Chapter 3

Results

In this chapter, the results of the three experiments are presented in five sections. First of all, section 3.1 exhibits the findings of the distribution of T2 variations in different vowels in isolated words. Section 3.2 further presents the results of the distribution of T2 variations in disyllabic expressions with different preceding tones. In section 3.3, we cover the results of the distribution of T2 variations in sentence-medial and sentence-final positions. Finally, section 3.4 presents the regional difference among the bilinguals, and section 3.5 summaries the results and findings.

3.1 Experiment 1: T2 in isolated words

Experiment 1 explored the contour types of T2 with different vowels in isolated words. The row tokens of each variable can be seen in Appendix 8.

3.1.1 The distribution of the tonal types in isolated words

Figure 13 shows the percentage of the normal T2 (62%) and the T2 variations (38%). A chi-square test shows the two percentages are significantly different (χ^2=24.083, df=1, p<.05). This shows that in isolated words, the occurrence of the normal T2 is significantly more frequent than that of T2 variations.

Table 2 and Figure 14 present the row tokens and the percentage of each tonal

type (NR, LR and Level). As revealed in Table 2, a set of chi-square tests (test of

goodness of fit) shows that NR (267) is significantly more frequent than LR (70)

(χ^2=115.160, df=1, p<.05) and Level (95) (χ^2=81.724, df=1, P<.05). In a word, the

percentage of normal rising (NR) is much higher than the percentage of T2 variations

(LR and Level). This further confirms that NR is the most dominant type in isolated

words[22].But within the variation, the mount of Level (95) does not significantly

different from the amount of LR (70) (χ^2=3.788, df=1, p=.052>.05). Although not

being significant, the p-value of the comparison between the token of LR and Level

(.052) is very near the significant value .05. This indicates that the frequency of Level

tends to be higher than LR in isolated words. The further illustration of the

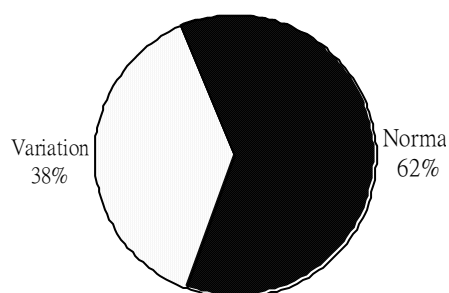distribution of the three types is shown in Figure 14.

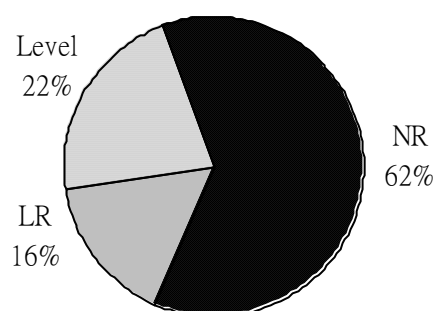Fig. 13 The percentage of NR and variation

Fig. 14 The percentage of the 3 tonal types
(NR,LR, Level)

Table 2 The row tokes of NR, LR and Level in isolated words

Tonal type Tokens	Normal T2	Variation		
	NR	LR	Level	Total
Total	267	70	95	432

---

[22] This is also called the 'citation forms.'

3.1.2 T2 with different vowels

Figure 15 shows the percentage of the three tonal types (NR, LR, Level) for each vowel. Of the three types, NR is the most frequent type (with the percentage of 66.7%, 49.3% and 69.4%), Level is the second (20.1%, 28.5% and 17.4%), and LR is the least frequent type. The Chi-square shows a significant distribution (χ^2= 14.7581, df=4, P<.05)

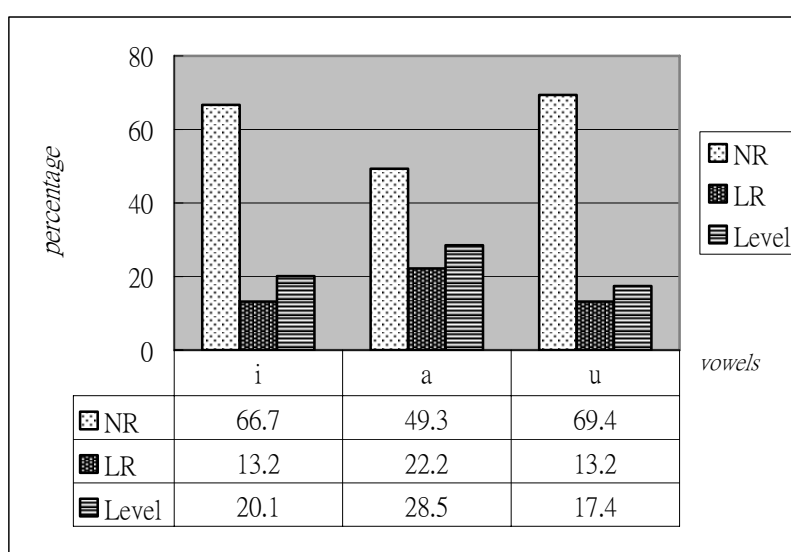|	i	a	u
NR	66.7	49.3	69.4
LR	13.2	22.2	13.2
Level	20.1	28.5	17.4

Fig. 15 The distribution of the three tonal types (NR, LR and Level) in vowel [i], [a] and [u].

For each tonal type, the distribution of each vowel is quite different. For NR, [a] shows the lowest percentage (26.6%), while [i] and [u] are almost even. For LR, [a] presents the highest percentage (45.7%), while the other two are even low (27.1%). For the variant Level, [a] is still the highest (43.2%), [i] the second high (30.5%) and [u] the lowest (26.3%). A chi-square test (test of homogeneity of proportions) shows the distribution of the three tonal types for the three vowels are significantly different (χ^2= 14.7581, df=4, P<.05). However, we do not know which pair is significantly

different. By comparing the absolute value of the adjusted residual with 1.96[23], we can distinguish the respect difference. When the absolute value of the adjusted residual is larger than 1.96, the percentage of a given type is significantly higher or lower than the expected value. When the adjusted value is negative, the percentage of the compared token is lower than the expectation; when the value is positive, it shows the percentage of the compared token is higher than expectation. While the others that are smaller than 1.96 are within the normal distribution. From this point of view, there are four significant absolute values (with an asterisk in Table 3) that are larger than 1.96 as shown in Table 3. They indicate that the percentage of NR with [a] (-3.8*) is significantly lower than expectation. This indicates that [a] carries less NR but more LR (2.4*) and Level (2.3*) and [u] carries more NR.

Within the variation (LR & Level), the distribution of LR and Level with the three vowels is not significantly different among the three vowels (χ^2= 0.2285, df=2, p>.05). It suggests that the distribution of the two types (LR, Level) in the three vowels is similar (27.1:45.7:27.1≈30.5:43.2:26.3).

---

[23] Haberman (1978) proposed that the distribution of adjusted residual is a normal distribution when its absolute value is smaller than the threshold. Under the two-tailed test, 1.96 is the threshold of the .05 level of significance (Cited in Wang, 1999).

Table 3 The percentage of the three tonal types in different vowels

V.	Tonal types					
	Normal T2		Variation			
	NR		LR		Level	
	% within NR	Adjusted Residual	% within LR	Adjusted Residual	% within Level	Adjusted Residual
i	36	1.5	27.1	-1.2	30.5	-.7
a	26.6	-3.8*	45.7	2.4*	43.2	2.3*
u	37.5	2.3*	27.1	-1.2	26.3	-1.6
Total	100%		100%		100%	
The result of Chi-square test: χ^2=14.758, df=4, p=.005<.05						

The tokens of variation for [i]: [a]: [u] are 48:73:44 respectively. As revealed in Figure 16 which shows the percentage of each vowel, the occurrence of [a] is much more frequent than the other two. A χ^2 goodness of fit test showed there is a significance among the three value (χ^2=8.982, df=2, p<.05). This confirms that [a]'s variation occurs more frequent than [i] and [u].
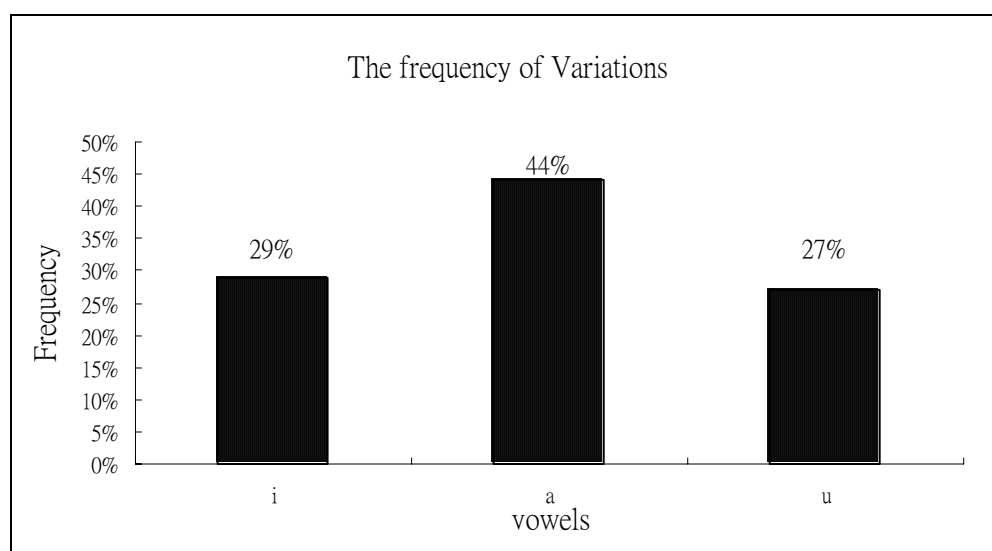

Fig. 16 The occurrence of variation of [i], [a] and [u]

The above results suggest that vowels do affect T2 variations. It shows that the vowel [a] has more T2 variations. But the influence is on the occurrence of variations,

but not on any particular tonal type. On the contrary, vowel [i] and [u] have fewer variations but more normal T2s.

3.1.3 Language backgrounds and T2 variations

Table 4 shows the difference of different language backgrounds. A two-factor chi-square shows that the distribution of T2 types is significantly different between monolinguals and bilinguals (χ^2=8.906, df=2, P<.05). The adjusted residual suggests that the monolinguals' NR (2.3) is significantly higher than expected and their LR (-2.9) is lower than expected. The bilinguals NR (-2.3) is significantly lower than expected and the LR (2.9) is significantly higher than expected. This reflects a complementary distribution of NR and the variant LR in the two language backgrounds. But for the variant Level, the percentages of the two language backgrounds are nearly the same (21.8% and 22.2%).

Table 4 The percentage of tonal types in monolinguals and bilinguals.

Lg. bg	Tonal types						
	Normal T2		Variation				
	NR		LR		Level		
	% within	Adjusted Residual	% within	Adjusted Residual	% within	Adjusted Residual	% within
Mono	67.1	2.3*	11.1	-2.9*	21.8	-.1	100
Bi.	56.5	-2.3*	21.3	2.9*	22.2	-.1*	100
The result of Chi-square test: χ^2=8.906, df=2, p=.012<.05							

Within the variations, the distribution of the two variants LR and Level in the two language backgrounds is not significantly different (χ^2=3.792,df=1,p>.05) as shown in Figure 17.
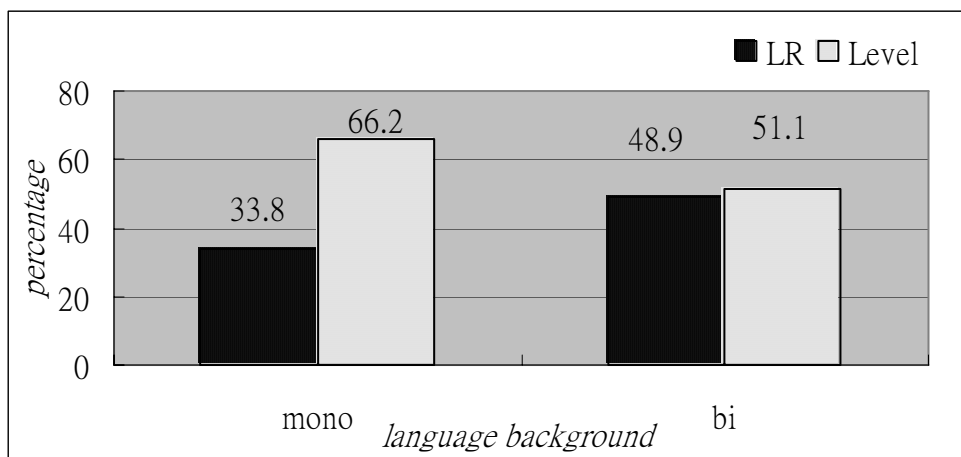
Fig. 17 The distribution of LR and Level in different language backgrounds

3.1.4 Genders and T2 variations

Table 5 shows the distribution of T2 variation in different genders. A two-factor chi-square shows the total tokens of the variations has no gender difference between male (73) and female (92) (χ^2=2.188, df=1, P>.05). Also, the distribution of LR and Level in the two gender are not significantly different (χ^2=.00, df=1, p>.05). The results suggest that, in isolated words, males and females perform similar patterns of T2 types (NR, LR and Level).

Table 5 The distribution of LR and Level in two genders

Gender	Variation		
	LR	Level	**Total**
M	31	42	73
F	39	53	**92**

3.2 Experiment 2: Final T2 in disyllabic expressions

Previous studies show that almost all Mandarin T2 variations occur in the final position. But the patterns of variation may still be influenced by its preceding tones, language backgrounds and genders. This section will examine the effect of those

variables on the final T2 in disyllabic expressions. The row tokens of each variable

can be seen in Appendix 9.

3.2.1 The distribution of the tonal types in disyllabic expressions

Figure 18 shows the distribution of the variation and the normal T2. There are a

total of 514 (67%) tokens of variation, while the NR has only 254 (33.1%) tokens.

The distribution shows that the variation is higher than NR, which is drastically

different from the distribution of T2 in isolated words, whose NR (62%) is higher than

the variation (38%). The result of a chi-square test shows a significant difference

between NR (254) and variation (514) (χ^2=88.021, df=1, p<.05).
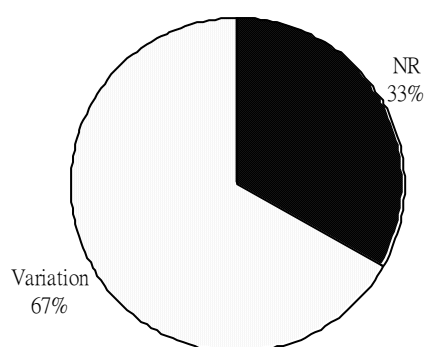

Fig. 18 The distribution of NR and the variation
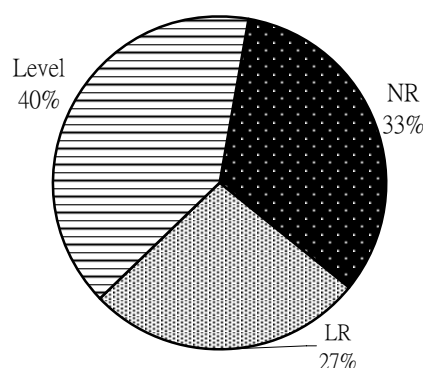
in disyllabic expressions

Fig. 19 The distribution of the three tonal

types in disyllabic expressions

Figure 19 presents the percentage of each tonal type NR, LR and Level in

disyllabic expressions. The distribution shows that, unlike the distribution of T2 in

isolated words (NR>Level>LR), here, Level is the most frequent type (40%), NR

(33.1) the second and LR (27%) is still the least frequent type (Level>NR>LR). The

analysis of a chi-square test shows that the three types of T2 contours are significantly

different (χ^2=19.555, df=2, p=.00<.05). To sum up, the performance of T2 in disyllabic expressions is very different from the T2 in isolated words. In disyllabic expressions, the T2 variations are much more than NR; the variant Level becomes the most frequent type among the three (NR, LR and Level).

3.2.2 T2 with different preceding tones

The preceding tones in Experiment 2 are classified into high-ending (H-ending) tones, including T1 (55) and T2 (35) and low-ending (L-ending) tones, including T3 (31) and T4 (53 or 51). The H-ending tones end with a high offset with the tonal value of 5; while the L-ending tones end with a low or mid offset with the tonal value of 1 or 3. Previous studies show that the offset of the preceding tones will influence the phonetic performance of the target tone. Therefore, we would like to know if T2 will be affected by its preceding offset. Under what preceding tones will T2 create more variations?

Table 6 shows the percentage of the three types of T2 in the condition of different preceding tones. The percentage presents a very diverse distribution in each type of the preceding tones. Within the H-ending group, the percentage of the three tonal types ranks as Level (41.9%)>LR (31.8%) >NR (26.3%), while for the L-ending group, the tonal types ranks as NR (39.8%)>Level (38%) >LR (22.1). The result of a chi-square test shows the distribution of the three T2 types (LR, Level, and NR) in the two groups of preceding tones are significantly different (χ2=17.992, df=2, p<.05). This indicates that different environments affect the distribution of T2 types. The

adjusted residual also provides evidence for the significance of the higher percentage of NR in L-ending (39.8%) and the higher percentage LR in H-ending (31.8%). The asterisk suggests its percentage is higher than the expectation.

Table 6 The percentage of the three types of T2 with different preceding tones

Preceding Tone	Tonal types						
	Normal T2		Variation				
	NR		LR		Level		
	% within pre. tones	Adjusted Residual	% within pre. tones	Adjusted Residual	% within pre. tones	Adjusted Residual	% within pre. tones
H-ending	26.3	-4.0	31.8	3.0*	41.9	1.1	100
L-ending	39.8	4.0*	22.1	-3.0	38.0	-1.1	100
The result of Chi-square test:	χ2=17.992, df=2, p=.000<.05						

However, within the variation, the distribution of LR and Level is not significantly different between the two types of preceding tones (χ^2= 1.853, df = 1, p >.05). It suggests that the preceding offset does not affect the distribution of LR and Level. The distribution and percentage of LR and Level can be seen in Figure 20 and Table 7.
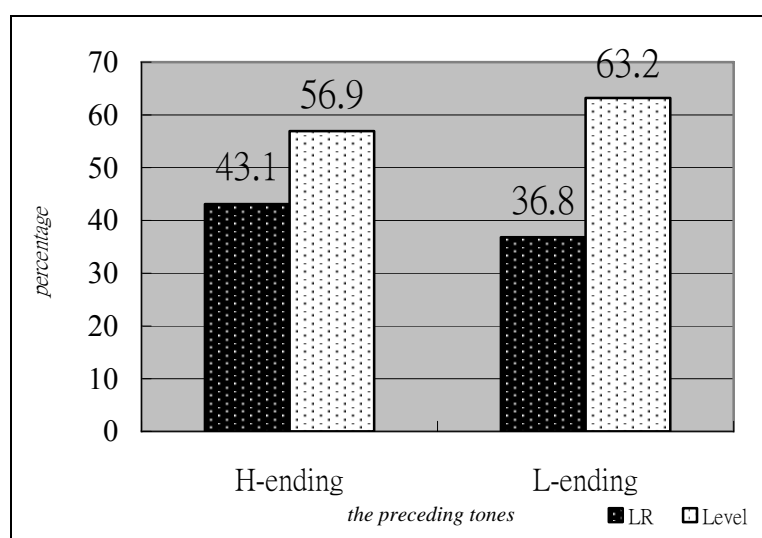

Fig. 20 The distribution of LR and Level in different preceding tones

Table 7 The distribution and percentage of LR and Level

Preceding tones	Variation		Total
	LR	Level	
H-ending	122	161	283
L-ending	85	146	231

From Table 7 we can also compare the total tokens of the variation in different preceding tonal environments. The total tokens show that the H-ending environment may include more variations (283) than the L-ending environment (231). A chi-square test shows a significant difference between the two values (χ^2=5.261, df= 1, p<.05). The above results show that the preceding tones do affect T2, with the H-ending tones carrying more variations, especially the variant Level. While L-ending tones affect less variations, especially the variant LR.

3.2.3 Language background and T2 variations

Table 8 shows the distribution of the three tonal types in different language backgrounds. The distribution of NR, LR and Level are quite similar between the two language backgrounds, with the highest percentage of Level (37% and 43%) and the lowest of LR (26% and 27.9%) as shown in the grey areas. Within each tonal types, the percentages of each language background are all quite near 50% as shown in the white columns. There is not sharp difference between each language background in each tonal type. A chi-square test shows an insignificant result of the distribution (χ^2=5.503, df=2, p>.05). It suggests that the language background in disyllabic expressions does not affect the distribution of the tonal types.

Table 8 The distribution and percentage of the three tonal types in different language backgrounds.

Lg. Bg.	Tonal types						
	Normal T2		Variation				
	NR		LR		Level		
	% within lg.bg.	% within NR	% within lg.bg.	% within LR	% within lg.bg.	% within Level	% within Lg. bg.
Mono	37	55.9	26	48.3	37	46.3	100
Bi	29.2	44.1	27.9	51.7	43	53.7	100
Total		100%		100%		100%	
The result of Chi-square test:		χ2=5.503, df=2, p=.064>.05					

3.2.4 Genders and T2 variations

Table 9 shows the occurrences and the percentages of the three tonal types (NR, LR and Level) between the two genders: male and female. The percentage shows that NR is higher in females (38.8%) than in males (27.3%); while Level is higher in males (46.4%) than in females (33.6%). For the variant LR, both genders present close percentages (26.3%, 27.6%). The total distribution as observed in Table 9 is highly significant (χ^2=15.564, df=2, p=.000<.05). This indicates that genders do affect the distribution of the tonal types. For the tonal type NR and Level, the two genders present a complementary distribution. Males perform more Levels and females more NRs.

Table 9 The distribution and the percentage of each tonal type in the two genders

Gender	Tonal types							
	NR	%	LR	%	Level	%	Total	%
M	105	27.3	101	26.3	178	46.4	384	100
F	149	38.8	106	27.6	129	33.6	384	100

Within the variation, the occurrence and percentage of LR and Level in each gender is shown in Table 10. The Table presents a similar distribution of the two

variants (LR and Level) between males and females. Both genders show a higher

percentage of Level (63.8%, 54.9%) than that of LR (36.2%, 45.1%). This reflects the

fact that the variant Level occurs more often than LR.

But for each variant, the percentages of males and females show a

complementary distribution. For LR, the females have higher percentage (45.1%) than

the males (36.2%), while for Level, the males have higher percentage (63.8%) than

the females (54.9%). A chi-square test shows there is a significant difference in the

distribution (χ^2=4.26, df=1, p<.05). It indicates that gender does affect the distribution

of LR and Level.

Table 10 The frequency and percentage of LR and Level in the two genders

Gender	Variation				Total	%
	LR	%	Level	%		
M	101	36.2	178	63.8	279	100
F	106	45.1	129	54.9	235	100

3.3 Experiment 3: Final T2 of disyllabic expressions in different sentence positions

This section examines T2 in sentence-medial and sentence-final position. All

target T2s in Experiment 3 which are the same test items as in Experiment 2, are now

put into sentences. The T2 will appear in two sentence positions: sentence-medial and

sentence-final. This design aims to know if different sentence positions will affect the

production of T2. It is noticeable that the real "sentence-initial" position for a T2 was

not taken, because the initial-T2 showed a very limit variation in my pilot study.

Therefore, in this experiment, T2s are examined only in sentence-medial and sentence-final positions. The row tokens of each variable can be seen in Appendix 10.

3.3.1 The distribution of the tonal types in the sentence level

Figure 21 shows the row tokens and the percentage of the normal T2 and the variation in Experiment 3. The row token of the variation (1227) are three times more than the normal T2 (309). Meanwhile, the percentage of variation is 80% of the total, while the normal is only 20% of the total. The result of a chi-square test shows a highly significant difference between the normal T2 and the variations ($\chi2=548.648$, df=1, p=.000<.05).
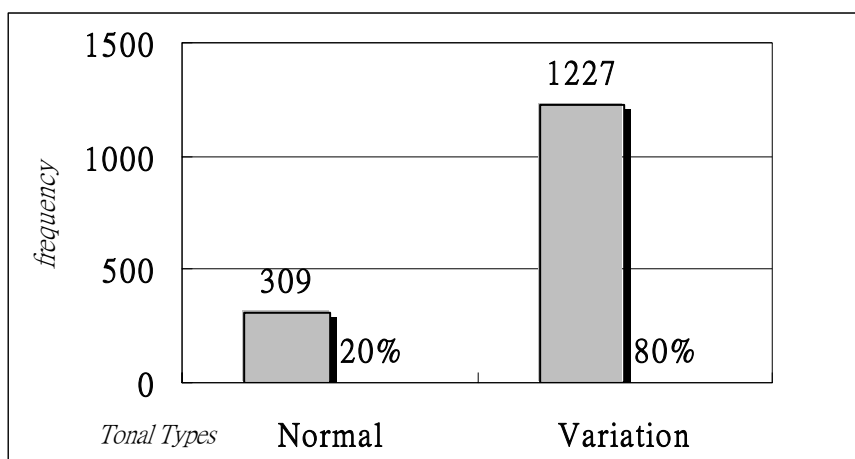
Fig. 21 The percentage and occurrence of NR and the variations in the sentence level

Figure 22 exhibits the row tokens and the percentages of the three tonal types (NR, LR and Level) in the sentence level. The distribution shows that Level (56.1%) has the highest percentage, LR (23.8%) the second and NR (20.1%) the lowest. A set of chi-square tests shows significant differences among the three tonal types ($\chi2=360.012$, df=2, p=.000<.05) and between each two types[24]. This indicates that the

---

[24] LR(366)>NR(309) :$\chi2=4.813$,df=1, p=.028; Level(861)>LR (366): $\chi2=199.694$, df=1,p=.00; Level

occurrence of Level is significantly more often than LR and NR, and the occurrence of LR is significantly more often than NR. Such results show in the sentence level, T2 has much more variations than the normal forms. The variant Level is much more frequent than the other tonal types.
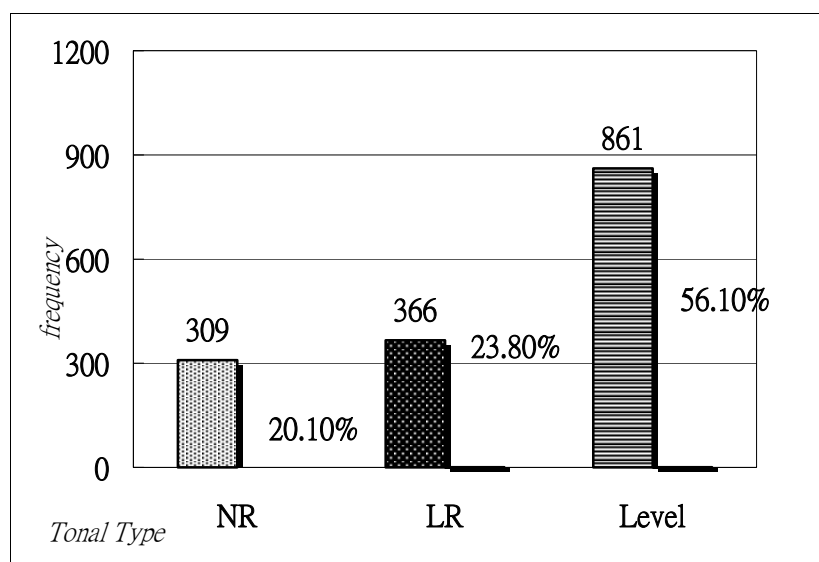

Fig. 22 The percentage of the three tonal types: NR, LR and Level in the sentence level

3.3.2 Final T2 in different sentence positions

This section examines the tonal types of the final T2 in different sentence position. Table 11 shows the tokens and percentages of the normal T2 and the variations in each position. The percentages show a similar distribution of NR and Variation between the two positions, with each position's variation near 80% and the NR near 20%. A chi-square test shows a insignificant result of this distribution ($\chi2=1.462$, df=1, p>.05), which means the ratio of NR and the variation in each position is similar.

---

(861)>NR (309): $\chi2=260.431$, df=1, p=.00.

Table 11 The distribution of NR and the variation in the two positions

Tonal types S-position	Normal(NR)		Variation		Total
	tokens	%	tokens	%	%
S-medial	164	21.3	604	78.6	100
S-final	145	18.9	623	81.1	100

Considering the three tonal types, as shown in Table 12, the distribution in the two positions show a highly significant difference (χ^2=21.834, df=2, p=.000<.05). The percentages show that S-final position has much more LRs and fewer Levels than S-medial position. While for NR, both positions show close percentages (53.1%, 46.9%). This result presents a very different distribution of different positions. S-medial has more Level T2, but S-final has more LR T2.

Table 12 The distribution of NR, LR an Level in the two positions

Sentence Position	Tonal types					
	Normal T2		Variation			
	NR		LR		Level	
	token	% within NR	token	% within LR	token	% within Level
S-medial	164	53.1	144	39.3	460	53.4
S-final	145	46.9	222	60.7	401	46.6
Total	309	100%	366	100%	861	100%
The result of Chi-square test:	χ^2=21.834, df=2, p=.00<.05					

To sum up, the sentence position does influence the types of T2 variations, but not the occurrence of T2 variations. The sentence-medial position carries more Level variants, while the sentence-final position carries more LR variants.

3.3.3 Language Background and T2 variation

Table 13 and Figure 23 show the distribution of NR, LR and Level in each

language background. The percentage shows that in each language background, Level is the highest type with the percentage of about 50%. But within the rest types, the distributions of the two language backgrounds are complementary. Monolinguals have more NR (26%) than LR (18.5%), but bilinguals have more LR (28.4%) than NR (16.4%). The result of a chi-square test shows a highly significance (χ^2=33.536, df=2, p=.00<.05). This suggests that the language background does affect the T2 variation. Beside the variant Level, monolinguals have more NRs and fewer LRs, while bilinguals are the opposite.

Table 13 The distribution of the three tonal types within each language background

	NR	%	LR	%	Level	%	Total	%
Mono	200	26	142	18.5	426	55.5	768	100
Bi	109	16.4	224	28.4	435	55.2	768	100
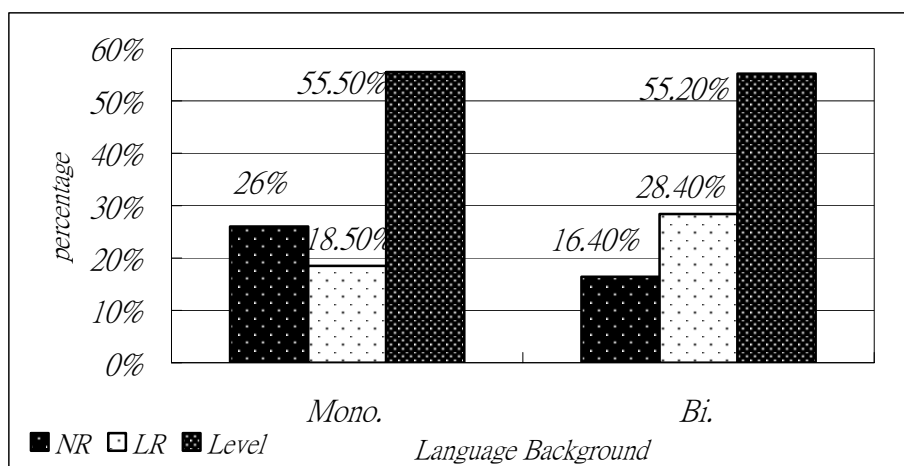
Fig. 23 The percentage of NR, LR and Level within each language background

3.3.4 Genders and T2 variations

Figure 24 shows the percentages of NR, LR and Level in males and females. In

each gender, Level shows the highest percentage, while the percentages of NR and LR are quite near. The results of chi-square tests show a significant difference between Level and the other tonal types in both genders (χ^2=296.00, df=2, p=.00<.05; χ^2=92.773, df=2, p=.00<.05). The percentages of NR and LR in both genders show no significant difference (χ^2=3.556 df=, p>.05; χ^2=1.651, df=1, p>.05).
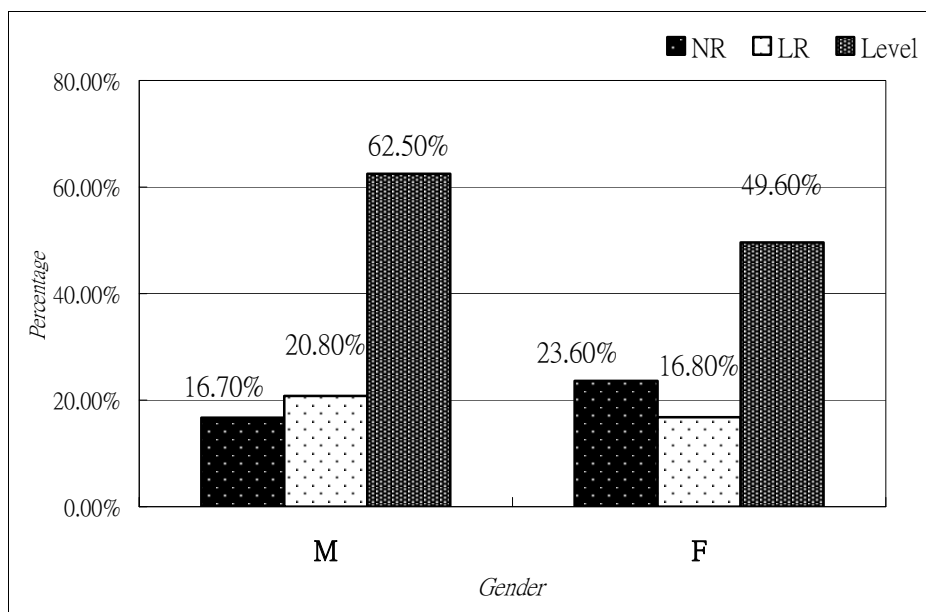

Fig. 24 The percentage of NR, LR and Level in each gender

Figure 25 shows the percentage of each gender in NR, LR and Level. Although the percentages of each gender in each tonal type are not very different, a set of chi-square tests show significant differences between each pair in NR, LR and Level[25]. The percentage of the female's NR and LR is significantly higher than males, while their Level is lower than males. The results indicate that gender does affect the distribution of the tonal types.

---

[25] NR (M., Fm.): χ2=9.901, df=1, p=.003; LR (M., Fm.): χ2=5.781, df=1, p=.016; Level (M., Fm.): χ2=11.383. df=1, p=.001)
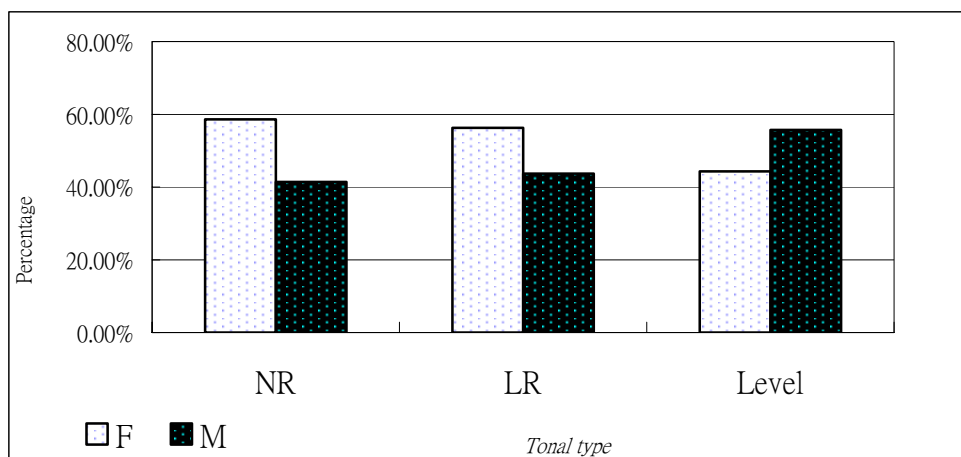
Fig. 25 The percentage of each gender in NR, LR and Level

3.4 T2 variations and regional differences among the bilinguals

Previous studies have proposed that there may be regional differences among the T2 variations (S. Y. Hsu, 2004; H. J. Hsu, 2004; Lo, 2004), but such proposal still lacks of larger-scaled experimental evidence. Therefore, in our experiments, we would also like to tackle this question as well. We would further like to know if different regions of Taiwan perform different tonal types. These different regions are the north, the central and the south of Taiwan[26]. The comparisons are throughout the three experiments, but mainly among the bilinguals[27].

Figure 26, 27 and 28 exhibit the three regions' percentages of the T2 variation of the total tokens of the T2 with regard to different syntactic units (isolation, disyllables, and sentences). Each Figure shows that each region's occurrence of variations is very near. The results of chi-square tests also show no significant difference among the percentages of each region in each syntactic unit (χ2=2.301,

---

[26] The definition of each region can be found in 3.2 subjects.
[27] Because the bilinguals are wider distributed than the monolinguals, who mostly live in Taipei. Moreover, because the T2 variations occurs more within the bilingual group, we would like to know which region contribute to the variations more.

df=2, p>.05; χ2=2.14, df=2, p>.05; χ2=4.1, df=2, p>.05). This suggests that different

region's bilingual subjects do not affect the occurrence of T2 variations. But through

the three bar charts, we can still find that the southern subjects have a tendency to
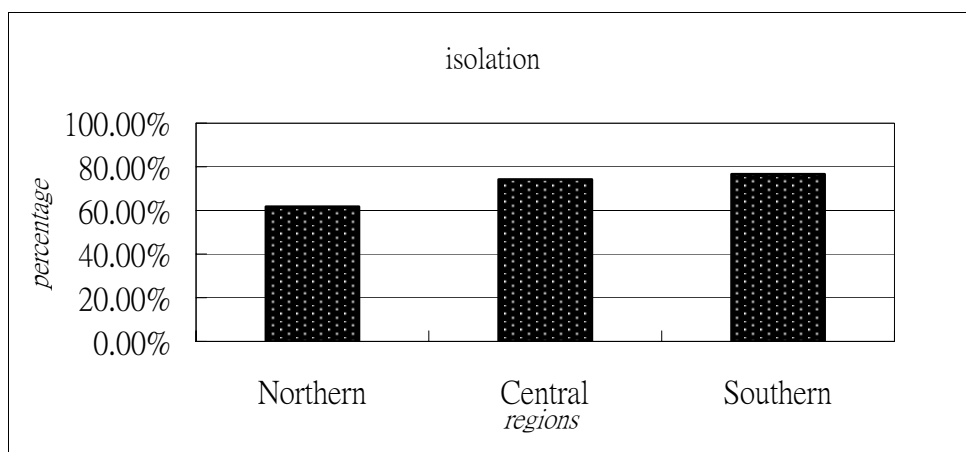
perform more variations than the other two regions

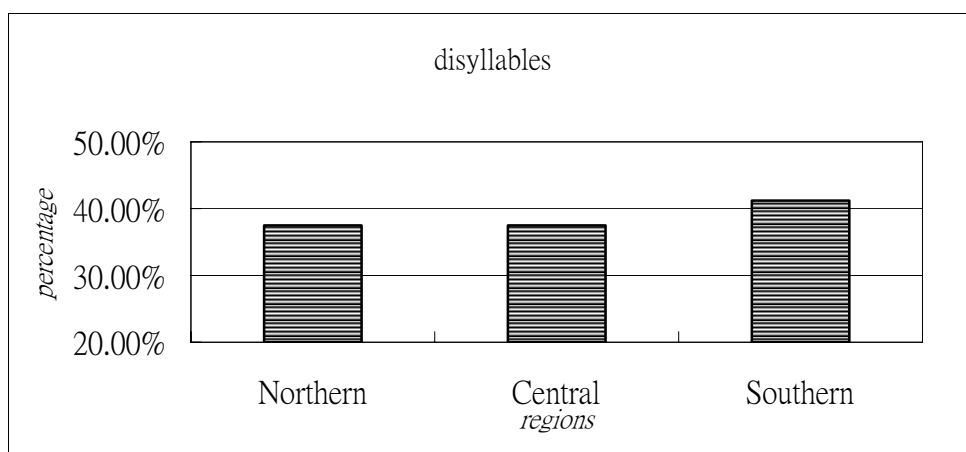Fig. 26 The percentage of the variations of the three regions in isolated words

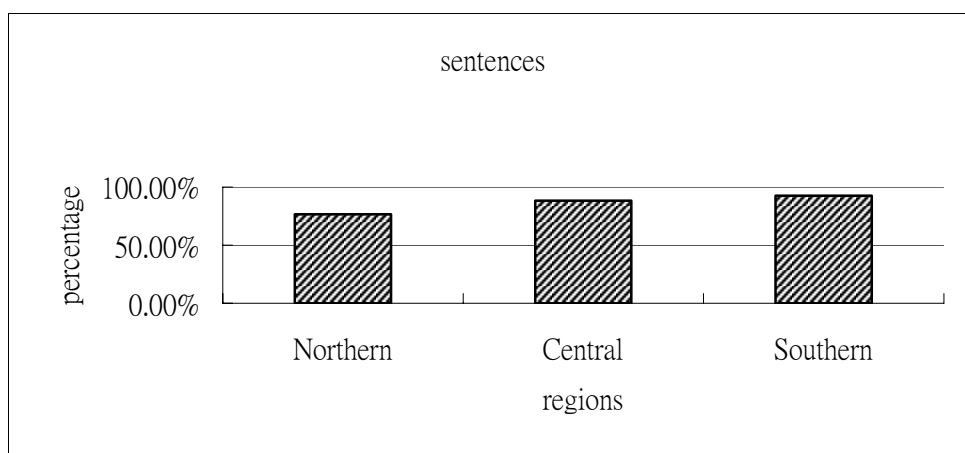Fig. 27 The percentage of the variations of the three regions in disyllabic expressions

Fig. 28 The percentage of the variations of the three regions in sentences

Within the variations (LR, Level), insignificant results of the distributions of LR and Level among the three regions are shown in the isolated words and the disyllabic expressions (χ2=5.223, df=2, p>.05; χ2=4.09, df=2, p>.05). These can be seen in Figure 29 and 30.
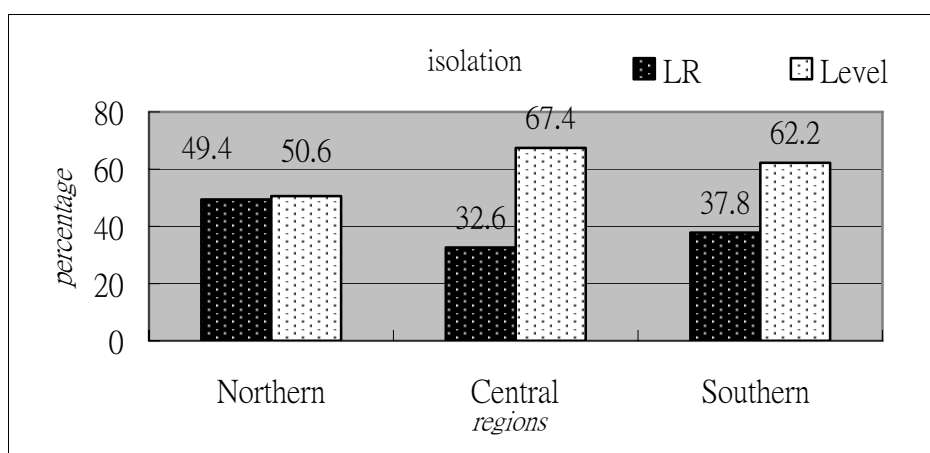

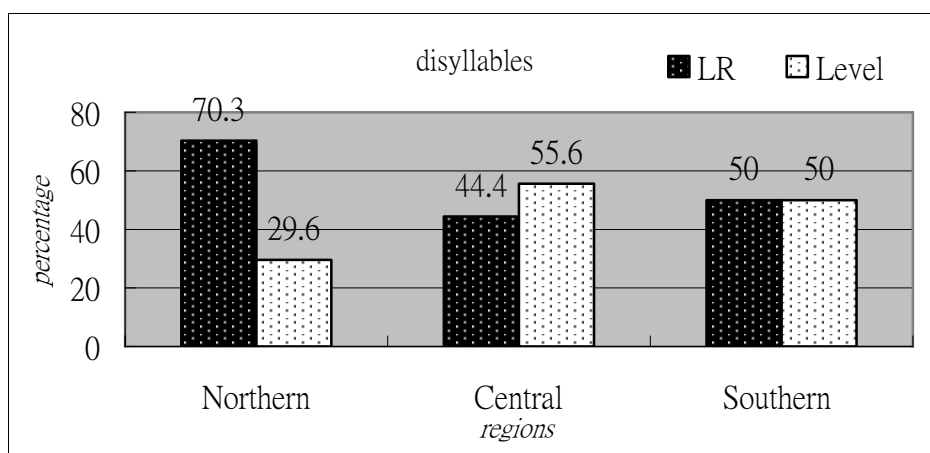Fig. 29 The percentage of LR and Level in isolated words among different regions

Fig. 30 The percentage of LR and Level in disyllabic expressions among different regions

However, in the sentence level, the regions shows significantly difference (χ^2=9.951, df=2, p=.007). Figure 31 shows the distributions of LR and Level among different regions. The result shows that the variant Level occurs most frequently in the southern group, and least frequently in the northern group; while the percentage of LR in the southern group is the lowest, and in the northern group the highest. The central group is at the middle ranking. The result shows that regional difference exists only in the sentence level, which is thought to be more natural than the isolated words and phrases.
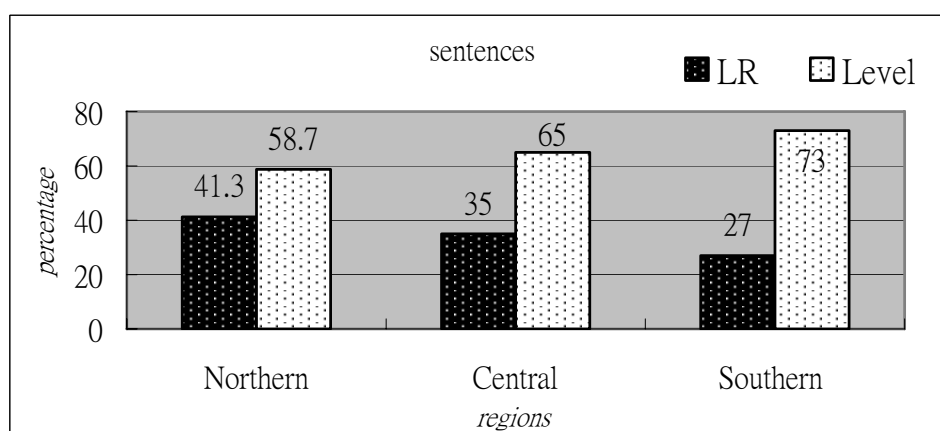

Fig. 31 The percentage of LR and Level in sentences among different regions

Figure 32 shows each gender's total percentages of the T2 variation through the three experiments. The distribution shows no significant difference of the two genders among different regions ($\chi2=.177$, df=2, p>.05).
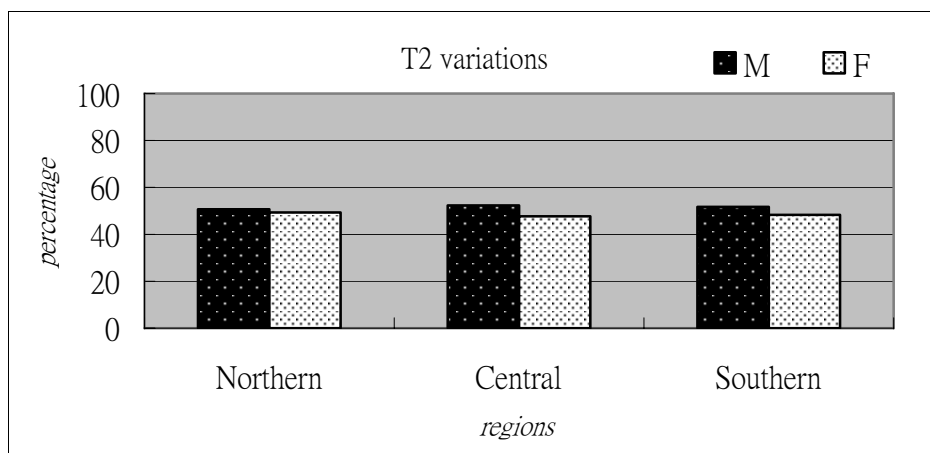

Fig. 32 The percentage of the variation in the three regions with regard to genders.

3.5 Summary

Through the three experiments, T2 in various conditions are examined: in different syntactic units (isolated words, disyllabic expressions and sentences), in different vowels ([i],[a],[u]), with different preceding tones (high-ending and low-ending tones), in different sentence positions (sentence-medial and sentence-final), in different language backgrounds (monolinguals and bilinguals), in different genders and in different regions (the northern, the central and the southern part of Taiwan). Each condition shows particular impact on T2 variations. In general, the significant findings are as follows:

1. In different **syntactic units**:

    (1) T2 variations occur less often than the normal T2 (NR) in isolated words, but more often than NR in disyllabic expressions and sentences. The

percentages of the variations increase as the syntactic units become larger.

These distributions in the three syntactic units can be seen in Figure 33.
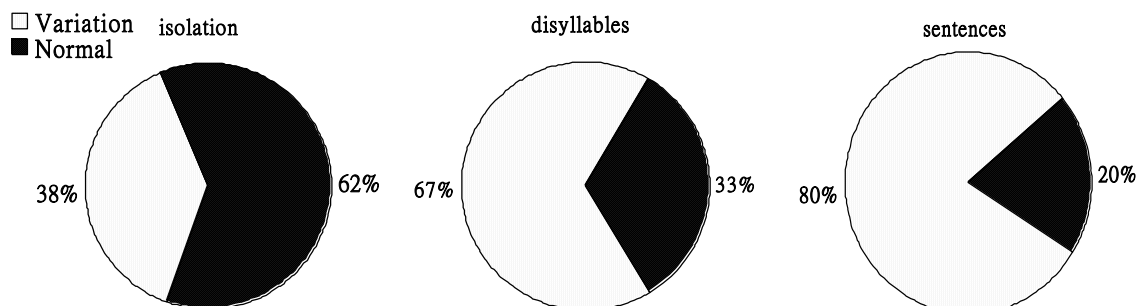

Fig. 33 The distribution of the normal T2 and the T2 variation in three different syntactic units

(2) Within the variations, the percentages of Level are always higher than

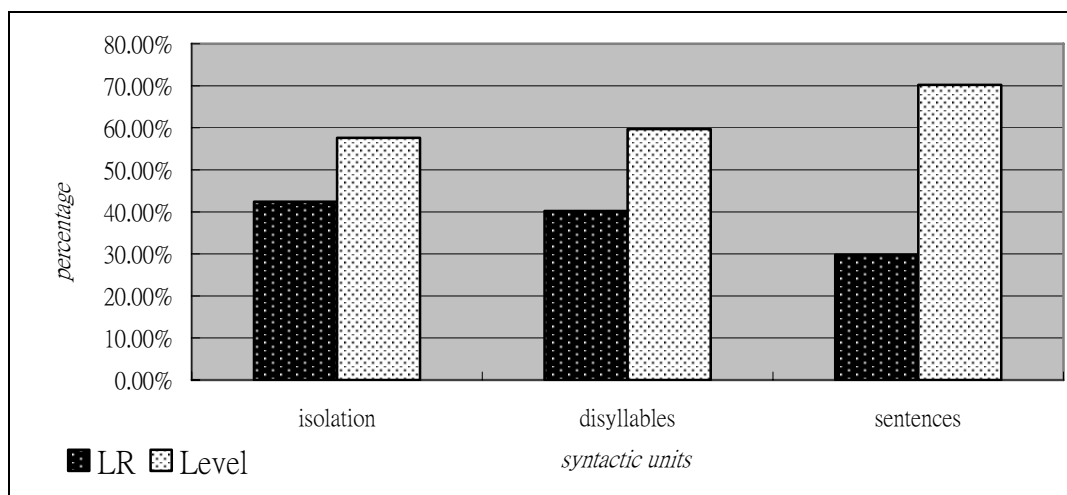those of LR in the three syntactic units, as shown in Figure 34.

Fig. 34 The distribution of LR and Level in three different syntactic units

2. In different **vowels**:

The low vowel [a] carries more T2 variations (both LR and Level) than the

high vowels [i] and [u].

3. With different **preceding tones**:

T2s with the high-ending preceding tones have a higher percentage of

variations, especially the variant Level, while T2s with the low-ending preceding tones have fewer variations, especially LR.

4. In different **sentence positions**:

    T2s in the sentence-medial position have a higher percentage of Level than the sentence-final position and T2s in the sentence-final position have more LRs than the sentence-medial position.

5. In different **language backgrounds**:

    Bilinguals have more variations, especially the variant LR, than monolinguals. But the speakers of both language backgrounds have equally high percentage of Level. The details of the difference in different syntactic units can be seen in Table14.

Table 14 The distribution of monolinguals and bilinguals in LR and Level.

	Isolated words	Disyllabic expressions	sentences
Within LR	b>m (65.7>34.3)	b>m (51.7>48.3)	b>m (61.2>38.8)
Within Level	b≈m (50.5, 49.5)	b>m (53.7>46.3)	b≈m (50.5>49.5)

Note: b=bilinguals, m=monolinguals, ">" means "higher than," "≈" means "almost equal to."

6. In different **genders:**

    In disyllabic and in sentence conditions, males have more Level T2s than females, while females have more LR T2s than males. In total, males have more variations, as shown in Figure 35.
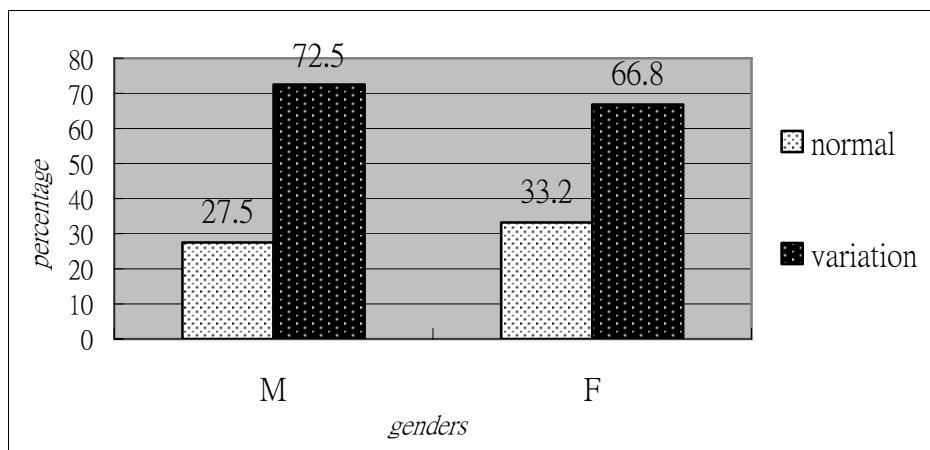
Fig. 35 The distribution of the total NR and the variation of males and females

7. In different **regions**:

The region difference only exists in the sentence level. The southern subjects have the highest percentage of Level, the central subjects have the second high percentage, while the northern subjects the lowest. The ranking of LR is on the contrary to that of Level. This shows that in sentence conditions, the central and southern subjects perform a more flat T2 than the northern subjects.

The possible explanations of the results and the comparisons with previous studies will be presented in the next chapter—Discussion.