SOUND ALTERNATIONS IN THE ENGLISH MORPHEME MEANING PAST TENSE

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Abstrak: Artikel ini membahas perubahan-perubahan bunyi yang terjadi pada morfem bahasa Inggris yang bermakna lampau. Ada dua kelompok bentuk lampau dalam bahasa Inggris, yaitu teratur dan tidak teratur. Yang pertama merupakan *phonologically bound*, sedangkan yang kedua merupakan *phonologically bound*. Artikel ini hanya membahas bentuk teratur yang mana perubahan bunyi dapat diperoleh dengan menggunakan rumus fonologi. Teori yang digunakan dalam studi ini adalah fonologi generatif yang dapat menghubungkan struktur dalam ke struktur luar. Studi ini menggunakan penelitian kepustakaan (kamus, buku teks berbahasa Inggris), data kualitatif, studi dokumentasi, metode deskriptif dan pendekatan intrinsik-obyektif. Hasil dari studi ini menunjukkan bahwa kata kerja lampau dalam bahasa Inggris mempunyai tiga allofon, [d], [t], dan [id]. Perubahan-perubahan pada fonem ke allofon dapat dihasilkan melalui dua rumus: *voicing agreement rule*, dan *vowel insertion rule* pada proses derivasi. Dalam hubungannya dengan keteraturan rumus, *the insertion rule* tidak dapat didahului oleh *the assimilation rule.*

Kata kunci: *phonological rule, environment, distinctive features, derivational process, underlying representation, surface representation*

Introduction

Language is considered as a device for pairing meaning and sound sequences (Langacker, 1975). It is the possession of such a device which enables a speaker to transfer his thoughts into sequences of sounds for communication to others. The realization of sending message can be done through speech sounds (in the spoken language), words, phrases, and clauses/sentences/discourse. According to Halliday (1985) human language is multiple coding systems consisting of three strata: meaning (semantics) – wording (grammar and lexicon, or lexicogrammar) – sound (phonology). It means that semantics is the resource for meanings, while lexicogrammar is the resource for wording meanings (lexicons and grammar in one unit), and phonology is the resource for sounding words (Matthiessen, 1995).

In sounding words (in the spoken language), there are often many sound changes when two segments (morphemes/words/sentences) or more come together (Fromkin et al, 1989). The sound alternation may occur because of the features of its neighboring sounds (the preceding or the following sounds) which are called the context or environment (Halle, Clement, 1983). In short, the job of phonology is to connect the surface structures or the surface representation (SR) from the underlying structure or the underlying representation (UR) through a series of phonological rules (Langacker, 1975, Fromkin et al, 1989, Finegan et al, 1992). This article

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tries to study the various kinds of phonological rules and their application in deriving the SRs from the URs.

Generative Phonology

The theory that underpins this study is that of generative phonology. Generative phonology is a part of the theory of Generative Grammar which has been developed by Chomsky and his collaborators (Katamba, 1989). It is believed that meaning, as a semantic representation is an abstract concept (underlying representation), which will be connected to the surface structure (phonetic representation/phonetic manifestation) through the phonological rules (Langacker, 1975, Katamba, 1989) which in turn, it goes to the semantic and syntactic systems. The relation of phonology (phonological rules) and other elements in the model of generative grammar can be demonstrated by the following figure 1 and 2.

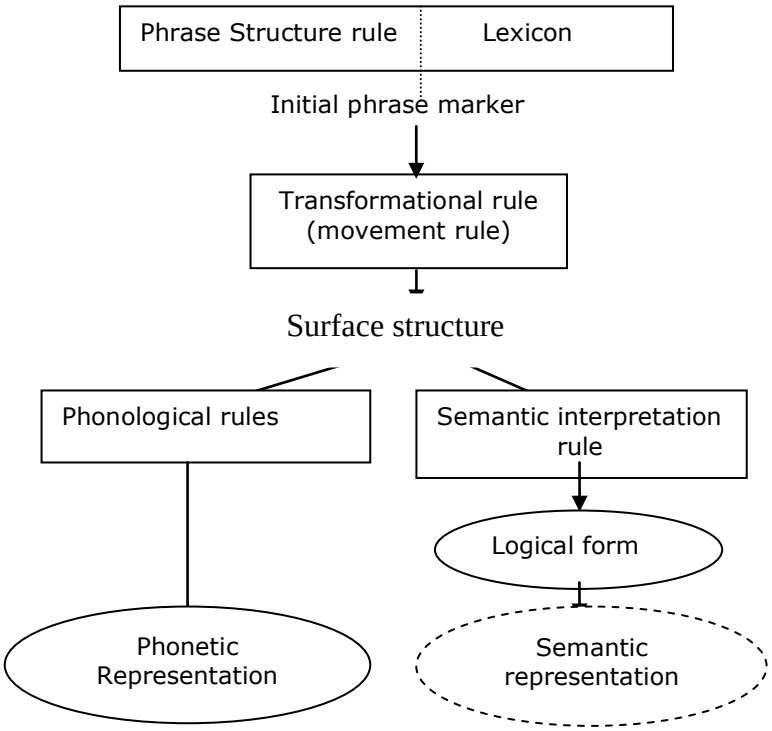


Figure 1: A generative model of language (adapted from Katamba, 1989)

Another figure which also demonstrates the relation of phonological rule and the surface structure and other grammatical elements can be adapted from Langacker (197).

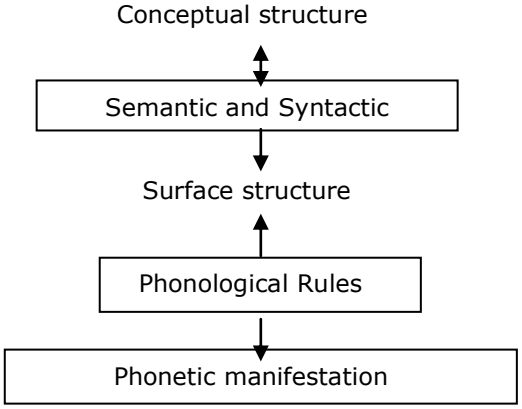


Figure 2: The role of phonological rules in a grammar (adapted from Langacker, 1975)

From the figures above, the key word of generative phonology lies on the phonological rules. Therefore, our discussion will focus on the formalism of phonological rules, distinctive features, and derivational process.

A. The Formalism of Phonological Rules

When two morphemes or more come together, there are often some adjustments to the spellings as well as to the pronunciation (Finegan et al, 1993). The adjustment of the spelling means there is a sound alternation in the segments. These sound changes are commonly expressed in the form of phonological rules. Typically, a phonological rule states that a certain class of segments undergoes a change in some particular environment (Clark and Yallop, 1991). Hale and Clements (1993: 93) explain that a phonological rule, in general, can be written in the formal notation of:

A → B / C — D

This basic rule can be simply read as: change A into B if A occurs in the environment of following C and preceding D (Finegan et al, 1992). In more details, the rule can be simplified as follows:

(a) The input (A) means the sound affected by the rule,

(b) The arrow (→) means 'rewrite as', 'is realized as' or simply 'becomes',

(c) The output of the rule (B) is the new sound produced by the rule,

(d) Following the output is the diagonal line (/) which introduces the context or the environment of the rule,

(e) C and D are the context or the environment which determines the applicability of the rule, and

(f) The dash line (—) between the environment (C and D) shows precisely where the change segment is located.

Furthermore, Hale and Clements (1993: 93) explain that phonological rule should satisfy the following conditions:

(1) A, B, C, and D are distinctive features except that:

- A or B (but not both) may be the null set or zero (Ø),
- C or D (or both) may be absent,

(2) C and D may contain (or consist solely of) the word boundary symbol (#), and the morpheme boundary symbol (+).

Based on the conditions above, the general phonological rule above can be developed into more rule variants, as follows. When A is absent, the rule may indicate an insertion. It means that there should be an addition sound to the sound alternation, which is simply from nothing to something. This insertion rule (→) can be expressed in the following formal notation: Ø B. In contrast, if B is absent, there should be a deletion sound which results in a deletion rule which can be written as:

A ⟶ Ø. Next when C is absent, it means that the sound which determines the alternations only that which follows the affected sound (A), and can be written as: A ⟶ B / ⎯ D. In contrast, when D is absent, it indicates that only the preceding sound which determines the change of the affected sound. This rule can be written as: A⟶ B / C ⎯. Finally, if the both C and D are absent, it shows that the sound alternation occurs every where. This condition is called as context free, as the opposite of context sensitive. The variation of the phonological rules, then, can be written as:

Assimilation rules: A → B /C – D
A → B /C –
A → B / – D
A → B

Insertion Rules: Ø → B / C – D
Ø → B / C –
Ø → B / – D
Ø → B

Deletion rules: A → Ø / C – D
A → Ø / C –
A → Ø / – D
A → Ø

In addition, phonological rules may also move phonemes from one place in the string to another. Such rules are called metathesis (Fromkin et al, 1989, Langacker, 1975). In other words, metathesis is a phonological rule which is used to indicate a change in the order of the sound segments. This rule can be realized into the following notation.

Metathesis rule: A → B (the context can be sensitive or free, as applied above)

B. Distinctive Features

As suggested by the condition of phonological rules, A, B, C, and D should be expressed in the distinctive feature matrixes (Halle, and Clement, 1983). Distinctive features are the features of speech sounds which are able to define and distinguish one from another. The features are collected from the phonetic properties, such as: state of voicing, places of articulation, manners of articulation, and nasality (for the consonants), and tongue fronting, and tongue height, lip rounding (form the vowels). The features are put into a set of features, under the headings of: syllabic/nonsyllabic, consonantal/nonconsonantal, coronal/noncoronal, anterior/posterior, etc. (Halle, and Clement, 1988). The operation of this set of features is commonly expressed by the

symbol plus (+) having the features, and minus (-) having no features. The features of a sound in phonological rule are put into the matrix, or the square brackets [ ].

In fact, two sounds or more may have similar features, which are called natural classes, for example: /p, b, t, d, k, g/ have features in common, and can be classified in the natural class of stop sounds. However, there is a pair of sounds which have completely similar features. It means that every sound at least has one different feature from any other because each sound has its own features. Therefore, though /p/ and /b/ are similar almost in many features, they are different in the feature of state of voicing. The former is voiceless, and the later is voiced. Following the distinctive features, the stop sounds /p, b, t, d, k, and g/ share the features of obstruent (-son) , and stop (-cont), as demonstrated by figure 3.

Figure 3: The distinctive features of stop sounds:

[− Son
 − Cont]

Figure 3 gives the features of the natural class of sounds /p, b, t, d, k, and g/. They are stop sounds. They have the features in common, such as: - sonorant (+ sons), and non-continuant (-continuant). In contrast, the sounds /p/ and /b/ have some features in common, but the state of voicing, as demonstrated by figure 4.

Figure 4: The distinctive features of /p/ vs /b/

/p/		/b/	
-	Son	-	Son
-	Cont	-	Cont
+	Lab	+	Lab
-	Voiced	**+**	Voiced

C. Data and Analysis

There are two groups of verbs in English. They are finite verbs and non-finite verbs. The difference between them lies on their relation to tense and subject. Finite verbs are verbs which are bound by tenses, or by subjects, while non-finite verbs are not. In other words, the forms of the verbs may change if the tenses or the subjects are different. In relation to the tenses, verbs are classified into regular verbs and irregular verbs. Regular verbs are phonologically bound, and they are predictable, while irregular verbs are morphologically bound, each has their own forms.

As regular verbs are predictable, the question is how to predict their forms. What are their forms (phonologically called as allophones), how can the basic form (phonologically called as the phoneme) change into the allophones? This study tries to answer all the questions through generative phonology. In this theory, the data will be analyzed according to the sound changes to find the phoneme, the allophones, and the

environment or the context of the sound alternation. Let us start the discussion by observing the data in Table 1.

Table 1: The Data

No.	Common Spelling	Phonetic Transrption	No.	Common Spelling	Phonetic Transrption
1.	wanted	/wontid/	16	kissed	/kist/
2.	passed	/pa:st/	17	hated	/heitid/
3	walked	/wolkt/	18	nailed	/ neild/
4	described	/diskribd/	19	offended	/ofeindid/
5	mentioned	/mænʃənd/	20	programmed	/prograemd/
6	Killed	/kild/	21	punished	/paniʃt/
7	washed	/woʃt/	22	smiled	/smaild/
8	allowed	/əlaud /	23	snowed	/snoud/
9	announced	/ɜnaund/	24	changed	/tʃeidjd/
10	Attracted	/ətræktid/	25	watched	/wotʃt/
11	avoided	/əvoidid/	26	selected	/silæktid/
12	stopped	/stopt/	27	lied	/laid/
13	appeared	/əpiəd /	28	needed	/ni:did/
14	headed	/hædid/	29	judged	/dja:djd/
15	Entertained	/intɜteind/	30	jammed	/djæmd/

From the table of the data, it can be presented that the past tense of English verbs are indicated by three allophones. They are [t] for data number: 2 /pa:s**t**/, 3 /wolk**t**/ , 7 /woʃ**t**/, 12 /stop**t**//, 16 /kis**t**, /21 /paniʃ**t**/, and 25 /wotʃ**t**/, [d] for the data number: 4 /diskrib**d**/, 5 /mænʃən**d**/, 6 /kil**d**/, 9 /əlau**d**/ 10. /əpiɜ**d** /, 15. /intɜtein**d**/ 18. / neil**d**/, 20 /prograem**d**/, 22 /smail**d**/, 24 /tʃeidj**d**/ , 27 /lai**d**/, 29 /dja:dj**d**/, and 30 /djæm**d**/, and [id] for data numbers: 1 /wont**id**/, 10 /ɜtrækt**id**/, 11 / ɜvoid**id**/, 14 /hæd**id**/, 17 /heit**id**/, 19 /ofeind**id**/, 26 /silækt**id**/, 28 /ni:d**id**/.

There are three allophones of the morpheme meaning past tense if English. They are [t], [d].and [id]. From these three forms, one of them can be taken as the phoneme. The most possible form is [d] because this form is the simplest one (requiring the smallest number of phonological rules) to be explained. Our next step is to observe the context or environment of the sound alternation that is how /d/ becomes [t], and how /d/ becomes [id]. As demonstrated by the data, the form [t] is used if the previous sound, or the final sound of the verb is voiceless, such as /s, k, ʃ, tʃ, p/ but not the [t]. The [d] sound is used for the data in which the final sound of the verb is voiced sound /b, l, n, m, dj/ and vowels, but not /d/. And the form [id] indicates that the previous sound, or the final sound of the verb is [t] or [d]. The relation between the phoneme, the allophones and the context where each allophone occurs can be mapped out in Table 2 (the distribution of allophones).

Table 2: The distribution of allophones

Phoneme	Allophones	Context
/d/	[t]	if it is preceded by a voiceless sound and they occur in different morphemes
	[id]	if it is preceded by a voiced sound, but not they occur in different morphemes
	[d]	if it is preceded by [t] , or [d] and they occur in different morphemes

The distribution of allophones enables us to produce the phonological rules. In other words, the distribution of allophones is the resource of phonological rules. The basic rule, as demonstrated above is:

A → B / C ———— D

The notation A is the phoneme /d/ or the affected sound, or the input, while the output is B, which is manifested by the allophones [t], and [id]. The environment is only the preceding sound, and the morpheme boundary because the affected sound and the environment belong to different morphemes. The basic rule above can be rewritten as follow.

/d/ → [t] / C + ————, and

/d/ → [id] / C + ————

The first rule is an assimilation rule because the sound /d/ assimilates into /t/, while the second rule in an insertion rule for it needs to insert another sound to the phoneme. As required by phonological rules, each sound should be changed into distinctive feature matrixes. The sound /d/ has the features of a stop, alveolar, and voiced sound, or (non-continuant, non-sonorant, anterior, and voiced sound). The sound [t] is similar to the sound [d]. The only difference is the feature of state of voicing, [d] is voiced while [t] is voiceless. Considering the distinctive features of two sounds, the formal notations can be established.

In the assimilation, the sound /d/ changes into [t]. It means that the sound only assimilates in the feature of voicing; if the preceding sound is voiceless, the allophone will be voiceless [t]. In contrast, when preceding sound is voiced, it will take the voiced allophone [d]. Therefore, the rule can be named as the voicing agreement rule. This rule can be mapped out in Table 3.

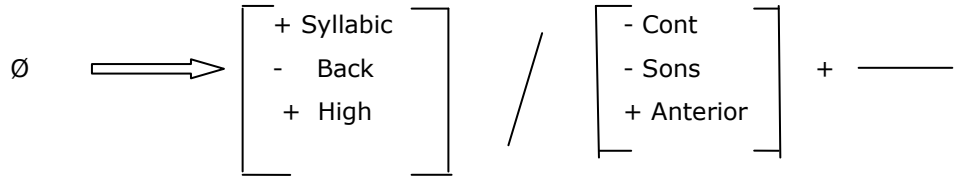
Table 3: Voicing agreement rule (VAR rule)

$$\begin{bmatrix} - & \text{Cont} \\ - & \text{Sons} \\ + & \text{Anterior} \\ + & \text{Voiced} \end{bmatrix} \Rightarrow \begin{bmatrix} - \text{ Voiced} \end{bmatrix} \; / \; \begin{bmatrix} - \text{ Voiced} \end{bmatrix} + \; ————$$

The voicing agreement rule dictates that a voiceless labial stop sound alternates into the voiceless corresponding if it is preceded by a voiceless sound, and they occur in different morphemes.

The next rule is concerned with the insertion sound, that is the vowel sound should be inserted if the phoneme /d/ is preceded by /t/ or /d/, as demonstrated by data number. As the /t, d/ have the features of a stop, and alveolar voiced sound, or (non-continuant, non-sonorant, and anterior sounds). The formal notation of the rule can be formatted as in Table 4.

Table 4: Vowel insertion rule



The insertion rule above says that the vowel /i/ should be inserted if the phoneme /d/ is preceded by an alveolar stop sound. The motivation of this rule is to make the pronunciation of the word fluent since two similar sounds come together in one word. If it is not inserted by another sound, the pronunciation of the word will be strongly disturbed. An insertion is very common to take a place in any language.

D. Derivational Process

Having been completely explained all the sound alternations in the data; it is time to derive the data, which are called the phonetic representations (PRs) from the underlying representations (URs). The process of generating the PRs from the URs is called as the derivational process ( ). In this process, the URs consisting of the main form (e.g. free morphemes) and the additional element (e.g. affixes) are placed in the first line. The phonological rules are put orderly to generate the PRs. There two rules formulated above; they are voicing assimilation rule (VAR) and vowel deletion rule (VIR). If the rule is not applicable for the data since the context is not appropriate, it is marked by NA means not applicable. Finally, it is ended with the PR forms. When the PR form is not similar with the data, it will be coded by asterisks (*), and it needs to be considered the rule ordering. The derivational of PRs from the URs is mapped out in Table 5.

Table 5:

UR s :	pa:s + -d pa:sd	wolk + -d wolkd	diskraib + -d diskraibd	ki:l + -d ki:ld	əvoid + -d əvoidd	heit + -d heitd
VAR	pa:st	wolkt	NA	NA	NA	heitt
VIR	NA	NA	NA	NA	əvoidid	heitit
PRs	pa:st	wolkt	diskraibd	ki:ld	əvoidid	heitit*

Table 5 demonstrates that all the PRs are correct, but the heitit* which must be heitid. The incorrect result is caused by the application of the voicing assimilation rule. The VAR changes the the phoneme /d/ into /t/ since the phoneme is preceded by a voiceless consonant /t/ and they occur in different morphemes. To solve this problem, we can consider the rule ordering in which the VAR is applied after the VIR rule, as demonstrated in Table 6.

Table 6

URs :	pa:s + -d pa:sd	wolk + -d wolkd	diskraib + -d diskraibd	ki:l + -d ki:ld	əvoid + -d əvoidd	heit + -d heitd
VIR	NA	NA	NA	NA	əvoidid	heitid
VAR	pa:st	wolkt	NA	NA	NA	NA
PRs	pa:st	wolkt	diskraibd	ki:ld	əvoidid	heitid

By applying the VIR rule before the VAR rule, we can generate the correct data heitid. In other words, the application of the VIR rule has changed the data heitid, in which the phoneme /d/ is not directly followed by a voiceless consonant /t/. As a result, the VAR is not applicable (NA). Since the VAR rule is not applicable, the PR follows the form which is produced in the step of VIR rule, heitid.

Conclusion

The morpheme meaning (regular) past tense in English has three allophones. They are [-t], [-d] and [-id]. Through the phonological rules the phoneme as the underlying representation can be transferred into the surface structure or phonetic representation. It means that the sound alternations which occur in the morpheme meaning past tense in English can be explained structurally by phonology. The PRs of the phoneme can be generated through two phonological rules: voice agreement rule and vowel insertion rule. Since the voice agreement rule can delete or make the vowel insertion rule not applicable, to generate the correct data through the

derivational process, the vowel insertion rule should be applied before the voice agreement rule.

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