Natural Morphology

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CHAPTER 12

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NATURAL MORPHOLOGY

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12.1 THE GROWTH OF NATURAL MORPHOLOGY

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NATURAL Morphology (NM) grew up in the late 1970s after naturalness became an important issue discussed in several perspectives (see for instance Bruck, Fox, and La Galy 1974). Of particular relevance for the development of NM was David Stampe's model of Natural Phonology (cf. Stampe 1969, 1973, see also Donegan and Stampe 1979) which was taken up and extended to language change and to morpho-phonology as a special case of interaction between phonology and morphology by Dressler (1974, 1977a) (see Luschützky 2015 for a historical reconstruction). The foundational year is 1977, when, during the LSA Summer Institute held at Salzburg, a common platform was formulated building on the three important contributions by Dressler (1977b), Mayerthaler (1977), and Wurzel (1977). The specific character of NM was first laid down in comprehensive terms in Mayerthaler (1981). This monograph has been highly influential because it contained probably the most ambitious attempt to qualify NM as an epistemologically well-founded theory, with postulates and corollaries providing sharp predictions on what language structure should look like. However, this first model of NM has been strongly criticized, because it proved inadequate to account for several different phenomena and fared particularly badly with language-specific exceptions. For this reason, Mayerthaler's (1981) book should be complemented by Wurzel's (1984), in which a consistent theory is developed accounting for language-specific aspects relating to inflectional morphology. Dressler (1981a, 1985a, 1985b, 1986) proposes a general picture which is of a rather typological nature, developing an NM of word-formation processes, while Dressler (1985c) provides an in-depth analysis of the phonology–morphology interface from the perspective of Natural Phonology and NM. The views of these three authors are collected together in a book which outlines the main issues debated within NM (Dressler at al. 1987).

Since the mid-1980s, scholars interested in the issues developed within Natural Phonology and NM have regularly met at conferences—or workshops organized during general conferences. These conferences have given rise to miscellaneous volumes of proceedings: at Eisenstadt in 1984 (Dressler and Tonelli 1985), at Krems in 1988 (Méndez Dosuna and Pensado 1990), at Essen in 1988 (Boretzky and Auer 1990), at Krems in 1992 (Tonelli and

Dressler 1993), at Kraków in 1993 (Dziubalska-Kołaczyk 1996), at Maribor in 1993 (Boretzky et al. 1995) and in 1996 (Teržan-Kopecky 1998), at Poznań in 2001 (Dziubalska-Kołaczyk and Weckwerth 2002). For a (now somewhat dated) introduction to NM, the French reader is referred to Kilani-Schoch (1988), while a critical discussion of NM in English can be found in Carstairs-McCarthy (1992: Chapter 8) and Bauer (2003: Chapter 14). Short overviews of NM have been provided by Wurzel (1994a), Dressler (2000a, 2003, 2005), and Luschützky (2015).

12.1.1 The functionalist nature of NM

NM is couched within a broad functionalist framework: language exhibits on the one hand a communicative dimension, which makes reference to a (historically determined) social understanding of our linguistic interactions, and on the other a (panchronic) neurobiological rooting of our speakers' capacities, which defines the physical potentialities and limits of our socio-communicative interactions (cf. Mayerthaler 1987: 25). In line with this functionalist view, NM strongly relies on external evidence, drawn especially from language acquisition and change, in contrast to the typical approach adopted by formalist models such as Generative Grammar which are primarily interested in the investigation of the speakers' internal(ized) competence. In this connection, it rejects a purely formalist, deductive-nomological—in Hempel's (1965) sense—approach to language, and seeks to respond to the complexity of the empirical facts by making appeal to substantive principles like markedness which is the counterpart of naturalness:

> "natural" is synonymous with cognitively simple, easily accessible (esp. to children), elementary and therefore universally preferred, i.e. derivable from human nature, or with the terms unmarked or rather less marked.

> (Dressler 2005: 267)

This is made explicit through a theory of preferences rather than through strictly predictive laws or principles. In this light, naturalness does not refer to any global or overall constraint, but rather to a restricted number of naturalness parameters providing the basis of the universal theory of markedness. Such a preference theory has the advantage of making 'local' predictions along a given dimension which can be in conflict with what is favored by other preferences (cf. Vennemann 1983; Wurzel 1998). The resulting picture is highly dialectic in keeping with the dynamic nature of language.

12.1.2 The cognitive roots of NM

The essential role played in NM by the concept of markedness in shaping the relation between form and content can be captured by what has been called by Givón (1991) the meta-iconic markedness principle: "Categories that are cognitively marked—i.e. complex—tend to also be structurally marked". This implies that NM defends a strongly anti-separatist view of the relation between content and its formal, overt expression. This view stands neatly in contrast with the opposite "arbitrarist" view espoused by many actual morphological frameworks in which content is taken to be separate and independent from its formal expression (cf. Aronoff 1994; Beard 1995 Stump 2001). In the separatist view, no prediction

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can be made with regard to the formal complexity of the word as the mirror of cognitive complexity. In the same vein, NM defends a strongly incremental approach to morphology insofar as it assumes that content is encoded in a preferably overt way, "incrementing" the formal substance of the base word. The opposite view, defended for instance by Stump (2001) and Baerman, Brown, and Corbett (2005), maintains that content is encoded "realization-ally", that is, via its direct association with the root which licenses its formal, overt realization.

Furthermore, NM is output-oriented in the sense that the single concrete forms are evaluated according to naturalness parameters and universal markedness theory. In this way, both the anti-separatist and the incremental view are not assumed a priori but concretely result from the empirical investigation of language after language. In this regard, it is important to stress that this effort of empirical investigation has to be carried out on a morphological system as a whole and is not falsified by single cases relating to subparts of it.

NM makes large use of the concept of prototype as developed by cognitive psychology (cf. Dressler 1990a). Accordingly, NM treats the categories and the components of language as characterized by fuzzy boundaries rather than as strictly separated and only associated by correspondence rules (see for instance Ackema and Neeleman 2004: 14 for such a view). In this regard, inflection and word-formation must be treated in prototypical terms (cf. Dressler 1989; Wurzel 1996) as the two poles of a continuum containing in-between cases, such as for instance diminutives (and more generally evaluative morphology), which represent non-prototypical word-formation (cf. Dressler 1994a; Dressler and Merlini Barbaresi 1994a; Noccetti et al. 2007), and participles, which are an instance of non-prototypical inflection inasmuch as they often change word class and/or approximate the behavior of agent nouns (cf. Haspelmath 1996; Kerge 1996).

12.1.3 Naturalness at the different levels of linguistic analysis

The stress on naturalness has fostered research carried out especially in natural(istic) speech contexts, for instance in connection with language acquisition or impairment, and on transitional areas of grammar traditionally marginalized in the theoretical debate. These interests characterize the research program developed especially by Dressler, who has largely investigated language acquisition with a focus on the early stages of pre- and proto-morphology (cf. Dressler and Karpf 1995; Voeikova and Dressler 2002), aphasia (Dressler and Denes 1988), language decay and death (cf. Dressler 1981b, 1996a), the phonology–morphology interface (cf. Dressler 1985c), the morphology–pragmatics inter-face (cf. Dressler and Merlini Barbaresi 1994b), the concept of submorpheme (cf. Dressler 1990b), and the so-called extra-grammatical morphology (cf. Dressler 2000b), as well as other concrete instantiations of our language faculty, such as for instance text linguistics, especially with regard to the role of word-formation (cf. Dressler 1981c, 1996b).

12.2 THE SEMIOTIC BASIS OF NM

The basic tenets of NM are tightly related to Charles S. Peirce's semiotics. In this regard, naturalness as a concept has been wandering around in linguistics at least since

Roman Jakobson (1965) and his reflections on *ordo naturalis*, which were strictly interwo-
ven with Peirce's concept of iconicity. In Jakobson's view, the *ordo naturalis* reflecting the
real sequence of events as in Caesar's famous sentence *Veni, vidi, vici* is "iconic" in Peirce's
sense and accordingly unmarked. In fact, in Peirce's taxonomy of the three types of sign—
indices, icons, and symbols—icons are the most important and widespread. An iconic
relation consists in a direct form–meaning correspondence whereby the *signans* immedi-
ately refers to the *signatum* by reflecting its concrete properties in the shape, while in the
case of indices the relation between *signans* and *significatum* is of proximity (a "factual
connection") and symbols are purely conventional (for the relation between symbols and
icons, see Gaeta 2002a). Therefore, "[t]he only way of directly communicating an idea is by
means of an icon; and every indirect method of communicating an idea must depend for its
establishment upon the use of an icon" (Peirce 1965: 2.278).

12.2.1 Iconicity and semiotic parameters of naturalness

Among the three different types of icons, namely diagrams, images, and metaphors, a
central role is played in NM by diagrams, "which represent the relations, mainly dyadic,
or so regarded, of the parts of one thing by analogous relations in their own parts"
(Peirce 1965: 2.277). This stands at the heart of the Principle of Constructional Iconicity
(cf. Mayerthaler 1981: 23) requiring that more meaning should correspond to more form.
In other words, morphologically complex words are preferably diagrams. Given the
primary status of words as signs with respect to affixes which are secondary signs
because—following Peirce—the latter are "signs on signs", they are also preferably selected
as bases of derivation (cf. Dressler 1988).

Diagrammaticity can be intended generally as a preference for affixation over conver-
sion over subtraction (cf. Dressler 1987: 105). In semiotic terms, this results in an
increasing degree of markedness because only affixation gives rise to iconic signs, while
conversion (or zero-derivation, cf. Gaeta 2013 for a recent discussion of the issue) is non-
iconic and subtraction anti-iconic (cf. Dressler 1984, 2000c). On this base, affixation is
predicted to be more widespread than the other two. As a matter of fact, no language
seems to totally dispense with affixation in favor of pure conversion or, even worse,
subtraction. The latter in particular is further predicted to be generally absent or
eventually recessive and replaced diachronically by more iconic coding. For instance, the
subtractive coding of noun plural found in Franconian German, e.g. *hond* / *hon* 'dog(s)',
is observed to have become unproductive and to lose items in favor of the more
diagrammatic additive coding (cf. Dressler 2003: 464). This is not to deny that there
can be deviations from affixation as a preferred strategy for morphological coding.
However, the latter do not undermine the general preference for iconic coding (see,
however, §12.4.3 below).

Another facet of diagrammaticity is expressed by biuniqueness, which is defined as the
preference for a uniform relation between form and meaning. This is due to the fact that
"[p]erception (and processing by the receiver) of a signans which uniquely represents a
signatum *B* (uniqueness or biuniqueness) is easiest, for it does not impede semiotic
transparency at all" (Dressler 1987: 112). Constructional iconicity and biuniqueness provide
the basis for a concrete evaluation of morphologically complex words. They are both

represented as dyadic relations in which diagrammaticity emphasizes the recoverability of the base-affix (syntagmatic) relation (1a) while biuniqueness focuses on its paradigmatic counterpart (1b) (cf. Dressler 1987: 111):

(1)   a. $(A + B) \equiv (a + b)$ $(|\text{GARDEN}| + |\text{AGENCY}|) \equiv (garden\text{-}er)$
      b. $(A \equiv a) + (B \equiv b)$ $(|\text{GARDEN}| \equiv garden) + (|\text{AGENCY}| \equiv \text{-}er)$

While constructional iconicity is further spelled out along the two dimensions of morpho-tactic and morphosemantic transparency, to which we will return in §12.3, the preference for biuniqueness is expressed by what Vennemann (1972: 184) has called Humboldt's Universal: "Suppletion is undesirable, uniformity of linguistic symbolization is desirable: Both roots and grammatical markers should be unique and constant". By enhancing the paradigmatic recoverability of base and affix, this principle lies at the heart of analogical change (cf. Gaeta 2007, and 2010 for a recent survey).

Clearly, the general validity of the principle is subordinated to severe constraints of a system-specific nature (for instance, the type and number of inflectional classes occurring in a language as discussed in §12.4.2 below; or the stratification of the lexicon distinguishing native from non-native morphemes, in which affixes belonging to either strata select their homogeneous lexical bases, e.g. *gardener* vs. *typist*), or of a more general type, as for instance the effect of economy in restricting an excessive degree of form–meaning unifor-mity (on the relation between economy and naturalness, cf. Wurzel 1997; Gaeta 2006). One of these effects can be seen in so-called lexical blocking preventing the formation of a derivative in the presence of an already extant lexeme displaying a similar meaning as in the well-known case *thief* vs. **stealer* (cf. Wurzel 1988; Gaeta 2015b for a recent survey), which can be considered a case of paradigmatic suppletion.

It is important to stress that biuniqueness can come into conflict with diagrammaticity insofar as the latter requires a violation of the former when a hyper-characterized plural form such as *feets* is created in children's or learners' varieties by adding a suffix to an already marked plural (cf. Dressler 2003: 464). Besides highlighting the dialectic nature of the naturalness parameters to which I will return in §12.3.3, this case also illustrates a general tendency because diagrammaticity seems normally to prevail over biuniqueness when they come into conflict. This provides the base for a universal hierarchy among the different parameters shaping naturalness. However, such a hierarchy must be thought of as the sum of preferences rather than as the explicit language-specific order of a number of constraints as commonly assumed in theoretical models like Optimality Theory (cf. McCarthy 2002: 50–2; Carstairs-McCarthy 2008; and Donegan 2001 for a comparison of the two approaches).

Far less significant, although often emphasized as a peculiar trait of natural languages, is the occurrence of the second type of icons, namely the images whose *signans* directly reflects the *signatum*, which in linguistic terms can be understood in connection with the phenomenon of sound symbolism. While it is only marginally exploited in morphology as a whole, sound symbolism is highly relevant for those instances of word-formation char-acterizing the early stages of acquisition that are labeled as pre- or proto-morphological, especially with regard to the abundant usage of diminutives and hypocoristics (cf. Dressler 1994b). This is due to the important role played by evaluative morphology in children's early developmental stages attuned along the social function of accommodation, which favors a smooth interaction among the members of a speakers' community (cf. Gaeta 2015c

for a survey). As long as the process of language acquisition proceeds, the importance of images is reduced while the role played by diagrams increases in relevance because the latter can be used to encode more complex content in correspondence with their more abstract nature of sign.

Finally, metaphors which are a type of icon "representing a parallelism in something else" (Peirce 1965: 2.277) play a marginal role in morphology, although it has been suggested that typical instantiations of non-iconic coding such as conversions might in fact be interpreted as morphological metaphors (cf. Crocco Galèas 1990).

In contrast with the low relevance of images and metaphors in morphological coding, the parameter of indexicality also plays an important role in shaping morphological natural-ness. Indexicality, which is connected with Peirce's (1965: 2.284) index defined as "signs which are rendered such principally by an actual connection with their objects", refers to the formal distance between *signans* and *signatum* and suggests that morphological coding implying a lower degree of distance is strongly preferred. Accordingly, because of its proximity with the stem, prefixal and suffixal coding, and more in general concatenative morphology, is cross-linguistically preferred over conversion while infixation and non-concatenative morphology which "produce the closest connection" (Dressler 1987: 111) with the stem are expected to be highly favored by indexicality but stand in an antagonistic relation with diagrammaticity. This conflict is solved typologically insofar as, for instance, in the Indo-European languages non-concatenative coding like verb ablaut can generally be shown to be recessive and diachronically replaced by pre- or suffixal coding. This, in turn, lends support to the preference for diagrammaticity, while this is apparently not the case in Semitic (I will come back to this point in §12.2.3 below).

12.2.2 Cognitive endowment and universal parameters of naturalness

Two further parameters shaping morphological naturalness come from general properties underlying our cognitive endowment (cf. Dressler 1990a). In particular, the Gestalt principle of figure-ground regulating our perceptive faculty is responsible for the preference for binarity in morphological coding. The effects of binarity are visible in the subordinated role manifested by circumfixation which apparently only occurs when pre- and suffixations are also present in a language. Moreover, compounds are overwhelmingly to be interpreted in terms of (preferably head-modifier) binary relations, while ternary compounds are strongly limited to some type of coordinative constructions such as *green-white-red flag* (cf. Dressler 2006). The cognitive primacy of the figure–ground relation also supports the preference for an optimal word shape consisting of a bi-syllabic or tri-syllabic foot in which one prosodically prominent syllable—the figure—is followed by one or two unstressed syllables providing the ground (cf. Dressler 1985b).

12.2.3 Conflicting levels of adequacy

The impact of semiotic and more in general cognitive principles on morphological systems can be operationalized by means of the handful of preferences discussed above: (i) diagrammaticity

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(transparency); (ii) biuniqueness (uniform coding); (iii) indexicality (proximity); (iv) binarity (head–modifier relations); (v) optimal word shape (bisyllabic foot). This set of preferences which are grounded in our cognitive abilities of 'semiotic animals' is meant to explain the strategy followed by morphology as a specific component of natural languages. In this sense, NM, as pointed out by Bauer (2003: 253), "is concerned with providing a partial explanation for patterns of morphological behaviour" inasmuch as it "deals with substantive universals such as the range of possible morphological patterns and the categories that are necessary in morphology".

It must be added that natural languages, as (socio-)historically determined entities, generally result from the interaction of five different levels of adequacy which are intrinsically in conflict with each other (cf. Dressler 1985b; 1987: 117–21). Accordingly, besides the level (i) of universal preferences sketched so far which profile the level of naturalness adequacy, morphological systems are shaped via the level (ii) of typological adequacy, in which Skalička's (1979) five language types—fusional, introflectional, agglutinating, polysynthetic, and isolating—are "the particular choice of very natural options from some parameters and of rather unnatural (or marked) options from other parameters of naturalness" (Dressler 1985a: 324). In this sense, they function as ideal 'poles of attraction' because they respond to the satisfaction of particular architectural requirements. For instance, in spite of the little degree of diagrammaticity expressed by scarce biuniqueness and morphotactic transparency, the introflecting type displays a number of advantages: the occurrence of short words / word forms approximating the optimal word shape, a high degree of indexicality expressed by fixed morpheme structure conditions in which consonants signal lexical roots and vowels encode morphological information, and finally a strong internal cohesion of the morphological paradigms because of the high degree of uniqueness of the root alternations (cf. Dressler 1987: 121). Thus, in Modern Hebrew even loanwords borrowed from languages with concatenative morphology are integrated into the non-concatenative type as in the case of *Pasteur*, which is treated as a quadriconsonantal root /pstr/: *pister* 'has pastorized', *pistur* 'pastorization', etc. (cf. Dressler 1981a: 7).

Through the level of typological adequacy, the subsequent level (iii) of language-specific normalcy is reached which responds to particular principles of system-dependent naturalness (cf. Wurzel 1984). As will be considered in §12.4 below, at this level the relevant language-specific options are those which decide the concrete instantiation of the preferences established at levels (i) and (ii), such as the base-format (root, stem, etc.) or the affix type normally preferred in a language.

Language-specific normalcy is also shaped via level (iv) relating to the (sociolinguistic) norms developed within a speakers' community (cf. Coseriu 1962) that are subsequently actualized in the level of (v) concrete performance of the speech act. This last level is crucial because it directly influences the universal preferences which are meant to capture the real essence of naturalness for linguistic structure. It is in fact at the level of performance that the dialectic among the several conflicting preferences expressed by the speakers-listeners takes place. The latter shape the linguistic signal and are at the heart of the variation giving rise to the 'internal', that is, grammatically-initiated, language change (cf. Wurzel 1994b for the distinction between grammatically initiated vs. extra-grammatically initiated language change).

In sum, with regard to alternative and competing models of morphology, NM is characterized (i) by the conflicting nature of the relations among the components of

language and (ii) by the 'dynamic' nature of its conception. These two aspects are strictly interwoven in the sense that the dynamic nature of the single components leads to the optimization of the single components through the instantiation of the specific preferences. At the same time, however, conflicts unavoidably arise as a consequence of the different and partially opposed teleology of the preferences instantiated by the single components and also within the same component. As a matter of fact, any component can be considered dominant or basic with respect to the others. Therefore, it is quite difficult to imagine a global optimization of the linguistic structure resulting in an overall 'natural' linguistic system.

12.3 The strategy of NM

Because of the conflicting nature of the different preferences, the attempt to find out how natural a morphological system can be might appear at first sight illusive. In fact, one major criticism raised against NM focuses on the fact that its "aim is to provide a theory of languages rather than a theory of grammars" (Spencer 1991: 127). This makes it difficult, on the one hand, to figure out how the morphology of a natural language should concretely be shaped: NM "is not too concerned to provide hard-and-fast criteria for distinguishing the different sorts of rule" (Spencer 1991: 127). On the other hand, it is not straightforward to implement concretely the predictions issued by NM in a given morphological system beyond sporadic observations on the effect of the natural preferences for the benefit of a certain class of words or of derivatives. While I will come back to the discussion of the former observation in §12.3.2 below, let us consider in the next section one concrete issue aimed at verifying the reliability of NM as a theory of morphology.

12.3.1 Scales of transparency

In this regard, I will discuss what is probably one of the most relevant achievements of NM in the realm of word-formation, namely the role of morphotactic—which will be especially focused on here—and morphosemantic transparency for word-formation rules, especially in its repercussion on productivity, as observed by Bauer (2001):

> naturalness increases productivity because only if a morphological process is maximally natural is it maximally analysable and maximally computable. That is, the more natural a morphological process is, the more likely it is that forms using it will be readily understood and will be produced with ease by speakers.
>
> (Bauer 2001: 59)

In fact, word-formation is likely to be more liberal in allowing the universal preferences to act in an unconstrained or less constrained way than inflection which is more likely to be subject to system adequacy, as will be discussed in §12.4. This is because the main function of word-formation is to contribute to lexical enrichment, that is, to label new concepts and expand our lexicon (cf. Kastovsky 1982), while it only secondarily serves the other function of enhancing text cohesion, which is best performed by inflection, for instance via agreement. On the other

hand, text cohesion is served by word-formation by means of typically transpositional techniques such as for example nominalization or by means of compounding (cf. Dressler and Mörth 2012). This may be particularly relevant in specific text sorts produced by homogeneous communities of speakers for which a cohesive text is evaluated as highly positive (cf. Gaeta 2015c). The link to text linguistics is thus of paramount importance for understand-ing the multifunctional relevance of word-formation for the speakers' behavior at the fifth level mentioned in §12.2.3 of the concrete performance of the speech act (cf. Dressler 1996b).

As for transparency, constructional iconicity is concretely spelled out with the help of a scale of morphotactic naturalness which entails that the productivity of a morphological technique decreases with the increase of morphotactic opacity involving different degrees of allomorphy due to the intervention of phonological, morpho-phonological, and allomorphic-morphological rules (respectively PRs, MPRs, and AMRs) (Table 12.1).

Diagrammaticity, namely the recoverability of the base–suffix relation, is increasingly endangered as long as the degree of opacity grows as a consequence of the intervention of a phonological rule, such as, for instance, the resyllabification found in *exist*$^\$$ → *exis*$^\$$*tence* where a syllable boundary is inserted within the lexical base with regard to the more transparent *excite*$^\$$ → *excite*$^\$$*ment*. Opacity is further increased by the occurrence of morpho-phonological alternations such as the palatalization of *electri*[k] → *electri*[s]*ity* and its opaquer variant involving the disappearance of the triggering segment *conclu*[d] → <u>*conclu*</u>[ʒ]*on*, which are suffix-specific insofar as they do not show up, for instance, in *boo*[k] → *boo*[k]*ish* and *Ovi*[d] → *Ovi*[d]*ian*, and even more by the allomorphic-morphological alternations in which no phonological motivation can be reconstructed as in *dec*[ai]*de* → *dec*[i]*sion*. These are quite close to the weak suppletion found in the extended stem of *child*→*childr-en*, while the last degree of strong suppletion is completely idiosyncratic. The prediction drawn from this scale is that word-formation processes involving alternations placed at the highest degrees of the scale are to be preferred over those involving alternations placed at lower degrees.

As the philosophy of this as well as of other scales and preferences focuses on the speakers' concrete behavior in socio-communicative contexts rather than on system-related inventories of morphological processes or rules, the preference entails the prediction that morphological patterns (of either an inflectional or derivational nature) displaying a lower degree of opacity are expected to be more natural and accordingly more productive, easier to acquire, more resistant to change, later to lose than patterns displaying a higher degree of

Table 12.1. Scale of morphotactic naturalness

Degree	Operating rules	Examples
I	Intrinsic PRs	*excite*$^\$$ + *ment* ← *excite*
II	PRs, e.g. resyllabification	*exis*$^\$$*t* + *ence* ← *exist*
III	Neutralizing PRs, e.g. flapping	*ri*[ɾ] + *er* ← *ride*
IV	MPRs without fusion, e.g. velar softening	*electri*[s] + *ity* ← *electric*
V	MPRs with fusion	*conclu*[ʒ]*on* ← *conclude*
VI	AMRs, e.g. Great Vowel Shift	*dec*[i]*sion* ← *dec*[ai]*de*
VII	Weak suppletion	*childr* + *en* ← *child*
VIII	Strong suppletion, e.g. root alternation	*be, am, are, is, was*

Source: cf. Dressler 1985a: 330–1.

opacity because the latter impose a stronger cognitive burden on speakers, at least from the viewpoint of the preference for diagrammaticity. The focus on the processing dimension finds a nice parallel in recent research on probabilistic linguistics, in which predictions on productivity are drawn from the salience of the segmental cluster with reference to its parsebility, namely the ease of detection of a morphological boundary on the basis of its phonotactics (cf. Hay 2003). Accordingly, opaque alternations render this process of detection more difficult because of the reductive effect of fusion.

12.3.2 Morphotactic transparency and naturalness

To see how the predictions on morphotactic transparency can be concretely implemented within a given morphological system, let us briefly discuss the case of Italian action nouns, which will also highlight the conflict between the first and the third level of adequacy mentioned in §12.2.3. They present an interesting case of suffix rivalry, because at least three different suffixes displaying similar problems of allomorphy are in competition, namely *-(z)ione*, *-(t)ura*, and *-mento* (cf. Gaeta 2002b: 63–8; Gaeta and Ricca 2006 for detailed discussions). Here, the focus will be on the first suffix *-(z)ione* although the others display similar properties. In particular, the allomorphy is partly accounted for by a specific base form of the Italian verb such as the Verbal Theme (= VT) consisting of the stem plus the thematic vowel combined with the suffix *-zione* (2a). This analysis competes in several cases with another one in which the suffix takes the form *-ione* and the base consists of the Past Participle (= PP), possibly accompanied by an additional rule of affrication changing the expected °*fondatione* in the actual *fondazione*, while in other cases only the analysis based on the PP is possible (2b). Partly, the allomorphy is completely opaque in Italian insofar as the base form is given by the Latin Past Participle (= LatPP) (2c), that is, an additional allomorphy justified only in paradigmatic terms, combined with the suffix *-ione*. Finally, another allomorphic type involves the verbal Stem deprived of the thematic vowel plus the suffix *-ione* (2d):

(2)		VT	PP	LatPP / Stem
a.	*fondazione* 'foundation'	$[[fonda]_{VT}$ *-zione*$]$	°$[[fondat]_{PP}$ *-ione*$]$	
	spedizione 'shipment'	$[[spedi]_{VT}$ *-zione*$]$	°$[[spedit]_{PP}$ *-ione*$]$	
b.	*assunzione* 'employment'	*$[[assumi]_{VT}$ *-zione*$]$	°$[[assunt]_{PP}$ *-ione*$]$	
	delusione 'disappointment'	*$[[deludi]_{VT}$ *-zione*$]$	$[[delus]_{PP}$ *-ione*$]$	
c.	*adesione* 'adhesion'	*$[[aderi]_{VT}$ *-zione*$]$	*$[[aderit]_{PP}$ *-ione*$]$	$[[ades]_{LatPP}$ *-ione*$]$
	emissione 'emission'	*$[[emetti]_{VT}$ *-zione*$]$	*$[[emess]_{PP}$ *-ione*$]$	$[[emiss]_{LatPP}$ *-ione*$]$
d.	*recensione* 'review'	*$[[recensi]_{VT}$ *-zione*$]$	*$[[recensit]_{PP}$ *-ione*$]$	$[[recens]_{Stem}$ *-ione*$]$
	opzione 'option'	*$[[opta]_{VT}$ *-zione*$]$	*$[[optat]_{PP}$ *-ione*$]$	°$[[opt]_{Stem}$ *-ione*$]$

Notice that, besides the opaque alternation of a suppletive nature in (2c) given by the LatPP allomorphy, which has to be taken into account either way, the other three options based respectively on the VT, on the PP or on the Stem are in principle equally viable candidates to account for the derivational process. Given the scarce productivity of (2d), in practice only the first two alternatives have been defended in the literature respectively by Thornton (1990: 193–6) and Scalise (1984: 67). Comparatively, the analysis based on the PP plus *-ione* accounts for a larger number cases because it covers both the derivatives in (2a) and in (2b),

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while that based on the VT plus -*zione* is unable to account for the derivatives in (2b). For this reason, the analysis based on the PP has often been considered superior in spite of the fact that it requires an additional rule of affrication, which is clearly of a morpho-phonological nature as it is not found before other suffixes: *argento* 'silver' → *argent-iere* 'silversmith', *Evita* (*Perón*) → *evit-iano* 'Evita's', etc. In Scalise's view, the maximization of the number of derivatives accounted for by the rule takes priority over its unnatural-ness resulting from the MPR of affrication. In contrast with this view, the parameter of morphotactic transparency predicts that the analysis based on the VT should be preferred because it does not involve any additional opacity after the addition of the consonant-initial suffix -*zione*. This preference should be reflected by a significant difference in terms of the productivity of the derivatives in (2a) which are expected to display signifi-cantly different properties with regard to the derivatives in (2b). Furthermore, the latter are expected to behave similarly to the derivatives found in (2c), which are clearly based on weak suppletion, and to the derivatives found in (2d), which also partially display affrication.

These expectations have been tested on the basis of a large text corpus consisting of about 75 million tokens extracted from three years of the Italian newspaper *La Stampa* (1996–98). In order to assess the different alternatives, the results have been mapped onto a simplified version of Dressler's scale containing a first degree of PRs, a second degree of MPRs, a third degree of AMRs, a fourth degree of Suppletion (Suppl), and a fifth degree of further irregular allomorphies. On the left side of Table 12.2 the derivatives are evaluated on the basis of the PP-*ione* pattern taken as an input, while the right side shows the alternative analysis based on the VT-*zione* pattern (Table 12.2).

Table 12.2 reports the number of tokens (= N), of types (= V), the average frequency of the types $((N/V) \cdot 10^{-2})$ and the number of *hapax legomena* (= h) found in the corpus. The last figure has been shown to be a generally reliable estimate of the productivity intended as

Table 12.2. Derivatives formed with -(z)ione in the La Stampa corpus (1996–98)

Degree	Base: PP + -ione				Base: VT + -zione			
	N	V	$(N/V) \cdot 10^{-2}$	h	N	V	$(N/V) \cdot 10^{-2}$	h
I. PRs	90,178 8.6%	112 4.7%	8.0	15 3.1%	552,818 53.0%	1930 81.7%	2.9	440 90.6%
II. MPRs	616,170 59.0%	1994 84.4%	3.1	445 91.6%	— —	— —	— —	— —
III. AMRs	61,324 5.9%	34 1.4%	18.0	4 0.8%	214,854 20.6%	210 8.9%	10.2	24 4.9%
IV. Suppl	269,861 25.8%	204 8.6%	13.2	17 3.5%	269,861 25.8%	204 8.6%	13.2	17 3.5%
V. Others	6,446 0.6%	19 0.8%	3.4	5 1.0%	6,446 0.6%	19 0.8%	3.4	5 1.0%
Tot.	1,043,979 100.0%	2363 100.0%	4.4	486 100.0%	1,043,979 100.0%	2363 100.0%	4.4	486 100.0%

the availability of a certain word-formation rule in a given time span (cf. Baayen 2009; Gaeta and Ricca 2015). As can be gathered from a comparison between the two parts of the table, the analysis based on the PP scores quite badly in terms of diagrammaticity: only a few derivatives are placed at the first degree, while a larger amount is found at the second degree because of the affrication rule. Moreover, the third degree basically contains the stem-based formations of (2d), while the fourth degree houses the weakly suppletive derivatives based on the LatPP of (2c). For these latter groups, similar figures are found in both parts of the table.

The first expectation on the relation between morphotactic transparency and overall productivity is clearly evidenced by the analysis based on the VT in which a strong correlation is observed between the first degree of the PRs and the high number of h, about 90 per cent of the total derivatives, and of the types, about 80 per cent. In the alternative analysis based on the PP this nice correlation is completely lost, as only 3 per cent of h and about 5 per cent of the types are found at the first degree.

Nonetheless, one might argue that the benefit brought by a larger coverage of the analysis PP-*ione* compensates for the reduced degree of morphotactic transparency because the whole number of derivatives is formed by means of one suffix -*ione*, while the alternative analysis has to distinguish between the derivatives found under the PRs which select the form -*zione* from those found under the AMRs and the Suppl which select the form -*ione*. In this regard, the second expectation is helpful, whereby the derivatives found in (2b) are expected to behave similarly to the derivatives found in (2c), which are clearly based on weak suppletion and to the derivatives found in (2d), which also partially display affrication. In fact, a significant difference can be observed on the left side of Table 12.2 between the derivatives found at the first degree of the analysis based on the PP (i.e. the type *delusione* in (2b) without affrication) and those found at the second degree (i.e. the types (2a) and (2b) with affrication). While the latter display a high number of V and h with a comparatively smaller N/V average relation, the first-degree derivatives are rather similar to those found in the fourth degree (i.e. type (2c)) with a low productivity measured in terms of h, a smaller V number spread on a higher N value, and accordingly with a large N/V average relation.

The N/V relation measures the frequency of the derivatives plotted on their numerosity: a high value typically mirrors a scarcely productive word-formation rule which is represented by a restricted amount of fairly entrenched types. On the other hand, a low N/V is generally found when a highly productive word-formation rule gives rise to a large number of types which are, however, on average scarcely frequent, that is, not stabilized in the lexicon. The former state of affairs corresponds to what Miklos Dokulil (1968) understands under *Wortgebildetheit*, that is, word-formedness or analyzability (cf. Bauer 2001: 144) and photographs a static situation, typically involving lexical material of learned or foreign origin. The latter, however, represents Dokulil's *Wortbildung*, that is, word-formation *stricto sensu* which is responsible for the dynamic part of the lexicon, namely the true lexical enrichment. While the analysis based on the PP does not distinguish between the static and the dynamic parts of the rule, the analysis based on the VT nicely expresses this difference: the derivatives found in the third and fourth degree of the scale of the right part of Table 2 behave quite similarly in terms of low productivity and high average frequency. Recall that in this case the third degree gathers together the derivatives of the (2b) and (2d) types.

12.3.3 The dynamic dimension in morphology and the natural language change

This case illustrates the main points of interest of NM: the effects of the universal preferences manifest themselves in the behavioral properties of the derivatives. These are of relevance for our analysis much more than structure-internal considerations such as the maximization of the reach of a rule. The latter runs the risk of projecting a picture which reflects the static aspects of the lexicon without really highlighting its dynamic parts. The latter also involve predictions relating to the ontogenetic (i.e. language acquisition) and to the phylogenetic dimension (language change). For instance, to stick to the example of *–zione* discussed in §12.3.2, the PP is systematically avoided as a derivational base in a certain number of derivatives while the VT is preferred, as for instance in *apparire* 'to appear' → *apparizione* 'apparition' (PP *apparso*, but *apparsione), etc. This means that, while PP-based derivatives such as *delusione* in (2b) basically go back to their Latin ancestors and cannot be said to be formed in Italian, truly Italian coinages only display the VT-pattern such as *apparizione*, which has been expanded in the diachronic development of Italian for this as well as for the other suffixes in competition with *-zione* such as *-tura*: *cuocere* (PP *cotto*) 'to cook' → *cottura* / *cuocitura* 'cooking', *rompere* (PP *rotto*) 'to break' → *rottura* / *rompitura* 'break', *scoprire* (PP *scoperto*) 'to discover' → *scopritura* / *scopertura 'discovery', etc.

In sum, the scale of morphotactic transparency is able to capture the diachronic reallocation of the old rule selecting the PP as a base (originally coming from Latin) to the new VT-based format. The increased naturalness of the system of Italian action nouns is, however, strongly disturbed by the occurrence of a large number of derivatives placed at lower degrees of the scale and sustained by a high token frequency. Thus, since the gain in terms of morphotactic transparency is counter-balanced by a heavy lexical burden, one cannot regard the resulting system as more natural as a whole. Rather, the dialectic essence of linguistic systems as envisaged by NM suggests that an improvement at a certain point may increase the unnaturalness of other aspects of the system, which may well undergo further changes in an endless cycle. What is at the heart of this perennial cycle is the idea common to certain functionalist circles (e.g. see Vennemann 1993) that language change consists of a language improvement:

> Natural language change always takes a direction such that it seeks to replace grammatical phenomena which are more marked with respect to a markedness parameter M_i by grammatical phenomena which are less marked with respect to the markedness parameter M_i.
>
> (Wurzel 2001: 508)

In its essence, this idea displays the character of an if/then conditional statement: if an arguably natural change takes place, then it consists in the reduction of markedness (cf. Wurzel 1994b: 29). Thus, markedness reduction is the ultimate goal of language change and contributes in a complementary way to the increase of naturalness. In the next section, this idea will be discussed with regard to so-called system-dependent naturalness.

12.4 SYSTEM-DEPENDENT NATURALNESS

As shown by the Italian example discussed in §12.3, universal tendencies as represented by the scale of morphotactic transparency are strictly interwoven with language-specific traits as required by the base selection properties of Italian action nouns. This latter aspect is captured by the concept of system adequacy (or congruity) developed by Wurzel (1984). Although this is generally meant to deal with inflectional morphology, it clearly has consequences at the word-formation level as well, because of the close relation between the two domains.

12.4.1 System adequacy and markedness reduction

System adequacy reflects the fact that a morphological system is organized around its own properties summarized in a restricted list of parameters consisting in (i) the type and number of the occurring categories (e.g. number and case for nouns, etc.); (ii) the type of morphological markers classified on the basis of their formal properties (affix type, separate or cumulative exponence, degree of syncretism, relevance of the word-internal articulation in terms of root, stem, etc.); and finally (iii) the presence or absence of inflectional classes (= ICs). The values fixed for certain parameters (e.g. four cases and two numbers for German nouns, VT-based derivation for Italian action nouns, etc.) constitute the system-defining structural properties (= SDSPs) of a given morphological system. The SDSPs emerge inductively from the way morphological meaning is concretely realized by means of morphological forms:

> Their status is neither that of grammatical rules (they represent overriding structural features), nor of grammatical universals (they differ from language to language) but rather that of generalizations of the morphological forms and rules of the respective language made by the speakers of a language.
>
> (Wurzel 1987: 65)

In spite of their inductive emergence, the SDSPs are of crucial importance in order to understand how morphological systems evolve along the diachronic dimension exploiting their own internal resources, and in fact they provide the classificatory matrix against which system adequacy is measured. In this regard, the SDSPs act as a system-stabilizing force insofar as they allow us to identify the trend towards the uniformity of the morphological system that is unveiled by those morphological phenomena which are eliminated because they arguably violate system adequacy. This happens especially when the SDSPs are organized in a non-uniform way, as it often turns out to be the case.

To make one concrete example, early Old High German (= OHG) displayed two distinct inflectional types for neuters which encoded number in a non-uniform way. In the first type number was encoded in an iconic way by adding a suffix to the word stem as in *faʒ* / *faʒ-u* 'barrel(s)', *herza* / *herz-un* 'heart(s)', *lamb* / *lemb-ir* 'lamb(s)', which can be summarized by the SDSP$_1$: [Sg. $\neq$ Pl.]. The second type displayed a

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non-iconic zero plural as in *wort* / *wort* 'word(s)', expressed by the SDSP$_2$: [Sg. = Pl.]. In spite of its non-iconic nature, this latter type covers about three-quarters of all neuters and therefore the SDSP$_2$ qualifies as the normal or system-adequate variant. Accordingly, we can account for its spread to the rest of the neuters testified by later forms like *faʒ* 'barrels', *herza* 'hearts' and *lamb* 'lambs' as an improvement of the system adequacy at the expense of a non-system-adequate trait. Thus, the SDSP$_2$ which is quantitatively dominant defines system adequacy, and at the same time makes us foresee the direction which is likely to be followed by the trend towards uniformity. The improvement of system adequacy brings about the reduction of the markedness of the system insofar as a non-normal trait is eliminated, although markedness reduction has to be understood here in rather different terms with regard to the universal perspective adopted in §12.3.

However, system adequacy, as well as its predictive force, cannot be interpreted in deterministic terms. On the one hand, it does not allow us to make strict predictions on the possible elimination of a certain non-system-adequate trait, and in fact the decomposition of non-uniformly structured morphological systems can last for centuries and is often accomplished by means of several alternative solutions (in this regard, cf. Gaeta 2002c on the development of the system of the OHG preterite-presents). On the other, system adequacy and its predictive force is not necessarily violated when a non-system-adequate trait emerges in a given morphological constellation, because the latter can be due to a different reason, for instance of a phonological nature.

12.4.2 The role of paradigms in markedness reduction

Morphological systems which display a large number of ICs tend to develop an internal organization based on paradigm structure conditions (= PSCs) which allow the speaker to keep the morphological complexity under control:

> By establishing implicative relations between inflectional forms of words, paradigm structure conditions not only cover the matching of forms in a uniform paradigm but also fix the different status of its individual forms; they distinguish between the "identifying forms" . . . along with the lexical basic form of a word and the other forms of the paradigm following from it (which is properly the distinction between implying and implied forms). This takes account of the fact that an inflectional paradigm is more than the sum of its forms, that it has a specific internal structure.
>
> (Wurzel 1989: 239)

To understand what it concretely means to say that a paradigm is not simply the inventory of its word forms, let us discuss a case in which several ICs are in competition as, for example, Latin nouns belonging to the third declensional class (cf. Wurzel 1984: 120–1). Here, two implicational series can be established on the basis of the IC of the noun *puppis* 'afterdeck' which stands for the nouns whose stem displays the *i*-vowel (3a) and of the IC of the noun *rēx* 'king' which stands for the nouns whose stem ends with a consonant (3b):

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(3)   a. $[\text{-}im/\text{Acc.Sg.}] \supset [\text{-}\bar{\imath}/\text{Abl.Sg.}] \supset [\text{-}\bar{\imath}s/\text{Acc.Pl.}] \supset [\text{-}ium/\text{Gen.Pl.}]$

$$\supset \left\{ \begin{array}{c} [\text{-}is/Gen.Sg.] \\ \vdots \\ [\text{-}ibus/Dat.\text{-}Abl.Pl.] \end{array} \right\}$$

b. $[\text{-}um/\text{Gen.Pl.}] \supset [\text{-}\bar{e}s/\text{Acc.Pl.}] \supset [\text{-}e/\text{Abl.Sg.}] \supset [\text{-}em/\text{Acc.Sg.}]$

$$\supset \left\{ \begin{array}{c} [\text{-}is/Gen.Sg.] \\ \vdots \\ \text{-}ibus/Dat.\text{-}Abl.Pl. \end{array} \right\}$$

The logic of the PS Cs is that when a speaker hears the word forms *puppim* (accusative singular) or *rēgum* (genitive plural) he or she is able to reconstruct respectively the forms *puppī* (ablative singular) and *rēgēs* (accusative plural) but not vice-versa, and step after step their entire paradigm which is partially identical insofar as the last step gathers the same forms for both ICs. The systemic force of such intra-paradigmatic relations consists in a hierarchical organization of the single word forms which have a different relevance for the whole inventory. Such different relevance is expressed by the implications and by their effect on the dynamics of the ICs. In fact, *puppis* and *rēx* are surrounded by at least three mixed ICs which display inflectional properties which go back to either of them. The PSCs in (3) allows us to describe the three mixed classes as resulting from the hierarchy of implications in which a certain noun may 'join in' at any point:

(4)   a.   *ignis* 'fire'

$[\text{-}\bar{\imath}/\text{Ab1.Sg.}] \supset [\text{-}\bar{\imath}s/\text{Acc.Pl.}] \supset [\text{-}ium/\text{Gen.Pl.}] \supset \left\{ \begin{array}{c} [\text{-}is/Gen.Sg.] \\ \vdots \\ [\text{-}ibus/Dat.\text{-}Abl.P1.] \end{array} \right\}$

$[\text{-}em/\text{Acc.Sg.}]$

b.   *auris* 'ear'

$[\text{-}\bar{\imath}s/\text{Acc.Pl.}] \supset [\text{-}ium/\text{Gen.Pl.}] \supset \left\{ \begin{array}{c} [\text{-}is/Gen.Sg.] \\ \vdots \\ [\text{-}ibus/Dat.\text{-}Abl.Pl.] \end{array} \right\}$

$[\text{-}e/\text{Abl.Sg.}] \supset [\text{-}em/\text{Acc.Sg.}]$

c.   *civis* 'citizen'

$[\text{-}ium/\text{Gen.Pl.}] \supset \left\{ \begin{array}{c} [\text{-}is/Gen.Sg.] \\ \vdots \\ [\text{-}ibus/Dat.\text{-}Abl.Pl.] \end{array} \right\}$

$[\text{-}\bar{e}s/\text{Acc.Pl.}] \supset \quad [\text{-}e/\text{Abl.Sg.}] \supset [\text{-}em/\text{Acc.Sg.}]$

The noun *ignis* (4a) shares most PSCs with *puppis* except for the accusative singular *ignem*; in *auris* (4b) the PSCs of *puppis* are present only at the third step of (3a) while at the same time the rightmost PSCs of *rēx* are found, namely the ablative and the accusative singular *aure* and *aurem*; finally, in *civis* (4c) only the rightmost PSC of *puppis* is found, namely the genitive plural *civium*, while the others come from *rēx*. In this way, the PSCs form a

network of internal correspondences within one or more ICs which help the speakers cope relatively easily with even complex patterns of distinct but partially similar paradigms.

Furthermore, the PSCs provide the diachronic scenario according to which the nouns previously belonging to the IC of *puppis* are re-assigned to the IC of *rēx*. Such changes of IC are often observed diachronically and are usually due to what Wurzel calls the different stability of the ICs, basically resulting from their numerosity, as already discussed in §12.4.1 with regard to system adequacy and the SDSPs. In our case, the PSCs nicely capture the stepwise roll-out of the change from the type *puppis* to the more numerous type *rēx* through the single stages shown in (4). In spite of its apparent chaotic effect due to the multiplication of the mixed paradigms, this change results in an overall markedness reduction of the inflectional system via ordered transitional stages because its full completion is expected to bring about the reduction of the general number of ICs found in the system, ultimately eliminating the PSC in (3a) and its intermediate types (see Bittner 1996 for a similar multi-stage PSC to account for the various subclasses of the German strong verbs, and Carstairs-McCarthy 1991 for a general criticism of this view).

The effort made towards the identification of PSCs usually results in the optimization of the information is necessary to recover the single forms within a paradigm. This is best accomplished when the PSCs are univocally associated with extra-morphological properties. These are either phonological or semanto-syntactic properties such as, on the one hand, a clearly identifiable phonological ending and, on the other, gender or semantic features such as 'person', 'plant', 'animacy', 'modality', 'transitivity', etc. (cf. Wurzel 1984: 117). ICs which are anchored at extra-morphologically motivated PSCs have a chance of being stable and expand diachronically, acquiring newcomers from other unstable ICs.

One example showing in a spectacular way the importance of the association of an IC with clearly identifiable extra-morphological properties is given by the so-called weak masculine nouns found in German (cf. Wurzel 1984: 122–4; Bittner 1991; Gaeta 1995, 2008; Harnisch 2001 for details). This IC was characterized in OHG by the occurrence of nasal suffixes as shown by *boto* 'messenger' / *boten* 'Gen. Sg.' / *boton* 'Nom. Pl.', and contained a disparate set of nouns including *bluomo* 'flower', *bogo* 'bow', *fano* 'flag', *funko* 'spark', *knabo* 'boy', *lewo* 'lion', *mago* 'stomach', etc. (see Harnisch 2001: 84–9 for an overall picture). At a later point—after the weakening or loss of the final vowels in the Middle High German (= MHG) period had taken place—this IC happened to be associated with the phonological feature [ə]-ending and with the semantic feature 'animacy', on the basis of nouns like *boto > Bote*, *knabo > Knabe*, *lewo > Löwe*, etc. The disparate set of nouns found in OHG was subsequently reorganized by slowly eliminating the nouns which did not match the extra-morphological properties. This brought about a number of changes of IC coupled with changes in the extra-morphological properties of the nouns. Accordingly, a number of nouns passed to the IC of feminines, such as *Glocke* 'bell', *Zunge* 'tongue', etc., by changing their gender as in the case of *bluomo > Blume*, *fano > Fahne*, etc. Furthermore, other nouns changed their extra-morphological properties with the addition of a final -*n*: *bogo > Bogen*, *mago > Magen* and at the same time modified their inflectional features passing to the IC of masculines like *Boden* 'ground', *Faden* 'thread', etc. The latter go back to the OHG class of the *a*-nouns and actually display *s*-genitive and umlauted plural: *Bodens* / *Böden*, *Fadens* / *Fäden*, etc. While in modern German nouns like *Bogen* and

Magen have passed to this latter IC: *Bogens / Bögen, Magens / Mägen*, other nouns like *Funke* have acquired the new properties only partially insofar as both the *n*-ending and the inflectional properties are not completely matched: the nominative singular swings between *Funke* and *Funken*, while the genitive singular displays the form *Funkens* but the plural is *Funken*.

Conversely, other masculine nouns which did not originally belong to the *boto*-class have entered the class of weak masculines because they happened to display the extra-morphological properties of 'animacy', such as *Hirt* 'shepherd', going back to the OHG *ja*-class: *hirti / hirtes* 'Gen. Sg.' / *hirta* 'Nom. Pl.', which has developed a nominative singular *Hirte* and the form *Hirten* for the genitive singular and the nominative plural similarly to *boto > Bote / Boten*. Clearly, such processes of reorganization can last for centuries, and we still observe variation in cases such as *Friede / Frieden* 'peace', *Glaube / Glauben* 'belief', etc. However, the actual productivity of the weak masculine class is shown by new formations matching the property of animacy, for example *Chaot* 'slob' / *Chaoten* 'Gen. Sg. / Nom. Pl.', and by a pair like Typ_1 'type' / *Typs* 'Gen. Sg.' / *Typen* 'Nom. Pl.' vs. Typ_2 'fellow' / *Typen* 'Gen. Sg. / Nom. Pl.'.

12.4.3 Contrasting system adequacy and diagrammaticity

In §12.4.1 we have seen a couple of examples which apparently contradict the claim that natural change consists of a markedness reduction favoring the universal preference for diagrammaticity because non-iconic coding, the zero-marking required by the OHG $SDSP_2$ [Sg. = Pl.], replaces iconic coding, namely the additive marking of *herza / herz-un*. Also the case of the German weak masculine nouns reveals a similar contradiction insofar as the new form *Funken / Funken* 'spark(s)' reduces the iconic marking of the earlier *Funke* 'Sg.' / *Funken* 'Pl.'. In other words, system adequacy is improved at the expense of diagrammaticity, or, to put it in more general terms, the system-dependent naturalness takes precedence over the universal naturalness.

This conclusion has dramatic consequences for the idea that morphology displays a strong semiotic motivation grounded on Peirce's diagrams because it implies that, in principle, system adequacy may be increased by systematically expanding non-iconic signs at the expense of iconic marking. And in fact a clear-cut example supporting this embarrassing conclusion can be drawn from Milanese, the dialect spoken in Milan (cf. Salvioni 1975). Here, the nominal system has developed towards a complex set of at least six different ICs, which are distinguished on the basis of extra-morphological properties such as gender, phonological ending, and animacy (cf. Gaeta 2016 for a detailed discussion) (Table 12.3).

Notice that the occurrence of the article helps the speakers identify the gender in the singular. Note also that gender is completely neutralized in the plural since the articles are identical for all classes and both genders. This is particularly relevant for the IC-1 which is the largest class and the only one to include masculine and feminine nouns. In this class, gender—neutralized in the plural as in the other ICs—can be inferred in the singular only thanks to the article, while in the other classes other properties are of help. In the quite small IC-3 and IC-4 plural marking, which is encoded via substitutive markers, allows the speakers to infer the gender because these classes contain only masculine nouns. In the

Table 12.3. Nominal ICs in Milanese							
	IC-1		IC-2	IC-3	IC-4	IC-5	IC-6
Extra-morphological properties	[+M]	[−M]	[+M] [+animate]	[+M]	[+M]	[−M] [+animate]	[−M]/a/#
Singular	el mur 'wall'	la red 'net'	el scior 'mister'	el basin 'kiss'	el capel 'hair'	la sciora 'lady'	la scala 'staircase'
Plural	i mur	i red	i sciori	i basett	i capej	i sciori	i scal

other three ICs, gender clusters with other properties, namely with animacy in the IC-2 and the IC-5, and with the phonological *a*-ending in the IC-5 and the IC-6, which contain only feminine nouns.

As we have seen in §12.4.2, in such a complex cluster of properties the PSCs help the speakers keep the morphological complexity under control by making reference to extra-morphological properties in the form of implicative relations. Only extra-morphologically motivated ICs are predicted to be stable and to expand, acquiring newcomers from other ICs. This is what happened to the IC-6 which is clearly identified by the following PSC holding that feminine nouns ending with /a/ form their plural by Vowel Deletion (= VD):

(5)
$$\text{PSC}_{\text{IC}-6}: \begin{bmatrix} Noun \\ +Fem \\ /a/\# \end{bmatrix} \supset [Pl./VD]$$

The peculiar character of this IC is due to the effect of a phonological change which has deleted all final vowels except /a/ in Milanese: Lat. MŪRU(M) 'wall' / MŪRĪ, SCĀLA(M) 'staircase' / SCĀLAE > Mil. *mur* / *mur*, *scala* / *scal*, etc. In spite of the anti-iconic nature of this subtractive plural marking, the IC-6 has acquired newcomers such as *carna* / *carn* 'meat(s)' and *vesta* / *vest* 'dress(es)' which go back to the Latin ancestors CARNE(M) / CARNĒ(S) and VESTE(M) / VESTĒ(S) and are expected to appear as **carn* / *carn* and **vest* / *vest*, similarly to *red* / *red* of the IC-1.

Far from being eliminated as in the Franconian German example *hond* / *hon* seen in §12.2.1, the anti-iconic IC-6 displaying subtractive marking was expanded by adding a final /a/ to the singular form because of the clear PSC$_{\text{IC-6}}$ in (5) which facilitates the retrieval of feminine nouns provided with the corresponding extra-morphological property.

Two conclusions can be drawn from this case. First, an arguably natural morphological change intended as a language improvement or markedness reduction can militate in favor of anti-iconic marking, that is, can have an utterly unnatural effect. As observed by Wurzel (1987: 71), "system-independent naturalness can induce morphological change only if this does not contradict system-congruity". However, this conclusion is tempered by an "ecological" tendency towards the overall sustainability of the system, in which the ICs are preferably anchored to easily detectable PSCs and benefit from generally uniform SDSPs such as, for instance, the combined expression of article and suffix for plurality as in the Milanese example. Thus, system adequacy aims to maximize the lexical

recoverability of the inflectional behavior by means of PSCs, even if this is done at the expense of the universal naturalness represented by Peirce's diagrams. Although it remains to be understood how far this dialectic tension between system adequacy and universal naturalness can go, this conclusion is quite comforting, because it provides an optimal base on which we can attempt to understand what are the limits that a morphological system can sustain. In this regard, Baerman, Brown, and Corbett (2005: 170) take up the distinction between system-dependent and universal naturalness insofar as the former is language-specific and typically results from phonological change while more widespread patterns of syncretism usually reflect "common or universal elements of feature structure" which "are available to all languages".

Second, by enhancing the lexical coverage of a PSC through the generalization of its extra-morphological properties, an important side-effect is reached, namely the reduction of lexical specification. This contributes to the simplification of the morphological system, insofar as the reach of a PSC is enlarged, even if in some cases the system can become more complex as a whole.

In sum, the conflicting nature of the preferences and of the predictions suggested by NM "should not be seen as an admission of defeat: although much remains to be done, Natural Morphology represents a step forward in its acceptance of interaction between the universal and the language-specific, between morphology and other components of the grammar, and between synchronic morphology and morphological change" (McMahon 1994: 106).

12.5 Conclusion and outlook

NM has attracted the interest of a large number of scholars working mainly, although not exclusively, in Europe (see Dziubalska-Kołaczyk 2002 for a first appraisal). Probably, one main point of attraction of the theory has been its high flexibility, that is, the capacity of providing principled answers to conflicting questions, within a functionalist understanding of language as a psychological and historical phenomenon. This has also been generally recognized by scholars who do not necessarily subscribe to all the tenets of NM but see in the concept of naturalness a useful term for accommodating "complex chains of causation". It is useful because it keeps distinct the different factors involved inasmuch as "[n]atural-ness itself is a function of a large number of factors, including transparency" while "frequency is a result of naturalness" (Bauer 2001: 59). Moreover, naturalness, taken in all its universal and system-specific aspects, can easily be accommodated to other approaches which are centered more on economy of expression and structure (cf. Nübling 2011; Carstairs-McCarthy 2000, 2008) and on markedness relations (cf. Andersen 2008).

On the other hand, the flexibility of NM can also be found in the attempt to draw attention to phenomena or areas of morphology which have traditionally been considered marginal, as, for instance, the so-called extra-grammatical morphology (cf. Doleschal and Thornton 2000), particularly rich in the domain of trade names (cf. Ronneberger-Sibold 2010 for a recent overview), or the large area covered by morpho- and socio-pragmatics (cf. Merlini Barbaresi 2015; Gaeta 2015c).

Finally, the questions and the principled answers provided by Wurzel's model of system-dependent naturalness still require to be carefully checked against other competing models

such as for instance Stump's (2001) realizational model of inflection which is at odds with the incremental approach adopted by NM, especially with regard to its predictive force and the diachronic dimension constantly present in the NM perspective (for an attempt on French verbs, cf. Kilani-Schoch and Dressler 2005). All of this remains a desideratum for future research.

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