

An Electropalatographic Study of English *l*, *r* and the Korean Liquid Sound ㄹ*

Soo-Woong Ahn**

ABSTRACT

The pronunciation of English *l* and *r* was a consistent problem in learning English in Korea as well as Japan. This problem occurs from the fact that in Korea and Japan there is only one liquid sound. Substituting the Korean liquid for English *l* and *r* was a common error. The pronunciation of the dark *l* causes a further problem in pronouncing the English *l* sound. To see the relationship between the English *l*, *r*, and the Korean liquid sound, an electropalatographic (EPG) experiment was done. The findings were (1) there were no tongue contacts either on the alveolar ridge or on the palate during the articulation of the dark *l*. (2) The Korean liquid sound was different in the tongue contact points either from English *l* or *r*. The English clear *l* consistently touched the alveolar ridge in the forty tokens, but the Korean liquid sound in the intervocalic and word-final position touched mainly the alveopalatal area. The English *r* touched exclusively the velum area. The Korean intervocalic /l/ was similar to English flap in EPG and spectrographic data. There was evidence that the word-final Korean /l/ is a lateral.

Keywords : electropalatographic (EPG), electrodes, pseudopalate, Korean liquid, English dark-*l*

1. Introduction

This paper purports to clarify the relationship between *l*, *r* and the Korean liquid sound through the electropalatographic (EPG) study. One of the major problems in pronouncing English in Korea is the learners' substituting the Korean liquid sound for English *l* and *r*. The same problem was also found in Japanese learners' English pronunciation. Riney, Takada and Ota (2000) found that Japanese individuals' percentages of flap substitutions ranged from 0.4% to 77.8% for all attempts at English liquids. Their prin-

* This work was supported by Korea Research Foundation Grant (KRF-99-041-A00003). I thank professor Bruce Hayes at UCLA linguistics department for kindly being my subject using his own pseudopalate in my EPG experiment. I also thank Taehong Cho for being my subject using his own pseudopalate and helping me to use the palatometer at UCLA phonetics laboratory.

** Division of the English Language and Literature, Pukyong National University.

cipal finding was a strong negative correlation ($r=-0.805$) between percentages of Japanese flap substitution and accent ratings (p. 711). This meant that the higher the rating of Japanese learners' substitution of Japanese flap for the English liquids was, the heavier their foreign accent was.

One persistent problem in Korean learners' pronunciation of English was mispronunciation of the dark-*l* sound as in words *elm*, *film*, *pulp*, etc. Some phonetics books give confusing figures or explanations for the articulation of the dark-*l*. For instance, Daniel Jones(1957) recognizes that acquiring the pronunciation of dark *l* is "often a matter of considerable difficulty to most foreign people" (p. 177). He recommends,

The best way of obtaining it is to place the tip of the tongue between the teeth in the lateral position and, while the tip of the tongue is pressed firmly against the upper teeth, to try to pronounce the vowel *u* without rounding the lips (Jones, 1957, p. 177).

The misleading point in Jones's explanation is the contact of the tongue against the upper teeth. It was found that this doesn't work and has not worked in teaching this sound to Korean learners.

The figures of the tongue position of the dark *l* in some phonetics books are misleading the learners. For example, Bronstein (1960, p. 127), Gimson (1972, p. 202), Ward (1956, p. 141) and a figure from the UCLA phonetics laboratory show figures of the dark *l* in which the tongue tip touches the alveolar ridge. But this information conflicts with the explanation that the dark *l* is vocalized and realized as a back vowel /o/ or /u/ (Wells, 1982, p. 95, 259).



FIG. 34. Tongue position for dark /l/.

Figure 1. dark *l* in Bronstein (1960, p. 127)

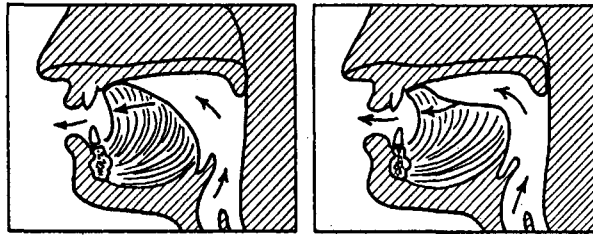
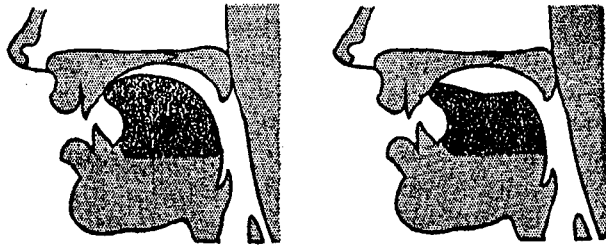


FIG. 41.—/l/; clear [l].

FIG. 42.—/l/; dark [ɫ].

Figure 2. clear and dark *l* in Gimson (1972, p. 202)



34 (a) clear l

34 (b) dark l

Figure 3. clear and dark *l* in Ward (1956, p. 141)

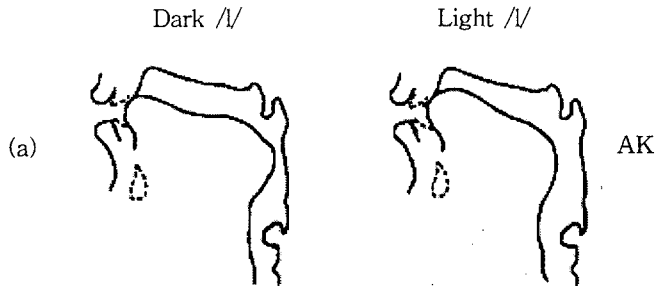


Figure 4. clear and dark *l* (from UCLA phonetics laboratory)

If the dark *l* is vocalized to /o/ or /u/, and if the best way to teach the dark *l* to learners of English as a second/foreign language is to vocalize it, then the pictures in Figures 1, 2, 3, and 4 are misleading. This study wanted to clarify this matter by the EPG experiment.

Another question on both English and Korean liquid sounds is the relationship between them. A general perception of the Korean intervocalic liquid is that it is closer to English /r/. That's why the letter *r* is used in romanizing it. In the EPG experiment, the Korean intervocalic liquid will be compared with English *l* and *r*.

This paper has the following research questions:

Research Question 1: This study wanted to see the degree of contact of the tongue on

the alveolar ridge or the palate during the articulation of dark-*l*, compared with that of clear-*l* and /r/.

Research Question 2: This study wanted to see whether the intervocalic Korean liquid sound (ㄹ) is closer to English /l/ or /r/ or whether it is closer to the English flap.

2. Method

An EPG method was used. Three subjects who owned the pseudopalate participated in the experiment. One native American speaker (named BH) pronounced English words which contained English flaps, *l* and *r* sounds. Two native Korean speakers (named AH and TH) pronounced Korean words which contained the intervocalic and word-final Korean liquid (ㄹ). Wearing the pseudopalate, each subject pronounced each sentence that contained the target word five or ten times. The palatometer was used to get the tongue contact points on the palate. The experiment was done at the phonetics laboratory at the Department of Linguistics of the University of California at Los Angeles.

The sentences that contained the target words for the experiment of English flap, /l/, and /r/ were as the following (The number in the parenthesis shows the times that the sentence was pronounced.):

- | | | |
|---|------|-------------|
| 1) Say <i>pity</i> Dad. | (5) | /r/ |
| 2) Charge the <i>battery</i> . | (5) | /r/ |
| 3) It stops <i>matter</i> ing. | (5) | /r/ |
| 4) <i>Jerry</i> likes <i>jelly</i> and <i>bread</i> . | (5) | /l/ and /r/ |
| 5) He <i>lied</i> about the long <i>ride</i> . | (5) | /l/ and /r/ |
| 6) We saw a <i>palace</i> in <i>Paris</i> . | (5) | /l/ and /r/ |
| 7) He left a <i>rake</i> near the lake. | (5) | /l/ and /r/ |
| 8) Say <i>black</i> Dad. | (10) | /l/ |
| 9) Say <i>lock</i> Dad. | (10) | /l/ |
| 10) Say <i>rock</i> Dad. | (10) | /r/ |
| 11) Say <i>elm</i> Dad. | (10) | /r/ |
| 12) Say <i>pulp</i> Dad. | (10) | /r/ |
| 13) Say <i>Paul</i> Dad. | (10) | /r/ |

The target words for the Korean liquid sound were in sentences as the following (The number in the parenthesis shows the times that the sentence was pronounced.):

- 1) *pili* (flute)lul bulgo (blow a flute) (10)
- 2) *dali* (leg)ga gilgo. (10)
- 3) malbeol han *mali* (unit for counting animals) (10)
- 4) balgeun *dal#* (moon) (10)

3. Results and Discussions

3.1 Comparison of English clear and dark l, and r by EPG: Research Question 1

The tongue contact points for clear *l* was clearly on the alveolar ridge. The electrodes that were activated for clear-*l* were 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 in the 40 tokens in the words *jelly, lied, lake, palace, black and lock* as shown on Figure 6. There were no tongue contacts at all for the dark-*l* either on the alveolar ridge or on the palate in all 30 tokens of pronouncing *elm, pulp and Paul* as shown on figures 7, 8, and 9. A complete vocalization theory of the dark *l* (Wells, 1982, p. 95, 259) was supported. This shows that the part of the figures 1, 2, 3, and 4 where the tongue tip touches the alveolar ridge gives misleading information for learners of English. For the /r/ sound, the tongue contact points were mainly on the velum in the words *Jerry, ride, rake, Paris, bread and rock*. The electrodes activated were on 65, 67, 69, 74, 76, 78, 83, 85, 87, 95, 96, 63, 66, 68, 72, 75, 77, 82, 84, 86, 90, 91 (Table 1).

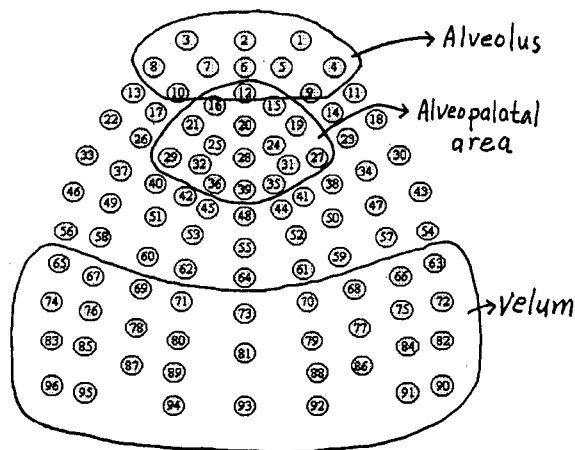


Figure 5. Default layout of electrodes with regions exemplified

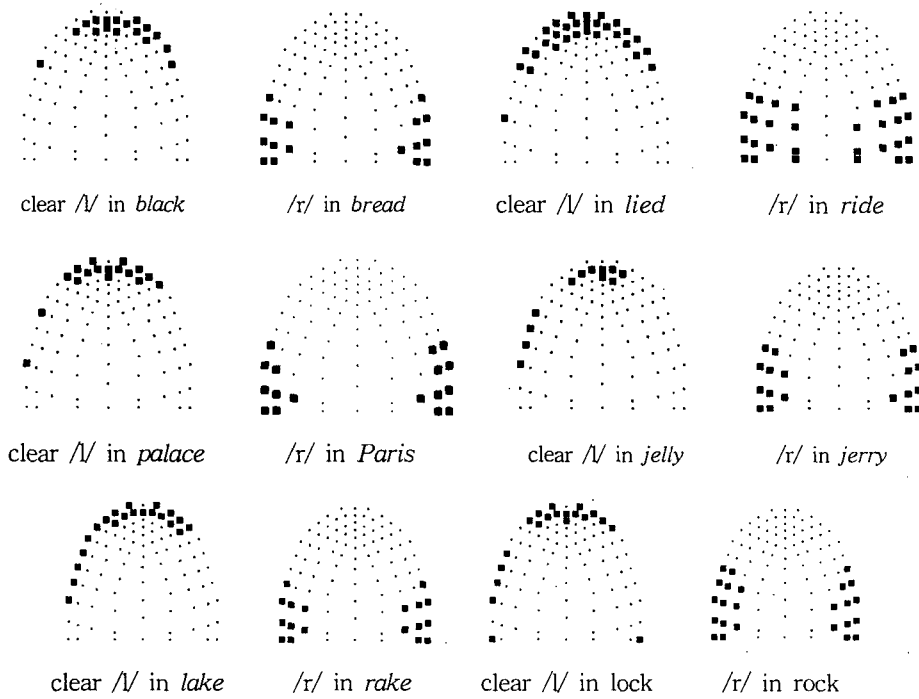


Figure 6. The EPG data of English *l* and *r* in pairs of words *black/bread*, *lied/ride*, *palace/Paris*, *jelly/Jerry*, *lake/rake* and *lock/rock* spoken by a native English speaker BH

Table 1. The number of contacts of the tongue to each electrode on the alveolus and the palate for English *l* and *r*

electrodes words(tokens)	alveolar ridge										alveopalatal area											
	1	2	3	5	6	7	9	10	12	15	16	19	20	21	24	25	28	31	32	35	36	39
jelly(BH)(5)				5	2	4	4	5	5	4	1											
lied(BH)(5)	3	1	1	5	5	5	5	5	5	2	3											
palace(BH)(5)	2		2	5	5	5	5	5	5													
lake(BH)(5)	3		3	5	5	5	5	5	3													
black(BH)(10)			2	10	10	10	10	10	10	10	10											
lock(BH)(10)	4		3	10	9	10	10	10	10	8	2											
Jerry(BH)(5)																						
ride(BH)(5)																						
Paris(BH)(5)																						
rake(BH)(5)																						
bread(BH)(5)																						
rock(BH)(10)																						

* Speaker: BH (native English speaker)

electrodes words(tokens)	velum																					
	65	67	69	74	76	78	83	85	87	95	96	63	66	68	72	75	77	82	84	86	90	91
jelly(BH)(5)																						
lied(BH)(5)																						
palace(BH)(5)																						
lake(BH)(10)																						
black(BH)(10)																						
lock(BH)(10)																						
Jerry(BH)(5)	5	5	2	5	5	5	5	5	5	5	5	5	4	1	4	5	2	5	5	5	5	5
ride(BH)(5)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Paris(BH)(5)	4			5	5	3	5	5	5	5	5	4	4		5	5		5	5	5	5	5
rake(BH)(5)	5	5	5	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	5	5	5	5
bread(BH)(5)	4	4	1	5	5	5	5	5	5	5	5	5	5		5	5	4	5	5	5	5	5
rock(BH)(10)	10	10	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

* Speaker: BH (native English speaker)

Figure 7 shows that there are no alveolar contacts of the tongue tip and that the raising of the back of the tongue is not high enough to touch the velum in the pronunciation of dark *l*. The same phenomenon is seen in Figures 8 and 9. This gives important information for the teachers of English that the figures 1, 2, 3, and 4 above are clearly misleading.

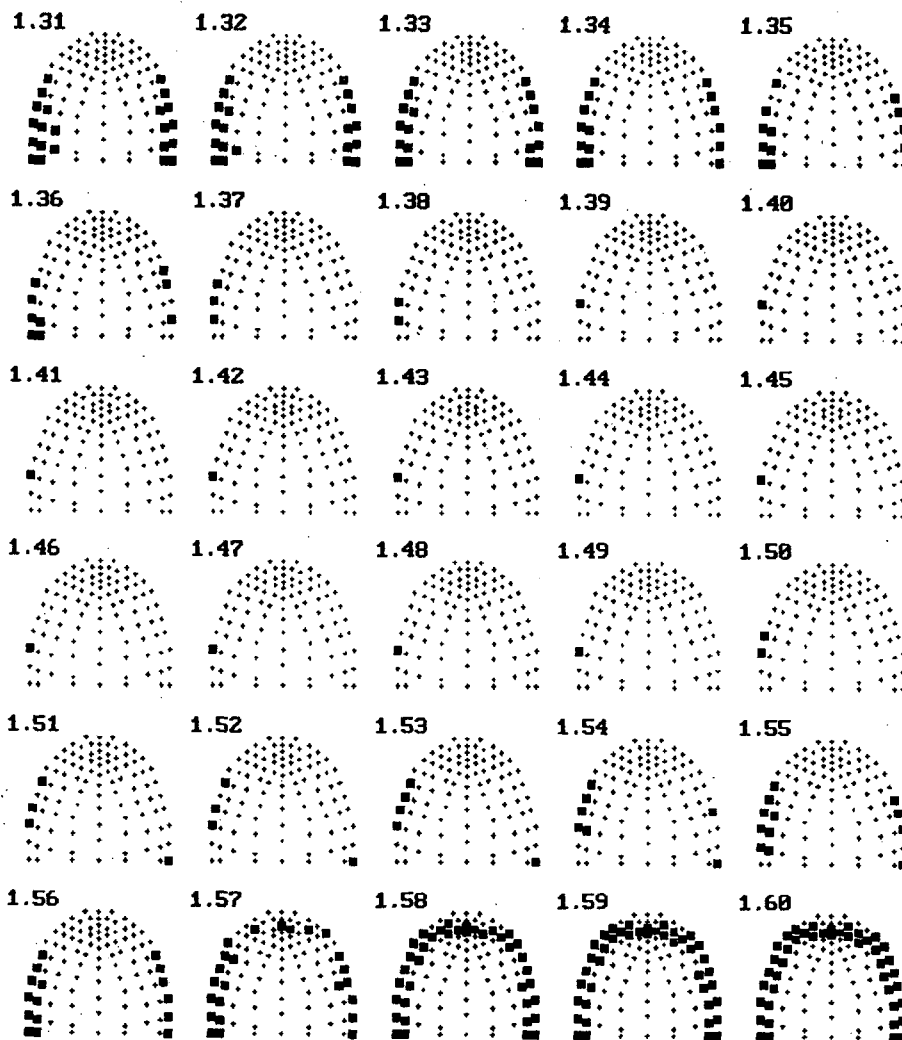


Figure 7. dark [ɫ] in *elm*

This figure shows [ɫmɔd] in the whole utterance [seɪɫmɔdæd]. The vowel at 1.31 ms is /ɛ/ in *elm*. The period 1.39 ms-1.50 ms is [ɫm]. There is no alveolar or palatal contact during this period. From 1.51 ms the tongue rises for the alveolar contact for /d/ in *Dad*.

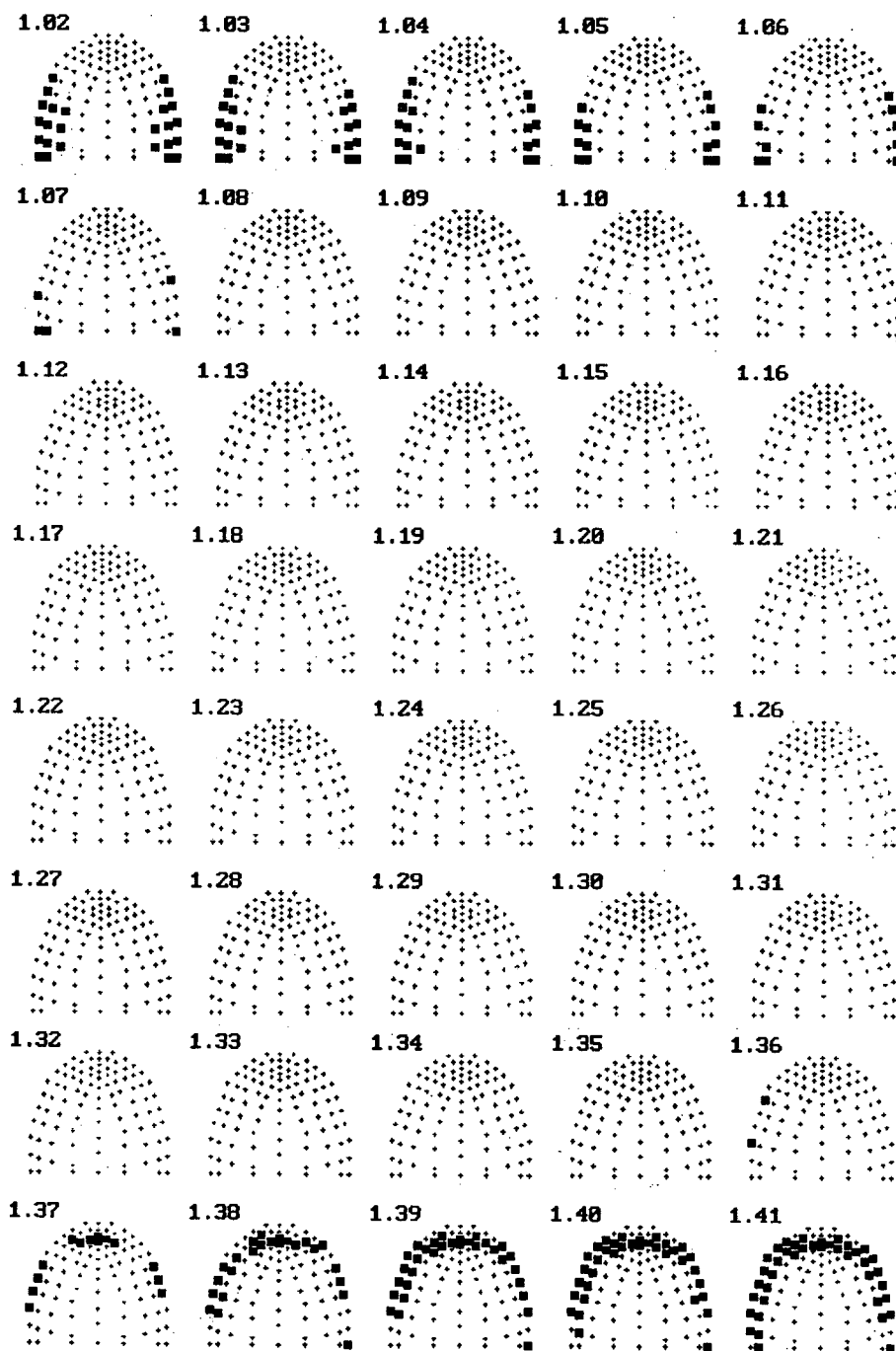


Figure 8. dark [ɫ] in *Paul*

This figure is [ɪpɔɫd] from the whole utterance [sɛpɔɫdæd]. The vowel at 1.02 ms is /ɪ/ in *Say*. The period of 1.08 ms-1.36 ms is [pɔɫ] during which time there is no alveolar or palatal contact. From 1.37 ms, the tongue rises for alveolar contact for [d] in *Dad*.

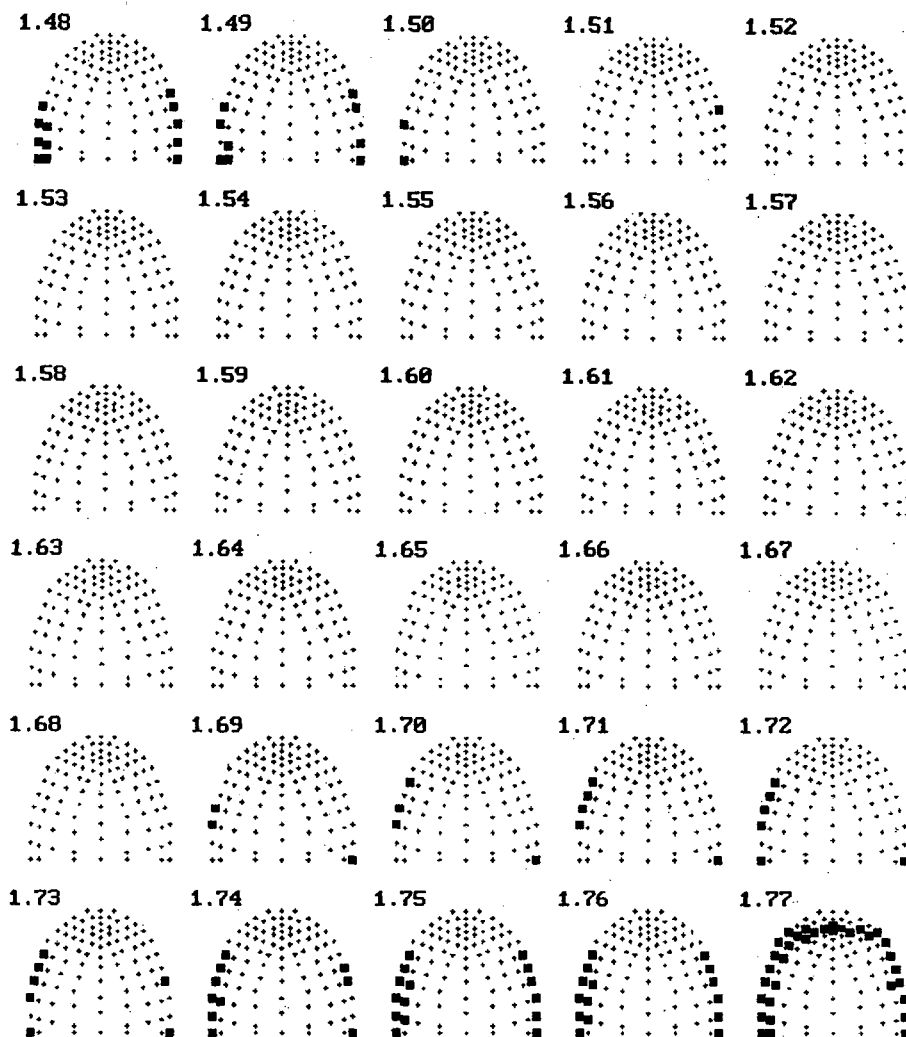


Figure 9. dark [ɫ] in *pulp*

This figure is [ɫpɫpɫd] from the whole utterance [seɪpɫpɫdæd]. The vowel at 1.48 ms is /ɪ/ in *Say*. The period of 1.50 ms-1.69 ms is [ɫpɫ] during which there is no alveolar or palatal contact. From 1.70 ms, the tongue rises for alveolar contact for [d] in *Dad*.

3.2 Comparison of the Korean liquid /l/, English l and r: Research Question 2

The Korean liquid sound was not similar to either English *l* or *r*. It behaved rather like an English flap in tongue contact points. For English /l/ the tongue contacted clearly the alveolar ridge (Table 1), but for the Korean /l/ the tongue contacted mainly the alveopalatal area as shown on Figure 10. The electrodes that were activated for the Korean liquids were mainly 12, 15, 16, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 31, 32, 35, 36, 39 (Table 2). These were similar to the tongue contact points of the English flap as

shown on Figure 11 and Table 2. The tongue contact points for the English /r/ were mainly on the velum as shown on Figure 6. In pronouncing an English flap and Korean intervocalic /l/ in such words as English *pity* and Korean *pili* (flute), the tip of the tongue contacted the alveopalatal area and the sides of the tongue contacted the palate. This was the same with other flaps in English words *battery* and *matter* and Korean words *dali* (leg) and *mali* (unit for counting animals). The Korean /l/ in the word-final position was a clear l with the sides of the tongue open, as shown in the word *dal#* (moon) in Figure 10. This result supports Park's study (1999) that reports that the Korean intervocalic /l/ is a flap [ɾ] and the word-final /l/ is an alveolar lateral [l] (p. 89; Lee, 2001). But in this study, all 20 tokens of the word-final /l/ in *dal#* show that it is an alveopalatal lateral rather than an alveolar lateral.

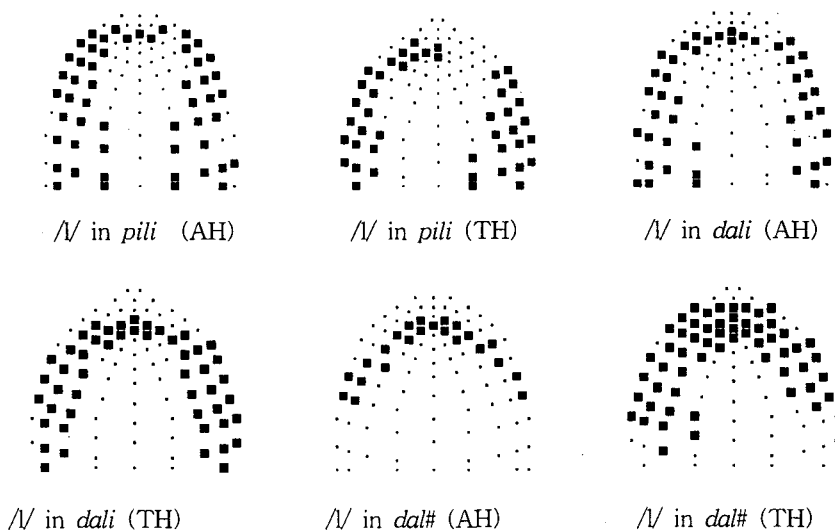


Figure 10. The EPG data of the Korean liquid /l/ in intervocalic positions in *pili* (flute), *dali* (leg) and in word-final position *dal#* (moon) by two native Korean speakers named AH and TH.

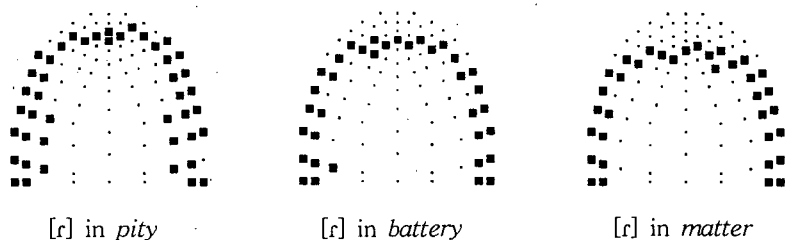


Figure 11. The EPG data of the English flap in *pity*, *battery*, and *matter* by a native English speaker named BH

Table 2. The number of contacts of the tongue to each electrode in the pronunciation of the Korean liquid and English flap

electrodes words(tokens)	alveolar ridge										alveopalatal area													
	1	2	3	5	6	7	9	10	12	15	16	19	20	21	24	25	27	28	29	31	32	35	36	39
pity(BH)(5)							4	3	5	5	4	1	3	2										
battery(BH)(5)									1			3	3	3	5	3		1						
matter(BH)(5)															5			3						
pili(AH)(10)			2				1	1	8	1	1													
pili(TH)(10)		1			2	2			10	1	8		5	6										
dali(AH)(10)									9	8	7	3	6	4		2								
dali(TH)(10)							1	1	9	9	10	4	8	8	5	8		1						
mali(AH)(10)		1		1					7	8	8	7	8	7	1	3								
mali(TH)(10)							1	1					10		10	10		9		7	10		1	1
dal#(AH)(5)									1	2	1	1	1	1	3	3	2	4	2	4	3	5	5	4
dal#(TH)(5)							1	1	1	4	4	5	5	5	4	5	1	2	1	1	1	1	1	1

* pili(flute), dali(leg), mali (unit of counting animals), dal# (moon)
 AH, TH: native Korean speakers

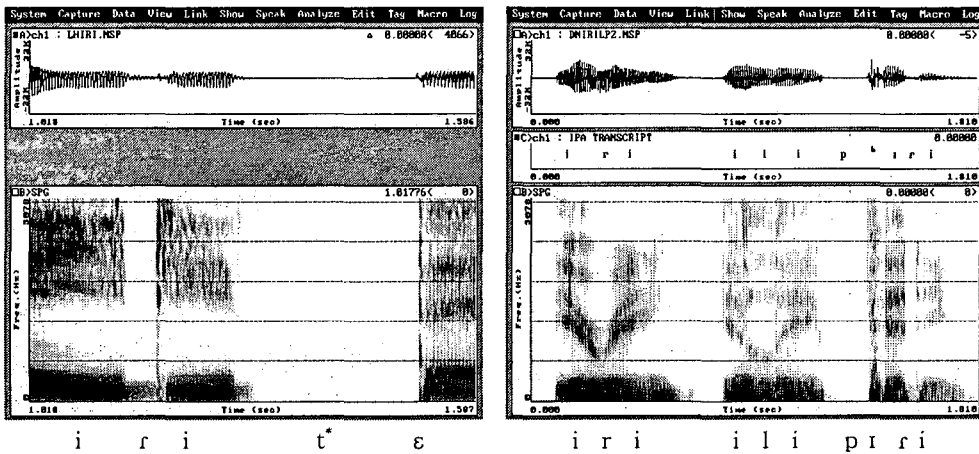


Figure 12. Spectrographs of Korean *ilite* [irit*ε] (group of wolfs) and nonsense English words *iri*, *ili* and an English word *pity*

The spectrographs in Figure 12 show the similarity between the Korean intervocalic /l/ in the Korean word *ilite* [irit*ε] (group of wolfs) and an English flap in the word *pity* which are compared with English *r* and *l* in the nonsense English words *iri* and *ili*.

4. Conclusion

The EPG data showed that there were no tongue contacts either on the alveolar ridge or on the palate during the articulation of English dark-*l*. The Korean lateral sound behaved differently according to the environments. In the intervocalic position, it behaved neither like English /*l*/ nor /*r*/. It is completely different from both of them. The tongue contact points of English /*l*/ are clearly on the alveolar ridge but those of the Korean liquid were consistently on the alveopalatal area. The intervocalic Korean liquid was similar to English flap in the EPG and spectrographic data, but the word-final Korean liquid was a lateral. This study supports Park's study (1999) that reports that the Korean /*l*/ is a flap in the intervocalic positions and that it is a lateral in the word-final positions. The tongue contact points of English /*r*/ were always on the velum. This rejects the common belief that the intervocalic Korean liquid is similar to English /*r*/.

It is suggested that in teaching English, teachers should keep in mind that the Korean intervocalic liquid is completely different from English /*r*/ and that English dark *l* can be produced better by vocalizing it to /*o*/ or /*ʊ*/ rather than showing the misleading pictures in Figures 1, 2, 3, and 4.

References

- Bronstein, A. J. 1960. *The pronunciation of American English*. New York: Appleton-Century-Crofts. Inc.
- Gimson, A. C. 1972. *An introduction to the pronunciation of English*. London: Edward Arnold.
- Kang, H.-S. 1999. "Production and perception of English /*r*/ and /*l*/ by Korean learners of English: An experimental study." *Speech Sciences*, 6, 7-24.
- Jones, D. 1957. *An outline of English phonetics*. Cambridge: W. Heffer & Sons LTD.
- Lee, S. O. 2001. A study on frequencies of Korean phonemes and allophones. *Proceedings of the 10th national conference on speech sciences*, 13-27. Seoul: Korean Association of Speech Sciences.
- Park, S.-G. 1999. "/*l*/ and /*r*/ production by Korean and Japanese speakers of English: What factors are influential for the production?" *Malsori*, 37, 87-118.
- Riney, T., M. Takada, and M. Ota. 2000. "Segmentals and global foreign accent: the Japanese flap in EFL." *TESOL Quarterly*, 34(4), 711-737.
- Ward, I. C. 1956. *The phonetics of English*. Cambridge: W. Heffer & Sons Ltd.
- Wells, J. C. 1982. *Accents of English 1: An introduction*. Cambridge: Cambridge University Press.

Received : 2001. 4. 26.

Accepted : 2001. 5. 23

▲ Soo-Woong Ahn

Division of the English Language and Literature, Pukyong National University
599-1 Daeyondong Namgu Pusan 608-737, Korea

Tel : +82-51-620-6681

Fax : +82-51-628-2791

E-mail : swahn@pknu.ac.kr