The Viewpoint of the outosegmental phonology Theory and Phonological Consonant Neutralization Process in Persian Language

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Abstract

The theory of Self-unit phonology was first proposed by Goldsmith as an independent field of generative phonology; this theory was proposed in tone languages and then was generalized to intonation languages. Phonological analysis in this research is non-linear which a common method in self-unit theory is. This research shows that neutralization happens in one or several feature(s) of a phoneme and are now popular common features. The display of neutralization process and data analysis is in the form of tree diagram or geometry of features. Spreading of feature [+ voiced] in Persian language can affect other layers and change them.

Keywords: Neutralization, Generative Phonology, outosegmental phonology, Geometry of Features.
1- Introduction
This research deals with the study of phonological consonant neutralization process in Persian language and examines the characteristics spreading of the larynx layer and its impact on other layers in the process, and the research is based on the self-units and non-linear phonemic theory. According to the present findings the neutralization in Persian language in from the marked feature to un-marked, like many other languages. The desire of neutralization is from the phonemes containing feature [+ stop] [+ voiced], to the feature [- stop] [- voiced], the phonetic environments of which are studied in this research. Data collection method is the speakers in a normal discourse and non-laboratory environment.

The Research Method
In this study, for the collection of language data, we used interviewing with Persian language speakers who pronounce target words in a non-formal and colloquial way and examined them. At the end of the article, the sources listed are used for the theoretical foundations.

2- Review of the Literature
The process of neutralization is a term that is used in phonology, and a phenomenon in which distinguishing and detecting two phonemes in a texture and phonetic environment minimizes. From the perspective of experts, Correard refers to some components of this process, about the meanings of neutralization from the experts’ perspective, including phonemes? Dependent characteristics? The contrasts? And emphasizes that, if we want to be accurate, neutralization is only related to confrontations. Of course many scientists disagree on the type of phonological identity of neutralization and the opinions of some of them are indicative of the diversity of neutralization identity.
1. Confrontation of phonemes(Trubetzkoy 1932- Trnka 1935- Martinet 1936)
2. Confrontation between phonetic features and absence of these features (Trnka 1935- Martinet 1936)
3. Confrontation between phonetic features (Trubetzkoy 1933-Trnka 1958)
5. Confrontation between dependent features (Martinet 1944)

For example, in English the confrontation between pulmonics (voiceless) and non-pulmonics (voiced) stop is naturally determinative and distinguishable in the words / tip / and / dip / but this confrontation disappears or is neutral in / stop /, / skin /, / speech / when stops are after the phoneme /s/, as a result, in English language the words skin/sgin are not minimal pairs. These changes are justifiable from the phonology point of view, a phenomenon in which /k/ in this position is non-pulmonic and is not distinguishable from /g/ physically and acoustically.
Kisparsky (1973) brings an example of the language (Finnish) for neutralization in which the last consonant of stem of the verb which is before the voice /i/, means /s/ converts to /t/ after joining the suffix / na’/ and the voice /i/ converts to /e/. This neutralization of confrontation of /s/ and /t/ happens in the border of morphemes and never happens inside a syllable. The main and important question here is that according to these examples, these structural points are language-specific or are world-language, if these cases are global, they should be able to be
predicted based on the global principles. Kisparsky proposes the general and global principle and that two expressions must be used, Neutralization Rule and Automatic Rule and natural and explains these two expressions through the following linear rule:

\[(p)\ A \rightarrow B / xc \rightarrow Dy\]

In this rule (p) / phonological process / C and D are as context (phonological or morological ) and x, y are contract chains, so phonological layer is abnormal and non-regulated, if the connection chain of CAD be phonological output, there will be neutralization in the phonemic layer, if and only if a chain of CBD be phonemic input, in this case the phonemic rule is neutralization. Kisparsky claims that both rules are created by phonetic context and environment and no other rule will create this restriction. This claim is based on this point that all of the rules that Kisparsky shows, are restrictions that are derived from the context.

The primary background of Markedness in the Prague School was originated from the phenomenon of "Neutralization", in the Trubetzkoy term, some confrontations are stable and some other are unstable or possible to be neutralized. When two phonemes are neutralized in a certain position, its unmarked member which is a result of confrontation will appear in the superstructure. In other words, an unmarked member appears in neutralization states. The occurrence of any of the two members of the confrontation in the neutralization position, depends on the environment in other words, in certain environments we must consider a member, unmarked.

2-1 Generative Phonology

Generative phonology names markedness values, global. In the languages changes and evolutions, phonetics usually change mostly from marked to unmarked than from unmarked to marked and in acquisition of language by children, they often learn the unmarked phonetics earlier than the marked phonetics. In generative phonology, following the Prague school, the contrast value between the features is important and phonetic components are merely analyzed unstructured forms out of features which play roles in the generative theory. In the generative rule, distinguishing the phoneme from phonetic is stated in a mental or abstract reality for phoneme and an objective or physical reality for the phonetic. A phoneme is an image of a set of phonological features that exists in people's minds and becomes objective in the state of a special phonetic in the time of speech production. In this view a phoneme is a set of distinctive features. In fact the distinctive features are considered as the smallest elements in language studies. The phonetic elements are rewritten positively or negatively in the form of matrices or divalent features.

Rewriting the phonological units in the form of divalent matrices was first proposed in Prague School by Trubetzkoy or Jacobsen.

2-2 outosegmental phonology

In self-unit phonology, Goldsmith believes that a feature independent of other features, has effect in the phonological chain. Phonemic representation was introduced from linear mode to network mode. There are multiple layers in phonological representation; the representation space is multidimensional that in each of its dimension there are one or some independent productive features. The difference between self-unit representation and linear representation is that linear representations are formed by a chain of phonological units but in self-unit representation,
two or more layers of phonological units are considered and the specification of each layer is different from that of another layer. Features in self-unit phonology have their own special independence and existence (Page 41). Clements (1984) proposed a plan in which he classified the distinctive characteristics into groups. Instead of assuming that a phonological element is simply a list of unstructured characteristics, we can imagine that it is a set of characteristics that are hierarchically arranged in four groups. This hierarchy is usually represented through tree diagrams in linguistics.

In Clement’s proposed plan, the first node encompasses the entire tree and is known as the root node in which the features of the original class are included. The root node is an equivalent for phonemic element. There are two specification categories derived from the root node, laryngeal features and other features, means those features that are related to the production aspect and are in the holes of mouth and nose at the top of the larynx, thus this classification node is called above the larynx. This basic generalization is also derived into two groups called nodes of production how and the production location. In this type of representation, features are produced in a tree production and this theory is known as "the feature geometry theory".

3-Data analysis
In Persian, some phonemes lose their confrontation mode in a special phonetic environment and convert to another phonetic in one or some features and become neutralized. Dr. Mahmoud BijanKhan in the book, Optimal theory in phonology, investigates the phonetic pattern resulting from neutralization of confrontation of /x/ and /G/. In addition to the neutralization of confrontation of these two consonants, the confrontation of phonemes /j/ and /ɛ/ is neutralized in a special phonetic context. In the framework of self-unit phonology theory, we explore some of the examples of neutralization of these phonemes. Consider the following data.

<table>
<thead>
<tr>
<th>Infrastructure representation</th>
<th>Superstructure representation</th>
<th>Written form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gar</td>
<td>Gar¹</td>
<td>غار</td>
</tr>
<tr>
<td>Xar</td>
<td>Xar</td>
<td>خار</td>
</tr>
<tr>
<td>Gab</td>
<td>Gab</td>
<td>قاب</td>
</tr>
<tr>
<td>Xab</td>
<td>Xab</td>
<td>خواب</td>
</tr>
<tr>
<td>God</td>
<td>God</td>
<td>قد</td>
</tr>
<tr>
<td>Xod</td>
<td>Xod</td>
<td>خود</td>
</tr>
<tr>
<td>biG</td>
<td>biG</td>
<td>بی녀</td>
</tr>
</tbody>
</table>

¹-To represent the phoneme /Gh/ the sign /G/ is used in the optimal phonology by Dr. Mahmoud BijanKhan but Dr. Samareh used the sign /q/ to represent this phoneme in the book of Persian language phonology.
As you can see the confrontation of / X / and / G / is stable in all positions, but in the following words, this confrontation is neutralized at the place where / G / is before the consonant, voiceless alveolar.

Table 2

<table>
<thead>
<tr>
<th>Infrastructure representation</th>
<th>Superstructure representation</th>
<th>Written form</th>
</tr>
</thead>
<tbody>
<tr>
<td>vaGt</td>
<td>vaXt</td>
<td>وقت</td>
</tr>
<tr>
<td>noGte</td>
<td>noXte</td>
<td>نقطة</td>
</tr>
<tr>
<td>raGs</td>
<td>raXs</td>
<td>رقص</td>
</tr>
<tr>
<td>taGsir</td>
<td>taXsir</td>
<td>تقصير</td>
</tr>
</tbody>
</table>

The neutralization process is shown by the representation of feature geometry and the tree diagram.

A) Representation of the Infrastructure 1
In representation of superstructure, in addition to expanding the feature of voiceless, the phonemes /t/ affects the how of consonant production as an adjacent consonant of /G/ and changes its production mode. Therefore, consistent in how it affects and changes its production mode. In the phonemes matrix, only the voiceless uvular phoneme in Persian language is the phoneme /X/ which is represented in the superstructure and the method of production of this phoneme has feature [+continued].
The representation of superstructure [raXs] from the infrastructure for [raGs] will be as follows.

Representation of infrastructure

```
Root Layer
X
Larynx
Above the Larynx
Manner of articulation
Point of articulation
[+Continuant]
[Uvular]

T
Larynx
Above the Larynx
[-Voice]
Manner of articulation
Point of articulation
[-Continuant]
[Alveolar]
```

```
Root Layer
G
Larynx
Above the Larynx
[+Voice]
Manner of articulation
Point of articulation
[-Continuant]

S
Larynx
Above the Larynx
[-Voice]
Manner of articulation
Point of articulation
[+Continuant]
[Alveolar]
```
Spreading of features of larynx layer and production mode

In spreading of feature of larynx layer [-voiced], the consonant / s / to the consonant / G /, it only leaves one phoneme available that its place of production is velum and that is the phoneme / X /. However, we can say that they spread in the sequence of two features [-voiced] and [-continued] and thus the phoneme / X / is produced in this phonetic context.

Representation of superstructure

In the representation of superstructure of the word / raxs / from the representation of infrastructure of the word / raGs / we can present two analyzes:
1. Spreading of feature of larynx layer [-voiced], the consonant /s/ as the consonant adjacent to /G/, according to other characteristics of the target phonemes, there is only one choice in Farsi phonemes and that is the phonemes /X/.

2. The features of larynx layer [-voiced], and the production mode of [-continued], both spread to the target phoneme and create the phoneme /X/. In representation of superstructure there are two actions which are introduced by McCarthy (1988) in nonlinear phonology.

1. Spreading of Linking: Adding a linking line the traditional concept of which is "assimilation".
2. Delinking: Removing the linking line the traditional concept of which is "delinking".

**Restriction**

1. The rules of linking lines: the linking lines should not intersect. In the spreading of the feature [-continued] of the phoneme /s/ to the phoneme /G/, it should not be assumed that the production lines has been disconnected because each layer has its own autonomy and the nodes of the different classes are independent from each other it means that the layers of "how to produce" and "production location", each in a different dimension.

Consider the following words:

| Table 3 |
| --- | --- | --- |
| Infrastructure representation | Superstructure representation | Written form |
| Jam? | Jam? | جمع |
| cehel | ċehel | چهل |
| majāl | majāl | ممال |
| ?āčār | ?āčār | اجار |
| ?aj | ?āj | عاج |
| māč | māč | ماج |
| moʻtābā | moʻtābā | مجتبی |
| moʻtāmā | moʻtāmā | مجتمع |

As you can see the confrontation of /j/ with /c/ and /š/ is stable in all positions but in the last three terms, ie at the place where /j/ is neutralized when in syllable boundary it is prior to voiceless alveolar consonant.

We show the superstructure representation [moʻtāmā?] from infrastructure [mojtama?].

Infrastructure Representation
From the infrastructure form of final terms in table 3, there are other terms which can be seen in the superstructure in which the confrontation of /j/ with /s/ is neutralized. This neutralization happens in two layers.

The superstructure representation [močtamā?] from infrastructure ]mojtama?].
Spreading of feature of larynx layer and change in the feature of production mode

\[
\begin{array}{c}
\text{Root Layer} \\
G \\
\text{Larynx} \\
\text{Above the Larynx} \\
\text{[-Voice]} \\
\text{Manner of articulation} \\
\text{Point of articulation} \\
\text{[-Continuant]} \\
\text{[+Blade]} \\
\text{[+Voice]} \\
\text{[-Voice]} \\
\text{[+Blade]} \\
\end{array}
\]

\[
\begin{array}{c}
\text{Root Layer} \\
\text{T} \\
\text{Larynx} \\
\text{Above the Larynx} \\
\text{[+Blade]} \\
\text{Manner of articulation} \\
\text{Point of articulation} \\
\text{[-Continuant]} \\
\text{[+Blade]} \\
\text{[+Voice]} \\
\text{[-Continuant]} \\
\text{[+Blade]} \\
\end{array}
\]

\[
\begin{array}{c}
\text{Root Layer} \\
\hat{c} \\
\text{Larynx} \\
\text{Above the Larynx} \\
\text{[+Voice]} \\
\text{Manner of articulation} \\
\text{Point of articulation} \\
\text{[-Continuant]} \\
\text{[+Blade]} \\
\text{[+Voice]} \\
\text{[-Voice]} \\
\text{[+Blade]} \\
\end{array}
\]
Superstructure Representation

In Persian language, there are two possibilities for voiceless phonemes which are produced alveolar-palatal; therefore, both phonemes can be in this position. In superstructure representation, change in the feature \([\pm\text{voiced}]\) affects the production mode and changes it, of course a slight change also occurs in the production location.

4- Conclusion
According to neutralization of the phoneme /G/ and /X/ in this position, means before a voiceless alveolar nasal consonant, we can conclude that: 

- Spreading of the larynx feature \([\pm\text{voiced}]\) can project lower nodes and also change the production mode of the consonant.
- The neutralization frequency of the consonant in Persian language in the border of two syllables is more than inside a syllable.
- The final consonant of the first syllable has more tendency toward voiceless and spreading of features is from the first consonant of the second syllable to the final consonant of the first syllable.
- The spreading of the feature \([\pm\text{voiced}]\) can be followed by the change in other nodes specially the production mode.
- The presence frequency of the phoneme /t/ and then the phoneme /s/ in the neutralization process and the spreading of the feature \([-\text{voiced}]\) is more than other consonants.
- In this process, there is from feature \([-\text{continuied}]\) to \([+\text{continuied}]\), however, they are neutralized in the phoneme /j/ and /ê/. This neutralization also exists with the phoneme /s/ which has the feature \([+\text{continuied}]\).
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