A Note on Labov's *The Social Stratification of English in New York City.*

Chong-on Ha
(Hanyang University)

1.0 This paper deals with the so-called 'embedding problem' which Labov designated in terms of the search for correlation between elements of the linguistic and non-linguistic systems of social behavior(Labov, W. *The Social Stratification of English in New York City.* Center For Applied Linguistics, 1966) The former refers to phonological variables, and the latter to features of the structure, specifically, the stratification of social classes.

This paper does not attempt to test the accuracy of the evidence presented by Labov but to postulate a better formalization of his fundamental scheme by minimizing his phonological variables and integrating them into a generative model of linguistic systems through the application of an ordered set of rules. In order to achieve the purpose, D.F. analysis is applied both in setting up the phonological variables and in enumerating the final string of pronunciation.

A careful examination of Labov's phonological variables leads to two types of logical relations implicit in them: the contradictory relation and the contrary relation. The contradictory relation describes those cases in which a choice between the presence and absence of a variable is necessary. The contrary relation describes those cases in which the degree of distance from the norm of a certain variable has to be specified. Logically speaking, while contradictory relations are specified in terms of disjunct answers, namely yes/no decisions, contrary relations cannot be answered in the same manner. Among the five variables used by Labov (r) is a case of the contradictory relation (p 50), while the remaining four are cases of the contrary relation(p 51-56). Labov uses the multidimensional concept for these variables.

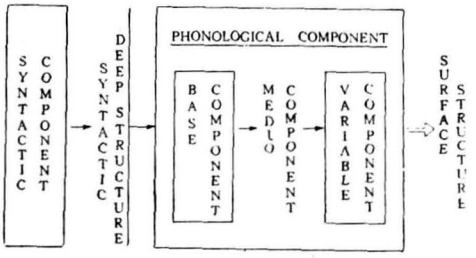
Although the consistent application of binary opposition is needed for the distinctive feature analysis, it follows that some modifications have to be made for the application of D.F.[1]

[1] Although Chomsky and Halle's approach in thier recent work(*The Sound Pattern of English*, Happer and Row, 1968) has many merits in terms of the quantitative operations, basically I take a theoretical position favoring Jakobson's view that acoustical level is preferable to articulatory one in terms of the operational hiearchy of levels in their pertinence. Besides, I

analysis to Labov's phonological variables. (See proposal 4 below.)

2.0 For the purpose of integrating these variables into the generative model[2], it is proposed that the variable component be set up as follows.

1) The variable component is designated as a sub-component of the phonological component of a transformational grammar.[3] The variable component is regarded as an input-out device. In the phonological component, there are the base component and the variable component as shown in the figure below.



2) There are three kinds of structures with three kinds of matrices: (1) Syntactic deep structure, which is the output of the syntactic component and the input of the base component of the phonological component. Syntactic deep structure consists of the set of representations with a structural index. Each representation is specified in the classificatory matrix where the columns stand for segments and the rows, for categories.[4] (2) Medio structure, which is the output of the base component of the phonological component; some of its output will be the input of the variable component. The set of representations of medio structure is specified in the phonetc matrix proper where the columns stand for phones, and the rows for phonetic features. (3) Surface structure, which is the final output of the phonological component. The output of the variable component will be specified in the surface phonetic

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introduce 'sonorant' feature to operational economy. Jakobson, R., G. Fant and M. Halle, *Preliminaris to Speech Analysis*, MIT press, 1963. Halle, M. "On the Basis of Phonology," in Fodor and Katz, *The Structure of Language*, 324-33, (1964) Ha, Chong-on, "Generative Approach to Korean Phonology," The 30th Anniversary Thesis Collection of Hanyang University, 1969.

[2] Chomsky, N., *Aspects of the Theory of Syntax*, MIT press, 1965.

[3] ibid., Chomsky, N., and Halle, M. *The Sound Patterns of English*, Harper and Row, 1968.

[4] Chomsky, N., *Current Issues in Linguistics*, 66-67, 1964. See also, Chomsky, "Some General Properties of Phonological Rules," Lg, 43, no. 1, 1967.

matrix where the columns stand for phones of the final strings of pronunciation,[5] and the rows for their phonetic features. The variable component has two restrictions on its function. One restriction is on the number of variables. Consequently, for the most part, the medio structure will be realized directly as surface structure except for the cases where it can be represented in the variable components. However, if the variable component is triggered, the variables will all be specified in the variable phonetic matrix. The second restriction is the optional trigger of the variable component. In other words, in those cases where the optional trigger is not employed, the medio-structure will be directly realized as surface structure.

3) There are two types of variable component. The one type may be called 'an overall V.C.'. It has all the information necessary for identifying the social-stratification of speech in the U.S. The other type is restricted to a certain idiosyncratic speech community, such as New York City.

4) On the basis of the principle of convenience, the two types of relation (contrary and contradictory) are specified differently as follows (accepting Labov's position):

(a) Variables indicating contradictory relations such as (r) will be specified simply by either the presence or the absence of certain bundles of distinctive features.

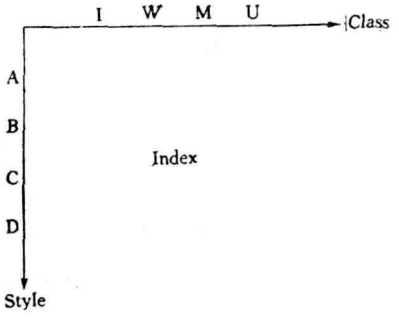
(b) Variables designated as 'contrary relations' such as (eh), (oh), (dh), (th) will be specified by a numerical index. The numerical index is simply a cover term representing a certain bundle of phonetic features, such as the final strings of pronunciation. This point will be discussed in paragraph 3.

5) The context sensitivity of the social strata is shown in the variable rules as an environmental restriction.

6) The phonetic matrix of the variable component only leads to the phonetic realization of a certain variable in accordance with each social stratum on the basis of statistical probability. We need a certain type of code book providing the information for identifying the social stratum of the individual when we have his variable index. In brief, index numbers show the medio-value of the range of variation from the maximum frequency to the minimum frequency. An alternative solution to this is the choice of the maximum frequency. In both solutions, the total number should be fixed such as 10, 100, etc. The columns and the rows stand for the multiplication of class and style. For instance, W. A. means style A used by working class. Index numbers are based upon the statistical figures. A sample of a subcode

[5] ibid.

book is given below



It is rather important that the phonetic matrix and the code book be distinguished. Subcode books are not the output of the variable component. They consist of a pseudo-dictionry indicating only the relationship of variable frequency and social stratum.

3.0 While the base component of the phonological component contains morpheme structure rules and phonological rules proper,[6] the variable component contains the set of variable rules. Variable rules are optional transformations applied to medio structure whenever the pronunciation of the terminal strings has to be realized in accordance with the phonological variation of a certain social stratum. Variable rules are composed of two types. The one type indicates a statement of the structural principles of which all actual variables are special instances. In other words, such structural statements specify the contextual restrictions(environments) of each variable. These rules are called 'distributional constraint rules' abbreviated "D.C.R." The other type is the variable rule proper, abbreviated "V.R." V.R. indicates the phonetic realization of variables with social context sensitivity. The social context sensitivity determines certain environments where each variable can occur in accordance with each social stratum.

3.1 (r) (p 63–76, p 237–243)

D.C.R–1

$$\begin{bmatrix} -+\text{consonantal}- \\ +\text{vocalic} \\ -+\text{liquid} \quad - \end{bmatrix} - \begin{Bmatrix} \# \\ \\ c \end{Bmatrix} \qquad * \quad r = \begin{bmatrix} -+\text{vocalic} \quad - \\ +\text{consonantal} \\ -+\text{liquid} \quad - \end{bmatrix}$$

D.C.R. indicates the distributional restriction of (r). It may occur either before consonants or at a morpheme boundary. The inventory of D.F. is a tentative convention, mainly based upon the Jakobsonian school.

[5] Halle, M., *The Sound Pattern of Russian*, 1959, pp. 40–41.

V.R-1

$$\begin{bmatrix} -+\text{consonantal}- \\ +\text{vocalic} \\ -+\text{liquid} \quad - \end{bmatrix} \Rightarrow \left\{ \begin{matrix} \begin{bmatrix} --\text{consonantal}- \\ +\text{vocalic} \\ -+\text{liquid} \quad - \end{bmatrix} \\ [\phi] \end{matrix} \right\} \quad /\_\text{CS}$$

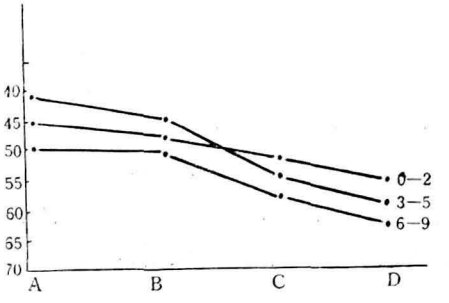
The motivation for designing -consonantal as a feature of (r) on the right side is only to specify its particular phonic(allophonic) quality. The so-called 'terminal r' shows more vowel-like formants pattern. For the sake of convenience, the numerical index will be used in the same manner as shown by Labov. (p. 51-52) That is,

$$\begin{bmatrix} --\text{consonantal}- \\ +\text{vocalic} \\ -+\text{liquid} \quad - \end{bmatrix} \cdots\cdots\cdots\cdots 1 \qquad [\phi] \cdots\cdots\cdots\cdots 0$$

C,S stands for social context sensitivity. (This point will be discussed later.)

3.2 (eh) (oh) (p. 51-54, p. 221-235, p. 254-258)

Although Labov set up (eh) and (oh) respectively as independent variables, a careful examination of his statement provides a strong argument for setting up a simple, straightforward rule combining the two variables. Not only do they have common acoustic properties, but they also demonstrate the social distribution. If we combine both class stratification of (eh) and (oh), we get the following figure, which clearly shows the systematic regularity of class 3-5 and class 6-9. The irregularity of 0-2 class reflects the irregularity of class 0-2 in (oh) class stratification. Nevertheless, the degree of irregularity is much reduced when the two figures (eh) and (oh) are combined. The following figure indicates perfect regularity of the A and B styles in any class.



In short, (eh) and (oh) constitute a natural class. It is possible to set up this natural class as one variable instead of two independent variables, specifying (eh) and (oh) as follows:

$$(\text{eh}) = \begin{bmatrix} -\text{sonorant} \\ +\text{diffuse} \\ -\text{flat} \\ +\text{tense} \end{bmatrix} \qquad (\text{oh}) = \begin{bmatrix} -\text{consonantal} \\ +\text{diffuse} \\ +\text{graye} \\ +\text{tense} \end{bmatrix}$$

$$\begin{bmatrix} -\text{sonorant} \\ +\text{diffuse} \\ -\text{grave} \\ +\text{tense} \end{bmatrix} + \begin{bmatrix} -\text{sonorant} \\ +\text{diffuse} \\ +\text{grave} \\ +\text{flat} \\ +\text{tense} \end{bmatrix} \Rightarrow \begin{bmatrix} -\text{sonorant} \\ +\text{diffuse} \\ +\text{tense} \end{bmatrix}$$

Here, we get a natural class: $\begin{bmatrix} -\text{sonorant} \\ +\text{diffuse} \\ +\text{tense} \end{bmatrix}$

VR-2

$$\begin{bmatrix} -\text{sonorant} \\ +\text{diffuse} \\ +\text{tense} \end{bmatrix} \Rightarrow \begin{matrix} [+\text{sonorant}] \\ \begin{bmatrix} -\text{sonorant} \\ +\text{diffuse} \end{bmatrix} \\ \begin{bmatrix} -\text{compact} \\ -\text{diffuse} \end{bmatrix} \\ \begin{bmatrix} -\text{compact} \\ -\text{diffuse} \\ +\text{tense} \end{bmatrix} \\ \begin{bmatrix} +\text{compact} \\ +\text{tense} \\ -\text{diffuse} \end{bmatrix} \\ \begin{bmatrix} +\text{flat} \\ +\text{compact} \\ -\text{diffuse} \end{bmatrix} \end{matrix} \quad [\alpha\text{grave}] \quad \Big/ \; \text{CS}^{8} \quad \_$$

The notation of the index number will follow the same notation used by Labov (1-6). For instance, (+sonorant)(αgrave) will be indicated as 1, (αstands for$\pm$).

Although more accurate information about the social context sensitivity is needed, there is some approximate information for this in Labov's work. For instance, two items in Labov's summary of the co-variation of (eh) and (oh) enables us to formulate their social context sensitivity (p 511).

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[7] Jakobson, R., G. Fant, M. Halle, *Preliminaries to Speech Analysis*, MIT press, 1963.

[8] CS stands for context sensitivity.

VR-21

$$\begin{bmatrix} -\text{sonorant} \\ +\text{diffuse} \\ +\text{tense} \end{bmatrix} \Rightarrow \left\{ \begin{bmatrix} [+\text{sonorant}] \\ \begin{bmatrix} -\text{sonorant} \\ +\text{diffuse} \end{bmatrix} \end{bmatrix} \right\} \Big/ \begin{matrix} [+\text{lower}] \\ [+\text{upper}] \end{matrix} \_$$

A set of transformational rules is needed to specify the differences between (eh) and (oh) in three respects (p 224).

VR-22

$$\begin{bmatrix} -\text{sonorant} \\ +\text{diffuse} \end{bmatrix} [+\text{grave}] \Rightarrow [+\text{sonorant}] \Big/ \_ \begin{Bmatrix} [+\text{W}] \\ [+\text{L}] \end{Bmatrix}$$

W stands for working class and L represents lower class.

VR-23

$$\text{S.V.} \Rightarrow \phi \Big/ \_ \begin{bmatrix} -\text{sonorant} \\ +\text{diffuse} \\ +\text{grave} \end{bmatrix}$$

S.V. stands for stylistic variation. In this case variable rules are ordered, so that VR-2 has to be applied before VR-22, VR-23.

3.3 (th) and (dh)

DCR-2

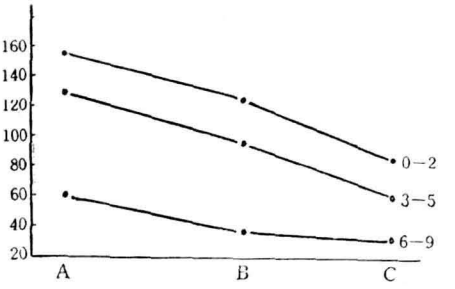
$$\begin{bmatrix} +\text{consonantal} \\ -\text{vocalic} \\ -\text{grave} \\ -\text{compact} \end{bmatrix} \_ \text{X}$$

(th) and (dh) constitute a natural class and DCR-2 specifies the structural environment where the variable may occur. With regard to the DCR mentioned before, it is preferable to set up independent rules rather than to add the context-sensitive environments to the variable rules; this is because social context sensitivity has to be shown in the variable rules.

$$\begin{bmatrix} +\text{consonantal} \\ -\text{vocalic} \\ -\text{grave} \\ -\text{compact} \end{bmatrix} + [\alpha\text{tense}] \Rightarrow \begin{matrix} \begin{bmatrix} \_\_\_\_\_ \\ +\text{continuant} \\ -\text{strident} \end{bmatrix} \\ \begin{bmatrix} \_\_\_\_\_ \\ +\text{continuant} \\ +\text{strident} \end{bmatrix} \\ \begin{bmatrix} \_\_\_\_\_ \\ -\text{continuant} \end{bmatrix} \end{matrix} \Big/ \begin{matrix} \text{CS} \\ \\ \_ \end{matrix}$$

The indication of the index numbers follows Labov's notation. The three variants are given their index number 1, 2, 3, respectively. Unlike the case of (eh) and (oh), the

distribution of (th) and (dh) shows a perfect regularity.



4.0 In order to clarify the internal economy of the phonological space (system), I believe that Labov's empirical verification of the ingliding system needs to be integrated into the phonological system out of which the variables are derived.

According to Labov, the position of (ah) in the phonological space is determined by both (eh) and (oh). In other words, (ah) is a product of the correlation of (eh) and (oh). The dependency of (ah) is formulated as follows.

$S=(S_1, S_2)$

$$\text{Where } S=\begin{bmatrix} -+\text{vocalic}- \\ +\text{compact} \\ \alpha\text{acute} \\ -\beta\text{grave} \quad - \end{bmatrix} \qquad S_1=\begin{bmatrix} -\alpha\text{diffuse}- \\ -+\text{acute} - \end{bmatrix} \quad S_2=\begin{bmatrix} -\beta\text{diffuse}- \\ -+\text{grave}- \end{bmatrix} \quad \begin{matrix} \alpha=\pm \\ \beta=\mp \end{matrix}$$

Acoustically speaking, the range of S_1, S_2, are as follows.

	F_1	F_2
S_1	360–510	2400–1900
S_2	360–510	800–1200

F = formant

This simple rule simplifies Labov's nine diagrams (p 528–536).

Conclusion: I believe that the integration of phonological variables into linguistic systems has to be undertaken by means of DF analysis on the following grounds:

1) The principle of economy. If we use feature representation instead of segmental notation, we achieve a neat, systematic formalization in terms of natural classes and generalizations. For instance, the number of features (6) is much smaller than that of segmental notations (12) in the case of VR–2. Further we would be able to explain the neutralization between natural classes. The so-called "neutralization" may occur when the distinctive features

differentiating members of a natural class become redundant because of various aspects of communicative events (distortion, environmental influences, etc.).

2) Power of explanation. Labov limited his purpose mainly to the correlation of phonological variables and social stratification. However, the connection of these correlations with the theory of grammar in general, as suggested in this paper, is a desirable operation that would give his work explanatory power.