Degrees of grammatical productivity in inflectional morphology

Wolfgang U. Dressler

This paper focusses on grammatical productivity as constitutive property of a model of dynamic morphology (in contrast to overlapping static morphology, which is unproductive). Grammatical productivity is located in the potential system of grammar (here exemplified with inflectional morphology) as opposed to type frequency belonging to the level of language as social institution and to token frequency belonging to the level of performance. Productivity is prototypical for morphological categories, rules and paradigm classes formed by them. This contribution concentrates on productive microclasses. Section 3 establishes degrees of grammatical productivity according to effects in integration of loan words, of extragrammatical neologisms, conversion and class shifts. Theoretical consequences for the model of Natural Morphology espoused here (section 4) concern the function of productivity, the distinction between morphological richness and complexity and competition between productive rules. In order to vouch for psychological reality of the model, psycholinguistic consequences are shown, in the framework of a race model, for online processing, first language acquisition and offline evaluation tests (section 5).[1]

> Die Gewalt einer Sprache ist nicht, dass sie das Fremde abweist, sondern dass sie es verschlingt (Johann Wolfgang von Goethe: *Maximen und Reflexionen*) [2]

1. Introduction

The main thesis of this contribution is that productivity should be taken as a constitutive primitive property of inflectional patterns (or rules or processes), in the same way as in the other components (or (sub)modules) of grammar. The central role of productivity is at least implicitly acknowledged in syntax, where nobody would propose or modify a model just in order to account for unproductive constructions, such as impersonal E. *methinks*. Similarly, in many models of phonology, particularly in Natural Phonology, where truly phonological processes must be fully productive (cf. Dressler 1985). Analogously I suppose that morphological rules (or their equivalents in other models) are prototypically productive. For productivity in

word formation, see Dressler & Ladányi (2000) and Dressler et al. (2001).

In contrast to analogical models (e.g. Skousen 1989, Becker 1990), I restrict the notion of analogy to that of surface analogy (cf. Motsch 1981), i.e. to analogies formed after precise actual words and word forms. Let us exemplify this with the morphological pattern of the French verbs of the type (below defined as a microclass) of *finir* 'to end', 1.Sg.Pres. *je finis*, 1.Pl. *nous finissons*. This pattern has been unproductive, at least since the 19th century, although in the early 20th century new verbs have been coined which follow this pattern: *amerrir* (1912) 'to alight on water' and *alunir* (1921) 'to land on the moon'. But these two neologisms have been coined according to the precise model of the verb *atterrir* 'to land', which is also evidenced by the orthography: the double *rr* of *amerrir* can only be explained by analogy to *atterrir* (cf. Dressler & Kilani-Schoch 2003).

In schema models, as in Bybee (1991:86f, 1995) and Köpcke (1993) and in related connectionist models, productivity relies on type-frequency (e.g. Bybee 1995) or on token frequency (e.g. Baayen 1992, 1994) or is also related to other psycholinguistic factors of signal cue strength (as in the competition model of Bates & MacWhinney 1982, cf. Köpcke 1993). Within the model of Natural Morphology, Wurzel (1984) derives productivity from type-frequency and other factors of inflectional class stability (cf. also Bauer 2001: 20ff, 48ff).

In psycholinguistic models, influenced by generative grammar, productivity has been recognized as an important property of morphological rules and as an advantage of rule models in contrast to connectionist ones (cf. discussion in Lima et al. 1994), but has been subordinated to concepts of regularity and/or default (e.g. Pinker & Prince 1994, Clahsen 1999 with references, critique in Dressler 1999a, cf. Bauer 2001:54ff).[3]

In contrast to all these models, I postulate productivity as a primitive property of inflectional morphology (in strict parallel to all other rule components of grammar). If we conceive of productivity as a grammatical concept, then morphological productivity can still be defined in Schultink's way, as translated by van Marle (1985: 45) as:

the possibility for language users to coin, unintentionally, a number of formations which are in principle uncountable.

This definition clearly holds for the potential system of grammar, where Chomsky's notion of competence and Saussure's notion of *langue* (in Coseriu's 1975 interpretation) converge. Thus this definition predicts the formation of grammatically correct inflectional word

forms, as opposed to actual ones. This parallels Marchand's (1969) distinction between dynamic word formation and static word-formedness and fits to Aronoff's (1976) postulate that the main task of word-formation theory is to account for what is a potential, not an actual, word. Whereas potential words belong to language as potential system, actual words belong to language as social institution (cf. Coseriu 1975, cf. Chomsky's 1986 notion of external language). Here we have two overlapping distinctions: potential vs. actual, dynamic vs. static: the dynamic character of productive rules which account for potential words and inflectional word forms is constrained in language as social institution both by actually existing words and word forms and by stylistic and other normative constraints, including norms on rule competition.

If one assumes rules to be constitutive for grammar (cf. Lima et al. 1994), then they must be potentially applicable in the potential system and thus have to be productive, i.e. to apply to new forms which match the structural description of the rule. Of course the domain of a productive rule may be limited on the level of the grammatical system, e.g. through competition or antagonism of rules. Lexical restrictions on morphological productivity or on its domains are twofold. On the one hand, class membership of bases (words) may be lexically stored. This is, by definition, the case with unproductive rules/patterns. On the other hand, I assume that productive rules are restricted within the (inflectional) morphological module by general features (e.g. application only to masculine nouns or to consonant-final roots, etc.), i.e. "competence restrictions" (Booij 1977; Baayen 1989: 12ff). The problem of overgeneration is much smaller than in overgenerating generative models (cf. Baayen 1989:228), because in my model it exists only for productive rules, whereas the great problems of overgenerating generative models originate with unproductive rules.

2. Concepts and definitions

Based on the above assumptions, the morphological model I espouse (within the framework of Natural Morphology (cf. Dressler et al. 1987; Kilani-Schoch 1988; Dressler 2000), is constituted by two, largely overlapping morphologies: first, dynamic morphology whose core consists of the productive morphological patterns (categories, rules and classes, cf. Dressler 1997a, 1999b), second, static morphology which consists of the representations of stored morphological

forms (cf. Pöchtrager et al. 1998; Kilani-Schoch & Dressler 2002, Dressler 2003). The large overlap between rule mechanism and memorised storage results from two factors: on the one hand, most frequently used forms, even when productively processed by a rule mechanism, are stored. On the other hand, the way productive patterns are handled, can be extended to unproductive but regular or subregular patterns. This leads to rivalry (competition) between the two morphologies in performance (cf. the race models of Baayen & Schreuder 1991 and Frauenfelder and Schreuder 1992). Thus productivity is the default for dynamic morphology, whereas for static morphology productivity is in principle irrelevant (except indirectly via the consequences of productivity in type and token frequency).

Whereas I posit the notion of productivity on the level of the potential system of grammar, type and token frequency are derived properties on the levels of norms (language as social institution) and performance, respectively: grammatical productivity is realised on the level of norms as type frequency of actually existing inflectional word forms derived by a productive rule or of paradigms belonging to a productive class. On the level of performance, productivity and type frequency result, via intervening pragmatic, sociolinguistic and stylistic variables, in token frequency of actual inflectional forms.

Presence or absence of productivity is not only a property of rules, but also of other morphological patterns, first of all of morphological categories. For example, in spoken German, we have the following productive vs. unproductive synthetic inflectional categories: within declension, as signalled within the noun, number (Sg. vs. Pl.) is productive as well as case (although masc. Gen.Sg. *-s* and Dat. Pl. *-n* are recessive in substandards), whereas gender is only morphosyntactically symbolised. Within conjugation: person and number are productive, synthetic tense distinction beween present and preterit is productive in the standard, but unproductive in the indicative of Southern German). Among mood categories indicative and imperative are productive, whereas the present subjunctive is only literary, thus unproductive, whereas preterit subjunctive has become a sort of conditional in Southern German. Infinitive and past participle are productive, present participle is not.

Second, the property of productivity applies also to inflectional classes. For its investigation the following concepts and definitions are used here:

a) An inflectional paradigm comprises all inflectional forms of one word or (more precisely) of one base (word, stem, or root, according to

the type of inflection) within the same inflectional system (e.g. conjugation of verbs vs. declension of nouns). Thus E. *the cut-s* belongs to another paradigm than *(s)he cut-s*. Suppletive paradigms are those which contain more than one root, and where these root alternants are in complementary distribution, e.g. It. *and-a-re* 'to go', 1.Sg.Prs. *vad-o*.[4]

b) Sets of similar paradigms form classes (in the generic sense, cf. Aronoff 1994), in hierarchical order: macroclass, class (in the specific sense: similar to the traditional term of, e.g., the 5 Latin declension classes, where not all nouns of one class inflect in exactly the same way), subclass, (subsubclass, if necessary, etc.), microclass.

c) An inflectional microclass is the smallest subset of an inflectional class above the paradigm, definable as the set of paradigms which share exactly the same morphological generalizations, but may differ via the application of phonological processes (in the sense of Natural Phonology, which corresponds roughly to Kiparskyan postcyclic phonological rules). Thus phonological assimilation of voicedness in top-s [tåps] vs. dog-s [dågz] does not establish a different plural microclass, whereas morphonological assimilation in wive-s [waivz] does.

The bases of a microclass may be either simplex words or complex words (as the results of word formation rules). In the extreme case they may consist of the outputs of just one word formation rules, such as within the masculine macroclass of Polish declension, the microclass of ethnics (etc.) formed with the suffix *-anin*, e.g. *Amerykanin* 'American', *wegetarianin* 'vegetarian', Nom.Pl. *Amerykan-ie*, *wegetarian-ie* (cf. Dressler, Dziubalska-Ko aczyk & Fabiszak 1997: 105).

d) An isolated paradigm is a paradigm which differs morphologically or morphonologically from all other paradigms. It does not form a microclass of its own. All suppletive paradigms are isolated paradigms. Word forms of an isolateds paradigm may be accounted for by productive rules, but, as a whole, an isolated paradigm does not belong to dynamic morphology. Within static morphology, an isolated paradigm is a satellite to the most similar microclass(es). For example, the isolated paradigm of G. *bring-en, brach-te, ge-brach-t* 'bring, brought, brought' is a satellite of the microclass of *s/wend-en, s/wand-te, ge-s/wand-t* 'to send/turn'.

e) An inflectional macroclass is the highest, most general type of class, which comprises several (sub)classes or, at least, microclasses.

Prototypically, its nucleus is a productive microclass and it has at least two microclasses. The interior coherence of a macroclass, in terms of shared properties, must be higher than affinities between microclasses of different macroclasses (cf. Dressler 2003).

f) productivity must be distinguished from regularity, since also an unproductive rule has a regular output. Thus regularity is a hyperonym of productivity (cf. Dressler 1999a). Regularity means that the rule's input-output relations (patterns) are homogeneous (cf. Dressler 1985: 65ff; Bertinetto 1995: 17f). Reduction of homogeneity implies reduction of regularity. For example, within the morphophonology of Breton mutations, lenition of /p, t, k/ to /b, d, g/ is more regular than lenition of /b, d, g/ to /v, z/ and zero, respectively (for other definitions see Bauer 2001: 54ff).

g) productivity must also be distinguished from default status (cf. Dressler 1999a, Bauer 2001: 60ff). Both among productive and unproductive patterns usually one pattern represents a strong or weak default. For example, within German plural formation rules, *-en* plurals represent the default among feminines, *-e* plurals among non-feminines, although several productive plural formation rules apply to them, i.e. *-s* plurals to all of them, zero plurals and umlauted *-e* plurals to non-feminines. Or let us take the microclasses of neuter nouns in Russian and Slovene: all of them are unproductive, but the microclass with Nom./Acc.Sg. in *-o* represents the default, exactly as in those Slavic languages (e.g. Polish, Czech, Slovak, Serbo-Croatian) where the respective microclass is productive.

h) Finally productivity must be distinguished from generality, which means how general a rule's application to potential inputs is. Whereas phonological rules typically apply to all actual inputs which possess the respective phonological format, morphonological rules apply only to parts of them. Still they may productively apply to new foreign words which fit the structural description of the rule. Moreover, comparable unproductgive rules may differ widely in generality, a difference which burns down to the relation between structurally conceivable input and actual input (as measured by type frequency).

3. Criteria of inflectional productivity

Such as many other concepts of naturalness theory, also productivity is gradual. But in contrast to previous work on graduality of

productivity (as surveyed in Bauer 2001: 125ff, 177ff), I will focus on graduality of grammatical productivity within the potential system, without denying that accounting for type frequency on the level of norms and for token frequency on the level of performance are important endeavours (see especially the work of Baayen (1989, 2001), Plag (1999) and their research associates in the area of word formation). Neither can relative productivity within the potential system of grammar be equated with the amount of structural constraints (Booij 1977: 5, cf. Bauer 2001: 126ff), as Dressler & Ladányi (2000: 111f) have shown for derivational morphology with the example of ordinal-number formation. Constraints have only an indirect and secondary influence via rule competition, as we will discuss below. Whether a form is potential, can be tested, but psycholinguistic testing has its own pluridisciplinary presuppositions, of which we will focus on the linguistic ones.

Our concept of gradualness corresponds to the following hierarchy of criteria:

a) Wurzel's (1984) secondary productivity in the integration of loan words with fitting of unfitting properties,

b) Wurzel's (1984) primary productivity in the integration of loan words with fitting criteria,

c) assignment of indigenous neologisms (except e below), i.e. of abbreviations, conversions and onomatopoetic neoformations,

d) inflection class change,

e) word formation productivity of affixations

Before going into details, I must stress that the material given below is all actually attested data, but also tested with native speakers (both linguists [5] and non-linguists) such that what holds for actual forms, holds for potential forms as well (cf. also section 4.3). The five hierarchical criteria a-e) are illsutrated with examples of gradual productivity of microclasses:

a) The most important criterion is represented by Wurzel's (1984) secondary productivity, which shows in the integration of loan words with unfitting properties, which have to be fitted (accommodated) to the system adequacy of the loaning language. This criterion is the most important one, because a rule must have maximum productivity in order to overcome the two obstacles of foreignness and unfitting properties. For example, English (and German) verbs have no thematic vowel, thus a thematic vowel must be added when adapting an English loan-verb into a Romance language:

(1)   E. *to dribble* > It. *dribbl-a-re*, Sp. *dribl-a-r*

Inversely, when Neolatin and Italian thematic verbs were loaned into German, their thematic vowels were inadequate for German system adequacy, thus they had to be accomodated, viz. the root amplification (stem-forming suffix) *-ier-*, as in:

(2) Lat. *salv-a-re* > G. *salv-ier-en* 'to save'
     It. *collaud-a-re* > Austrian G. *kollaud-ier-en* 'to ratify the construction of a building'

Many Slavic languages have both productive thematic verb microclasses and unproductive athematic paradigms. As predicted, athematic English or German loan-verbs are assigned to the productive thematic verb microclasses and not to the, morphologically closer (more similar), unproductive athematic paradigms (cf. Dressler, Dziubalska-Ko aczyk & Fabiszak 1997, Dressler, Dziubalska-Ko aczyk & KatiëiÊ 1996, Dressler & Makovec-»erne 1995, Dressler & Gagarina 1999), e.g.

(3) E. to flirt, G. schmink-en 'to rouge' > Pol. flirt-owa-Ê, szmink-owa-Ê; (computerese) to save > Pol. imperfective za-[seiv]-owa-Ê, perfective [seiv]-n±-Ê); G. sprech-en 'to speak', spar-en 'to save' > Pol. szprech-a-Ê, szpar-a-Ê (Dressler et al. 1997: 115); E. to lynch > Croat. linË-ova-ti, E. to box > Croat. imperf. boks-a-ti, perf. boks-nu-ti, cf. u-hep-i-ti se 'to get happy' (Dressler et al. 1996: 133).

For Russian cf. § 4.2.

Analogously, German and French athematic masculine and feminine loan-nouns are integrated only into the two gender-dominated productive and thematic Italian microclasses masc. Sg. *-o*, Pl. *-i*, fem. Sg. *-a*, Pl. *-e* (cf. Dressler & Thornton 1996):

(4) G. masc. *der Feldspat* > It. *il feldspato*, Pl. *i feldspati*, Fr. *le début* > il debutto, Pl. *i debutti*, Fr. *la betonnière* > It. *la betoniera*, Pl. *le betoniere*

Wurzel (1984) only thinks of accommodation of unfitting phonological shapes. Of equal importance, I suggest, is the fitting of other criteria, particularly of gender, e.g. (in maintaining or only minimally adapting phonological or graphic shapes)

(5) Fr. masc. *l'étage*, *le garage* > G. fem. *die Etage*, *die Garage*, Pl. *-en*, Jap. (genderless!) *kimono* > It. il *k/chimono*, Pl. *i k/chimoni* (or undeclinable), Finn. (genderless!) *sauna* > It. *la sauna*, Pl. *le saune*.

The French inanimate masculine loan-nouns, which at the time of loaning still ended in schwa, are integrated into the only productive schwa-final microclass of German which contains inanimate nouns, i.e. feminine nouns. The fact that in the Italian case, the genderless words of Japanese or English, etc. origin are always adapted to gender but not always integrated into the productive gender-dominated inflectional microclasses, casts doubts on whether they are indeed fully productive, e.g.

(6)   *il film*, Pl. *i film* (antiquated inflection: *i filmi*), *la jeep*, Pl. *le jeep*, *la radio*, Pl. *le radio*

In tests, a minority of subjects even did not inflect the Spanish loan-words *la rumba, la samba*.

However, in older loan-words, both gender and phonological shape are adapted in Italian words loaned via English, such as:

(7)   E. *jungle* > It. *la giungla*, Pl. *le giungle* (fem. like synonymous *la foresta*, *la selva*)

b) A hierarchically lower criterion of productivity is represented by Wurzel's (1984) primary productivity which appears in the integration of loan-words with already fitting properties. Here integration must overcome only the obstacle of foreignness. One example is loaning of German neuters in *-o* into Slavic languages, where *-o* is the default ending of neuters (Sg.Nom. = Acc.) and the respective microclass the default for neuters:

(8)   G. *das Auto* > Pol. *auto* (neuter), Slov. *auto* (masc.)

The fact that G. *Auto* (neuter) has become a neuter in Polish but a masculine in Slovene demonstrates non-productivity or scarce productivity of the Slovene neuter microclass in *-o*, but high productivity of its Polish correspondent.

That gender must not be identified with gender-determined class, is shown by Russian, where phonologically fitting inanimate loan words are integrated as neuters but remain indeclinable, e.g. *radio*, *pal'to* < Fr. *paletot* 'coat', cf. the recent abbreviations *RONO*, *SILPO*, *GUNO* (cf. also Doleschal 1995). Thus neuter gender is productive in Russian, neuter inflection microclasses are not (beyond word-formation productivity, criterion e) below, e.g. of suffixation with *-stvo* and *-enie*).

For loan-nouns in Italian, cf. the productivity of the feminine vs. the unproductivity of the masculine microclass in *-a*:

(9) Russ. fem. *daËa* > It. *la dacia*, Pl. *le dacie* vs. Tibetan/E. *lama* 'Tibetan monk' & Sp. *lama* (animal) > It. *il lama*, Pl. *i lama* (indecl.) vs. *il poeta*, Pl. *i poeti* (loaned from Ancient Greek already into Latin)

The following loan-nouns in German demonstrate medium to high productivity of noun microclasses, as shown by their plurals:

(10) *die Datscha*, Pl. *die Datscha-s/Datsch-en, die Pizza*, Pl. *die Pizza-s/Pizz-en*; *der Radar*, Pl. *die Radar-s/e*; *der Laser*, Pl. *die Laser-(s)*; *der Quiz*, Pl. *die Quizz-e*; *das Fax, die Fax-e*; E. *cake-s > der/das Keks, die Keks-e* 'biscuit(s)'

c) Still hierarchically lower as productivity criterion is inflection of indigenous neologisms (not counting word-formation productivity of affixations, cf. below e). A first subtype is represented by inflection of conversions: all English and German verbs formed via conversion are weak verbs (the only productive microclass). Analogously all Italian nouns formed via conversion land in the two maximally productive microclasses, such as in:

(11) It. *degradare* 'to degrade', *revocare* 'to revoke' → masc. *il degrado*, Pl. *i degradi*, fem. *la revoca*, Pl. *le revoche*.[6]

The evidence of German adjective-to-noun (12a) and verb-to-noun conversions (12b) again fits the previous, more important criteria:

(12) a. *hoch* 'high' → *das Hoch, die Hoch-s* (in meteorology), opposite: *tief* → *das Tief, die Tief-s*; *oval* → *das Oval* → *die Oval-e/s*

   b. *stau-en* 'to congest' → *der (Verkehrs)stau* 'congestion', *die Stau-e/s*; *hock-en* 'to squat' → *die Hocke*, Pl. *-n* (in sport); *beug-en* 'to bow' → *die Beug-e*, Pl. *-n*.

Converted denominal German verbs are both word- and root-based weak verbs:

(13) *Mond* 'moon' → *mond-en* 'to land on the moon', *Schriftsteller* 'writer' → *schriftsteller-n, Lok-führ-er* 'locomotive driver' → PPP *ge-lok-*

führer-t, *Mendel* (geneticist) → *mendel-n* vs. *Klump-en* 'clot' → *klump-en*, PPP *ge-klump-t*, *Gutachten* 'evaluation' → *gutacht-en*, PPP *ge-gutacht-et*, *Wahlrede* 'election speech' → *wahlred-en*, PPP *ge-wahlred-et* = *wahl-ge-red-et*, but: *Röntgen* → *röntg-en*, PPP *ge-röntg-t* & *ge-röntgen-t*.

Whereas conversions are – on the universal preference parameter of constructional iconicity – less natural than affixations and therefore less easily integrated into inflection and therefore more telling for inflectional productivity, a second subtype, abbreviations of all sorts, is partially strange to the grammatical system of morphology, because the abbreviatory devices discussed here are extragrammatical (cf. Dressler 2001). This partial strangeness makes them an obstacle to inflectional integration, albeit less so than foreign words (criterion a and b). Consider:

(14) It. *l'autobus* 'bus' > *l'auto*, Substandard Pl. *gli auti*; *il professore* > *il prof*, Pl. *i profi*; Standard *gli auto, i prof*

This seems to indicate that the masculine microclass *-o* → *-i* is less productive in the Italian standard than in the substandard.
From substandard Pl. *i prof-i* there exists also the back-formation, Sg. *il profio* and analogously fem. *la profia*, Pl. *le profie*. This last example also illustrates a special subtype of conversion (first subtype), productive gender motion, cf. *la moglie* 'the wife' > jocular male correspondent *il moglio*, Pl. *i mogli*.
Meeting only this hierarchically lower criterion c (but not the higher ones) cannot vouch for full but only for slight productivity: in Italian, according to criteria a, b and d, the microclass of masc. *il ponte* 'the bridge', Pl. *i ponti* is unproductive, but if there is syntactic conversion of infinitives to nouns and obtain a lexicalised meaning, then these are declined, such as:

(15) *sapere* 'to know' → *il sapere* 'the knowledge', Pl. *i saperi*
   potere 'to be able' → *il potere* 'the power', Pl. *i poteri*

An anonymous reader draws my attention to the inflected learned loan-words

(16) *il clone*, Pl. *i cloni*, *la enclave*, Pl. *le enclavi*

But these examples contrast with the great number of non-inflected laon-words, such as:

(17) *il - i golpe* 'coup(s)', *il - i kamikaze, il - i pope, il -i ponce* 'punch(s)'

Moreover the declension of fem. *enclave* may be due to older loaning or analogy to the old latinism

(18) *il conclave*, Pl. *i conclavi*

d) Hierarchically still lower as productivity criterion is class shift of a paradigm, typically from a recessive or less productive to a more stable and thus more productive microclass, i.e. productivity of the more stable class may be very slight. For example with Italian nouns, also this shift always goes in the direction of the two maximally productive microclasses, e.g., in substandard:

(19) *il pane* 'the bread', Pl. *i pani* > *il pano*, Pl. *i pani*, *la moglie* 'the wife', Pl. *le mogli* > *la moglia*, Pl. *le moglie*

Examples of class shift which does not carry paradigms into a more productive but into an equally productive microclass are German suffixed umlaut plurals, as in:

(20) 19th century: G. *der General/Admiral*, *der Mops* 'pug', *die General-e/Admiral-e/Mops-e* > today: *die Generäl-e, Admiräl-e, Möps-e*

Sometimes class change occurs only in errors (slips), which – when examined – are hotly denied by their perpetrators, as in the following ostracised substitutions of unproductive strong with productive weak past German participles:

(21) *lüg-en, be-trüg-en* 'to lie, betray', PPP *ge-log-en, be-trog-en* → *ge-lüg-t, be-trüg-t*; *fern-seh-en* 'to watch TV', PPP *fern-ge-seh-en* → *fern-ge-seh-t* [7]

An Italian example is class shift from the unproductive microclass (1.Sg., Inf.) *sent-o, sent-i-re* to the slightly productive microclass *fin-i-sc-o, fin-i-re*:

(22) *consegu-i-re* 'to obtain', 3.Sg.Pres. *consegu-e* → *consegu-isce* [8]

These class shifts in unintentional errors appear to be unidirectional.

e) The last and hierarchically lowest criterion is word-formation

productivity of affixations, which presents direct productivity evidence for word formation, but shows for inflection only, at most, stability of an inflectional microclass. Examples are, e.g., the above-mentioned (b, c) unproductive Italian microclass masc. Sg. *-a*, Pl. *-i*: each noun with the masc. agent suffix *-ista* (e.g. *aut-ista* 'bus driver') has the correct *-i* plural. Or in Polish, the neuter microclass in *-o* is productive, the one in *-e* not, despite of productive verbal-noun formation in *-anie*.

The distinction of these five criteria is not always as clear as it looks like. In d) above we have noted a class shift from the Italian microclass of *sent-ire* to the microclass of *fin-ire* (for other attestations of this class shift, cf. Dressler et al. 2003; Spina & Dressler 2003). Further evidence for productivity of the latter microclass comes from neologisms and occasionalisms, such as

(23) *rin-verd-ire, in-volgar-ire, im-milanes-irsi*, *in-Chomsk-irsi*
'to become green / vulgar become assimilated to Milan become a fan of Chomsky'

These verbs are formed by a parasynthetic derivational process of derivational prefixing and addition of the thematic vowel /i/, which by default assigns these verbs to the only productive microclass of the inflectional class of *-ire* verbs (of the second macroclass of Italian verbs). The basis is an adjective (*verde* 'green', *volgare* 'vulgar', *Milanese* 'Milanese'), whereas the name *Chomsky* is an exceptional base.

Now does this evidence for productivity appertain only to the very weak type of evidence of criterion e) (derivational, but not inflectional productivity)? So far all our examples for this criterion have been derivational suffixations. However, the parasynthetic verbs of the type *rin-verd-i-re* have no derivational suffix, but only a derivational prefix. Thus they also resemble conversions (criterion c). Hence do they fall under criterion c) or e)? If we compare criteria a) and b), then the distinction burns down to properties of the right edge, e.g. whether we can identify the presence or absence of a thematic vowel at the right edge or of another indigenous-looking right edge of the base. Under this perspective, the right edge of our parasynthetic verbs belongs to conversions (criterion c) and not to derivational suffixation (criterion e).

These five criteria allow us to establish degrees of productivity of microclasses, from full over strong and weak to slight productivity. Among unproductive patterns stable and recessive ones can be distinguished according to criteria e) and d).

4. Theoretical Consequences

4.1. Graduality and functionality

The establishment of degrees of productivity of microclasses disconfirms the notion that "inflexion productivity is an all-or-nothing phenomenon" (Baayen 1989: 49, cf. Scalise 1988, critique in Bauer 1992, 2001: 125ff). The nature of this gradation shows that Baayen (1989: 12ff) is correct in being sceptical about Booij's (1977: 5) predicament that "the qualitative productivity of a word formation rule is inversely proportional to the number of competence restrictions on that rule". At least it gives little for inflection: if it were true, the general case would be always more productive than the special case. For example English plural formation with /z/ (*car-s*) would be more productive than formation with /ɪz/ (*clash-es*). In reality both subtypes of English plural formation are (equally) fully productive, only the domain of application of the special case /ɪz/ is more restricted than that of the general case /z/. The same holds for word formation, as argued for ordinal number formation by Dressler & Ladányi (2000: 111ff).

Scales of productivity are usually established for word formation rules (cf. Bauer 1992, 2001), where they hold for the level of language as norm. The above criteria, first developed since 1994 for Italian (cf. Dressler & Thornton 1966) and Polish (cf. Dressler et al. 1996, Dressler, Dziubalska-Ko aczyk & Fabiszak 1997), is the first tentative of establishing a scale of inflectional productivity on the level of language as system, without confusing degrees of productivity with restrictions on the domain of a productive rule. How often, e.g., a fully productive rule is actually used in integrating loan words with non-fitting or fitting properties (criteria a, b) or indigenous neologisms (criteria c, e) is to be answered on the levels of language as norm and/or of performance.

In functional terms (cf. Dressler in Dressler et al. 1987, Dressler 1995), all morphological rules have the function of morphosemantic and morphotactic motivation of their outputs from their inputs (bases). Inflection rules have, in addition, the syntactic function of providing syntax with appropriate specialized word forms.[9] Productive (but not unproductive) word formation rules have the additional function of lexical enrichment, i.e. of forming neologisms which may enrich the lexical stock. Thus unproductive word formation rules lack the specific function of word formation and are thus dysfunctional.

But what is the functional difference between productive and unproductive inflectional rules? It is, I propose, the following aspect of their syntactic function: productive rules serve the syntactic function in fitting new words to the specific patterns specialized for signalling syntactic categories such as number, case, tense, mood, etc. If a rule is not productive enough for fulfilling this function, then either a more productive rule takes over, or the new word remains uninflected, which may be, first of all, awkward for syntax. For example, the impossibility to form a genitive, dative or instrumental of Russ. *pal'to* 'coat' (loan word) or of abbreviations such as *SSSR* 'Soviet Union' renders syntactic constructions requiring such case forms awkward. Second, such uninflected loan words (and, partially, even abbreviations) remain foreignisms (cf. Doleschal 1995), i.e. they remain morphologically unintegrated or incompletely integrated, which tends to impede phonological integration as well. It is noteworthy that in languages with otherwise obligatory inflection, uninflected loan words appear to be tolerated only in the word classes of nouns and adjectives but not in verbs, i.e. where the signalling of syntactic functions is paramount. Thus all loaned verbs and all verbs formed via abbreviation or conversion are inflected by virtue of being put into a productive microclass.

4.2. Productivity of microclasses and morphological richness

Productive morphological categories, rules and microclasses are central for dynamic morphology, whereas unproductive categories, rules and microclasses are marginal, i.e. dynamic patterns can be applied to them secondarily in analogy to productive patterns. Isolated (e.g. suppletive) paradigms are even more peripheral, because only the productive categories expressed, and the productive rules applied, in them belong to dynamic morphology. Their paradigms themselves belong only to static morphology.

As a consequence for a model of Natural Morphology, language-specific system adequacy (as first modelled by Wurzel 1984, cf. modifications in Dressler & Thornton 1991, 1996, Dressler 2003) must be constructed on the basis of productive categories, rules and microclasses. Again we concentrate on microclasses, which are an outcome of the application of rules to categories.

Productive microclasses form the core of hierarchically higher classes, up to macroclasses (cf. Dressler & Thornton 1996, Dressler, Dziubalska-Ko aczyk & Fabiszak 1997, Dressler 2003, Dressler & Kilani-Schoch 2003 for their establishment). Thus we expect that,

prototypically a macroclass should contain at least one productive microclass.

Accordingly, the verb systems of English, Dutch, German have just the one productive microclass of weak verbs, French has three very similar productive microclasses of the first macroclass, exemplified by the verbs *parl-er* 'speak', 1.Sg. *je parle* [parl], *sem-er* [s(±)me] 'sow', *je sème* [sɛm], *céd-er* [sede] 'give up', *je cède* [sEd], respectively. Italian conjugation has two: the fully productive microclass of *parl-a-re* 'speak' and the weakly productive one of Inf. *fin-i-re* 'end', 1.Sg.Prs.Ind. *fin-i-sc-o*, 1.Sg. Passato Remoto *fin-i-i*, PPP *fin-i-to* (cf. Dressler & Thornton 1991, Spina & Dressler 2003).

Slavic languages, however, have many more productive verbal microclasses, which are also more dissimilar among themselves than the three French ones, because they typically belong to different macroclasses, for example Slovene (according to Dressler & Makovec-»erne 1995) has the four microclasses (with stress position added):

1) Inf. *dél-a-ti* 'work', Part. *dél-a-l*, 3.Sg.Prs. *dél-a*, Imp. *dél-a-j*;

2) Inf. *mísl-i-ti* 'think', Part. *mísl-i-l*, 3.Sg. = Imp. *mísl-i*;

3) Inf. *bóks-n-i-ti* 'box (pfv.)', Part. *bóks-n-i-l*, 3.Sg. *bóks-n-e*, Imp. *bóks-n-i*;

4) Inf. *kup-ov-á-ti* 'buy', Part. *kup-ov-á-l*, 3.Sg. *kup-új-e*, Imp. *kup-új*.

Polish conjugation has (according to Dressler, Dziubalska-Ko aczyk & Fabiszak 1997) even seven productive microclasses, i.e. the types (the forms given are: Inf., 1.Sg., 3.Sg., 3.Pl.Prs., 2.Sg.Imp., 1.Sg. masc. Pret, PPP):

1) *kup-ow-a*Ê 'buy', *kup-uj-Í/-e*, *kup-uj-±*, *kup-uj*, *kup-ow-a- -em*, *kup-ow-a-n-y*;

2) *pis-yw-a*Ê 'write (iterative)', *pis-uj-e*, etc.;

3) *siw-ie-*Ê 'become grey', *siw-ie-j-Í/-e/-±*, *siw-ie-j*, *siw-ia- -em*, *siw-ia-n-o*;

4) *krzyk-n-± - Ê* 'cry (pfv.)', *krzyk-n±/-ie/-±*, *krzyk-n-ij*, *krzyk-n-±- -em*, *krzyk-n-i-Ít-y*;

5) *waø-y-*Ê 'weigh', *waø-Í*, *wa-øy*, *waø-±*, *waø*, *waø-y- -em*, *waø-o-n-y*;

6) *nos-i-*Ê 'carry', *noszÍ*, *nos-i*, *nosz-±*, etc.;

7) *koch-a-*Ê 'love', *koch-a-m*, *koch-a*, *koch-a-j-±*, *koch-a-j*, *koch-a-ø-em*, *koch-a-n-y*.

Russian conjugation has 4 productive microclasses (see Dressler & Gagarina 1999: here only infinitives of loans or neologisms are

given): 1) *kontakt-ov-at'*, *boks-ir-ov-at* 'contact; box', 2) *klik-nu-t'*, *kopir-nu-t'* 'click; copy (< G. *kopier-en*)', 3) *faks-it'*, *print-it'*, 'fax; print out' 4) *tap-at'* 'tape', *kompromiss-ni-Ëat'* 'to tape; compromise'.

The more conservative Baltic language Lithuanian has even more productive microclasses in the verb.

Our procedure, as established so far, allows us to differentiate morphological richness vs. complexity. Morphological richness can be seen as a hyponym of morphological complexity. Whereas morphological complexity contains all the morphological patterns of a language, both productive and unproductive ones, morphological richness should be calculated only in terms of productive morphological categories, rules and inflectional microclasses. For all inflectional forms which belong to unproductive categories, rules, paradigms or microclasses are lexically stored (according to realistic models of the mental lexical) and thus do not belong to the active mechanism of dynamic morphology (cf. Dressler 1999b).

Accordingly, among the languages cited, Lithuanian verb morphology is the richest, then comes Polish, then other Slavic languages, and English verb morphology is the poorest, because it has the fewest productive categories and rules and just one productive microclass. Added complexity decreases in the same way. In other words, for Indo-European languages, which approach the ideal inflecting-fusional language type to varying degrees, degree of richness and degrees of complexity are parallel.

This is not the case in agglutinating languages: Turkish, which is closest to the ideal agglutinating languages, has great morphological richness, but little added complexity (i.e. unproductive patterns). Hungarian morphology is less rich, but more complex, and this is more so in Finnish. Thus the more properties of the inflecting-fusional type an otherwise agglutinating language admits, the less rich and the more complex it is likely to get.

4.3. Potentiality and Rule Competition

If we regard the domain of application of a morphological rule, we must think again primarily of the potential domain of a rule, i.e. on the level of language as potential system, not of language as norm. Whereas the actual domain may be very idiosyncratic (particularly in the application of unproductive rules), the potential domain of applying productive inflection rules may be much more systematic. Here an overlap of the domains of two rules is possible, particularly in word formation because of the greater role of rule competition (rival-

ry, cf. Bauer 2001: 177ff). This has been recognized already by Coseriu (1975: 69f) with his indication of potential plural doublets in Rumanian and their actual reduction in language as norm. What holds for rules, also holds for (micro)classes which owe their existence to a combination of rules.

Potential inflectional forms, which are system-adequate, but may be norm-inadequate, can be illustrated with the following German examples. As we have seen already in (8), the Italian loan-word *die Pizza* may have the Pl. *Pizza-s* and *Pizz-en*. Similarly we have the following forms:

(24) *die Mafia*, Pl. *Mafia-s*, *Mafi-en*; *die Villa*, Pl. *Vill-en*, *?Villa-s*; *die Firma* 'firm', Pl. *Firm-en*, *?Firma-s*; *Siesta*, Pl. *Siesta-s*, *?Siest-en* vs. **Pizz(a)-e*, **Pizza-n*, **Pizzä*, **Pizz-er*

The forms indicated with question marks are norm-inadequate, but system-adequate. Therefore they are much less rejected by native speakers than system-inadequate, conceivable plural forms as those which are starred in (24). How, then, can we explain the stars in:

(25) *die Mama* 'mum', die Oma 'granny', Pl. *die Mama-s*, *Oma-s*, **Mam-en* [10], **Om-en?*

In (24), we have the relatively rare cases of German nouns where the root is amplified by a thematic vowel, i.e. where the canonical Nom.Sg. form consists of root plus thematic *-a*. In (25), however, word-final *-a* belongs to the root itself, i.e. root equals canonical Nom.Sg. form. Thus the starred plurals are as illegal (system-inadequate) as the conceivable but starred forms at the end of (24) and in (25):

(26) *die *Mam(a)-e*, **Mamä*, **Mam-er*

In this perspective let us scrutinize the observable fluctuations in words of Latin and Greek origin, such as:

(27) *das Praktik-um*, Pl. *die Praktik-a*, *Praktik-en*, *Praktikum-s*, *Praktik-a-s*, *Praktik-a-n*; *das Lexik-on*, *die Lexik-a*, *Lexik-en*, *Lexikon-s*, *Lexik-a-s*, *Lexik-a-n*

The plurals in *-en* are root-based and unproductive (because not belonging to the productive microclasses of section 3). The plurals in -

a are not only unproductive, but also stylistically marked as learned forms. Therefore many people, spontaneously add a hypercharacteristic second suffix, namely productive *-s*. But why can also *-n* be added (even if hotly denied by the perpetrators of such "errors"), although this suffixation is not productive with neuters? I heard such forms only in the condition that the last vowel <a> was pronounced as an a-Schwa (as in the colloquial pronunciation of final unstressed <er>) and thus resembled the *-en* plural.

Variation is more frequent in languages with richer inflectional morphology. The following examples come from the Polish declension of animate nouns of the masculine macroclass (cf. Dressler, Dziubalska-Ko acyzk & Fabiszak 1997). Potential variation between competing suffixations occurs in the Nom.Pl. (' indicates morphonological palatalisation of preceding consonants): there are three alternative suffixes for signalling human (virile, non-pejorative) nouns: -*'i* / -*'y*, *-owie*, *-e*. Certain productive microclasses allow only two of these three suffixes (some only potentially), none all three: the microclass we are interested in, is defined by the 3 properties: 1) Loc.Sg. = Voc.Sg. -*'e*, 2) exclusion of Nom.Pl. *-e*. The main variant of Nom.Pl. is -*'i* / -*'y*, normatively the only recognized one, e.g.

(28) *student, aktor, bokser, speaker, byznesmen; Pl. studenci, aktorzy, bokserzy, speakerzy, byznesmeni*

The corresponding pejorative microclass, which differs only in the Nom.Pl. (treating the referents metaphorically as animals) has the Nom.Pl. (with non-palatalising plural suffix):

(29) *student-y, aktor-y, bokser-y, speaker-y, byznesmen-y*

Variants of (28) with the competing Nom.Pl. suffix *-owie* were rejected by our informants much less and weaker than conceivable variants with **-e*. The connotatively higher, more virile variant *-owie* is normatively lexicalized in old words such as highly connotated:

(30) *krol-owie* 'kings', *kardyna -owie* 'cardinals', *genera -owie* 'generals'

and in kinship terms such as *syn-owie* 'sons' as well as in names. Here too, the normatively inadequate, non-existing variants with -*'i* / -*'y* proposed by us, were much less rejected than those with **-e*. And in actual neologisms for highly connoted referents, *-owie* has appeared in variation only with -*'i* / -*'y*, as in;

(31) *geograf-owie = geograf-i, dyrektor-owie = dyrektorzy, menadøer-owie = menadøerzy*

An alternative analysis would consist in dividing this one micro-class, whose members are identical in potential but not in actual Nom.Pl. forms, only because of the normative distribution of actual Nom.Plural forms, into three microclasses. The same subdivision would have to be done in analogous ways with the microclass of *filolog* 'philologist' (Loc.Sg. = Voc.Sg. *-u*; Nom.Pl. *filolog-owie = filolodzy* vs. pejorative *filolog-i*). This would lead to a multiplication of microclasses, and this only because of a single case slot. Moreover it would have the implausible result of shifting the problem of interindividual variation from the dimension of single lexical units on the level of norm to the dimension of microclasses on the level of the language system.

Connotations appear to play no role with the three variants of the masculine Gen.Pl.:

(32) Gen.Pl. *-ów* (default of the macroclass), *-'i/-'y*, Zero

The microclass with the suffix *-anin* is defined by the four prop-erties: 1) Loc.Sg. = Voc.Sg. *-'e*, 2) Nom.Pl. *-e*, 3) loss of the suffix part /in/ in the plural, 4) exclusion of Gen.Pl. *-'i/-'y*. Variation in the Gen.Pl. is easy with:

(33) Nom.Sg. *Indianin* → Gen.Pl. *Indian = Indian-ów* 'of Indians', *Indian-i

The default suffix Gen.Pl. *-ów* is lexically fixed in actual forms such as:

(34) Nom.Sg. *Amerykanin* → Gen.Pl. *Amerykan-ów* vs. *?Amerykan* vs. *Amerykan-i

A zero variant is much less rejected than a variant **-'i*, whereas exactly the inverse is true with the microclass of:

(35) *kumpel* 'pal', *autostopowicz* 'hitchhiker', Gen.Pl. *kumpl-i* vs. *?kumpl-ów* vs. *kumpel; Gen. Pl. *autostopowicz-ów* vs. *?autostopowicz-y* vs. *autostopowicz

In this way our model can distinguish between grammaticality

and acceptability of inflectional forms.
5. Application to a Psycholinguistic Race Model

Having established morphological productivity as a core notion of inflectional morphology has the main advantage that it brings inflectional morphology in line with syntax and phonology, i.e. that it makes inflection more coherent with the rest of grammar. This linguistic innovation can easily be integrated into various psycho- and neurolinguistic models. This is done here only with a race model (cf. Baayen & Schreuder 1991, Frauenfelder & Schreuder 1992, Baayen, Dijkstra & Schreuder 1997). This limitation is not only due to reasons of space, but also because our linguistic distinction of overlapping dynamic and static morphology naturally translates into a processing model which assumes a race, i.e. an overlapping application, of rules (or morphological patterns) and direct lexical access. Last not least, this is not a psycholinguistic paper, but a linguistic paper which, in line with the goals of Natural Morphology, strives for psychological reality by adducing substantial or external evidence. In doing so, we need a bridge theory which links linguistic theory to, e.g., facts of processing, of acquisition, of language impairments, and for this we need a psycholinguistic model. In other words, our ambition is limited on the one hand to demonstrating psycholinguistic consequences, on the other, to showing that psycholinguistic data in the just mentioned areas of external evidence are compatible with our linguistic model. I will discuss only processing, acquisition and evaluation data (for aphasia cf. Dressler 1997a).

5.1. Processing

From the distinction and overlap between dynamic and static morphology the following hypotheses can be derived for processing:

a) In the race between rule/pattern application and access to lexical storage, ceteris paribus, a rule/pattern should be the more likely to win the race the more productive it is.
b) Since dynamic morphology applies only secondarily to unproductive patterns, lexical access should always win over unproductive rules/patterns.
c) For the same reason a productive pattern should always win over an unproductive one.
d) If more than one productive pattern applies to the same domain, then this pattern rivalry weakens their competitivity with lexical

access.

e) Pattern competitivity is the more weakened the more productive patterns compete for the same input.

f) in the race, direct lexical access has bigger chances, the higher the token frequency of the respective form is.

This allows for an array of different constellations. Main types of such constellations are:[11]

a) One polar case is the constellation of one fully productive rule which does not compete with other rules. Now we can assume for inflection, similar to Baayen (1989: 227 and passim, with references) for word formation, that "in lexical access a rule-driven procedure operates in parallel with an item-driven access procedure". We may assume that the automatic application of a productive rule mechanism is very efficient, both in production and perception, in general more so than lexical retrieval of whole inflectional forms,[12] provided that they are productively formed and thus entirely predictable, cf. also Baayen (1989: 4, 210ff, 220).

Nevertheless also some outputs of productive inflection rules can be stored, e.g. those with high token frequency (cf. Niemi et al. 1994; Frauenfelder & Schreuder 1992; Stemberger & MacWhinney 1988) or with a connotative load (cf. also Pinker & Prince 1994: 331; Baayen 1989: 4). Therefore also surface analogies cannot be excluded, although they are more to be expected in word formation, as in the case of G. *ent-drei-t* 'divided into three', formed with the productive word-formation rule of forming verbs with the prefix *ent-* 'dis-'. But in the textual sequence *ent-zwei-t, ent-drei-t* 'divided into two, divided into three' (poem by Joachim Ringelnatz), the ludic occasionalism *ent-drei-en* is an analogy to the immediately preceding existing verb *ent-zwei-en*.

b) Another pole is represented by the constellation of the absence of any inflectional rule, e.g. in the case of an inflectional form which belongs to an isolated paradigm, particularly if the respective form belongs to an idiosyncratic part of the paradigm. Here only lexical retrieval of the full inflectional form is possible. This includes possibilities of surface analogy with or without schema or family resemblance (cf. Pinker & Prince 1994: 322, 324; Köpcke 1993; Clahsen 1966: 4, 9f).

c) A constellation which is near this pole b, is represented by the con-

stellation of an unproductive rule. Such rules have still the function of motivation, although not of lexical enrichment (in case of word formation rules, cf. Baayen 1989: 225f), and the syntactic function in case of an inflectional rule applying to a familiar word. Here we assume that normally there is lexical retrieval of the full inflectional form and not decomposition into base and structural change (e.g. affixation) effected by the rule. This is suggested by the effects of token frequency of the full forms (cf. Baayen 1989: 193; Pinker & Prince 1994: 327ff). Pinker & Prince's (1994: 323) assumption of semiproductivity for such subregularities as the English microclass of sing, *sang, sung* is wrong, but "conscious" rule generalisations (i.e. non-automatic processing) are easily possible (cf. Niemi et al. 1994: 432), provided that the rule is sufficiently regular and general. At least poetic occasionalisms are more frequent with unproductive rules than with non-rules (constellation b).[13]

d) Another relevant constellation is represented by the presence of a slightly productive rule: the efficiency of the rule mechanism in its domain is presumably very limited, constant lexical checking may be necessary whether the complex item perceived or to be produced really exists or is adequate in the given circumstances. Thus the rule may be only rarely used in processing, particularly when more "conscious" efforts are called for, as when processing puns, new words, nonsense words, or in cases of misunderstanding, in learning situations, in evaluations of forms. Such rules may then serve as fall-back procedures (cf. Baayen 1989: 212, 221ff; Frauenfelder & Schreuder 1992: 170; Sandra 1994: 245f).

e) Another important constellation consists in competition (rivalry) of productive rules: here lexical retrieval is necessary in production in order to decide which rule to apply on the level of language as norm. Thus this necessity is only relative, it might be cancelled if the speaker feels unbound by norms, as in the case of "abnormal" mental states (e.g. when alcoholised). In case that one of the competing rules is the default or the more general case, lexical look-up is more likely for the competing rule which represents the special case (cf. Baayen 1989: 14f). Only when the domains of the rival rules are complementary (disjunct, cf. Baayen 1989: 13f), lexical look-up is not necessary.

As a result we may assume the following general continuum of prevalence of rule mechanism vs. lexical retrieval for the above five constellations: a - e - d - c - b.

Online tests with interfixed and non-interfixed German com-

pounds (e.g. *-n-*interfix in *Garage-n-besitzer* 'garage owner' vs. no interfix in *Segel-boot* 'sailing boat') have had results compatible both with the productivity scale of section 3 (Dressler et al. 2001) and the constellation model of this section (Libben et al. 2002).

Again, I must insist that my main focus is morphology as a potential system of systems and not as a texture of institutional norms. Therefore statistic approaches, such as those of Baayen (1989, 1992) or Bauer (1992) are of little relevance in itself, because they refer to language norm and to individual performances. In fact, all corpora data are performance data which reflect the realisation of linguistic norms and thus only indirectly the realisation of the corpus producers' competence of the system of potentialities.[14] The difference between grammaticality of potential forms and acceptability of actual forms is more important for word formation, on which all recent psycholinguistic studies of productivity have focussed, than for inflection, but the distinction is still relevant, as I have tried to show.

5.2. First Language Acquisition

Here I want to limit myself to a few brief indications (supplemented by references). First of all I claim that when children identify rules (be they productive or unproductive in the adult target language), they conceive of them as productive ones (in contradistinction to surface analogy), due to the prototypically productive character of rules as part of dynamic morphology. One result is overgeneralisation or overregularisation (cf. Clahsen 1996: 10ff), when they have not yet learnt the restrictions of constellations c, d, e of 5.1. Productivity as potentiality also explains another result, i.e. the great synchronic variation between alternative inflection forms (constellation e) observed with children whose production data are abundant (e.g. daily recordings, as in Elsen 1991). In the acquisition of word formation, this phase of variation corresponds to Berman's (1995) period of flux between emergence and consolidation of a rule and to her proposed development from "wellformed" (i.e. potential) to "conventional" forms (i.e. actual forms of language as norm).

Second, at least some children appear to distinguish in their input between adult morphological productivity, type- and token frequency and prefer productive to frequently applied rules, cf. our investigations on the acquisition of Polish, Slovene and Italian inflectional morphology (cf. the qualitative studies of Dressler et al. 1996; Dressler & Makovec-»erne 1995; Makovec-»erne & Dressler 1997; Tonelli et al. 1995). In the quantitative study of Klampfer et al.

(2003), the distinction between productive and unproductive rules and between absence or presence of productive rule competition (constellations a, e of section 5.1 and the underlying hypotheses) have been supported by the results of a plural formation test.

Third, in accordance with the constructivist approach to language acquisition of our "Crosslinguistic Project on Pre- and Protomorphology in Language Acquisition",[15] we assume that young children may construct their first grammars in many different ways, i.e. with much intralingual intersubject variation. This should also apply to their construction of productive rules. Precisely such variation has been found for the emrgence of competing plural-formation rules in German (Sedlak et al. 1998, Klampfer et al. 2001), for the emergence of personal forms of verbs in German (Klampfer et al. 2000) and of Finnish preterites (Laalo 2000: 64f).

5.3. Evaluation tests

In morphological evaluation tests, native speakers of French, German, Italian and Polish were asked to evaluate existing, non-existing but potential and illegal variants differentiated according to microclasses. First results of the Italian and French tests have been published (Spina & Dressler 2003, Kilani-Schoch & Dressler 2002). Here we are interested in the results of comparative evaluations of productive vs. unproductive microclasses.

In Italian verb inflection (cf. § 3), the microclass of *sento, sentire* is unproductive (one of the test items is 3.Sg. *bolle* 'boils'), the sister microclass of *finisco, finire* is at least slightly productive (one of the test items is 3.Sg. *pulisce*). Subjects had to compare each existing form with two illegal forms and with the respective form of the sister microclass, thus *bolle* with **bollisce* and *pulisce* with **pule* and to construct a rank order of the four variants. In this test, subjects rated forms such as **bollisce* (shift from unproductive to productive microclass) significantly more often better than forms such as **pule* (shift from productive to unproductive microclass). Similarly both Italian and French subjects rated shifts from the unproductive microclasses of the second macroclass to the productive microclass of the first macroclass (It. *parl-are*, Fr. *parl-er*) significantly better than reverse shifts, but this may also be due to the default status, to much greater generality and to greater morphotactic transparency of this microclass. These contributing variables do not differentiate the two Italian microclasses of *sento, sentire* and *finisco, finire*. On the contrary, the first one is more transparent than the latter.

6. Conclusions

The three psycholinguistic domains of external evidence discussed in the preceding section vouch at least for a certain degree of psychological reality of the model presented in this contribution. Further external evidence could be cited from the domains a) of language death, where reduction of morphological productivity is a decisive symptom of grammatical decadence (cf. Dressler 1996), b) of the transformation of pidgin into creole languages, which is connected with word-formation rules becoming fully productive (cf. Mühlhäusler 1983), and c) of poetic occasionalisms (cf. Dressler & Ladányi 2000). One main property of this model is the restriction of the notion of grammatical productivity to the potential system of grammar, from which similar but different notions can be derived for the levels of language as social institution (norms) and of performance. A second main property is the separation of dynamic morphology from overlapping static morphology. Productivity of morphological categories, rules and paradigm microclasses belongs only to dynamic morphology, of which it represents a constitutive property.

How does morphology, in this perspective, compare with phonology and syntax? Dynamic morphology corresponds rather closely to phonology proper in the sense of Natural Phonology or postcyclic phonology in models of Lexical Phonology, static morphology to parts of morphonology. Syntax is generally identified with the counterpart of dynamic morphology, whereas the repertory of idiomatic syntactic constructions and of unproductive constructions (such as E. *me thinks* = G. *mich deucht*) corresponds to the nucleus of static morphology.

As a consequence, gradualness of morphological productivity differs from previous approaches, both in the scale of section 3, where the obstacles productive patterns have to overcome represent the main criterion, and in pattern competition, as outlined in section 5.1. The relevance for morphological typology lies in the distinction of morphological richness and complexity and their role in different language types (as ideal constructs).

Finally, it might be worthwhile to mention that this conception of productivity shows analogies to the conception of productivity in other disciplines, notably in the economic theory of Adam Smith, who (according to Hwaletz 2001) insisted on the following three factors of productivity:

1) skill of the worker within division of labour - the most productive morphological rules clearly cooperate in an effective division of labour;

2) economy through saving of time - this has analogies in the race model of processing;

3) mechanisation - this fits to the mechanical character of automatically applied productive rules which guarantees economy of point 2.

Address of the Author:

Wolfgang U. Dressler, Institut für Sprachwissenschaft, Berggasse 11, A - 1090 Wien, Austria
<wolfgang.dressler@univie.ac.at>

Notes

[1]   This contribution has grown out of the prepublished paper Dressler (1997a). It owes much to the cooperation on inflectional systems with Carmen Aguirre (Madrid: on Spanish), Katarzyna Dziubalska-Ko aczyk (PoznaÒ: on Polish), Natalia Gagarina (Berlin: on Russian), Antigone Katiëiê) (Vienna - Zagreb: on Croatian), Marianne Kilani-Schoch (Lausanne: on French), Mária Ladányi (Budapest: on Hungarian), Markus Pöchtrager (Vienna: on Finnish), Anna M. Thornton (Rome: on Italian), as well as of others on other languages.

[2]   "The power of a language does not consist in refusing, but in devouring, of what is foreign".

[3]   In Caramazza et al. (1988: 309) morphological productivity is defined in an incomplete way (as involving "explicit criteria for determining the legal morpheme combinations in the language") such that unproductive rules may be covered as well. And indeed the authors illustrate it with both productive and unproductive Italian inflectional (micro)classes.

[4]   On the fundamental status of paradigms in inflectional morphology cf. Plank (1991) and of inflectional classes Wurzel (1984), Plank (1991), Aronoff (1994).

[5]   Notably with the help of the coauthors of Dressler & Thornton (1991, 1996), Dressler, Dziubalska-Ko aczyzk & Fabiszak (1997), Dressler, Dziubalska-Ko aczyk & Katiëiê (1996), Dressler & Makovec-»erne (1995), Dressler & Gagarina (1999), Dressler & Kilani-Schoch (2003), Spina & Dressler (2003), Pöchtrager et al. (1998).

[6]   Thornton (1990) interprets the type *la revoca* as abbreviation of the suffixed nominalisation *la revoc-a-zione*. In this case, we have an instance of the following subtype of criterion c (abbreviations).

[7]   This may also be an example of conversion from N *Fernsehen* 'television' to V *fernsehen* 'to watch TV'.

[8]   Reported by Stefania Biscetti, Università di Siena.

[9]   In psycholinguistic terms this corresponds to the task of the morphological parser "to show the inflectional (morphosyntactic) categories in order to map the inflectional information to the relevant syntactic representation and processes" (Niemi et al. 1994: 431).

[10]   Not to be confused with the forms of Yiddish origin: *die Mahm-e*, Pl. *Mahm-en*.

[11]   Here I abstract from the many favouring and disfavouring factors other than productivity and frequency. What is said for rules, holds also for classes.

[12]   Despite of arguments to the contrary for word formation, as discussed in

Baayen (1989). For whereas (also novel) accepted words (derived by productive word-formation rules) are necessarily stored in the lexicon, inflectional forms of the same word are not necessarily stored. Presumably, fully predictable inflectional forms (i.e. those motivated by a productive rule) are stored as such only exceptionally. For arguments on efficiency/economy of rule processing vs. lexical look-up see Frauenfelder & Schreuder (1992) and Sandra (1994: 247ff).

[13] Cf. Dressler (1981), Dressler & Ladányi (2000). Thus I cannot fully agree with Baayen (1989:193) "Given that unproductive rules have no psycholinguistic reality, unproductive formations wholly depend on accurate memory retrieval" and Pinker & Prince (1994: 327) "irregular forms are stored, and all generalizations of irregular patterns are directly read off the stored forms".

[14] Thus we can radicalize van Marle's (1992) critique against Baayen's (1992) "performance-oriented conception of morphological productivity". Similar critiques hold for the use of written corpora data as in Bauer (1992).

[15] cf. Dressler (1997b), Dziubalska-Ko aczyk (1997), Gillis (1998), Bittner et al. (2000), Voeikova & Dressler (2002), Dressler & Karpf (1995).

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