The effects of glottal finals on pitch in SEA languages

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0. Introduction

According to a well known "tonogenesis" hypothesis (Haudricourt,1954;Matisoff,1973) , languages which are originally toneless may gradually developed tone in there phonological system. The contrastive tones emerge as a result of a loss of final laryngeal consonants and a shift of voicing state of the syllable initial consonants. It was suggested that, laryngeal finals affect the contour of the preceeding vowel pitch i.e. a final glottal stop tended to produce a rising pitch; a final glottal fricative a falling pitch and syllable initials affect the register (pitch height) of the following vowel i.e. voiceless initial consonants gave rise to high tones, and voiced initial consonants gave rise to low tones.

It has been noticed that many experiments have been set up to test the effect of syllable initial consonants on Fo of following vowels (see more details in Hombert,1978 ; Hombert et al,1979) and all those experiments have confirmed that there is a consistent interaction of relatively higher Fo with voiceless initials and relatively lower Fo with voiced initials but only a few experiment has been set up to test the effect of laryngeal finals on Fo of the preceeding vowels.And from the auditory judgement , it has been noticed that the pitch pattern of syllables ending in final glottal consonants in several SEA languages do not always reflect the pattern proposed in the theory,the author decided to conduct a study examining the effect of glottal final consonants on Fo values of the preceeding vowels to see if any particular picture would be abstracted from the help of acoustical measurements.

1. Procedure

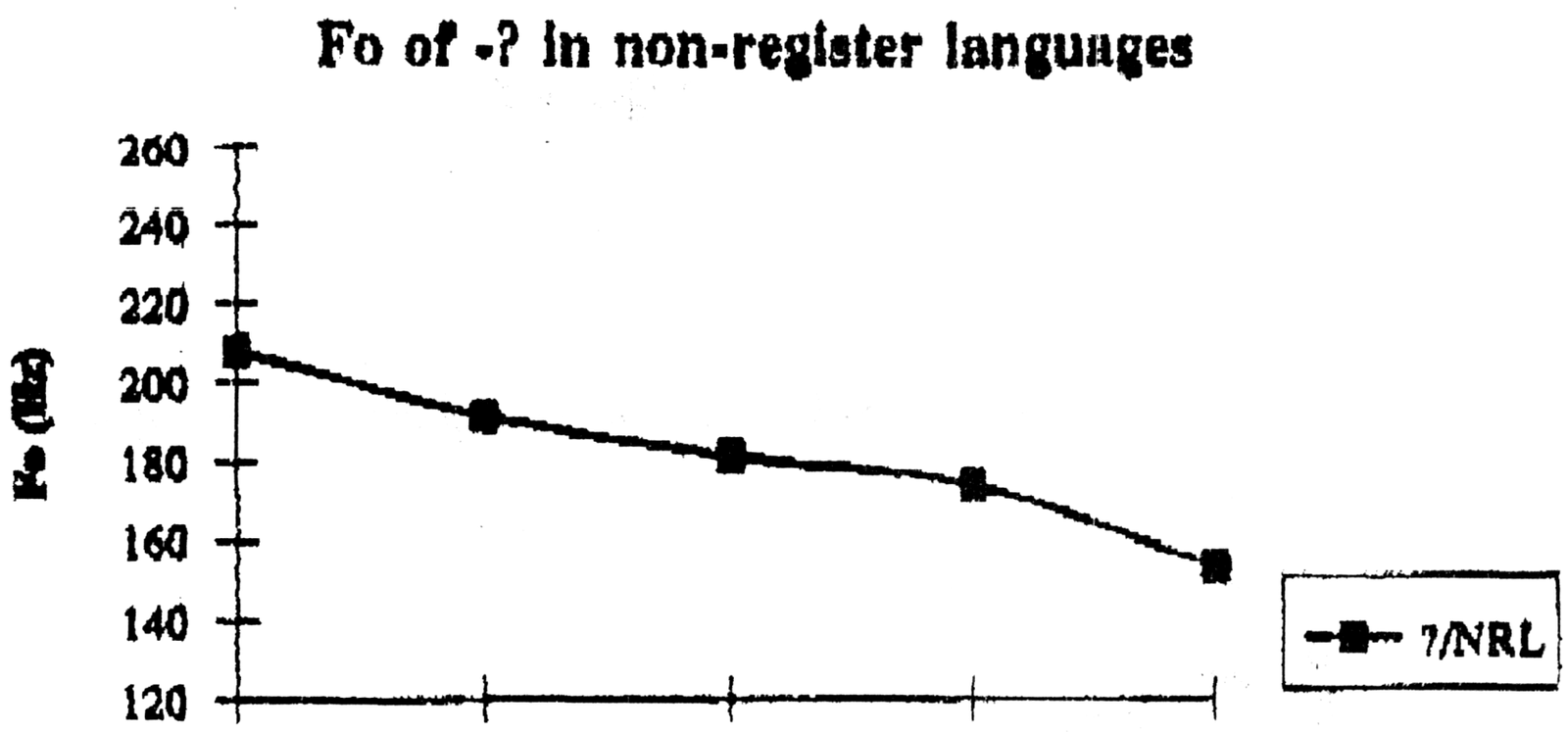
Since the author believes that before developing to a tonal language that particular language must have been in the stage of a 'register-language' or a language with register complex contrast (see Theraphan L- Thongkum,1984) ,the languages chosen as sources of the data are 6 SEA non-tonal languages comprising 3 register languages (Mon, Khmu and So) and 3 non- register languages (Lavue, Moken and Urak Lawoi').Five subjects from each language participated in the study.The wordlist in each language consisted of 4-6 real word XVC tokens, where V= any low vowel and C=/h,?/. The tokens were spoken as word in isolation after the reading of its meaning in Thai by the author.Each speaker recorded 4 repetitions of the token sets.Fo was measured using the pitch tracking program in WinCECIL, a speech analysis system produced by the Summer Institute of Linguistics (SIL).Measurements were made at the ending point of each Fo curve (point E) and measured backward into the

Fo curve for 150 ms [1] at 50 ms intervals i.e. at E-50, E-100, E-150 and the last measuring point is the starting point of the Fo curve (point S).The normalized Fo contours indicating the mean Fo values of the vowel preceeding both glottal finals (/-h/ and /-?/) were plotted.The Microsoft Excel were used for averaging and plotting the average Fo contours .

2. Results

The results of the acoustical measurements of Fo contours as influenced by glottal final consonants in the 6 SEA non-tonal languages , illustrated in figures 1-7 below, reflect that the effect of glottal final consonants on Fo contours of the preceeding vowels in this study and the patterns proposed in the theory are not all in agreement. It has been observed that a final glottal stop dose not cause a rising effect but a falling one in all non-register languages , however, a final glottal fricative does cause a falling effect similar to that mentioned in the theory. The Fo contours influenced by a final glottal stop and a final glottal fricative in non-register languages will be illustrated in figure 1 and figure 2 respectively.And the comparison between the two curves will be shown in figure 3.

Figure 1



[1] It has found that the effect of laryngeal consonants will last between 100-200 ms (Ladefoged, Maddieson and Jackson, 1987)

Figure 2

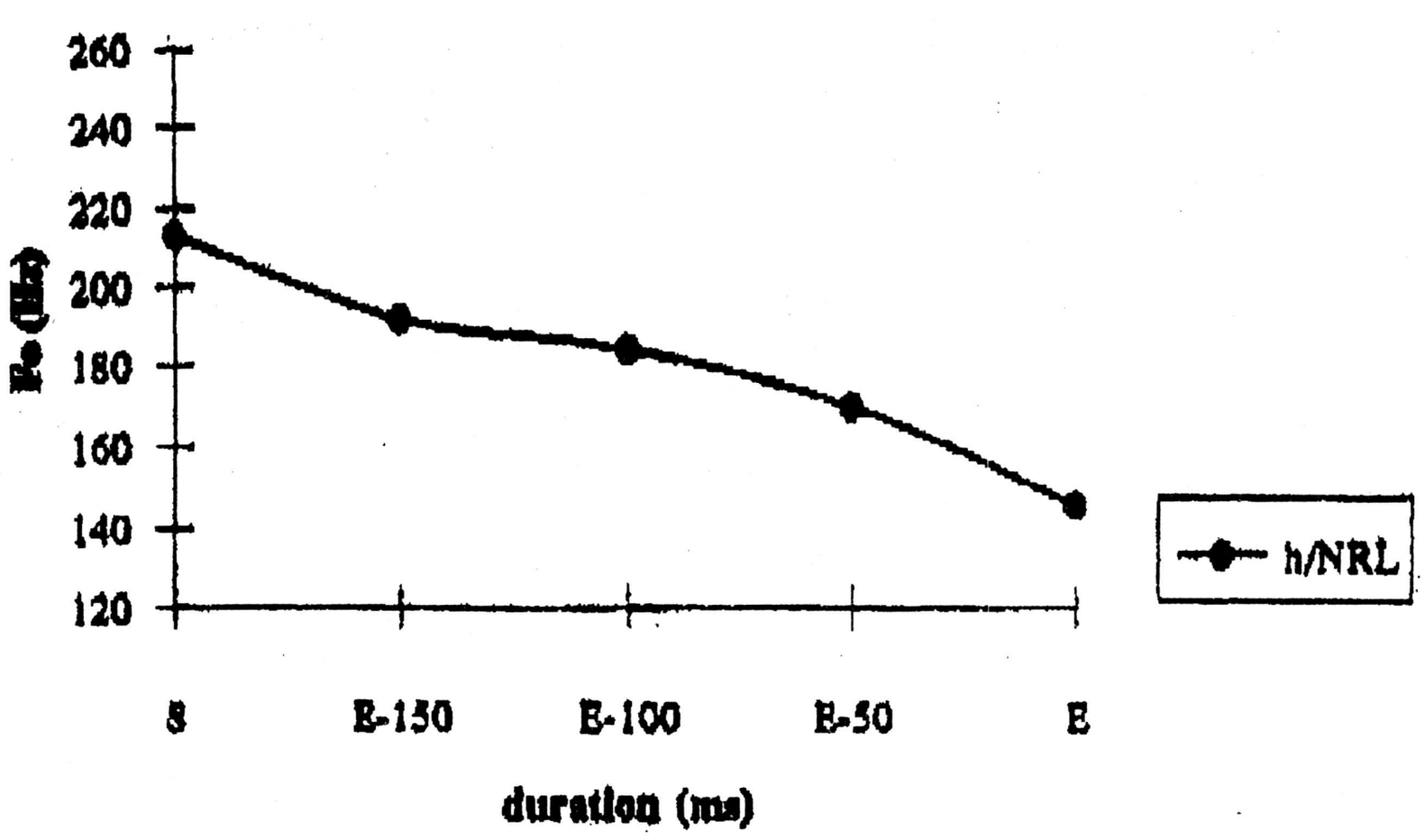
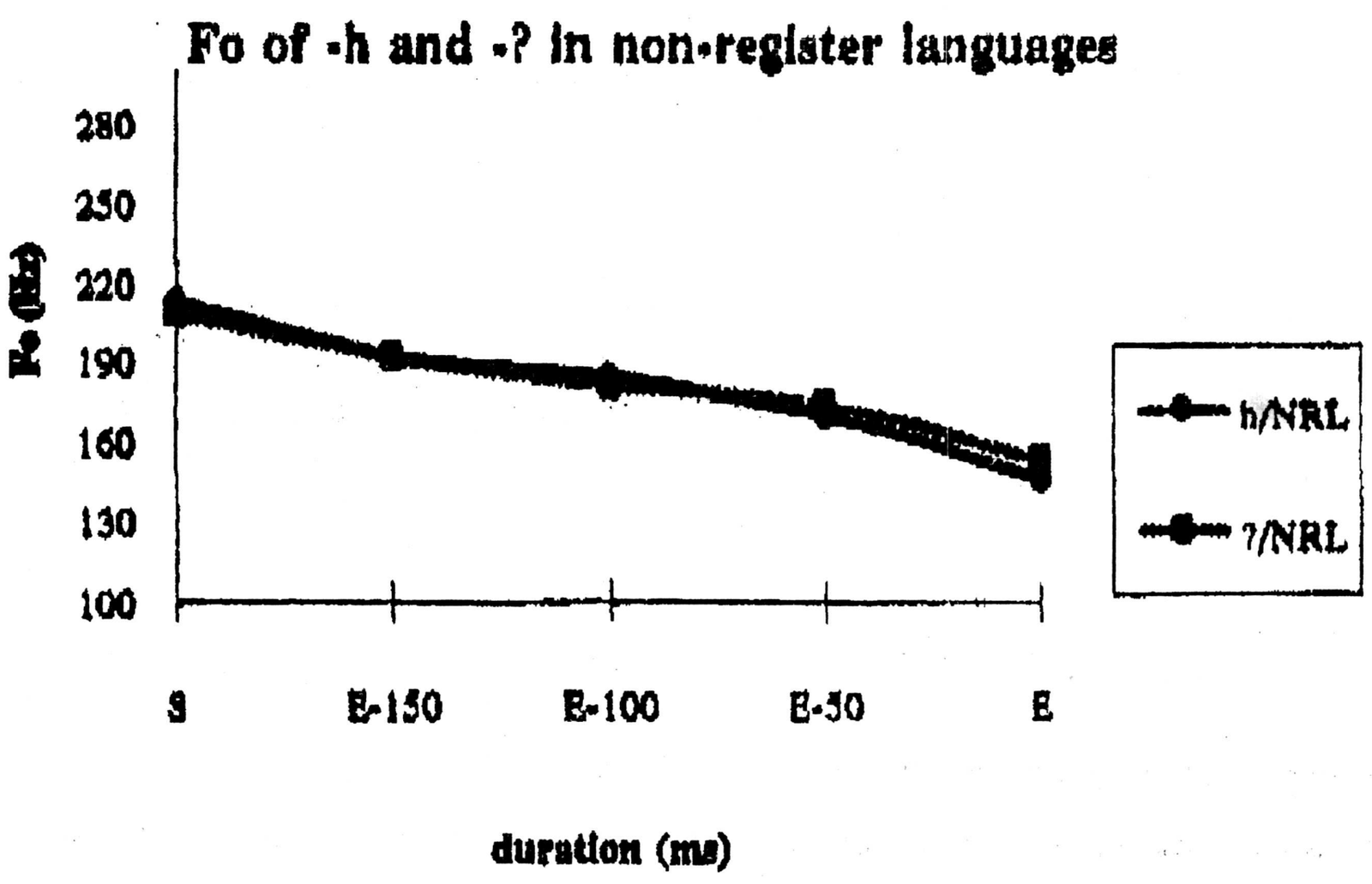


Figure 3



In register languages, the effect of glottal final consonants gave an interesting impression.Both glottal finals cause similar effect on Fo values of the preceeding vowels i.e. rising with final falling contours.It seems that the findings do not agree with what has been suggested in the theory since a final glottal fricative /-h/ gave rise to a rising contour. Though a final glottal stop /-?/ gave rise to a rising contour , it doesnot rise all the way through but closing its contour with a downward glide at its final portion.A completely similar pattern in Kui (a register language spoken in Surin provice) and a somewhat similar pattern in Chong (a register language spoken in Chanthaburi province), is also reported by Theraphan L-Thongkum (L-Thongkum,1989;1991 respectively).What is considered more interesting to the author is that the effect of a final glottal stop /-?/ and a final glottal fricative /-h/ in register languages are much more distinguishable than that in non-register languages.The Fo contours influenced by a final glottal stop and a final glottal fricative in register languages will be illustrated in figure 4 and figure 5 respectively.The comparison between the two curves will be shown in figure 6.

Figure 4

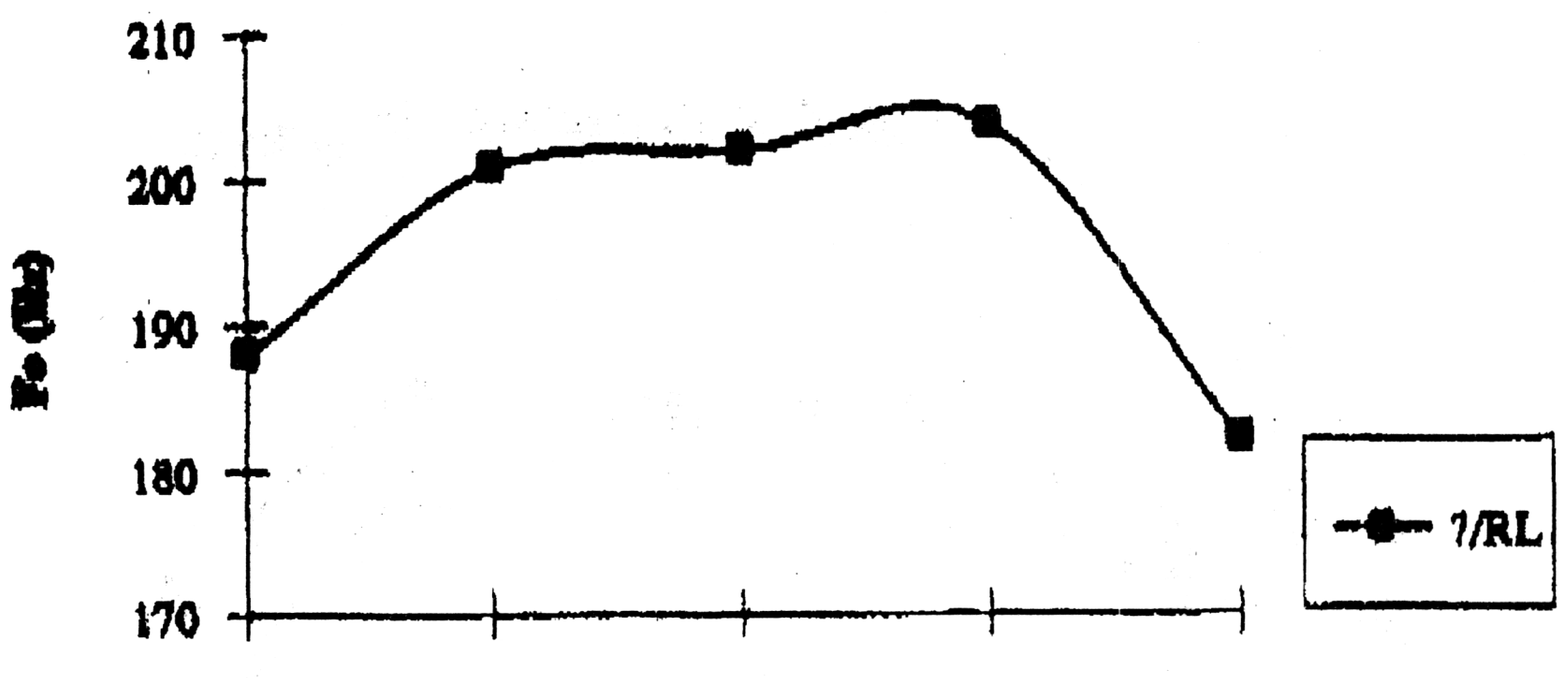


Figure 5

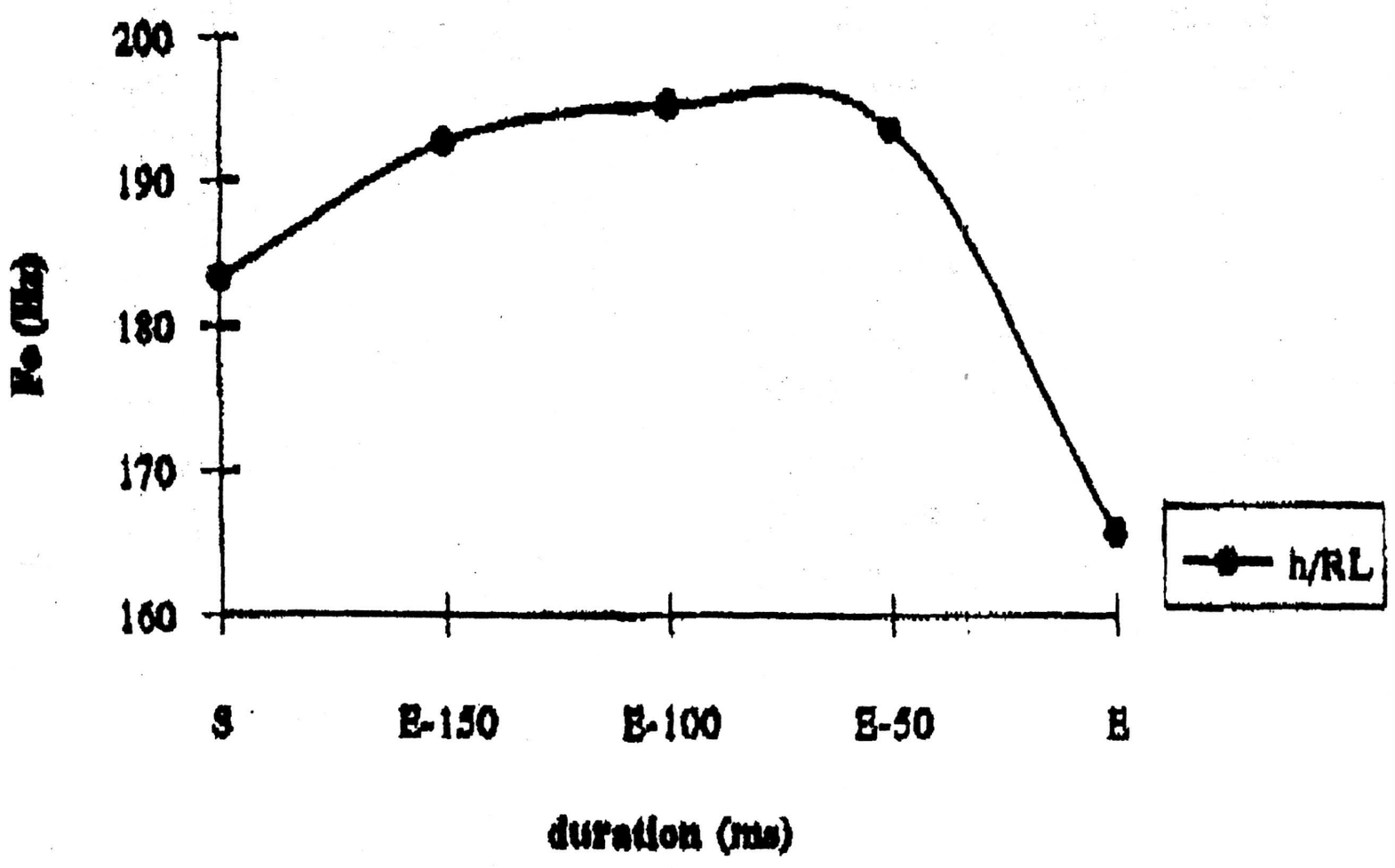
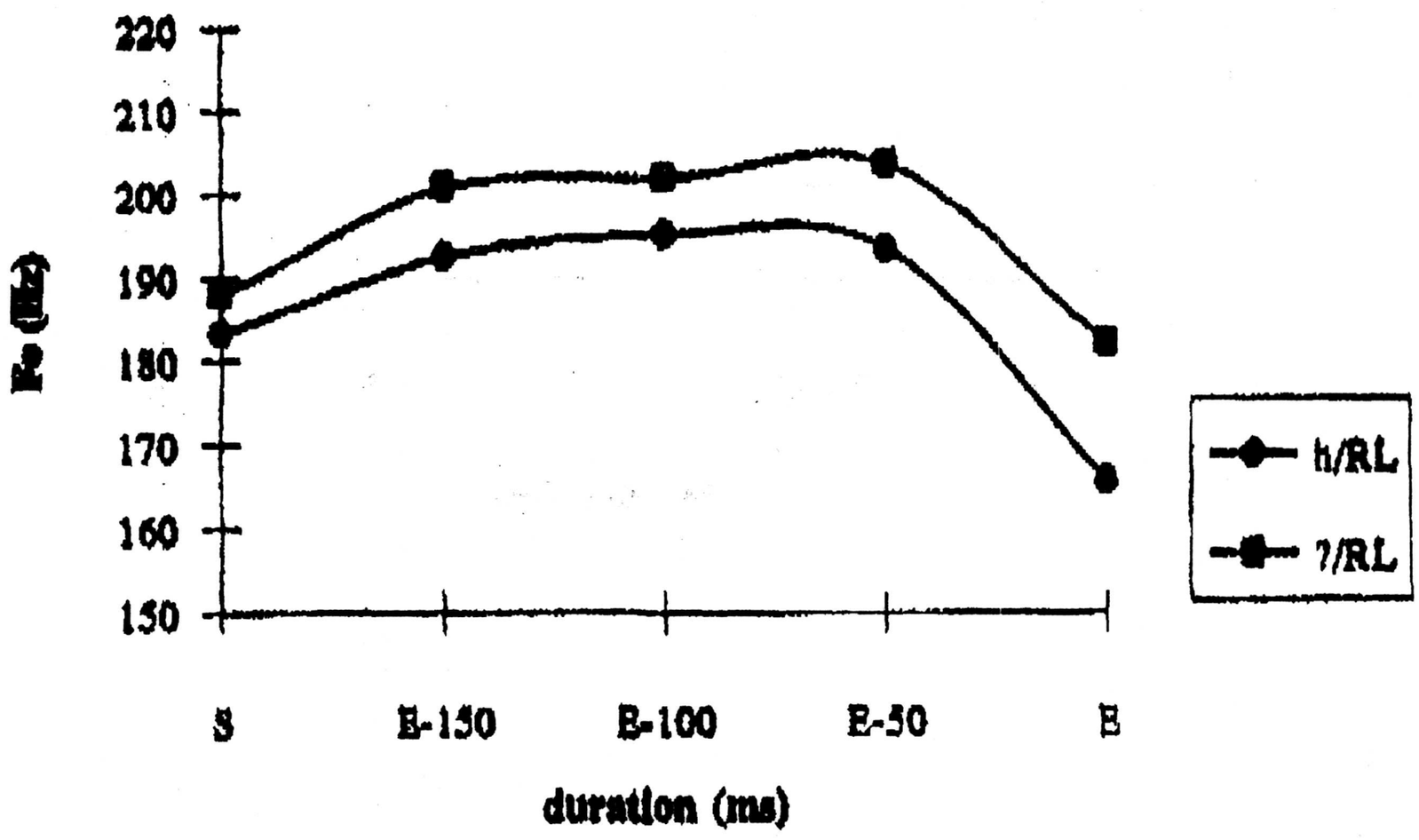
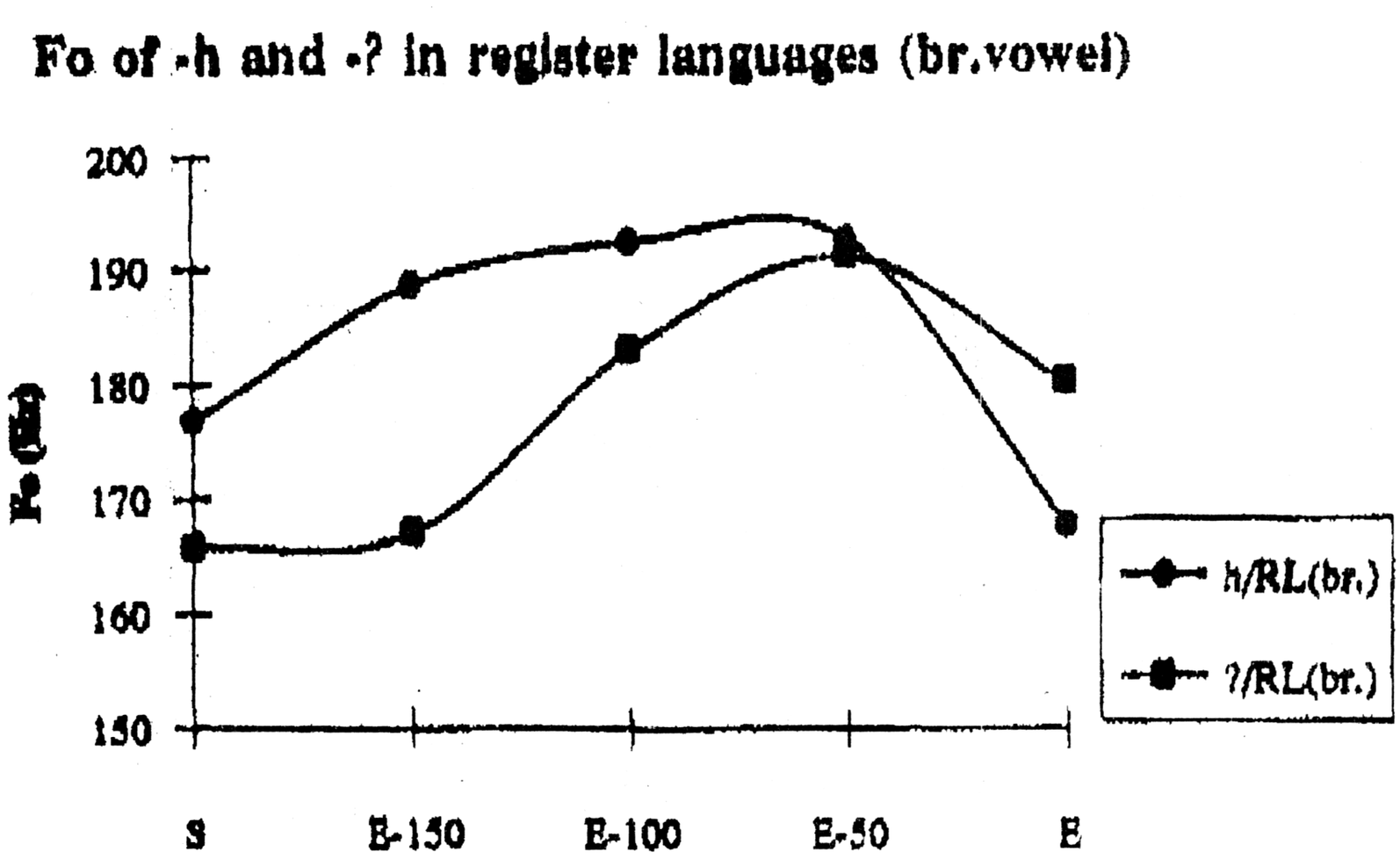


Figure 6



The effect of glottal finals on pitch in non-register languages and register languages shown in figures 1-6 are all measured from words with clear vowels. It might be of interest to see the similar effect in words with breathy vowels.Figure 7 will illustrate the Fo contours caused by /-?/ and /-h/ in words with breathy vowels.

Figure 7



Generally speaking, the effect of /-?/ and /-h/ in register languages as illustrated in figure 6 and figure 7 are somewhat similar. Looking at Fo contours in figure 7 where both glottal finals in words with breathy vowel cause a rising with final falling effect ,it is roughly paralleled to the the rising-falling contours seen in figure 6.But if we look at the contours in detail,we might see some differences between the two figures.In figure 7, the Fo curve of a final glottal stop starts lower than that of a final glottal fricative whereas in figure 6 the Fo curve of a final glottal stop starts higher than that of a final glottal fricative.However, In all compared curves illustrated, it is obvious that the final part of Fo contours influenced by a final glottal fricative ending at a lower level of Fo than that influenced by a final glottal stop.

3. Conclusion and Discussion

From the acoustical measurements conducted in 6 different SEA languages, it is found that laryngeal finals (a glottal stop and a glottal fricative) cause a falling effect on Fo of the preceeding vowels in non- register languages but a rising - falling effect in register languages. Though the experiment conducted by Hombert (1978) on Arabic seems to support the theory,the findings from this study is somewhat different from the patterns mentioned in the theory.Haudricourt gave an explanation for the association of laryngeal finals with rising or falling pitch contours that the pitch drops before a final glottal fricative is the result of a sudden relaxation of the larynx while the