is judged to have voice quality to the degree of a bit more than 4 on a seven-point scale by the listeners.

The mean of the fifth speaker is 4.1. It means that, on the average, the fifth speaker is judged to have voice quality to the degree of a little bit of 4 on a seven-point scale by the listeners.

From the listeners' ratings on the sixth speaker's voice quality, the mean evaluation is 2.3. Then, it can be said that, on the average, the sixth speaker is judged to have voice quality to the degree to a bit more than 2 on a seven-point scale by the listeners.

The mean of the seventh scale for the seventh speaker's voice quality is 2. Thus, it can be said that, on the average, the seventh speaker is judged to have abnormal voice quality to the degree of 2 on a seven-point scale by the listeners.

3.2.2 The Mean Of Value Of Semantic Scale On The Speaker's Age Decade

From the calculation of the mean value for semantic different scales on the speaker's age, the result can be presented as follows:

Scale I = first speaker's age decade: 6.6

Scale II = second speaker's age decade: 5.6

Scale III = third speaker's age decade: 5.1

Scale IV = fourth speaker's age decade: 4.3

Scale V = fifth speaker's age decade: 3.3

Scale VI = sixth speaker's age decade: 2.7

Scale VII = seventh speaker's age decade: 1.8

The mean of the first scale for the first speaker's decade judgment is 6.6. It can be said that, on the average, the speaker is judged to have age decade to the degree of almost seven on a seven-point scale by the listeners.

The mean of the second scale is 5.6. Then, it can be said that the second speaker is judged to have age decade to the degree of almost 6 on a seven-point scale by the listeners.

Next, on the decade age scale, the mean evaluation for the third speaker is 5.1. It could be interpretate that the third speaker is judged to have age decade to the degree of a little bit 5 on a seven-point scale by the listeners.

The fourth speaker has the mean of 4.3. It indicates that, on the average, the fourth speaker is judged to have age decade to the degree of a little bit more than 4 on a seven-point scale by the listeners.

The mean of the fifth speaker for the fifth speaker' age decade is 3.3. Thus, it can be interpreted as indicating that, on the average, the fifth speaker is judged to have age decade to the degree of a little bit more than 3 on a seven-point scale by the listeners.

The sixth scale for the sixth speaker has the mean of 2.7. It indicates that, on the average, the sixth speaker is judged to have age decade to the degree of almost 3 on a seven point by the listeners.

The seventh scale for the seventh speaker has the mean of 1.8. It indicates that, on the average, the seventh speaker is judged to have age decade to the degree of almost 2 on a seven-point scale by the listeners.

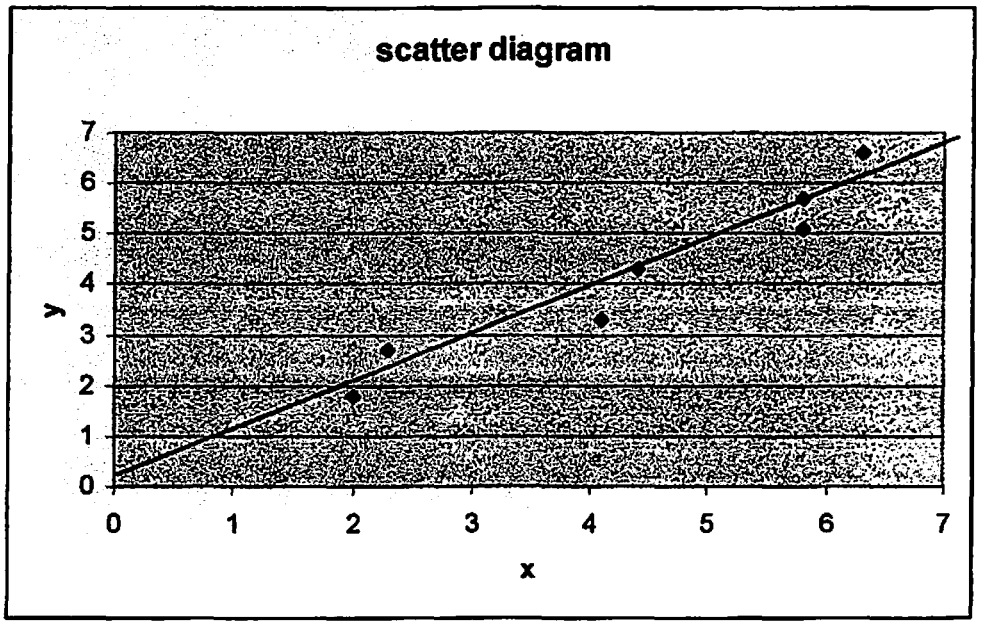
3.2.3. Correlation Test For Speaker's Voice Quality And Age

From the result of listener's ratings on the speaker's voice quality and the age judgment, we can get the mean of each scale. These values are the one that are to be reported and subjected to statistical analysis, in this case correlation test. The following table presents the summary of the result of the mean value calculating from each scale on voice quality and the age judgment:

Speaker	The mean value of scale Of voice quality (x)	The mean value of Scale of age decade (y)
1	6.3	6.6
2	5.8	5.7
3	5.8	5.1
4	4.4	4.3
5	4.1	3.3
6	2.3	2.7
7	2	1.8

Table 3.2.3.1

To know whether a relationship exists between the voice quality (variable x) and age (variable y), we need to plot the data in graph. The resulting plot is called a scatter diagram as shown in figure 3.2.3.1



The scatter diagram shown 7 points, one each pair of the mean value of speaker's voice quality. From the diagram we see that the dots tend to rise as we move from the life side of the plot to the right. This suggests that a speaker's degree a voice quality is related to the tendency to have abnormal voice quality. Based on the scatter diagram we can predict that there is a linear relationship between the speaker's voice quality and the increasing age. The next steps in to find the linear correlation coefficient r to measure the extent to which the points in the scatter diagram tend to cluster about the straight line, the formula to find the correlation coefficient r is:

$$r = \frac{n(\sum x_1 y_1)(\sum x_1)(\sum y_1)}{\sqrt{\{n(\sum x_1^2)(\sum x_1)\}}} \text{x} \frac{1}{\sqrt{\{n(\sum y_1^2)(\sum y_1)^2\}}}$$

r = value pf correlation coefficient

n = amount of the data

x_1 = the mean of certain speaker's voice quality

y_1 = the mean of certain speaker's age decade

The means from listener's ratings on semantic different scale for the speaker's voice quality are considered as x_1 while for the speaker's age as y_1. To make the calculation easier, y summaries the data as follow

x_1	y_1	x_1y_1	x_1^2	y_1^2
6.3	6.6	41.58	39.69	43.56
5.86	5.63	32.48	33.64	31.36
5.86	5.73	33.06	33.64	32.36
4.46	4.3	18.92	19.36	18.49
4.16	3.3	13.53	16.81	10.89
2.3	2.76	6.21	5.29	7.29
2.06	1.86	3.6	4	3.24
31	30.18	149.38	152.43	147.19

Table 3.2.3.2

Correlation analysis on speakers' voice quality and age decade

From the table 3.2.3.2 we have the calculation that:

$\sum x_1 = 31$
$\sum y_1 = 30.18$
$\sum x_1 yl = 149.38$
$\sum x_1^2 = 152.43$
$\sum y_1^2 = 147.19$

Thus, the r-value for voice quality and the age decade is:

$$r = \frac{n(\sum x_1 y_1) - (\sum x_1)(\sum y_1)}{\sqrt{\{n(\sum x_1 y_1) - (\sum x_1)^2\}}} \text{x} \frac{1}{\sqrt{\{n(\sum y_1^2) - (\sum y_1)^2}}$$

$$r = \frac{7(149.38) - (31)(30.18)}{\sqrt{\{7(152.43) - (31)^2\}}} x \frac{1}{\sqrt{\{7(147.19) - (30.18)^2\}}}$$

$$r = 0.97$$

The result of calculation to find the correlation coefficient shows that the r-value is high and positive – correlation coefficient 0.97 suggests a strong linear relationship between variable x and variable y. In this case, the correlation coefficient r matches the condition in the scatter diagram.

To make the result of the investigation more convincing, we need to do a significant test. The test finds out whether the correlation coefficient of the observation is different from zero. In this matter, we use the normal distribution, with hypothesis.

H_0 = There is no significant between the voice quality and the increasing age.

H_1 = There is significant between the voice and the increasing age.

The normal distribution test uses the formula as follows:

$$Z = \frac{\sqrt{(n-3)}}{2} \ln \frac{(1+r)(1-fo)}{(1-r)(1+fo)}$$

n = amount of the data

r = correlation coefficient value

fo= correlation coefficient zero value

thus, we get the calculation :

$$Z = \frac{\sqrt{(n-3)}}{2} \ln \frac{(1+r)(1-fo)}{(1-r)(1+fo)}$$

$$Z = \frac{\sqrt{(7-3)}}{2} \ln \frac{(1+0.97)(1-0)}{(1-0.97)(1+0)}$$

$$Z = 1 \ln 65$$

$$Z = 4.18$$

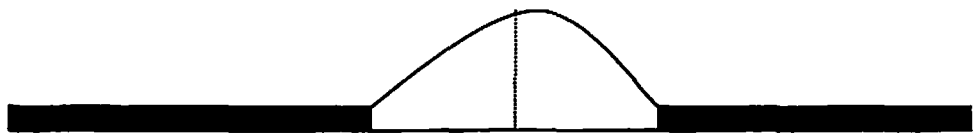
to compare the result of the calculation and the Z value in table, I take the confidence level of 95%. It means $\alpha = 100\% - 95\%$

$\alpha = 5\%$

from 2 table, we get :

$$\left| Z(\frac{\alpha}{2}) \right| \text{ for } \alpha = 5\% \text{ is } Z(\frac{\alpha}{2}) = Z(2.5\%) = 1.96$$

The result is presented in a diagram as follows:



-4.18 -1.96 0 1.96 4.18

Because the point (4.18) is outside the curve, then HO is rejected it means that, statistically there is a linear relationship between the voice quality and the increasing age and the relationship is significant.

3.2.4. Correlation Test for Speakers' Real Age Decade and Listeners' Ratings On The decade Judgment Of Speaker's Age Based On Voice Quality.

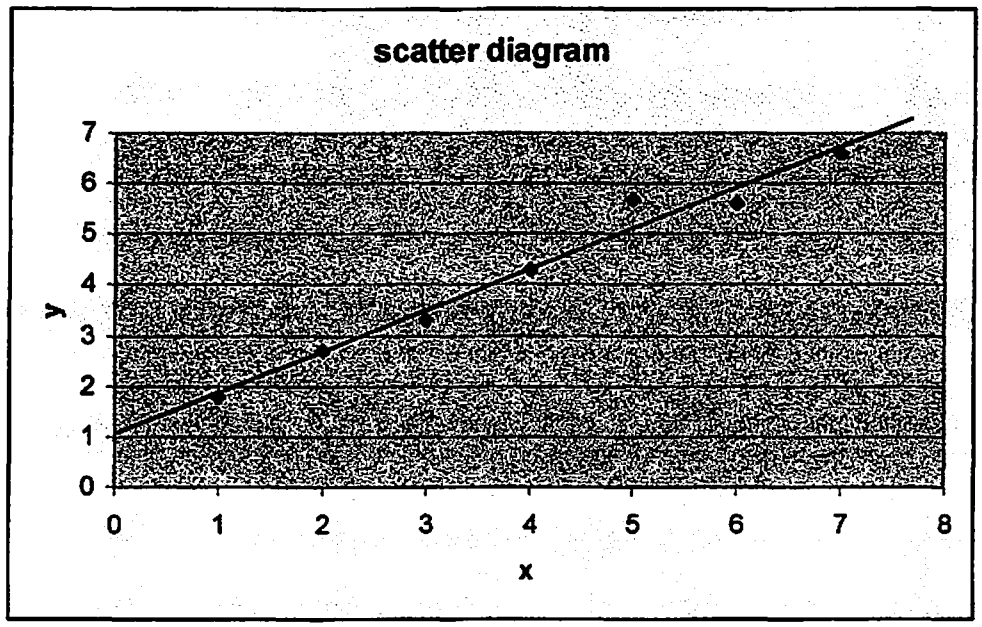
In the explanation about the instruments of study, I have explained that the speaker's are selected by observations about their age. Each of speakers represents 1-age decade. In this case their real age decade is the opposite of the order of the speakers and is considered as variable x, while the speaker's age perceived from voice quality as variable y.

Speaker	The real age decade(X)	The mean value of scale on age decade judgment (Y)	$x_1 y_q$	x_1^2	y_1^2
1	7	6.6	46.2	49	43.56
2	6	5.6	33.6	36	31.36
3	5	5.7	28.5	25	32.49
4	4	4.3	13.2	16	18.49
5	3	3.3	9.9	9	10.89
6	2	2.7	5.4	4	7.29
7	1	1.8	1.8	1	3.24
	28	30	138.6	140	147.32

Table 3.2.4.1

Correlation analysis on speakers' real age decade and the listener' ratings on the speakers' age decade based on voice quality

The scatter diagram shown in figure 3.2.4.1



From the diagram we see that the dots tend to rise as we move from left side of the plot to the right. This suggests that a speaker's age judgment. However, we also see that all point cluster around the straight line. One point deviates from the cluster. Thus it can't directly predict the degree of relationships.

The r-value for this is as follows:

$$r = \frac{n(\sum x_1 y_1) - (\sum x_1)(\sum y_1)}{\sqrt{\{n(\sum x_1 y_1) - (\sum x_1)^2\}}} x \frac{1}{\sqrt{\{n(\sum y_1^2) - (\sum y_1)^2}}$$

$$r = \frac{7(138.6) - (28)(30)}{\sqrt{\{7(140) - (28)^2\}}} x \frac{1}{\sqrt{\{7(147.32) - (30.^2\}}}$$

$$r = 0.81$$

The result of the calculation to find the correlation coefficient shows that the r value although not too high but still positive. Coefficient correlation 0.81 suggests a linear

relationship between variable x (real age decade) and variable y (decade judgment). In this case, the correlation coefficient r matches the condition in the scatter diagram.

To make the result of the investigation more convincing, we need to do a significant test. In this case we use normal distribution uses the formula as follows:

$$Z = \frac{\sqrt{(n-3)}}{2} \ln \frac{(1+r)(1-fo)}{(1-r)(1+fo)}$$

$$Z = \frac{\sqrt{(7-3)}}{2} \ln \frac{(1+0.81)(1-0)}{(1-0.81)(1+0)}$$

$$Z = 1 \ln 9.52$$

$$Z = 2.15$$

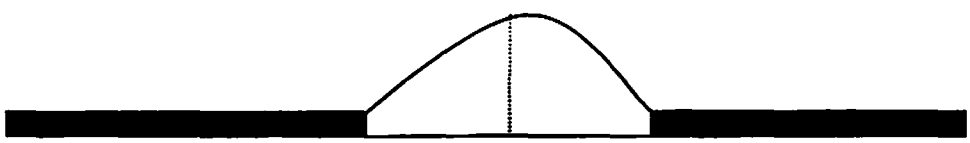
To compare the result of the calculation and the Z value in table, I take the confidence level of 95%. It means $\alpha = 100\% - 95\%$

$\alpha = 5\%$

From 2 tables, we get:

$$\left| Z(\frac{\alpha}{2}) \right| \text{ For } \alpha = 5\% \text{ is } Z(\frac{\alpha}{2}) = Z(2.5\%) = 1.96$$

The result is presented in a diagram as follows:



-2.15 -1.96 0 1.96 2.15

Because the point (2.25) is outside the curve, then H_0 is rejected it means that, statistically there is a linear relationship between the voice quality and the increasing age and the relationship is significant.

3.3 Interpretation of the Result

The result of the study shows that degree of voice quality has something to do with the increasing age. It is clear in the first data presentation about listeners' ratings on the speakers' voice quality and the speakers' age decade. Speakers who are rated as having degree of voice quality below the average are also considered as having degree of age below the average. On the other hand, speakers who are rated as having degree of voice quality above the average are also considered as having degree of age decade above the average. Although during the data collection the writer finds that there are also listeners who give moderate ratings on speakers' voice quality, but rate their degree of age decade below the average. This is not surprising since this study employs listeners' perception to asses the speakers' voice quality and speakers' age decade, and we cannot expect all people to give exactly the same perception. However, the data shows that most of the listeners have agreement upon the phenomena of voice quality. Even, from the voice quality of the speakers, the listeners are also able to evaluate other perceptual characteristics of the speakers' speech, their language behavior, and give comments upon their physical and health condition.

Besides we cannot expect that this study is 100 % right. . This happens because the listeners listen to the speakers from the tape recorder, and this is caused by the weaknesses of the tape recorder that cannot give a good result of recording. If the study use a more sophisticated equipment, for example using a professional recording system (Shure M 67 professional preamplifier, Ampex AG 440B stereo recorder, Kenwood stereo DC integrated amplifier KA 7100, and JBL speaker system), so that the speakers' voice can be recorded as quite exact as the way they

are, the deviation might not occur. But the deviation that occurs in this study is not solely caused by lack of the recording process. It could be caused by the real condition of the speaker herself, which is not the same as what the theories says about the speech characteristics of the aging population. According to Perlmutler and Hall, although our physical ability peak at thirty and decline gradually thereafter, older people who were physically fit as younger adults are generally in better health, so they can maintain their ability to speak normally (Permutler and Hall : 1985). However, the deviation of the listeners' ratings for the third speaker does not consequently affect the second correlation calculation since it is still in the line with the other ratings for the other speakers.

Nevertheless, from the result of the first correlation test on the speakers' voice quality and on the age decade, we see that the *r-value* is 0.97. It means that there is a positive and strong linear relationship between voice quality and the increasing age. A decrease in the degree of voice quality is followed by in the degree of age decade. Thus, it is a support for Walker , kozier and Erb theories about the voice changes in the aging. If we meet a person who has abnormal voice quality, we may predict that he is in the late adulthood or having old age, and if we meet a person whose voice quality is still in normal condition, we can say that she or he is still in the early adulthood (eliminating the phenomena of the pathological changes that may occur, such as cold, laryngitis, tonsillitis, or in more serious chronic diseases).

This study does not aim to define a causal relationship between the voice quality and the increasing age. However this study proves that there is significant

relationship between the voice quality and the increasing age. The significance of the relationship indicates that the relationship rarely occurs by chance.

The second correlation is not too successful in presenting a useful linear relationship between the really age decade and listeners' ratings on the speakers' age decade based on voice quality. The *r*-value is 0.81 in which we can hardly say whether the relationship is close to perfect correlation or to no correlation at all. However, since the r value is positive we can say that there is a relationship between the speakers' real age decade and listeners' ratings on the speakers' age decade based on voice quality.

All in all, the results of the study indicate that voice quality as one aspect of paralinguistic features can be used to indicate the increasing age. In consequence, the listeners' attitudes, that are responses toward the speakers' age decade based on the voice quality are the representation of the forming of the perception in their mental process. In this case, their attitudes toward the voice quality and the age decade of the speakers are considered as internal stimulation, which mediate their responses.

Voice quality as aspect of paralinguistic features or vocal behavior of a speaker has played a role in conveying information about the speaker's age. It is supported by the fact that the increase in the age is followed by the increase of abnormal voice quality. Thus, it is not wrong if we use paralinguistic features to verify the age of a person as Crystal said that the age and sex are proved to be easiest tools to identify from such vocal cues as paralinguistic features (Crystal: 1989:23).

CHAPTER IV

CONCLUSION