

# **Modern Natural Phonology: the theory for the future.**

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## **1. Introduction**

As all theories, Natural Phonology has evolved and changed over the years since its inception in the 1960s and 1970s. The type of explanation offered by Natural Phonology (NP) had originated in a variety of phonetic and phonological studies of the 19<sup>th</sup> and 20<sup>th</sup> century. The theory itself was founded by David Stampe (1969, 1973) and expounded by Patricia Donegan and David Stampe (1979). Its basic thesis is that phonological systems are phonetically motivated. NP was proposed as an alternative to both structural and generative approaches to phonology current at the time. The theory received new impetus and grew into a large explanatory framework of Natural Linguistics due to the works of Wolfgang U. Dressler (starting with Dressler 1984) and followers. Modern Natural Phonology (MNP) has many facets, and although the main tenet has remained valid, its interpretations may vary. Still more impor-

tantly, MNP has a much wider perspective, reaching far into the areas of external evidence and relying on a solid functional and semiotic foundation. It is no longer true to say that “natural phonology (...) lacks any a priori methodology or formalization” (Donegan and Stampe 1979: 168); the methodology stems from universal, functional and semiotic, principles, while formalizations are being introduced without detriment to the theory (most recently, Dziubalska-Kołaczyk 2002). Due to those developments, a favourable ground for cross-framework discussion has been formed and has already been exercised (e.g., with Optimality Theory, cf. Donegan 2001 and several other papers in Dziubalska-Kołaczyk (ed.) 2001; with Government Phonology, cf. the same source as well as the workshop on Government Phonology and Natural Phonology at Poznań Linguistic Meeting 2003, especially the talks by Scheer, Gussmann, Cyran, Dziubalska-Kołaczyk and Dressler, Ritt). Dynamically increasing scope of external evidence in such areas as psycholinguistics, acquisition of first and second language, neurolinguistics, speech technology and, indeed, phonetics itself, increases the potential of the theory. The holistic, all-embracing, and interdisciplinary nature of the theory tunes in very well with the interdisciplinary demands of modern research, and thus directly responds to the scholarly challenges of the 21<sup>st</sup> century.

The aim of the paper is to present in brief the state of the art of Modern Natural Phonology (MNP henceforth). For this purpose, firstly, a short review of the historical development of Natural Phonology will be pro-

vided. Secondly, core assumptions of a wider framework of Natural Linguistics will be spelled out. Thirdly, controversial issues that Modern Natural Phonology needs to approach will be presented.

## 2. Natural Phonology: the origin

Natural Phonology is a theory of phonological structure, acquisition and change originated by David Stampe (1969, 1973/1979) and developed by David Stampe and Patricia Donegan (cf., among others, Donegan -- Stampe 1979, Donegan 1978/85). The theory operates with *phonological processes*, which constitute natural responses of the human vocal and perceptual systems to the difficulties encountered in the production and perception of speech. For instance, it is more difficult, on purely aerodynamic grounds, to produce a voiced stop than a voiceless one, as well as a voiced velar stop than an alveolar one, while a bilabial one is the easiest of the three. It is more difficult to perceive the sequences [wu] and [ji] than the sequences [wi] and [ju], due to the insufficient perceptual contrast, which in turn stems from articulatory similarity. It is easier to perceive lower than higher vowels due to the greater perceptual salience of the former. Every segment and every sequence can be classified with respect to such criteria of difficulty. Phonological processes are thus pho-

netically motivated. They are universal, since all humans exhibit the same potential to respond to the difficulties of speech. A child learns to inhibit some of those natural responses in order to arrive at a language-specific phonology. Importantly, “the universality of processes does not mean that they apply in all languages – only that they are motivated in all speakers” (Donegan 2002: 64). Natural Phonology explains by referring to the tension between two conflicting criteria (ease of production vs. clarity of perception). There is also a conflict between paradigmatic (segmental) and syntagmatic (sequential) difficulty. Processes perform substitutions in order to adapt the speaker's phonological intentions to his/her phonetic capacities as well as enable the listener to decode the intentions from the flow of speech. They are thus either context-sensitive, assimilatory substitutions (lenitions), or context-free, dissimilatory ones (fortitions). Higher order prosodic processes map segmental material on rhythmic patterns prior to the operation of articulatorily and perceptually driven substitutions.

Stampe insists on a strict distinction between phonology and morphonology: *morphonological rules* do not have any synchronic phonetic motivation and have to be learned by children in first language acquisition. Morphonological alternations always involve phonemes (e.g., /k/ and /s/ in *electric* ~ *electricity*) while phonological processes operate on features. Morphology can influence the processing of phonological strings only via phonological/prosodic domains. The order of application of all the above

mentioned operations is thus: rules > prosodic processes > fortitions > lenitions.

A phoneme in Natural Phonology is an underlying *intention* (cf. Baudouin and Sapir) shared by the speaker and the listener (who are always "two in one"). The shared knowledge of intentions guarantees communication between the speaker and the listener within a given language, even if the actually pronounced forms diverge substantially from what is intended, for example, in casual speech. In other words, phonemes are fully specified, pronounceable percepts. Thus, both processes and phonemes are real, i.e. they exist in the mental as well as the physical reality of speech shared by all language users. If there is a process (or processes) which derives a given surface variant of a sound from a specific phoneme, then this phoneme must be an underlying intention of this sound. This means that phonological representations are explicable in terms of phonetically motivated processes, as stated in the *principle of naturalness*:

The principle of naturalness allows one to establish a possible phonological representation: if a given utterance is naturally pronounceable as the result of a certain intention, then that intention is a natural perception of the utterance (i.e. a possible phonological representation) (Donegan -- Stampe 1979: 163).

"*Naturally pronounceable*" in Natural Phonology means "derivable by means of phonological processes". Processes manifest themselves in all

types of phonological behaviour of language users: in normal performance, in child language, in second language acquisition, in aphasia and other types of disorders, in casual speech, in emphatic speech, in slips, errors, language games, whispered and silent speech, as well as in the changing phonological behaviour resulting in sound change. Processes account for all these types of behaviour and more: they also account for implicational universals by substituting the implying sound by the implied one. The task of Natural Phonology, then, is a constant search for processes in the languages of the world.

*Processes involving vowels* have been given a comprehensive account by Donegan (1978/1985). Thanks to the full specification of underlying segments, speakers have access to their language-specific inventory of phonemes; such inventory consists of those segments which "survived" the operation of context-free processes in a particular language. Donegan demonstrates how innate context-free phonological processes govern inventories of vowels.

*Prosodic processes* "map words, phrases, and sentences onto prosodic structures, rudimentary patterns of rhythm and intonation" (Donegan -- Stampe 1979: 142). Prosodic processes are fundamental for the phonology of a language: they determine a direction of phonological change and a segmental set-up of languages by the way in which segmental representations are mapped on prosodic patterns. Donegan and Stampe (1983) claim that the rhythmic type of the language is the main cause of language drift

on all levels of structure. There is stress-timing and syllable-timing, as well as mora-timing, in each language: however, they are language-specifically balanced with respect to one another. Predominance of one type of timing classifies a language into a given rhythmic type, with all the structural consequences this has. On the other hand, the potential for different timings opens a way to change. Stampe believes that on the prosodic level, languages share the same basic beat structure, parallel to a 4/4 beat in music. Segmental melody is not necessarily ideally mapped on this prosodic pattern,<sup>1</sup> thus resulting in varying timing types. However, languages show preference for the basic beat in all those linguistic behaviours which are not under the exclusive control of language-specific grammar.

### 3. Natural Phonology: expansion towards Natural Linguistics

*Naturalness* as the ideology behind linguistic explanations was operationalized in terms of functional and semiotic principles by Wolfgang U. Dressler. This led to the widening of the scope of the framework's ex-

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<sup>1</sup> I'd call these the "out-of-phase" mappings of melody on rhythm. For example, if syllables are mapped just on the primary accent of each beat, and the other three 'pulses' of a beat remain silent, then we arrive at the "syllable-timing".

planatory potential to other components of language, i.e. morphonology, morphology, syntax and text, as well as to such areas of language study as pragmatics and sociolinguistics. It also gave new impetus and provided new insights to Natural Phonology. Via Dressler's contribution, Natural Phonology found new followers and continuators in Europe.

Dressler's work has aimed at the formulation of a holistic framework, encompassing many (in intention all) levels of linguistic analysis, including phonology. Thus, while Stampe and Donegan worked out a detailed theory of phonology, henceforth in this paper referred to as Standard Natural Phonology (SNP), Dressler operationalized naturalness in terms of general functional and semiotic principles which, among others, underlie also linguistic behaviour. Consequently, while both approaches necessarily do have a lot in common, there is a substantial area of non-overlap between them.

#### **4. Natural Linguistics: core assumptions**

The following are the three basic characteristics of the natural linguistic framework. First, predictions and explanations are *functionalist* and *semiotic* in nature. One can, to some extent, predict form on the basis of its function; however, a given form may be allowed to serve more than one function, as well as a particular function may be satisfied by multiple



forms. This is reflected in multifunctionality of forms across languages. For instance, vowel epenthesis in a cluster of consonants serves both the speaker and the listener, since it facilitates production and clarifies perception. On the other hand, production of a cluster may be also facilitated by assimilation, deletion or even metathesis. The latter processes would not improve perception, though, since they would lower the recoverability of the original.

Particular linguistic choices are seen as results of goal-oriented (functional) linguistic behaviour of language users. Semiotics has been adapted as a metatheory for linguistics, which allows one to link linguistics with other disciplines in which signs are also the subject of investigation, and in this way better capture and explain linguistic phenomena. It is from semiotics that the criteria of transparency, iconicity, diagramaticity, indexicality and biuniqueness come from.

Second, generalizing statements formulated in natural linguistics have the status of universal or language-specific *preferences* and not absolute rules or laws. One can gradually move from less to more preferred forms when referring to a preference. A binary distinction between admissible and nonadmissible forms is replaced by a gradual differentiation of forms along a preference scale specified according to a complex set of relevant criteria. *Preference* implies a human agent, i.e. (some) control of language by the selves of the speakers, reflecting behavioural strategies preferred by them (cf. functional explanation). Natural Linguistics is,

thus, explicitly constructed as a *preference theory* rather than a general descriptive theory.

Third, *external* linguistic evidence in Natural Linguistics is regarded as substantive: performance data, such as e.g. casual speech, speech of young children or speech of second language learners, provides evidence for the structure of the speaker's competence. Consequently, to get an insight into the linguistic competence of language users, a linguist needs to consult both internal linguistic evidence (which amounts to grammaticality judgements issued by speakers, both consciously and subconsciously) and external evidence, which translates to all imaginable facets of linguistic behaviour, i.e. of language use, traditionally referred to as performance.

While structuralists relied on distinctiveness, and generativists on simplicity, natural linguists refer to the tension between contradictory preferences as the guiding principle according to which linguistic grammars are structured.

The explanatory system of Natural Linguistics can be envisaged graphically and exemplified as in Figure 1:

<b>higher principles</b>	<i>non-linguistic</i>
(e.g., the principle of the least effort, of cognitive economy)	( <i>cognitive, phonetic, psychological, sociological etc</i> )

<b>preferences</b> (e.g., a preference for simple phono- tactics, for a CV structure)	<i>linguistic</i>
<b>preference parameters</b> (pronounceability, perceptibility)	<i>functional and semiotic</i>
<b>consequences of preferences</b> (absence of clusters in a language)	<i>linguistic</i>

Figure 1. The explanatory system of Natural Linguistics

Linguistic principles have a non-linguistic basis and as such lead to explanatory preferences, referring linguistic phenomena holistically to "the nature of things" and "the knowledge of the world". Within language, preferences of performance become preferences of structure. Conflicts among preferences are resolved for the benefit of the more *natural* solution which is "cognitively simple, easily accessible (especially to children), elementary and therefore universally preferred, i.e. derivable from human nature, or unmarked/less marked" (Dressler 1999: 135). Conditioning factors influencing such resolutions are highly complex. Therefore conflicts may be solved either with respect to *universal* preferences

(i.e. the ones which all languages respect on some level of usage) or with respect to *typological* preferences (for the benefit of a given language type) or with respect to *language-specific*, local preferences (for the benefit of a given language system).

## **5. Modern Natural Phonology: controversial issues**

There is a number of theoretical issues that MNP needs to approach and either highlight or revise its current standpoint, or introduce new solutions. Some of these have already been tackled in the naturalist literature or discussed on the occasions of cross-framework communication with other theories. These issues include the problems of: methodology and formalization; phonology/morphology interface; process typology (lenition, fortition); degree of abstractness admitted for representations, processes, and features; hierarchies of preferences; the speaker's self; as well as, most importantly for Natural Phonology, the mutual relationship between phonetics and phonology. In the rest of this paper I will focus on the last issue.

## **6. Modern Natural Phonology and phonetics**

### 6.1. Early criticisms

In the early discussions, Natural Phonology received a lot of criticism targeted on its reliance on phonetics. Statements such as

[t]he living sound patterns of languages, in their development in each individual as well as in their evolution over the centuries, are governed by forces implicit in human vocalization and perception (Donegan -- Stampe 1979: 126)

gave rise to an opinion among phonologists that Natural Phonology was just phonetics, and thus could not aspire to be a theory of phonology. Phoneticians, on the other hand, would accuse it of pretending to be phonology and thus not being technical enough, and thus not phonetics, either.

### 6.2. Phonetics/phonology interface

Let us examine this issue again<sup>2</sup> in order to arrive at the MNP standpoint in this respect. First of all, trying to distinguish between phonetics and phonology in any clear-cut fashion brings us to an extensively discussed topic of the phonetics/phonology “interface”. Throughout the years a vast number of disputes on and around this topic have been held, to show a

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<sup>2</sup> For early and extensive responses to these criticisms see Dressler (1984).

divergence of views, and no real consensus. Still, some progress can be noted in that the extreme isolationists have lost ground for more liberally oriented holists, who, rather than talk about “interface” would differently weigh “the phonological” and “the phonetic” in their models. However, phonetics as a motivating force for phonology remains controversial.

### 6.3. Sub-categorical features

In this connection, it would be good to explain what Natural Phonology understands by this motivating force, since it was exactly the misunderstanding that led to the misconceptions which were subject to the above mentioned criticisms. I would like to concentrate on two essential points. First, “words are not only distinguished by sounds, they are made up of them” (Donegan and Stampe 1979: 129). This apparently simplistic statement not only ingeniously deprives the distinctiveness principle of its exclusive power, but also raises the question of sub-categorical differences in the realisation of sounds. The question is how to resolve the clash between non-categorical phonetic realisation of speech and its categorical phonological representation (supported by categorical perception). In Natural Phonology the solution lies in natural phonological processes which are based on categorical phonetic features (Donegan 2002: 61). Processes do not assign gradient, sub-categorical feature values to sounds (Donegan

2002: 63); rather, the specific phonetic result they obtain is due to the fact that each feature is dependent on other features it combines with paradigmatically and syntagmatically, as well as on a prosodic domain in which the processes apply. So, for instance, the more the jaw opens the less rounded the lips get; the features of a segment are more salient in the word-initial position or in a slower tempo of speech, etc. It should be thus predictable that a phonetic realisation of a given segment with a given set of features in a given prosodic context will be the same across languages.

**This entails that we should be able to find an ultimately phonetic explanation for any phonological phenomenon.** It is only a matter of how well we look for it whether we find it or not.

A challenge for Modern Natural Phonology is to resolve the following issue: is it indeed the case that the more informed phonetics, as we see developing nowadays, will enable us to find phonetic explanations for all phonological decisions? Of course, admitting that a whole array of external and internal factors may create particular circumstances for particular configurations of phonological processes to apply in a given language. These explanations are, however, of an *a posteriori* nature, since it is the role of phonology to decide what to take from phonetics, i.e. which of the options offered to overcome phonetic difficulties to adopt for a given language system, or type, or, in the most general case, universally. The latter

leads us to the second point concerning phonetic motivation in Natural Phonology.

#### 6.4. Universality of processes

The universality of processes does not mean that they apply in all languages – only that they are motivated in all speakers. (Donegan 2002: 64).

Phonological processes determine what a speaker can do, but not what they must do. Although processes are universal in form and motivation, they do not apply universally. Each language selects a set of processes which constitute its language-specific natural phonology. In this way, some processes are allowed to apply while some difficulties remain and have to be mastered by the native speakers. For example, Polish or German allow the process of word final obstruent devoicing to apply, while English requires its speakers to master the difficulty of producing word final voiced obstruent, i.e. to maintain voicing during the closure or obstruction. Still, the processes of obstruent devoicing (*Auslautverhärtung*) itself does not lose its universal motivation.

Another example could be the vowel /i/ which is universally expected in vowel inventories of languages (cf. Disner 1983). Still, is it the same /i/ across different languages? We suspect and we know that it is not,



at least not in the sense of its phonetic profile. While its “i-ness” is universal (described by the features [+high], [+front]), its realizations vary across languages. It remains unclear, however, whether they vary within the phonological features [high] and [front], or whether they require introducing additional features to be precisely specified. If so, these could be either sub-categorical or categorical, the latter being the choice of Natural Phonology. Another reason for the differences could be the process of diphthongization. Putative existence of sub-categorical differences would need to be proven acoustically. One thing is certain: quite diverse pronunciations of the same vowel by native speakers of the language do not invalidate their being native speakers of the language. I.e., in perception, phonological processes apply which derive a [+high], [+front] vowel for the listener. In this example, thus, both discussed issues combine: that of subcategoriality and that of universality.

#### 6.5. The (ir)relevance of phonetics<sup>3</sup>?

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<sup>3</sup> I owe the title of this section to Edmund Gussmann whom I want to thank for getting seriously involved in the discussion of the potential relevance of phonetics as an explanatory tool in phonology (cf. Gussmann 2004). I wish to continue our constructive exchange of views in Dziubalska-Kołaczyk (in preparation).

How relevant is then phonetics to phonology? Is it so that the more phonetic detail we are able to uncover, the less we know about phonological “underpinnings” of these details, and the further away we get from phonologically relevant generalisations? It seems that the phonetic details alone cannot be used to predict a direction or moment of change of a given phonological category when a certain critical value of accumulated factors is reached. Rather, such changes are phonological in nature and are, thus, a consequence of phonological decisions, which are systemic in nature, i.e. they are dictated by the needs of the whole system. The bottom-up phonetic prompts, however, either initiate or contribute to the top-down phonological decision-taking process. We talk then of either the motivating or explanatory or executional / implementational role of phonetics.

For instance, final obstruents in English may be voiced or voiceless due to the suppression of word-final devoicing process in the language. Voiced obstruents, however, may be phonetically partially or fully voiceless. The acoustic cue used to maintain the contrast in the word-final position is, in fact, the lengthening of the preceding vowel. Both the phonetic voicelessness and the phonetic lengthening are phonologically sub-categorical, no matter how voiceless a consonant and how long a vowel is. Even if they are identical to phonologically voiceless and phonologically long, they remain sub-categorical and will remain so unless phonology reshuffles the system (which wouldn't be easy, since both

long vowels and voice contrast are lexically indispensable independently of the discussed case). If the reshuffling were indeed to take place, then we would be able either to refer to the listener-initiated change or otherwise explain it phonetically, while the ultimate decision would be systemic and phonological and not phonetic and local.

All this is not meant to imply, however, that categorical phonological features and phonological processes operating on them do not have phonetic values. Every natural phonological process has phonetic content and phonetic explanation. Their application, however, is phonologically constrained. But once a process applies, there must be a way to find a phonetic account for its performance.

## **7. A final remark**

This short account of the character and development of Natural Phonology cannot give justice to the full potential of the theory. It is hoped, however, that it points to the dynamic responsiveness of Modern Natural Phonology to the newly arising research needs of the 21<sup>st</sup> century as well as highlighting the underlying stability of its principles.

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