

An Investigation of the Relationship between Phonetics and Phonology

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Abstract

This paper investigates the controversial issue of the relationship between Phonetics and Phonology. Throughout literature, there are different views and opinions that tackle this relationship, but none of them is adopted as the acceptable one. This is so because each has evidence as well as its merits and demerits. Generally, three main views about the relationship between phonetics and phonology can be introduced: they are the same, they are different but arbitrarily related , they are different but conditionally integrated.

Key Words: Phonology, phonetics, well-integrated, estranged, re-integrated

1.Introduction

The relationship between phonetics and phonology never seems a simple one, but it is a more complicated. When one comes to study a phonological phenomenon, s/he cannot move easily without getting help from phonetics and vice versa. For instance, placing 'stress' within a word is difficult unless full awareness of the phonetic features of the sounds of that word is present. On the other hand, studying the phonetic features of separate sounds, as a phonetic issue, seems useless without passing forward to phonological level to contrast these sounds. As such, a certain type of connection or association between phonetics and phonology is observed. In this regard, the nature of this relationship comes to the forefront. Thus, this study represents an attempt to investigate such a relationship in terms of the different views through the history of studying linguistics, namely the study of speech sounds. The study aims

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to find out the different views of the relationship between phonetics and phonology, whether they are the same or not.

The departure point of the current study about the relationship between phonetics and phonology is governed by different views. The following sections have the task of surveying them.

2. Historical Background

Historically speaking, the relationship between phonetics and phonology seems shaky and confused. Put it differently, no clear-cut borderline has been observed. There are different views which sometimes differentiate between the two fields whereas other times they are integrated into one field. The following paragraphs clarify.

One of the ancient classifications of phonetics is that of taxonomic and scientific. As regards taxonomic phonetics, it concerns with uniformity in naming and the classifying human speech sounds or phonemes and transcriptions of such phonemes. Eventually, this type of phonetics has led to the emergence of the IPA which provided the basis for a vocabulary (Fant, 1960; Lindblom, 1986 and Stevens, 1989). In addition to its phonetic nature, taxonomic phonetics represents a system to describe phonological universals and offers phonetic explanation for sound change (Ohala, 1981b; 1986a; Ohala and Feder, 1987). On the other hand, scientific phonetics aims to understand how speech works at all layers from the brain or mind of the utterer to the brain or mind of the auditor (Chiba and Kajima, 1941). Nevertheless, it holds phonology for its role to deliver vocabulary for stating phonological generalities. Moreover, during 17th, 18th, and 19th centuries, it is viewed that scientific phonetics is fully integrated within phonology. There are examples where traditional phonological (linguistic) questions are offered phonetically based answers or where the same individual is equally productive in scientific phonetics and phonology in general.

For de Saussure, the phonological structure has not given a considerable attention. In this sense, he (1878) posited the existence of sounds in Proto-Indo-European. In the early 20th century, de Saussure learned that beside the observable facts of a language's sounds there was also an underlying reality.

Gradually, linguists got adapted to the idea that there could be ever more abstract representations and processes for speech sounds which could describe their behaviour and which were distinct from phonetic representation and processes (ibid : 419). Additionally, it is seen that

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Prague School, especially, Trubetzkoy (1933) asserts the idea that phonetics then and now and again becoming integrated with phonology.

He, in the 1930's, states that there are two kinds of metalanguage about the sounds of language: phonetics studies parole which he calls (speech act) and phonology studies langue which he calls (language structure). The units of the phonetic analysis are empirically observable entities whereas those of the phonological analysis exist only in their relation to each other. As such, phonetics is indispensable to phonology. Phrased differently, the beginning of any phonological description consists of the meaning differentiating sound opposition. The phonetic record of the language in question must be taken as the starting point as the data. It is prior to phonology in the sense that the phonetic transcription provides the data for phonological analysis. Phonology is prior to it in the sense that the functional view alone can determine segmentation and class membership in many cases. Phonetics has no primacy over phonology since the functional view of speech sounds is primary because the phonemic level is a psychological reality (MacCamee, 1978: 120).

Finally, intellectual imperialists have sometimes taken the view that either phonology or phonetics is the whole story with respect to language sound structure. When coming from the side of phonology, they feel that phonetics is a relatively an interesting subfield of biology and physics, which sheds no light on those aspects of the human mind that distinguish humans from beasts (Halle, 1954; Kohler, 1984). Therefore, they argue, that phonetics has no place in linguistics proper. When coming from the side of phonetics, they argue that the mental entities posited in phonology are not subject to rigorous scientific investigation. Due to this observation, they feel that phonetics provides a scientific theory of sound structure while phonology is a relatively an interesting subfield of the humanities (Pierrehumbert, 1990: 375).

3. Different Fields

Around the beginning of the 20th century phonetics and phonology seem to have been two separated areas. This is due to the fact that phonetics is Bio-Physical by its nature. On the other hand, phonology is cognitive/ abstract (Chomsky and Halle, 1968: 450 and Halle, 1970).

Thus, each category stands by itself. In fact, some scholars tend to disregard phonetics from linguistics; they claim that it is not linguistic proper. In this respect, Saussure noticed that beside the observable facts

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of a language's sounds there was also an underlying reality. The distance between phonology and phonetics continued up to roughly the mid-20th century.

4. The Same Field (Unified Model)

According to this view, it is proposed that phonology and phonetics are integrated into a single unit which is all phonetic. In this unified account, the phonological components should be quantitative phonetic values, which result from the idea that the area of phonology is equal to that of phonetics (Pierrehumbert and Steele, 1987, 1990). This model is based on the assumption that they are not discrete. Therefore, contrastive properties co-produce non-contrastive ones within the model. The reason beyond adopting this model is that there are many cases in which phonetic and phonological phenomena closely parallel with each other. The existence of these parallels is analyzed as resulting from the phenomena of having the same motivating constraints that can be accounted for by a unified model (cf. *ibid*).

Phonetics and phonology are closely integrated in a single grammar not simply interfaced. Howe and Pulleyblank (2001:67) assert that the distinction between the two is erased by including all phonetic details into phonological representations. According to this view, the phonological elements can be completely abandoned with the help of perceptual constraints as well as constraints hierarchies within optimality theory. The basic idea of the unified model is that there is no difference in the representations between phonetics and phonology. Phonological representations are discrete and the phonetic ones are continuous. However, constraints sometimes force us to pick out a set of categories in preference, which induces a discrete state.

In this vein, Flemming (2001) states that phonetics and phonology are not obviously distinguished by the nature of the representations involved, or in terms of the phenomena they encompass, most of the primitives of the phonological representations remain phonetically based.

This model deals with phonetics and phonology as being integrated into a single unit which is all phonetic. Hence, it is maintained that the area of phonetics is equal to that of phonology. In this premise, it is supposed that both categories are best dealt with as a uniform component. Flemming (*ibid*: 11) postulates that there exist many similarities between phonetics and phonology; he states:

But it should be noted that the very existence of such uncertainty about the hypothesized dividing line between phonetics and phonology lends credence to the idea that the line does not exist.

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He (ibid.) adds that the division between phonetics and phonology should be ignored despite the belief that they are different from each other in nature. Hence, the term "integrated theory" is assigned to this view.

Phonetic implementation also determines what kind of phonological representation is possible in the first place. Some research suggests that distinctive feature values are in fact polymorphous, in that their phonetic realizations bear at best a family resemblance to one another, e.g. once you pronounce the words "stop" and "top", it is observed that there arises a difference in the way the /t/ is pronounced in both words. The /t/ of "top" is pronounced with aspiration, i.e. a burst of air accompanies the sound. Contrarily, the /t/ of "stop" doesn't have this kind of aspiration, so the two sounds are phonetically different, but phonemically identical(Vago,1976:244).

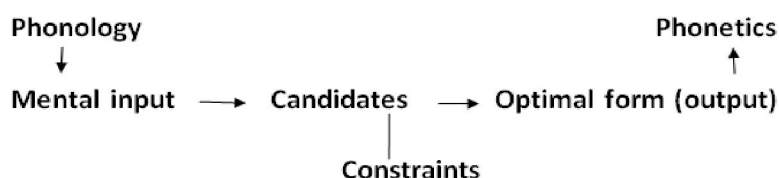
For optimality theory, it shows that there is a kind of relation between them. Phrased differently, phonetics takes its data from the output and works upon them. This means that phonology gives us several mental inputs (candidate forms) to be selected as an optimal phonetic product(Prince and Smolensky,1993:12 and McCarthy,2001). Thus, it is thought that universal and language specific constraints will work on each candidate to select the highly acceptable form to be the phonetic output in a given context. As a result, there are problems in phonology that can be solved by appealing to phonetics and at the same time there are phonetic issues that are addressed by phonology as in optimality theory, for instance,

[t] in 'twenty':Candidates from phonological input: t, d, Ø, T,D...etc.Constraints according to each variety will decide the final optimal phonetic form (output):

e.g. American will be [Ø] ...tweni

British will be [d]....twendi....etc.

The optimality theory representation of this relationship can be sketched in the following diagram (ibid.):



5. Interfaced Different Fields

5.1. Different but Arbitrarily (Unconditionally) Interfaced

An abstract view of the relationship between phonetics and phonology, as Fudge (1967) and Foley (1977) argue, stresses their autonomy from each other with, sometimes, an arbitrary interface. Put it another way, no normal rules govern such an interface. For them, phonology represents proper part of grammar due to its formal, cognitive, and abstract nature whereas phonetics is assigned to bio-physics (Foley, 1977: 52). Phonological items are represented as abstract and arbitrary features devoid of any direct phonetic information. As regards phonetics, they assume that phonetic components vary from one language to another (ibid.). For Ohala (1996:680), this separation has its origins in structuralism; however, it is fully developed in phonology by the Prague School.

In the phonological analysis, phonetic facts are irrelevant to phonological analysis and become useless without any function of them. An example of the abstract view of phonology comes from the analysis of the Hungarian vowels. A symmetric vowel chart was adopted instead of dividing some of them into mid and low. The specified low group combines mid vowels with low vowels. The low group can be described as non-high:

High /i, i:, y, y:, u, u:/

Low (non-high) /e, e:, o, o:, a, a:, ɔ, ɔ:/

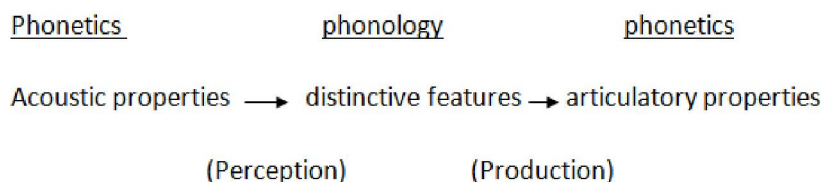
There are no high back unrounded vowels. Phonologically, a front vowel /i/ as the exponent of the plural affix can be attached to the stem with front vowels as in /keze-i/ 'his hands', and the stem with back vowels as in /doboza-i/ 'his boxes'. In terms of vowel harmony, attaching this plural affix to the back vowels is not normal on the grounds that the non-harmonious front vowel is attached to the stem which is composed of all back vowels (Fudge, 1976:10). This gap of High Back Unrounded can be filled with the corresponding vowels /i, i:/ which, from phonological point of view, have two places in the Hungarian vowel system, High Front Unrounded and High Back Unrounded. It is now crucial that the phonetically front vowels are regarded as back vowels from the abstract point of view. The function of high back unrounded vowels is then fulfilled by these high front unrounded vowels which take over the gap. Thus, the high front unrounded vowels are functionally

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back but phonetically front. In other words, they are used distinctively not in the pronunciation of them but in the system of the language(Fudge,1976:244).

5.2. Different but Conditionally Interfaced

On the contrary of the previous view, it is assumed that phonetics and phonology are distinct from each other but significantly interfaced. The assumption, here, is that a constrained mapping between phonology and phonetics exists and it implies that phonological elements are universally related to phonetic ones to some extent(Flemming,2001:11). Generally, there are two arguments supporting this view. The first has been proposed by Sound Pattern of English by Chomsky and Halle (1968) whereby phonological and phonetic representations are related to each other by rules. The general properties of phonological representations represent the best compromise between concrete phonetic transcription and abstract representation. The phonological representation is responsible for describing the qualitative contrasts in sound which can be used to convey qualitatively different meanings in any given language. The entities it posits are attributed to the mind of the speaker/listener as long as the association between sound and meaning takes place(Flemming,2001:39). On the other hand, phonetic representation is responsible for describing speech as a physical phenomenon. That is, it covers the measurable properties of articulation, acoustics and audition (Pierrehumbert, 1990:375). Halle (1983:94) maintains that " the abstract distinctive features constitute the link between specific articulatory and acoustic properties of speech sounds". As in the following diagram:



The diagram above shows that phonology and phonetics are separated; however, they are linked by the association line. Accordingly, she (ibid: 95) stresses that speech perception is interrelated to the connection between acoustic properties on the left hand side of the diagram and distinctive features in the middle of the diagram. On the other hand, speech production is pertinent to the interaction of distinctive features

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with articulatory procedures. Similarly, Silverman (2011:281) argues that the physical and cognitive constraints on sound structure are the primary determinant of the shape/nature of the phonological system. He, also, adds that language structure and use are inextricably intertwined, even to the extent that there is not a sharp distinction between discrete and variable aspects of speech.

The second argument is a semantic one. That is, they have the same general character as the principles relating ordinary nouns or adjectives to their meanings in the real world. Let's take the word (dog) as a concept (DOG) which refers to the whole class of dogs and its pronunciation /dog/ associated with this concept. The claim is that the relationship between DOG as a concept and its pronunciation is arbitrary (Boersma,1998:467). Semantically, children learn words such as "dog", "animal" or "red" by acquiring a mental association between these words and particular experiences of the real world. The semantic associations thus acquired are determined by the properties of the world, by the lexical inventory of the language by cognitive constraints on category structure (Hayes,1997). Likewise, children learn to talk by acquiring a mental association between phonemes and particular real world experiences, namely particular types of events in speaking and hearing speech. For example, they learn that /p/ means lip closure, raised velum, rising formant, and so on. The system of phonological categories children construct is constrained by the physical possibilities of articulation and speech acoustics, by the phonological inventory of the language being acquired, and by the cognitive constraints on category structure (Chang,2002:503).

Concluding Remarks:

It can be concluded that the relationship between phonetics and phonology is a multifaceted one. Throughout literature, three main views are observed concerning this relationship, but none of them can be judged as the acceptable one. It is so because each has its own evidence. The first view suggests that phonetics and phonology are the same and can be seen as complementary fields within a unified model of pronunciation. The second one proposes that the two fields are different with arbitrary interface between them. The final one argues that these branches of linguistics are distinct although they are conditionally interfaced.

ملخص البحث

يتناول البحث موضوعة الجدل القائم بخصوص العلاقة بين الصوت كمظهر (مجسد) قائم بذاته والصوت كعلم يضع قواعد هامة مؤثرة على المعنى بوصفه اشمل من (جزئية المظهر الملموس او المجسد للأصوات)؛ في ضوء هذا الجدل نشأت ثلاث نظريات عبر التاريخ اللغوي: الأولى في القرن الثامن عشر تتحدث عن اندماج كلاهما في مستوى واحد في (علم اللغة)؛ أما الثانية ظهرت عند بدايات القرن العشرين تتحدث عن اقتران كل منهما بالآخر؛ أما الثالثة فقد ظهرت عند النصف الثاني من القرن العشرين تتحدث عن اندماجهما ثانية. توصلت الدراسة إلى أن الرأي الثالث هو أكثر موضوعية وقبولاً وجدوى لحل المشاكل الناتجة عن انفصالهما .

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