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CHALLENGES FOR NATURAL LINGUISTICS IN THE TWENTY FIRST CENTURY: A PERSONAL VIEW.

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Any view that one expresses and signs his or her name underneath is bound to be "personal." Still, this paper will have a personal flavor in the sense of attempting a somewhat backstage review of the state of the art in Natural Linguistics: a view of a convinced insider. The purpose is to stir discussion and invite comments which may eventually result in Natural Linguistics asserting itself more widely in the present-day arena of linguistic frameworks.[1] This is precisely what I consider to be the challenge for Natural Linguistics in the twenty first century: to become more assertive of its epistemological potential. In order to do justice to this claim, the following steps will be taken: First, basic characteristics of Natural Linguistics will be summarized to make it easily identifiable as a theory against (or, to some extent, in accord with) other existent theories of language. Second, some earlier uses of naturalness in explaining language phenomena will be alluded to. Third, the main bulk of work in the framework will be briefly outlined by taking a bird's-eye view of the variety of research areas that natural linguists and their sympathizers have been involved in for the last few decades. Finally, some polemics with reference to a particular type of statements in both recent and older linguistic literature will be undertaken: specifically, statements which allude to natural linguistic explanations in either implicit or explicit fashion. Such implicit references in recent literature can only independently confirm what Natural Linguistics has long been claiming, and thus contribute to the convergence of views about language among many apparent opponents. Without doubt, older or explicit references to the idea of naturalness give direct support to the theory. The paper will close with a call for natural linguists to unite in their search for the true nature of language.[2]

1. Natural Linguistics: core assumptions and principles

In a nutshell, the following are 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 multi- and plurifunctionality of forms across languages. Particular linguistic choices are seen as results of goal-oriented (functional) linguistic behavior of language users. Semiotics has been adapted as a metatheory for linguistics,

[1] The present author is preparing a monograph on *Naturalness in Phonology. European and American leitmotifs of the past and present*, which will continue in depth the pursuits of this paper.
[2] I apologize to those readers who might consider such a call to be „politically loaded." It is meant to be taken genuinely at its face value.

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.

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 behavioral 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 judgments issued by speakers, both consciously and subconsciously) and external evidence, which translates to all imaginable facets of linguistic behavior, 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:

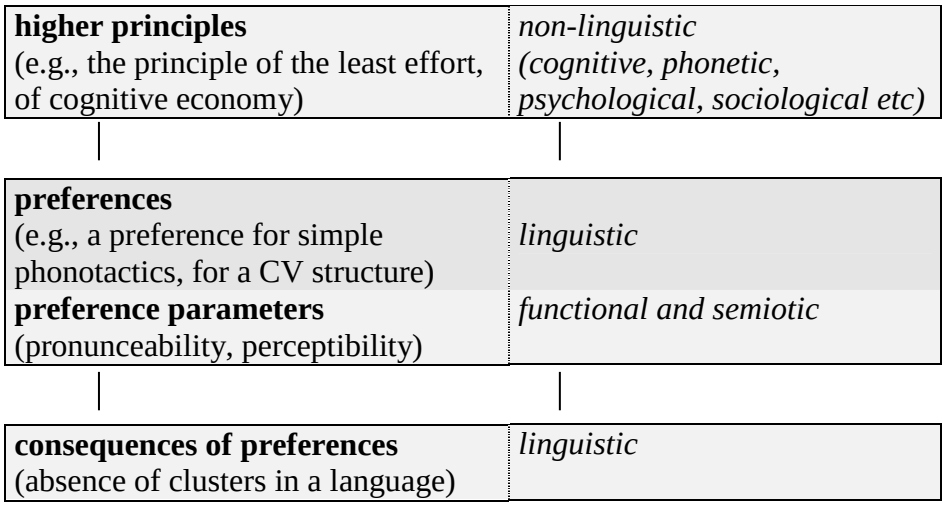

Figure 1. The explanatory system of Natural Linguistics

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).

2. Naturalness in early studies of language

With respect to its general approach to the study of language, Natural Linguistics has an array of largely acknowledged predecessors,[3] reaching as far back as the ancient times to Plato, and in the nineteenth and twentieth century linguistics, in the names of Jan Baudouin de Courtenay, Mikolaj Kruszewski, Roman Jakobson, Edward Sapir, Otto Jespersen, Henry Sweet, Eduard Sievers, Jost Winteler, Paul Passy, Maurice Grammont, Pierre Fouché. Let us look for the traces of naturalness in the approaches of some of those scholars.

2.1. Plato

As we read in the Introduction to Plato's *Cratylus* (p. iii), "[t]he ideal described in the *Cratylus* is of an origin for language in genuine, non-name-mediated knowledge of the natures of things." Hermogenes reports to Socrates what Cratylus says about names (383b):

> there is a correctness of name for each thing, one that belongs to it by nature. A thing's name isn't whatever people agree to call it – some bit of their native language that applies to it – but there is a natural correctness of names, which is the same for everyone, Greek or foreigner.

Later in the dialogue, Socrates says:

> []that the first names given to things have long since been covered over by those who wanted to dress them up, and that letters were added or subtracted to make them sound good in the mouth, resulting in distortions and ornamentations of every kind. [] that time has had a share in this process. Take *'katoptron'* ('mirror), for example, don't you think that the 'r' is an absurd addition? (414c) [FN 93, p. 53: Because it interrupts the sequence *'opto'*, suggesting a verb for seeing.]

Both naturalness of language and distortions of this naturalness (markedness, as we would say now) are referred to in the above quotes. Numerous other statements and observations Plato puts in the mouth of Socrates in *Cratylus* reveal his speech-oriented or speech-derived view of language. For instance, in his impressions about primary names (426 and 427), Socrates points to a connection between the nature of a given sound and the meaning of words created with this sound at their core (we would talk about sound symbolism as well as transparency of forms today). 'r', for example, is described as a tool for copying every sort of motion (*kinesis*); examples of words which include 'r': trembling, running, striking, crushing, rendering, breaking, crumbling, whirling; "he [the name-giver] saw that the tongue was most agitated and least at rest in pronouncing this letter, and that's probably why he used it in these names," remarks Socrates.

2.2. Jan Baudouin de Courtenay

The studies of language by two Polish linguists of the turn of the nineteenth and twentieth century, Jan Baudouin de Courtenay and his student Mikołaj Kruszewski, originated the approach to language later largely shared by natural linguistics. In his numerous works,

[3] The following are the names referred to by Donegan and Stampe (1979:126).

Baudouin elaborated his views,[4] among others, on such matters as the status of linguistics as a scholarly discipline and the nature of phonetic/phonological studies, the phoneme and representations, as well as alternating representations (cf. the theory of alternations). He also proved to be a dedicated empirical linguist and child language researcher by collecting the speech data from his five children over a span of twenty years. Below I will shortly characterize Baudouin's claims in each of these areas.[5]

2.2.1. Linguistics as a discipline.

Language is a psychological phenomenon and thus concerns an individual (cf. "the psychological world") and his/her interactions with three other "worlds": the biological world of an organism, the external, physical world, and the social world. [6] Although language is not an organism and linguistics is not a natural science, a linguist can follow the example of natural sciences in the observation of living languages, and apply quantitative, mathematical methods, but also qualitative method of psychology.[7] Linguistics is halfway between psychology, sociology, biology, anthropology, and the humanities, which is well-manifested by two branches of phonetics: anthropophonetics and psychophonetics.[8] Baudouin advocates balance between the two sides of linguistics in the study of language, allowing for both inductive and deductive research. Importantly, he states: "The object of investigation must be treated as it is, without forcing upon it alien categories."[9]

Baudouin attaches great importance to external evidence as well as morphological and semantic motivations in explaining phonological phenomena. Among the factors to be considered he mentions: psychological states of the speakers, linguistic abilities, articulatory and auditory dispositions, instinct of self-preservation and tendency toward economy of labor, channel of transmission, visual impressions, facultativeness of sounds, errors in hearing (lapsus auris), also in a foreign language, as well as morphologization and semasiologization of the articulatory-auditory representations.[10] All this reflects a "constant interaction of linguistic and extralinguistic concepts"[11] (p.268) in an individual.

2.2.2. The phoneme. Representations.

Baudouin's view of the phoneme as the ultimate invariant of psychophonetic sound structure was a direct predecessor of the phoneme in natural phonology, alongside with a parallel view of the phoneme developed later by Sapir.[12] In Baudouin's words:

> The phoneme: a unitary concept belonging to the sphere of phonetics which exists in the mind thanks to a psychological fusion of the impressions resulting from the pronunciation of one and the same sound; it is the psychological equivalent of a speech sound.[13] [] the actual and reproducible unit of linguistic thought[14]

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[4] Kruszewski died at a very young age, and thus Baudouin continued what they began together.
[5] Most of the references and quotes from Baudouin's works come from Stankiewicz 's (1972) anthology; actual titles of particular papers are provided in respective footnotes.
[6] cf. *Phonetic laws* (p.261).
[7] cf. *Linguistics of the nineteenth century* (pp.251-2).
[8] cf. *The difference between phonetics and psychophonetics* (pp.278-283).
[9] cf. *Statement of linguistic principles* (p.214).
[10] cf. *Phonetic laws* (pp.264ff).
[11] cf. *Phonetic laws* (p.268).
[12] See Sapir in 2.4. below.
[13] cf. *An attempt at a theory of phonetic alternations* (p.152).
[14] cf. *The difference between phonetics and psychophonetics* (p.279).

The concept of the phoneme is associated with individual anthropophonic representations: articulatory and acoustic ones. Thus, the phoneme belongs to the psychophonetic part of phonetics, while its articulatory and acoustic representations – to the anthropophonic one. In other words, the phoneme represents the intention behind the actual sound.

> The discrepancy between the phonetic intention and its realization is solved by substituting an intended impossible activity by a possible one.[15]

According to Baudouin, this substitution is the only type of phonetic change that may occur in the synchronic state of a language. It manifests itself either as an active substitution of intended activities by possible ones, also in the speech of children or in foreign words, or it appears as synchronic phonetic differences, i.e. alternations of historical origin of morphemes and phonemes. These two forms are interconnected: "active, dynamic substitutions give rise to embryonic, incipient phonetic alternations", while synchronic alternations can be traced back to substitutions which took place in the past.[16] What links the separate speech acts are representations, or *images of the memory*.[17] This reasoning leads us to the theory of alternations.

2.2.3. Alternations. Changes in representations.

A primary stimulus of an alternation is anthropophonic, but its roots may be in the native language, or a foreign language; the original cause may still be active in synchrony, or not.[18] Alternants (and alternation) are thus defined as:

> phonetically different phonemes, which are part of etymologically related morphemes and which occupy the same position in the phonetic structure of the morphemes.[19]

Kruszewski and Baudouin studied the ways in which phonetic distinctions take on meaning-differentiating function by being *morphologized*, and focused on the nature of the relations between such morphologically linked, i.e. *alternating* forms. Their theory of alternations, further developed after Kruszewski's death by Baudouin, was a prologue to the distinction between processes (cf. divergences) and rules (cf. correlations) in Stampe's natural phonology as well as to a hierarchy ranging from purely phonological processes via morphonological to morphological ones in Dressler's natural morphonology and morphology (since all alternations originated in anthropophonic divergences via phonologization and morphologization). The latter link is reinforced by the fact that Baudouin admitted a variety of criteria motivating alternations: phonetic, psychological, and social.

2.2.4. Baudouin's diaries.

Baudouin's interest in child language reflects his view on language in general: he attached great importance to the study of living languages, of which child language is one. Modern natural linguistics does just that: draws from external evidence to support its ideas (cf. section 1 above). Starting in 1885 and continuing for another nineteen years, Baudouin conducted

[15] cf. *An attempt at a theory of phonetic alternations* (p.159).
[16] cf. *An attempt at a theory of phonetic alternations* (p.160).
[17] cf. *An attempt at a theory of phonetic alternations* (p.158).
[18] cf. *An attempt at a theory of phonetic alternations* (p.161).
[19] cf. *An attempt at a theory of phonetic alternations* (p.154).

diaries of his five children (born in 1885, 1887, 1888, 1892 and 1897). The diaries consist of 473 note-books, containing 13336 pages of manuscript, entitled *Spostrzeżenia nad dziećmi* (Observations about children). The notes are very detailed and contain not only the children's vocalizations, and the explanation of their meaning, but also description of circumstances, the child's behavior and reactions, as well the child's age and the date of observation. Only a small part of the diaries have been published (Baudouin de Courtenay 1974, ed. by Chmura-Klekotowa). The manuscript has been in the National Library in Warsaw since 1953.

2.3. Roman Jakobson

Jakobson's (1941)[20] monograph *Kindersprache, Aphasie und allgemeine Lautgesetze* constituted the first attempt in modern linguistics to create an explanatory theory of linguistic systems based on "extralinguistic" material, i.e. external evidence. Although many details of his approach have since been refuted, his major claim about universal solidarity underlying child language, synchrony of the world languages and speech pathology retains its relevance.

In the child's acquisition of language two driving forces are at work which are "mutually opposed but simultaneous": "the particularist spirit" and "the unifying force" (Jakobson 1968:16). The latter is manifested both in the child's speech and the adult's, e.g. in nursery language. So,

> Certain constituents of the model are eliminated, while others are revalued. In spite of its dependence on that of the adult, [...] the phonological system of the child may contain elements which remain completely foreign to his model (p.14)

Jakobson notices that mutilations of the ordinary language observed in children have parallels to sound changes (p.18). He traces "general laws" in acquisition and emphasizes that the apparent deviations in the child's speech are not incoherent. The actual beginning stages of language are preceded by the babbling period, when the child is able to produce all conceivable sounds (p.21). The child then loses this ability and passes to acquisition of words, which Jakobson considers the first genuine stage of language (p.21). At the time the child also loses many sounds common to his and adult language, and recovers them gradually with effort (e.g. palatal Cs, sibilants, liquids). Jakobson describes this transition from the prelanguage babbling period to the "actual language" as a transition from „the purposeless egocentric soliloquy of the child" (p.24) or biologically oriented "tongue delirium" (Preyer's term) to a conceptual, phonemic distribution of articulated sounds. Thus, the babbling period, according to him, is "one of external phonetics, predominantly articulatory" (p.27) and divergent. The first appearance of "actual language", on the other hand, is a universal succession of stages regulated by structural laws (p.28).

> [A]ppearance of phonemes in a linguistic system has nothing in common with the ephemeral sound productions of the babbling period. (p.28)

Jakobson also admits a possibility of a mute period (p.29) intervening between babbling and true language.[21] Jakobson's discontinuity view has been refuted by later research. Interestingly, he himself states in the same book that pre-language stages and initial stages of the child's linguistic development are of "the utmost importance for the phonological structure of language" (p.19). He also correctly notes that "the acoustic impression of one's own sound

[20] All my quotes and references to the book come from a (1968) publication in English.

[21] The characteristics of true language are: persistence of the sound, intention to express meaning, and the social setting of use.

production is all-important" (p.21). He expresses the difference between perception and production in a child by suggesting two varieties of language a child has: one he controls actively, the other, the language of the adult – passively (p.22). He quotes here examples from Passy of children perceiving differences without being able to produce them. Also, however, he provides examples showing that a child "fails to hear many phonological oppositions of his native language" (p.23, fn 14), e.g. Grégoire's son did not recognize the difference between *bateau* 'ship' vs. *baton* 'stick', i.e., did not perceive the opposition of oral and nasal vowels, although he could nasalize vowels in babbling; similarly, *moment* vs. *maman*, *poussière* vs. *pisser*, *passé* vs. *cassé* – (examples from Bloch's son). These examples, if confirmed, would constitute counterevidence to the natural phonological assumption about the child's ability to hear the distinctions in the adult speech.

Jakobson's search for universals, based on the belief that the same linguistic principles underlie acquisition, disintegration, and change, reveals the naturalness trace in his approach.

2.4. Edward Sapir

Edward Sapir approached language as a profoundly mental, psychological phenomenon. This view contrasted with the behaviorist climate of the 30s and 40s in America. He was also aware of the works of European linguists; for instance he referred to Trubetzkoy and to Jones in his 1933 paper (p.56). On the one hand, Sapir pointed to the relevance of phonetics to the study of grammar,[22] while on the other, he strongly emphasized the distinction between physiology and psychology of speech sounds, claiming that sounds and sound processes of speech could not be properly understood in simple mechanical terms. By means of a comparison of a speech sound with an identical one not used in a linguistic context, e.g. *wh* in *when* and blowing out a candle, Sapir showed that "a complex psychology of association and pattern is implicit in [...] consonant or vowel" (1933:35). According to him, phoneticians often ascribe too much importance to phonetic detail which may reflect individual and contextual variation, and as such obscure the actual distinctiveness of sounds in a language (cf. Sapir 1925:36). Sapir distinguished two phases in the patterning of sounds in a language: first, speech sounds need to be patterned off against others non-linguistic sounds; second, the sounds should be "placed" with reference to one another in the system of a language (Sapir 1925:36-7). A finished pattern is an ideal, psychological mechanism, which may persist as a pattern long after its phonetic content is changed: "The inner sound-system […] is a real and an immensely important principle in the life of language" (Sapir 1921:55).

The most representative of Sapir's discussions of the difference between mechanics and psychology of speech is his treatment of the sound vs. phoneme[23] difference. He draws a parallel between our perception of an object – a club, and a phoneme, noticing that as much as we can recognize apparently quite different objects as specimen of a club, so much we can recognize apparently different sounds as one phoneme. Sapir's experience of teaching speakers of American Indian languages to write their language allowed him "to estimate at its true value the psychological difference between a sound and a phoneme" (Sapir 1933:54). He came to the conclusion that "[i]n the physical world the naive speaker and hearer actualize and are sensitive to sounds, but what they feel themselves to be pronouncing and hearing are "phonemes"" (Sapir 1933:47).

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[22] "[...] our present tendency to isolate phonetics and grammar as mutually irrelevant linguistic provinces is unfortunate. There are likely to be fundamental relations between them and their respective histories that we do not yet fully grasp"(Sapir 1921:184).

[23] „a functionally significant unit in the rigidly defined pattern or configuration of sounds peculiar to a language" (Sapir 1933:46).

Let us have a look at a few examples. Sapir's Southern Paiute[24] informant Tony (1933:48ff) syllabified a word *'pa:□a□* 'at the water' as *pa: / pa□*. Tony's perception of the word is explained by the fact that in his language post-vocalic stops occur as either spirantized, nasalized, or geminated stops, depending on the nature of the stem or suffix that precedes them, and the stem *pa:-* happens to be a spirantizing stem. To John, the native speaker of Sarcee[25] (1933:52ff), the words *dìní* 'this one' vs. *dìní* 'it makes a sound' sounded quite different. It turn out that there are phonologically distinct types of final vowels in Sarcee: smooth (simple) vowels and vowels with a consonantal latency. *-t□* is one of those consonants; it appears in *dìní* 'it makes a sound' in its phonological form, i.e. *dìnít□* (this form shows up e.g. in *dìnít□ + í*). Sapir's best student Alex, the speaker of Nootka[26] (1933: 54ff), wrote [h□] as /hi/ and [h□] as /hu/, since laryngeal consonants cause the following vowels /i/ and /u/ to lower in his language. In sum, Sapir's informants demonstrated phonemic perception, i.e., as Sapir put it, they rendered a flow of phonetic elements they heard, inadequately from a purely objective point of view, as "the intention of the actual rumble of speech" (Sapir 1921:56). Phonemes are understood not as abstractions but rather as mental idealizations of sounds.

This view of the phoneme (see also Baudouin's view, 2.2. above), as well as the fine balance between the phonetic and the phonological in speech, is shared by natural phonology.

2.5. Otto Jespersen

Jespersen's account of the English language is a sociolinguistic and pragmatic one in today's terminology. For example, the fact that English has consonant clusters requires no little energy on the part of the speakers, according to Jespersen. "That many suchlike consonant groups do not tend to render the language beautiful,[27] one is bound readily to concede (...)" (Jespersen 1905:4). But, English reduced many of those clusters, thus saving both on energy and roughness, as Jespersen suggests. He makes reference to phonetic and pragmatic criteria, which classify as external evidence in today's terms, and are vital for natural explanations.

Jespersen's view on language in general (cf. Jespersen 1921) relies very much on his views on language acquisition and in this sense contains a seed of naturalness. Sound-laws account for similarities among children in their "little language." What contributes to the child's learning of a language is his/her mental endowment, which means the capacity for development (Jespersen 1921:142), as well as the behaviour towards the child of the people around (p.141). "Playing at language", secret languages, onomatopoea, word inventions, and the like, prove that the child is an active participant in the process of language acquisition. The child also plays a role in language change.

2.6. Henry Sweet

There is a number of important similarities between the way Sweet (1891) characterizes sound-changes and the way processes are viewed in Natural Phonology (cf. section 3.1. below). "Organic changes are due to the natural tendencies of the organs of speech" (Sweet 1891/1960:238), while "[a]coustic changes are the result of the impressions which sounds make on the ear" (p.238), i.e., both articulatory and perceptual criteria are taken into consideration. "Isolative changes affect a sound without regard to its surroundings" (p.239) while "in combinative changes one sound is modified by another one close to it" (p.239), which reminds us of a distinction between context-free, paradigmatic processes vs. context-

[24] A language of southwestern Utah and northwestern Arizona.
[25] An Athabaskan language of Alberta, Canada.
[26] The west coast of Vancouver Island, B.C.
[27] The fact that many of Jespersen's evaluations would be politically incorrect today (and linguistically incorrect, too) is a separate issue, not relevant to the present discussion.

sensitive, syntagmatic ones. Sweet classifies combinative changes further as either convergent or divergent.

> Convergent changes, as of (au) into (□u) [Sweet refers to: ME (au) *saw* -> (s□u) ->MnE (s□□)] are organic, being due to the tendency to save trouble by making the passage from one sound to another as short and easy as possible (p.239).

A complete convergence results in assimilation; in Natural Phonology these correspond to processes driven by ease of articulation (-> lenitions).

> Divergent changes are often partly acoustic, being due to the striving for distinctiveness (p.239)

but they may also be organic, e.g. English change of (ii, uu) -> (ij, uw). Natural Phonology has processes driven by clarity of perception (Sweet's acoustic ones) (->fortitions), but which can also be driven by ease of articulation (organic changes in Sweet's terminology), thus having also a "lenitive" effect.

Another important similarity is demonstrated in Sweet's statement against "rule telescoping" (in modern terms): "even the most violent changes ... are the result of a number of very slight changes" (p.240). A natural process, as conceived by Stampe, changes only one feature.

The following statements by Sweet about the reasons of sound-changes are reflected in the functional explanation employed by modern Natural Linguistics:

> Organic sound-changes are mainly the result of carelessness, by which the speaker fails to hit the exact position for forming a sound, or laziness, as in combinative changes. (p.240)

> The loss of sounds or sound-dropping is the result partly of laziness, partly of the sound's indistinctness, as in the frequent dropping of weak vowels, or even syllables, as in the familiar (koz)=because; partly of economy, or the tendency to get rid of superfluous distinctions. (p.240)

Note that Sweet lists articulatory ease, perceptual clarity, and economy as all possible causes of a weakening change: compare multifunctionality of processes in NL. Sweet advocates the relevance of performance:

> whatever is in general use in a language is for that very reason grammatically correct [...] whenever usage is not fixed [...] grammar comes in, and helps us to decide which expression is most in accordance with the genius of the language, least ambiguous, most concise, or in any other way better fitted to express what is required (p.5).

There is thus a lot of evidence for the naturalness of Sweet's views on language.

2.7. Eduard Sievers

Sievers's *Principles of Phonetics* (*Grundzüge der Phonetik* 1893/1901) was a milestone work in the area and has remained a most valuable reference for modern phonetics and phonology. One of the most outstanding achievements of Sievers's monograph was a theory of the syllable, in which he was forerunner of the use of such criteria as sonority and syllable-cut. His notion of a *Nebensilbe* (Sievers 1901:205, §534) is a direct predecessor of Stampe's *sonables*. In general, the fact that what for Sievers appeared to be *phonetics* conventionally counts as *phonology* in modern understanding can be linked to the natural phonological view

on the issue of the relationship between phonetics and phonology.[28]

2.8. Other potential predecessors: the principle of least effort

Even among apparently quite divergent views can we find some common threads. For instance, Jakobson was a structuralist; still there is a lot that a natural linguist can draw from his view on language. Similarly, one can find some interesting precursors of later ideas in the works of other structuralists (e.g., Trnka'a law of the minimal phonological contrast, referring to the combination of phonemes in a sequence, cf. Trnka 1936, in Vachek (ed.). 1964). It would constitute a separate task to find out more about such convergences. Instead, let me concentrate on one example: the principle of the least effort, which Natural Linguistics lists among its higher, non-linguistic principles, alongside with the figure-and-ground one or a binarity one.

The principle of the least effort can be traced back to quite a number of scholars, linguists as well as psychologists and philosophers. I will mention some of them in a chronological order, without any claim at exhausting the topic. In 1878 William Dwight Whitney published a paper entitled "The principle of economy as a phonetic force." He claimed that a tendency to the saving of effort had been recognized in the history of the phonetic form of words since the beginning of the nineteenth century and had established itself in linguistic science (Whitney 1878:249). According to Whitney, the principle of economy accounts solely for "phonetic changes falling under the two heads of abbreviation and assimilation" as well as "the processes of the transmission, acquisition, and use of speech" (p.250). In other words, all changes "are for the purpose of increased convenience of use" (p.253). Whitney emphasizes that this is not a conscious action on the part of language users, but an independent force acting upon them. Rather than attempting to built a scale of difficulty of sounds, he suggests observing what comes easiest to a child acquiring the first language.

A German philosopher, Fritz Schultze claimed that "those sounds which require the least physiological effort for their production are learned first by children" (Schultze 1880: 27). This was referred to as "Schultze's law of the succession of phonological development" (cf. Jakobson 1941/1968:21) or the principle of the least effort. According to Jakobson, the principle was first mentioned by Buffon (he provides no reference), while a remnant of this conception is found in Stern and Stern 1928. In Jakobson's opinion, "this hypothesis is completely refuted by an essential fact of the child's linguistic development" (Jakobson 1941/1968: 21).

In Baudouin's (1897) *Statement of linguistic principles* we find the following passage:

> The cause, the impulse for all linguistic change, is a tendency toward convenience, toward a minimum of effort in pronunciation, hearing and perception, and in thought (cerebration) (p.213).

George Kingsley Zipf proposed a Principle of Least Effort which Manfred Krug refers to (Zipf 1935, 1949, cf. Krug 1998:288) to explain the origin of contractions in English. Contractions are the result of a tendency for frequent items to become monosyllabic, which follows the quoted principle. For Krug, the least effort principle constitutes the basis of a Frequency Factor, in which the parameter of frequency corresponds to the speaker's economy. He admits there is also the hearer's economy, which he labels Recoverability Factor (Krug 1998:300). The two factors are modeled on Horn's (1984, cf. Krug 1998:296, 300) R-

[28] There is no space here to comment on the numerous misunderstandings of this view following the publication of Stampe's (1979) dissertation. Cf., however, section 3.1. below, and Dziubalska-Kolaczyk (in preparation).

principle and Q-principle. The former aims at minimization of form; the latter aims at maximization of informational content.

The principle of least effort has also been widely used in phonetics, with reference to ease of articulation as opposed to the requirement of minimal distinctiveness (cf. also below section 4.6.).

All those renditions have a lot in common with one another as well as with the speaker-hearer dichotomy of Natural Phonology and the functional epistemology of Natural Linguistics in general. Despite the differences of detail or perspective, a similar line of thinking about economy of speech has been shared for at least two centuries.[29]

Let me now turn to a short overview of research conducted within the widely conceived framework of Natural Linguistics.

3. Overview of research in Natural Linguistics[30]

3.1. Natural Phonology.

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 and 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. They are thus phonetically, and not morphologically or syntactically, 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. Natural phonology explains by referring to the tension between two conflicting criteria (ease of production vs. clarity of perception). 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, 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 in §2.2.2. above and Sapir in §2.4.) shared by the speaker and the listener (who are always "two in one"). 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

[29] Research dedicated specifically to the topic of the principle of least effort would make this account more systematic.

[30] Linguists mentioned in this overview have not been personally consulted as to their scholarly identity for the purposes of this paper. I rely on my own perception of their research when qualifying their work under the label of "Natural Linguistics" or sympathizing with the framework. It is entirely possible that some of them may object, for which I apologize and invite them to a riposte.

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 and Stampe 1979:163).

"*Naturally pronounceable*" in Natural Phonology means "derivable by means of phonological processes." Processes manifest themselves in all types of phonological behavior 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 behavior resulting in sound change. Processes account for all these types of behavior 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 and 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,[31] thus resulting in varying timing types. However, languages show a preference for the basic beat in all those linguistic behaviors which are not under the exclusive control of language-specific grammar.

3.2. Widening the scope of naturalness: from Natural Phonology to Natural Linguistics.

Naturalness as the ideology behind linguistic explanations received further conceptualization and was operationalized in terms of functional and semiotic principles by Wolfgang U. Dressler.[32] This led to the widening of the scope of the framework's explanatory 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

[31] I'd call these the "out-of-phase" mappings of melody on rhythm. For example, if syllables are mapped on the primary accent of a beat, and the other three "pulses" of a beat remain silent, then we arrive at the "syllable-timing."

[32] cf. also Dressler, W.U. Naturalness and functionalism. in press.

provided new insights to Natural Phonology. Via Dressler's contribution, Natural Phonology found new followers and continuators in Europe.

The original statement of the theory of Natural Phonology by Stampe and Donegan has been referred to (in the literature and shop-talk) as classical Natural Phonology (CNP henceforth). Dressler's work has aimed at the formulation of a holistic framework, encompassing many (in intention all) levels of linguistic analysis, including phonology.[33] Thus, while Stampe and Donegan worked out a detailed theory of phonology, Dressler operationalized naturalness in terms of general functional and semiotic principles which, among others, underlie linguistic behavior as well. Consequently, while both approaches necessarily do have a lot in common, there is a substantial area of non-overlap between them.

Major characteristics of Natural Linguistic (NL henceforth) framework have been listed in section 1 above. Let me briefly consider to what extent those principles are agreeable with the epistemology of CNP.

1. Natural processes have the two basic functions: to serve the speaker and the listener. In this sense CNP employs functional explanation. It recognizes the tension between the speaker and listener, and assigns to phonology the task of finding solutions to the arising conflicts. *Predicting* form on the basis of function, however, is not exactly what CNP does: it has an empiricist attitude to the discovery of natural processes, which allows it rather to exclude the impossible forms than want to predict any.
2. Semiotic metatheory is part of NL only (but cf. point 5 below).
3. Inasmuch as any explanatory theory must be in principle a theory of preferences,[34] CNP is one, too. However, the meaning of preference corresponds to "more or less marked", i.e. the more preferred = the less marked. A theory of preferences is thus a theory of markedness. Conflicts between preferences are resolved in the direction of more *natural*, i.e. less marked. In this sense, neither preference nor markedness are employed by CNP (cf. point 6).
4. Since CNP is a theory of phonological behavior, external evidence provides substance for its search of processes. Paradoxically (especially to those who accused it to be a "theory of phonetics rather than of phonology"), CNP does not find particularly convincing the evidence from instrumental phonetics. In my view, this stems from a basic skepticism about validity of data and analyses provided by a non-phonologically oriented phonetics.
5. CNP is not explicit about the role of non-linguistic principles in its explanations. It draws parallels between speech rhythm and rhythm in music and nature, and it understands processes as natural responses of the human vocal and perceptual systems to the difficulties encountered in the production and perception of speech. The latter systems necessarily have to do at least with physiology, mechanics, acoustics and neurology. The principles which are explicitly stated, however, appear to be intended specifically for the realm of phonology, e.g. the naturalness principle mentioned above, or the rich-get-richer principle in Donegan (1978/1985). The rich-get-richer principle is a special case of the semiotic principle of figure-and-ground in NL (cf. Dressler 1990:81). Phonological naturalness is defined in NL not only with reference to derivability by processes, but also with reference to their relative applicability, dependent on the array of socio-psycho-pragma-linguistic criteria.
6. The notion of markedness is not employed by CNP. Again, as a matter of principle, the theory does not go further than specify that A becomes B in the context of C (which may be zero). This process makes A and B more similar or more different by one feature, but

[33] One could call this a "wider domain implies narrower domain" type of development.

[34] If one believes otherwise, s/he either believes in absolute explanations, or s/he is satisfied with general descriptions rather than explanations.

it does not make either A or B more or less marked. In NL markedness is an expression of relative unnaturalness. A relatively natural solution to a conflict among preferences is relatively unmarked (less marked) in the sense of being less complex and thus universally preferred, as well as cognitively more simple and thus more accessible to language user than some other solutions.

An early major contribution of Dressler was in morphonology (Dressler 1985) where it became clear that he did not approve of a strict process-rule dichotomy of CNP in favor of a gradual relation between the two, relative to a number of criteria determining the degree of prototypicality of a phonological process vis à vis a morphological rule. His other contributions, also in joint works with other colleagues, include naturalness approaches to textlinguistics (e.g. Dressler 1972, Dressler and de Beaugrande 1981), morphopragmatics (e.g. Dressler and Merlini Barbaresi 1994), sociolinguistics (e.g. Dressler and Wodak 1982), aphasia (e.g. Dressler 1988, Dressler and Stark 1989), diachrony (e.g. Dressler 1982) as well as, very extensively, Natural Morphology (cf. e.g. Dressler et al. 1988, but cf. also Kilani-Schoch 1988, Wurzel 1984). In recent years the theory of Natural Morphology (cf. Dressler and Karpf 1994/1995) has been gaining new evidence thanks to a substantive data collection on first language acquisition of morphology by children from nearly 30 various language backgrounds.[35] Other major contributions by Dressler concern the epistemology of Natural Linguistics and thus specifically, semiotic metatheory, functional explanation, principles of naturalness, markedness and the notion of preference, cognitive aspects of naturalness, productivity, and others. Among hundreds of his publications (ca. 400 publications, cf. http://www.univie.ac.at/linguistics/personal/dressler/Dressler-Publikationen.html) numerous are joint papers or monographs with colleagues from all over the world who are sympathesizers or followers of the NL framework.

3.3. Research areas in Natural Linguistics (NL).

The aim of this section is to provide a very general outline of contemporary research in NL besides the research conducted by Stampe, Donegan and Dressler themselves. This is not meant to go beyond mere listing of areas or topics and some authors associated with those and it is not meant to be exhaustive or constitute a bibliography.[36] A valuable annotated bibliography was prepared by Hans Christian Luschützky, covering twenty years up to 1991. A similar publication would be welcome again. Below I only intend to make an interested reader aware of the scope and variety of research within the largely conceived framework of NL.[37] I would like to state clearly that the intention of this list is not to "categorize" any researcher into a given field. Among the linguists mentioned below, some are advocates of naturalness, some eclectically admit naturalness as an interesting possibility, some became involved with it on some occasion, and, finally, there are those who sympathize with the framework, although they remain outside of it. What "unites" them is probably a very general common view that linguistic explanations cannot abstract from language users.

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[35] The data have been collected for the international project on „The acquisition of pre- and proto-morphology," organized by Dressler at the University of Vienna and Austrian Academy of Sciences. The languages so far involved are: Basque, Croatian, Dutch, English, Estonian, French, German, Greek, Hebrew, Huichol, Hungarian, Italian, Korean, Lithuanian, Polish, Russian, Slovene, Spanish, Swedish, Thai, Turkish, Ukrainian, and Yucateco Maya.

[36] In fact, no publications are listed in this section.

[37] I mention only a selection of authors; if this stimulates some colleague(s) to compile a comprehensive list and a bibliography, they would be most welcome! Footnote 30 applies as well.

1. Phonology (names are listed alphabetically): Peter Auer, Pier Marco Bertinetto, Grzegorz Dogil, Julian Dosuna, Katarzyna Dziubalska-Kołaczyk, Livio Gaeta, Mária Gósy, Bernhard Hurch, Marianne Kilani-Schoch, Michele Loporcaro, Hans Christian Luschützky, Willi Mayerthaler, Geoffrey S. Nathan, Miren Lourdes Oñederra, Carmen Pensado, Teodor Petrič, Richard Rhodes, Nikolaus Ritt, Stephan Schmid, Šárka Šimáčková, Péter Siptár, Livia Tonelli.
2. Morphology and morphonology: Dagmar Bittner, Ursula Doleschal, Marianne Kilani-Schoch, Willi Mayerthaler, Barbara Pfeiler, Rajendra Singh, Rossella Spina, Anna M.Thornton, Wolfgang U. Wurzel.
3. Historical linguistics: Antonio Bertacca, Michele Loporcaro, Hans Christian Luschützky, Nikolaus Ritt, Elke Ronneberger-Sibold.
4. First language acquisition: Dagmar Bittner, Katarzyna Dziubalska-Kołaczyk, Natalia Gagarina, Mária Gósy, Annemarie Karpf, Marianne Kilani-Schoch, Sabine Klampfer, Barbara Pfeiler, Ralf Vollmann.
5. Second language acquisition: Niclas Abrahamsson, Katarzyna Dziubalska-Kołaczyk, Björn Hammarberg, Annemarie Karpf, Roy Major, Stephan Schmid, Šárka Šimáčková, Nadja Kerschhofer-Puhalo, Rajendra Singh, Justyna Zborowska.
6. Phonostylistics: Grzegorz Dogil, Katarzyna Dziubalska-Kołaczyk, Livia Tonelli, Justyna Zborowska.
7. Aphasia and related issues: Grzegorz Dogil, Heinz K. Stark, Jacqueline A. Stark.
8. Psycholinguistics: Pier Marco Bertinetto, Cristina Burani, Gonia Jarema.
9. Metaphonology: Elke Ronneberger-Sibold.
10. Sociophonetics: Sylvia Moosmüller.
11. Sociolinguistics: Rajendra Singh.
12. Syntax: Willi Mayerthaler.
13. Morphopragmatics: Lavinia Merlini Barbaresi.
14. Experimental phonetics: Grzegorz Dogil.
15. Phonostatistics: Gertraud Fenk-Oczlon.

(...).

The above is, naturally, an open-end list, both with respect to the areas of research and with respect to the contributors.

4. In and out of Natural Linguistics (NL): convergent views on the nature of language

We have already assessed and acknowledged a number of predecessors of naturalness views in linguistics (cf. §2. above). In §2.8., the principle of least effort was discussed to show how the same principle may originate and be used independently by a variety of researchers. There have been other approaches developing in parallel throughout the years of which some may be argued to converge with some aspects of the naturalness theory. Let us consider such convergences now.

4.1. Chomsky and Halle on competence and performance.

In fact, although Chomsky (1965) proclaimed the strict dichotomy between competence and performance ("knowledge" vs. "behavior"), some of his formulations allow, under closer inspection, for a different interpretation, i.e. competence understood as *included* in performance. See, e.g., Chomsky and Halle (1968:3):

> One fundamental factor involved in the speaker-hearer's performance is his knowledge of the grammar that determines an intrinsic connection of sound and meaning for each sentence.

However, only the so-called "internalized" language deserves status in linguistic theory, as opposed to the "externalized" one which does not (cf. Chomsky 1986:31).

4.2. Vennemann's (1983) theory of preferences.[38]

Vennemann (1983) advocates a linguistic theory of preferences based on extra-linguistic sources. He arrives at a theory of linguistic preferences via a critique of usual practice in linguistics of constructing general descriptive linguistic theories.

> [A] general linguistic theory [of the sort making universal qualifications] is by its very nature incapable of telling us what is usual and what is rare in the languages of the world; it can only tell us what is possible and what is impossible (Vennemann 1983: 10).
>
> [W]e can arrive at explanations for the regularities within a certain domain by turning to theories that are *not* theories for that particular domain (e.g., for grammatical theories, these include: theories of phonetic production, perception, learning, memory, communication, action, semiotic theories etc.) (p.9).

The above is, in fact, a plea for the use of external evidence, and is thus very much in line with the epistemology of NL. Theories of linguistic preferences propose a rank order on a scale of preference relative to a specified parameter (Vennemann 1983:11). If you formulate a preference which says, for instance, that everything else being equal, open syllables are better than closed syllables, it amounts to the same as to saying that *having only open syllables is preferred to not having only open syllables* (Vennemann 1983:12). A concept of graded preference allows Vennemann to foresee that the less preferred a structure, the more tendency it has to change (in order to improve).

4.3. Preferences in Optimality Theory (OT).

A comparison between NL and OT[39] seems justified on the ground that Optimality Theory (cf. Prince & Smolensky 1993, Archangeli & Langendoen 1997, Kager 1999) is, on the one hand, an off-spring of the generative tradition in phonology and as such is expected to apply different epistemology than Natural Linguistics, while, on the other hand, it is in fact a preference theory (cf. Archangeli & Langendoen 1997) and as such appears to be nearer to NL than any other present-day theory.

As far as the terminology used by the two theories is concerned, OT operates with constraints, while NL with preferences. The question is whether these two are also different epistemological tools in the understanding of the respective theories. Constraints of OT constitute well-formedness conditions describing acceptable structures; they are universal tendencies and as such may be violated. The same description applies to preferences in NL. The difference lies in the fact that the constraints are inductive generalizations about grammars of the studied languages, while the preferences are deductive inferences about grammars based on universal higher-order principles applicable to language as well as to other natural phenomena. Thus, while an Optimality constraint may be identical to a Natural preference, their origins will be different. The term "preference" may also be avoided in OT, since it brings associations with performance rather than competence. On the other hand, the

[38] cf. some more discussion in Dziubalska-Kołaczyk 2001.
[39] cf. some more discussion in Dziubalska-Kołaczyk 2001.

term constraint in NL is identified with the aforementioned principles which, among others, naturally *constrain* human speech capacity.

The other discernible difference between the treatment of constraints and preferences by the two theories concerns the proposed solution of conflicts which arise among constraints or preferences. OT employs language-specific ranking of constraints by means of which the preferred outputs are selected. NL employs principled "ranking" of preferences. This means that in a given language/style/situation, those preferences will be at work which observe a hierarchy of semiotic and functional parameters of naturalness (deriving from non-specifically-linguistic principles) universally applicable to this given language type, style or situation. Thus, in fact, rather than by ranking preferences, conflicts are resolved at a higher level of actually conflicting (contradictory) parameters of naturalness.

Indeed, the formulations of Harmony-Theoretic Phonology, an early version of OT, came nearer to natural linguistic thinking than the later versions. As Mester (1994:9f) reports, the notion of "preference" is formalized there as

> a ranked hierarchy of *principles and mechanisms* (emphasis mine) governing well-formedness, against which representations are optimized. Languages typically do not choose one mechanism (...) to the total exclusion of another (...) - rather, both mechanisms form part of the grammar, but with a preference relation defined on them. (...) For phonological representations, it is also not the case that a certain configuration is categorically ill-formed or well-formed - we are instead dealing with degrees of well-formedness (or 'better-formedness'): Optimization means that representations must attain the best state available, not that they must always reach absolute perfection.

Another variant of OT, Hayes' phonetically driven phonology (cf. Hayes 1996), has even an explicit reference to classical Natural Phonology (CNP):

> The approach I have taken could be viewed as an attempt to extend Stampe and Donegan's work, making use of Optimality Theory to establish a more direct connection between phonetics and child phonology. (Hayes 1996:25, fn.17)

In his phonetically driven phonology Hayes proposes an algorithm of inductive grounding which makes reference to the productive and perceptive capacities of the speaker in creating the set phonological constraints.

4.4. Cognitive perspective of NL.

Another major framework of research in modern linguistics is cognitive linguistics (cf. Langacker 1987). The cognitive and naturalist perspectives are close in the following respects (cf. Dressler 1990): they are both non-conventionalist, they are functionalist in epistemology, they employ processes and prototypes, and, most important, they both see linguistics as a non-autonomous discipline, and consequently seek to establish extra-linguistic bases for their explanations of language phenomena. Nathan (1995, 1996) emphasizes the cognitive character of Natural Phonology (especially with reference to the nature of representations), and in fact advocates a Cognitive Phonology.

4.5. Emergentism and innateness.

The innateness of natural phonological processes in the sense of Stampe is not necessarily contradictory to a more recent view on acquisition known as emergentism.[40] To quote from Donegan:

[40] However, Stampe is not enthusiastic about the term and does not subscribe to Nathan's (1999:315) statement: "For Stampe 'innate' means roughly, 'emergent'."

> The claim that natural processes are innate does not imply that they represent some genetically-transmitted neural program (...). Instead, what is meant is that because of the (genetically-transmitted) physical abilities and limitations of human speakers, some combinations and sequences of phonetic features are more difficult than others, and the substitutions that speakers make (in the mental processing of their speech) to ease these difficulties represent natural processes (1985:26).
>
> It would not alter the theory of natural phonology substantially to say that processes may be discovered by the child as he learns to use his vocal tract (...). Perhaps this discovery happens in babbling and in early speech. But if processes are learned, they are learned as matters of physical coordination are learned - by doing - not by the kind of cognitive processing that is required to learn other components of language, like syntax, or morphology, or morphonological rules (1985: 26, note 5).

Instead of saying that processes are discovered, one might say that they emerge as a result of the child's struggling to make efficient use of his/her inborn physical (articulatory and perceptual) abilities and overcome difficulties posed by this task. Such processes emerge universally; this, however, does not imply that they are identical for all children. Since children are active in acquisition, and they are influenced by a particular ambient language, they discover divergent solutions to the difficulties, retreat from already entered paths, etc. All solutions, however, converge to the extent that they are motivated by the same capacity to hear and produce sounds. Donegan makes a difference, however, between learning of phonology and learning of other components of language which requires cognitive processing. In an emergentist view on acquisition there is no fundamental difference in the processing involved in constructing particular components. Emergentism assumes that the properties of language are shaped by more basic, non-linguistic forces (e.g. MacWhinney 1999, as referred to in O'Grady 2001). O'Grady (2001) proposes an emergentist approach to syntax in which syntactic theory is subsumed under the general theory of processing. The non-linguistic forces are processing considerations which shape the emergent forms. The key claim of O'Grady's account is that the properties of many core syntactic phenomena (the design of sentence structure, anaphora, control, agreement, contraction, and so forth) follow from efficiency considerations relating to the propensity to reduce the burden on working memory. In particular, O'Grady proposes three constraints on the processing: the efficiency requirement (O'Grady 2001:3), the informativeness principle (p.9) and the immediacy requirement (p.25), i.e. a computational, pragmatic and timing constraint. “Sentences have the sort of syntactic representations they do, not because there is a blueprint for phrase structure, but because the computational system operates efficiently [...]” (O'Grady 2001:6). In other words, “A sentence's design reflects the way it is built, not the other way round – there are no architects, just carpenters” (p.35). A tendency to reduce storage and processing costs appears to be a feature of any cognitive system, including language. If we go back now to the question of language acquisition and the original “equipment” the child is born with, according to O'Grady, the answer is an efficient brain. Efficiency is an inborn imperative for the brain, whereas the properties of language are emergent.

The emergentist view of syntax (and language in general) is compatible with a constructivist, self-organizational conception of acquisition that has recently been advocated within Natural Linguistics (cf. Dressler and Karpf 1995). In this model, phonology is an outcome of the interplay of genetic preprogramming (of phonetic processors and general cognitive principles) and selection of input information, which results in neuronal specialization and, ultimately, development of modules. The model predicts that phonological processes, rather than being available at once, arise at different stages of maturation in alternative set-ups.

The theory of self-organizing systems aims at formulating the general laws that govern the spontaneous occurrence of order in nature and the evolutionary dynamics of diverse phenomena encountered in physical, biological and sociocultural systems (Jantsch 1981, Prigogine 1976, Lindblom, MacNeilage, and Studdert-Kennedy 1984, Karmiloff-Smith 1992). It does account, thus, for the non-linguistic forces which, among others, shape language. A well-known example of termite nest-building, in which local independent behaviors lead to a global structure, is reminiscent of O'Grady's metaphor about carpenters without architects.

According to the self-organizational view, one would predict for early speech: (a) the lack of application of certain natural phonological processes, (b) the occurrence of forms which manifest transitional organizations and reorganizations of the system, some of them incompatible with the ultimate language-specific phonology, and (c) interindividual variation in the acquisition paths. Those predictions appear to be compatible both with the natural phonological view on acquisition (CNP) as well as with an emergentist view on the acquisition of phonology shortly sketched by O'Grady (2001:38).

4.6. What a naturalist can learn from the science of phonetics.

Scientific phonetics is a fundamental source of principles governing production and perception of speech for a natural phonologist. Phonetic principles, alongside cognitive, psychological, sociological, and others, allow for the formulation of universal phonological preferences. For instance, universally impossible pronunciations are constrained by "mechanical" limitations of atriculation, while "ecological" factors determine a degree of preferability of the possible pronunciations across language types and specific languages (the terms "mechanical" and "ecological" come from Maddieson 1999).

Another example concerns the CV-preference, i.e. the universal preference for a consonant-vowel structure in the languages of the world, manifested either in their systems, or in performance. The CV-preference is derivable directly from phonetics:

> To construct a useful signaling system out of sound, there must be some differentiation between different parts of the signal in time. It appears that a basic organization of this differentiation of sound in all (spoken) languages consists of an alternation between louder and quieter levels of sound, with a period not too far from 150-200 ms (Maddieson 1999:2525).

This amounts to

> [a] fairly regular wave-like alternation of amplitude peaks and valleys. The occurrence and timing of this pattern have been suggested to be related to a natural frequency of the jaw, which can be approximately equated with a comfortable mastication rate (Maddieson 1999:2525).

There is a lot of supportive evidence that indeed a CV sequence is the most successful realization of the above perception- and production-driven requirements (cf. Dziubalska-Kołaczyk in press, chap. 4 and 16).

Another principle, a principle of similarity, or gestural economy (cf. also the proximity law), leads to the preference for articulatorily easy, speaker-friendly sequences. Already in 1986, Janson showed that favored combinations are those in which the articulators do not have to make extensive movements from the consonant gesture to the vowel gesture (Janson 1986: 193). Since listener-friendly and speaker-friendly principles are contradictory, while a healthy language user is always simultaneously both a speaker and listener, there must be some overarching principle of balance governing an actual language-specific reality of speech. This leads to the preference for the creation of optimal inventories and sequences. This approach has been to various degrees represented e.g. by Lindblom (1986 and later), Ohala (1990), Maddieson and Precoda (1991), and Lindblom and Maddieson (1988). The last of these state,

for example, that "Consonant inventories tend to evolve so as to achieve maximal perceptual distinctiveness at minimum articulatory cost" (p.72). However, Maddieson (cf. 1999) has a more cautious approach to the idea of balanced inventories of consonants and vowels in the world's languages. It does not seem to be the case that languages tend to compensate for small vowel systems by very numerous consonant inventories. Languages like the West Caucasian ones appear to be atypical in this respect. What this clearly proves to a natural phonologist is that phonetic principles are not enough to be able to account for phonological structures.

4.7. Convergent evidence.

In this in-and-out review of viewpoints converging with naturalness we cannot overlook the evidence which Natural Linguistics receives for its claims from independent research in many areas such as: sociolinguistics, psycholinguistics, child language studies, research on aphasia and speech pathology, or SLA (second language acquisition research). There is evidence for processes in all types of usage, in acquisition, and in history; for functional phonological behavior of language users; for hierarchies of application of processes; for preferred structures (e.g. a CV or a trochee), and much more. Most significantly, however, there is evidence for a non-autonomous nature of language: what we actually say (and hear) depends to quite an extent on non-linguistic factors. Similarly in intra-language perspective, there is evidence for a non-autonomous nature of particular components of language: they are all simultaneously present in any utterance we produce (and hear).

4.8. Convergent calls or what others could learn from a naturalist.

Very recent literature abounds in what I refer to as "convergent calls" for the directions of study which happen to have been at the core of naturalist research at least since classical Natural Phonology. This is, for instance, the case, in some contributions to the volume by Hume and Johnson (eds. 2001). In their own article in the volume, the editors propose a general model of the interplay of external forces and phonology. In particular, they are interested in the interplay of phonology and speech perception, in the context of three other factors: speech production, linguistic cognition, and social influence. They claim that the influence between perceptual and productive abilities and the sound system of the language is bi-directional. The model includes generalization (formation of cognitive categories) and conformity (to the social norm) which are also factors remaining in a bi-directional mutual relationship with sound systems. These claims converge with a view held by Natural Linguistics, though the latter is more elaborate. Unfortunately, Hume and Johnson make a number of statements throughout the paper, which let the reader believe that theirs is a new endeavour, e.g. (*emphasis mine*):

- "The role of 'ease of perception' and 'ease of production' are widely cited, though *specific proposals as to how they may influence language are rare*." (p.14)
- "We view the model outlined [...] as *a starting point* for the study of the interplay of external forces and phonology, [it] will lead to a more comprehensive understanding of language sound structures." (p.15)
- "[...] we recognize that this venture is *necessarily programmatic*" (p.20)

One of the challenges for Natural Linguistics is to let itself be more widely accessible and recognizable and let others make use of its extensive research results.

Another example of a "convergent call" of a more general nature comes from Krug (1998). In proposing a String Frequency Factor[41] which, in conjunction with a Recoverability Factor, accounts according to the author for contractions in English, Krug talks about the

[41] There is no space here to discuss this controversial constraint of frequency.

trade-off between the speaker's and the hearer's economy (pp.299ff). He refers to Horn 1984 for two antinomic principles at work in communication: the R-principle and the Q-principle (cf. §2.8. above). R-principle is a force of unification aiming at minimization of form, so it is geared towards the speaker's economy; there is a counterforce, Q-principle, which aims to maximize informational content. Krug admits that his Frequency Factor co-determines which words will contract alongside such factors as rhythm, stress, phonotactics, style, or syntax. He concludes that "[t]he analysis of performance data may help reveal aspects of language theory" (Krug 1998:308), i.e., Chomsky's "externalized" language deserves status in linguistic theory besides the "internalized" one. Again, no reference to naturalist research can be found in the article.[42]

Cases of "convergent calls" for research – which has in fact been conducted for decades (and with an even longer preceding tradition) within a naturalist framework of either classical Natural Phonology or Natural Linguistics – are numerous. This is an arena of activity for Natural Linguistics: to ensure that progress is made in the global direction espoused by the framework.

[42] There is a reference to the work of Fenk-Oczlon (1991), who does refer to naturalness in her research.

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