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ON INACTIVITY, PRODUCTIVITY AND ANALOGY IN DERIVATIONAL PROCESSES

1. Troubles with derivational processes

Morphology has been one of the favourite disciplines of linguistic research for a long time. In a respectable tradition a great amount of facts and problems has been collected and many theoretical approaches have been developed. Systematic analysis of individual languages, historical and cross-linguistic research has permanently increased theoretical generalization of morphological phenomena. In this manifold and many-voiced field of research generative grammar plays an important role. In particular the hypothesis that there is an autonomous lexical component and the assumption of a modular organisation of human grammar has stimulated morphological research anew in the past decades. Of course, we should not conceal the interesting problems and results of typologically oriented directions of morphological research, in particular of natural morphology. In this paper, however, I wish to draw attention to derivational morphology in the framework of generative grammar.

Inspired by CHOMSKY's (1970) article 'Remarks on Nominalization' and his modular conception of linguistic structure, interesting proposals concerning universal principles underlying morphological structures and their parameters in certain languages have been put forward. Yet, it seems to me, we are still only in the beginning of deeper theoretical insights into the nature of morphological processes. There are many competitive hypotheses claiming to resolve the same type of problems and a great number of questions emerging from empirical observation seems to be rather mysterious.
The different approaches within generative grammar share the conviction that morphological structures are governed by rules. The proper task of morphological research, then, is to find out the general form of such rules and the way they interact with different grammatical and extragrammatical subsystems and principles in determining the internal and external structure of morphological constructions. Empirically this claim is justified by highly productive morphological processes which can be observed in many languages. But there are also phenomena which can hardly be covered by the usual notion of linguistic rules. In particular, in derivational morphology the assumption of rules has to be contrasted with phenomena which cannot be captured by rules, or which at least call for a modified concept of rules.

The problems referred to are well known. The usual notion of a rule takes a rule to specify possible configurations of units of a certain type and to assign to them a particular structural representation. Complex structures predicted by rules need not to be stored separately. In the case of highly productive processes it is, without any doubt, reasonable to make up rules which predict well-formed morphological structures. Inflectional rules typically have this property. In derivational morphology, however, also lexicalized complex words have to be taken into account. Such morphologically complex words included in the vocabulary may have a long history of their own. In this history the former origin from a rule may have been darkened considerably. Lexicalized derivatives, nevertheless, contain some regular information which can be described by rules. The peculiarity of these rules is their inability to produce new words, they are inactive or dead rules. This is tantamount to saying that native speakers have not only knowledge of the structure of individual lexicalized derivations, but also of the relatedness of similar derivatives in their vocabulary. JACKENDOFF (1975) called this kind of regularities dependent information, separating it from independent, i.e., idiosyncratic, information in the representation of a lexical entry (hereafter LE). In derivational morphology, consequently, two types of rules have to be considered, rules of production and rules of analysis.
Lexicalized derivatives present many unresolved problems. In particular the relationship between production rules and rules of analysis (hereafter PR and AR, respectively) has to be studied in detail. If we look for an explanation it is not sufficient merely to state the existence of lexicalized words and to describe their regular properties. There must be an explanatory framework which enables us to answer questions like: why may derivatives be lexicalized and why is lexicalization not a general property of the use of morphological rules? Word formation rules in general are not constrained to produce new LE, they may as well, like syntactic and inflectional rules, serve to derive ad hoc constructions.

If derivational morphology is considered, immediately phenomena come to mind which are covered by the term productivity. Productivity of morphological processes is 'one of the central mysteries of derivational morphology' as ARONOFF (1976: 35) puts it. 'Indeed, mere mention of the subject seems to be taken by many as an open invitation to anecdotalism.' ARONOFF tried to isolate some of the complex factors, the interplay of which presumably forms the result of what is called productivity.

Productivity is often distinguished from word formation by analogy. Analogous word formation is conceived to depend on actually almost unknown mechanisms which in any case are not part of the subject matter of grammatical theory. BAUER (1983: 63), following LYONS, makes a distinction between two kinds of coining new words, rule-governed word formation and non-rule-governed, or creative word formation. Only rules of rule-governed word formation may be restricted in productivity by extralinguistic factors. Analogous word formation is, by definition, not based on rules, i.e. its output is unpredictable.

In any case it is the task of a theory of word formation to explain why a large subset of derivational processes in many languages depends on rules which are more or less restricted as to productivity. The explanatory framework need not necessarily be involved in the theory of grammar. It plays, however, at least a heuristic role in grammatical analysis. To have just some
preliminary ideas about this framework is necessary in order to be able to justify the borderlines of a theory of grammar. For example, if there is a theoretical distinction between rule-governed word formation and analogy, examples of the latter type must be excluded from the analysis of word formation rules.

In this paper some issues and, admittedly, mysteries arising in the above-mentioned context will be discussed in more detail.

2. Properties of production rules

Highly productive processes in German word formation are, e.g., deverbal adjectives with the suffix -bar (erkenn-bar, versteh-bar, hör-bar), denominal adjectives with -los (arbeite-los, verstündnis-los, besitz-los). Further examples can be drawn from nominalization, e.g. agent nouns (Abschreib-er, Putz-er, Zuschneid-er), deverbal nouns with -ung (Vernein-ung, Wiederholung, Abrechnung) and deadjectival nouns with -heit/-keit (Freiheit, Dummheit, Nützlichkeit, Einsamkeit). These processes are well studied in German word formation. The general properties underlying these types of derivation may be accounted for by PR, i.e., by rules determining exactly the domain of application and the structural change. In other words, we may assume rules in the strict sense.

The form of derivational rules has been the subject of recent research in theoretical morphology, in particular in the work of ARONOFF (1976), JACKENDOFF (1975), SELKIRK (1982), LIEBER (1981) and TOMAN (1983). These authors share some fundamental claims of CHOMSKY and HALLE. Many important modifications and supplementary issues have been added by other linguists working in this framework. It is not our aim to report the state of the art in this direction of research. Albeit it is necessary for further discussion to point out some fundamental theoretical claims and assumptions more precisely.

The authors mentioned have the conviction in common that a theoretical account of productive processes in morphology forms the very basis of the description and explanation of phenomena in the area of word formation. They further assume respective
rules to be part of the linguistic competence of native speakers, i.e., to convey knowledge which has a certain function in performance processes. Derivational rules are assumed to operate on LE. Their particular form is taken to be an argument in favour of the autonomy of the lexicon. A further important common assumption is the modular organisation of morphological structures. This has, in particular, the consequence, that the notion 'possible complex word in Language L' has to be conceived as the product of the more elementary notions 'phonologically possible word in L', 'semantically possible word in L' and 'pragmatically possible word in L', since the respective modules presumably interact in determining the structure of complex words. It will be demonstrated that this differentiation of the notion 'possible word' is important for the analysis of phenomena involved in productivity.

In recent research hypotheses of universal constraints on word structure rules have been discussed. In general it is claimed that the study of morphological properties of a language has to take into account:

(i) the universal constraints on the form of morphological rules,

(ii) general language-specific constraints on structures admitted by (i). An example are the rules accounting for the behavior of neutral and non-neutral affixes in English,

(iii) systematic language-specific relations which contrast with universal constraints. To give an example, in German there are derivations of the following type: dreitürmig, Dreimaster, friedliebend.

The analysis of these words presupposes rules admitting phrases as the base of the derivative. These rules are highly productive. At any rate it is impossible to analyze the base as a word structure, because there are no rules deriving structures of the format Cardinal Numeral-Noun and N-V in German. That words like Dreiturm, Dreimast, friedlieben do not exist is not accidental but due to the absence of respective rules. The conceptual structure under-
lying Numeral-Noun combinations seems to be generally excluded from word structures. If words of this type occur (cf. Dreirad and Dreieck) they have to be interpreted as exocentric compounds ('a vehicle having three wheels', 'a figure having three angles'). For arguments that compounds of the format N-V are disallowed, see WUNDERLICH (1986),

(iv) all particularities of PR, e.g. the restrictions on the base word imposed by different rules.

It may be claimed that PR have to provide the following sort of information:

(1) (i) the phonological form of the affix,
      (ii) the syntactic category and subcategory frame of the derivative,
      (iii) restrictions defining the class of base words to which the affix is attachable,
      (iv) diacritic features of the derivative,
      (v) the semantic form of the derivative.

On general grounds PR have to generate representations of the morphological structure of well-formed complex words. A proper representation of the structure of derivatives has to provide:

(2) (i) a representation of the base word,
      (ii) a representation of the affix including all information the affix adds to the description of the derivative, i.e. (1)(i), (ii), (iv) and (v),
      (iii) an indication of the constituent structure of the derivative.

Note that the representation of complex words does not contain information of the type (1)(iii), because it would be entirely redundant. Properties defining the class of words to which an affix is attachable are only information pertaining to the rule. The derivative can be the input of different PR, or of inflectional rules. It is finally inserted into syntactic structures. None of these contexts demands the indication of information of the
type (1)(iii). To put it another way, the representation of a derivative has to provide all information restricting its occurrence in word-internal and word-external contexts. A further important requirement has to be mentioned. Since there is in some PR a regular relation between the subcategory frame of the base and that of the derivative and since the subcategory frame is related to the theta-grid, the form of a PR has to take care of these inheritance regularities.

It can easily be demonstrated that word formation rules proposed by ARONOFF do only partially fulfill the above-mentioned requirements. His rules have roughly the form (3) and (4).

\[(3) \quad [X]_{C_i} \rightarrow [\text{pref } [X]_{C_i}]_{C_j}\]

semantics: conditions on the form of the base:

\[(4) \quad [X]_{C_i} \rightarrow [[X]_{C_i} \text{ suff}]_{C_j}\]

semantics: conditions on the form of the base:

Rules of this type select a word \([X]\) pertaining to a certain major lexical category \(C_i\) and having the properties indicated in the conditions and add an affix to it. The derivative is indicated as a member of the category \(C_j\). Since there is no instruction of how the semantic effect of the rule has to be inserted in the representation of the derived word, the rule yields only fragmentary representations like (5) and (6):

\[(5) \quad C_j \quad \text{pref} \quad [X]_{C_i}\]

\[(6) \quad C_j \quad \text{suff} \quad [X]_{C_i}\]

If \([X]\) is allowed to be a complex word, i.e. the output of a PR or a lexicalized derivation, binary branched tree structures will result. This is a strong constraint on PR, although not a priori excluded. Representations of the form (5) and (6) do not provide
information of the subcategory frame of the derivative, of its diacritic features and of its semantic form.

JACKENDOFF's (1975) redundancy rules observe all essential requirements indicated in (1) and (2). The relatedness of LE in a given lexicon which is taken into consideration in JACKENDOFF's approach is provided by rules of the type indicated in (7):

(7)  

<table>
<thead>
<tr>
<th>base</th>
<th>derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>phonological form <em>/X/</em></td>
<td><em>/X-suff/</em></td>
</tr>
<tr>
<td>syntactic category</td>
<td>syntactic category</td>
</tr>
<tr>
<td>syntactic subcategorization</td>
<td>syntactic subcategorization</td>
</tr>
<tr>
<td>semantic form</td>
<td>semantic form</td>
</tr>
</tbody>
</table>

In (7) conditions on the base beside syntactic category and subcategorization, and diacritic features are omitted.

JACKENDOFF discusses two possible interpretations of his rules. In the framework of a full-entry theory they may only state the relatedness of LE, each LE being conceived as fully specified. In the framework of an impoverished entry theory the rules add all dependent information to the LE. Although JACKENDOFF considers only the analysis of lexicalized derivatives his rules may, without any problem, be interpreted as PR. PR of type (7) operate in the following way: They select a base word which fits the conditions indicated in the left part of the rule and add the affix with all information included in the right part of the rule. In order to obtain constituent structures, some conventions have to be supplemented. The two constituents of the derivative have to be connected by a binary branching indication, say a tree. The syntactic category of the base word has to be transferred to the knot immediately dominating it, and the syntactic category as well as all information needed to account for the internal and external distribution of the unit have to be transported to the knot dominating the two constituents. Note that there is no need to claim that the information given in the right part of the rule must be attached exactly to the suffix. It is present in the repre-
sentation the rule derives and since the base is represented separately it turns out that the remaining part of the repre-
sentation is conceived as pertaining to the affix.

A third type of rules has been put forward for consideration by SELKIRK, TOMAN and LIEBER. In their theories affixes are separate LE, i.e., they are not introduced by PR but by lexical insertion. There are rewrite rules deriving word structure trees into which LE, including LE for affixes, are inserted. The most attractive refinement of the basic idea, in my opinion, has been presented by LIEBER. In her theory only a very simple rule determining well-formed word trees with unlabelled knots is necessary. To the final knots of a tree LE's may be attached. A set of conventions ensures the transport of all information needed to account for further internal and external relations of the derivative to the respective knots of the tree. Obviously, in this theory the essential aspects of derivational processes are included in the representation of affixes. In particular, all information of restrictions imposed by the affix on the base to which it may be added have to be indicated in the LE of an affix. Thus, the LE representation in this approach includes not only properties needed in the representation of derivatives but also properties of a PR. The capacity of an affix to be added to a class of base words is essentially the information of rules proposed by ARONOFF and JACKENDOFF. If we use the term PR we refer to mechanisms roughly of the form indicated in (7). We further assume that all requirements discussed above are ob-
served.

We share the view that derivational processes are basically combinations of signs, i.e., they are linguistic devices which allow for the linguistic expression of the combination of some semantic units. The techniques available are manifold. DRESSLER (1986). Some of them do not involve affixes. The problems re-
sulting from this fact are omitted in our present discussion. MOTSCH (1987). In this paper we are concerned with affixation. The sign interpretation of derivational processes has some important implications:
Different rules may have the same semantic effect, i.e., they derive words which are synonymous. On the other hand, there must be different rules if the affix conveys different meanings.

There is no reason for a strict separation of mere affixation and semantico-syntactic aspects in derivational processes.

The latter implication is denied by BEARD (1986) and SZYMANEK (1985). BEARD pleads for a strict separation of the units of morpheme and lexeme, each of which is considered to establish a separate subsystem of grammar. While lexeme-based morphology is supposed to be based on semantic and syntactic principles, morpheme-based morphology is considered to be constrained by entirely different, purely morphological principles. Of course, there must be an interplay of both subsystems. It is supposed that lexemic rules generate lexeme structures with empty places for affixes. Thus, to give an example: riesig, riesenhaft, riesenartig, riesenmässig, all meaning roughly 'like a giant', presuppose only one lexemic rule but four rules which insert the affixes.

The advantages of the separation hypothesis are, on the one hand, purely technical. In this sense it has been already considered in JACKENDOFF (1975). The more essential aspect of this hypothesis, however, has to be proved. In particular it has to be demonstrated that there are separate principles determining the form and combinatorics of affixes without any semantic and syntactic information.

In the study of properties of PR morphological processes have been favoured which are highly productive and involve affixes which may be added to large classes of base words. In German, for example, the suffix -bar forms adjectives from transitive verbs which can be passivized. The suffix -los derives adjectives from nouns. In other cases morphological and phonological restrictions on the base may be involved in the process. Restrictions of this sort may in part govern the choice of alternative affixes like -heit and -keit in German.
It is interesting to note that even restrictions may occur which are based on connotation. The distribution of German -chen and -lein depends on dialect distinction. In general, semantic properties of the base may function as conditions on the base word, although examples from clearly productive processes are rare. Technically there are no troubles including semantic conditions in the set of restrictions on the base. It is, however, not possible to describe pragmatical restrictions in a PR. For example, in German word formation there is a fully productive process generating adjectives with -frei from nouns:

atomwaffen-frei, staub-frei, nikotin-frei.

A corresponding rule, among others, predicts the words reichtum-frei, and gesundheitsfroi. These words, however, sound odd. This is due to a positive attitude included in the meaning of -frei. Adjectives containing -frei do not only indicate the absence of some object but they maintain the absence to be desired. An interpretation which maintains that the absence of wealth and health is desired presupposes a rather strange experience. However, decisions of this sort are founded on extralinguistic knowledge, although the positive attitude should be analysed as a semantic property of -frei derivatives.

3. Some aspects of lexicalization

Until now we have only considered PR, neglecting the role of the lexicon as a storage of simple and complex words. There are two questions which have to be answered by theoretical approaches to morphology:

(i) Why do products of PR enter the lexicon?
(ii) What are the requirements imposed by lexicalized derivatives on grammatical description?

If there was no particular reason for lexicalization PR would be quite sufficient to generate new words in any speech situation where they are needed. This is the typical function of other sorts of rules, in particular of syntactic and inflectional rules. Note that the lexicon could be much simpler in
this case. We do not pretend to have a satisfactory answer to
this question. Nevertheless some hints of a more serious answer
are obtainable. Surely, it can be expected that the theoretical
background of the answer to this question lies beyond the border-
lines of grammar. It is very likely that it depends on conditions
of performance processes and on social and cultural aspects of
language use.

Results of psychological studies have demonstrated that
complex linguistic structures may be stored in memory, although
they are the predictable output of some rule. BECKER (1975),
BOLINGER (1976), MILLER (1978), PAWLEY & SYDER (1980). The
access to stored structures seems to be psychologically simpler
than the access to the output of rules. Thus, it is likely that
derivatives which are often used enter special storage in memory.
This may, in turn, be the beginning of processes veiling the
dependence of the derivative on the corresponding rule. It be-
comes more or less autonomous. BYBEE (1985). But the frequency
of use of a derivative need not result in an increasing distance
from the rule. There are many nominalizations in German and
adjectives with -bar which are very frequently used without any
consequence as to their relatedness to PR. If the frequency of
use generally effected idiomatization it could be expected that
the same effect was involved in the use of syntactical and
inflectional rules. But this is obviously not true. Consequent-
ly, there must be particular reasons why products of rules may
enter the vocabulary and, as a tendency, become autonomous
signs. These reasons will also explain why lexicalization is
not a general property of the output of PR.

In part the solution of the problem depends on different
functions of PR. It is well known that derivatives and compounds
may serve different functions. On the one hand, they may serve
to form new LEs, i.e., their function is the naming of concep-
tual structures which have some socio-cultural relevance, and,
on the other hand, they may be used for recategorization or
transposition of certain types of syntactic phrases. MOTSCH
nominalization and adverbalization by -ly in English, the
nominalized infinitive in German and nominalization by -enie in Russian are clear examples of recategorization. If participles are analyzed as deverbal adjectives, they would be a further example. All rules restricted to recategorization produce words which very rarely enter in the lexicon. In many cases, cf. the nominalized infinitive in German and gerundial nominalization in English, the output of rules serving only recategorization lacks properties of the syntactic category to which it is attached by the rule. On the other hand, it may retain properties of its original category. Nominalized infinitives cannot be counted, are restricted in the choice of determiners and may take the same complements like verbs in verb phrases.

Nominalized infinitives which have entered the German lexicon are, among some others:

das Leben, ... das Rennen, das Leiden.

They all differ remarkably from the representation the PR underlying this process assigns to the same word structures. There is one fundamental difference. The lexicalized words name conceptual structures which are relevant to human orientation in natural and socio-cultural environments. As KLIX (1971: 618) pointed out, LE are marks for conceptual classes with a high value for the orientation of human behavior. In order to be entered in the lexicon, a derivative should not only denote objects and relations between objects or properties of objects being singled out in ad hoc situations but classes and relations which are relevant to many situations and are therefore stored in the system of conceptual structures which serves as the fundamental grid for the analysis of environments. As a rule, PR resulting in recategorization serve to denote ad hoc situations.

We may ask two questions in this context:

(i) Are there linguistic properties restricting structures which may be lexicalized?
(ii) What are the anthropological and socio-cultural conditions determining the naming relevance of possible word structures?
I have nothing to say with respect to (ii), although there are interesting observations in anthropological research. As for (i), I would like to draw attention to KLIX (1972) who considers the forming of classes from a psychological point of view. Results of word formation analysis may also yield important hints. As we have pointed out above, there are no word structures expressing a conceptual configuration conveyed by the combination of cardinal numerals and nouns. Cardinal numerals are not able to distinguish classes of objects. Another aspect of nameability seems to be the linguistic form of an expression. Derivatives and compounds are obviously more suitable to naming than syntactic phrases. In this paper some observations concerning the functions of PR will be discussed.

While some PR serve nearly exclusively recategorization and, as far as nouns are concerned, do only denote ad hoc classes, rules underlying agent nouns may be used with different functions. On the one hand, they may produce words with a purely contextual function. Agent nouns may, for example, be used to ensure coherence in a given text, cf.:

Die Schulstunde wurde durch lautes Schreien gestört.

Der Lehrer rächte sich an den Schreiern mit schlechten Noten.

In this context Schrei-er denotes some persons which have shouted in a restricted situation, i.e., in the situation identified by the preceding sentence. There is no need to store conceptual structures of this ad hoc sort. On the other hand, the conceptual structures conveyed by Schleifer, Dreher, Betrüger comprehend classes of persons which are characterized by the activity denoted by the verbal base of the respective nouns. A person who is a Schleifer or Dreher performs the activity indicated by the verb professionally, a person is a Betrüger if he deceives habitually and not randomly. We may assume that lexicalization effects the addition of features like professional and habitual. The use for syntactic or textual purposes, on the contrary, demands reference to a particular situation. However, this requirement is not due to the
semantic form of the derivation. The semantic representation yielded by the rule is open to both functions. The same holds for nominal compounds. It is interesting to note that there are syntactic differences between lexicalized and non-lexicalized agent nouns:

(1) Er ist Schleifer.  (2) Er ist ein Betrüger.
   Er ist Dreher.  Er ist ein Angeber.
   Er ist Betrüger.  Er ist ein Schreier.

Predicative use without article is only possible if the agent noun denotes a profession. (2) is the correspondent predicative use of agent nouns denoting a habit, i.e., the indefinite article must occur in this case. In both contexts the ad hoc interpretation is excluded.

Apparently, there are PR which are specialized in the syntactic function. There are also PR which serve both the syntactic function and the naming of conceptual structures to be stored in the vocabulary. The naming function is connected with lexicalization. In this case a rule product is at least claimed to be a candidate for enriching the lexicon. Whether it really enters the standard vocabulary depends on intricate social conditions. Are there also rules specialized in the naming function? This seems to be the case with adjectives containing the suffix -los in German:

einfalls-los, hoffnungs-los, land-los.

These adjectives denote the absence of the object identified by the base noun. Of course, the chance of a possible word of this type to enter the lexicon depends on conditions of relevance and in part also on conditions of social norm changing. We may assume that the use of derivations in ad hoc situations is in contrast with the conditions of lexicalization. We may further assume that the use of PR specialized in the naming function is only a claim to offer candidates for enriching the lexicon. However, the syntactic function is not the only type of function which is in contrast with lexicalization. There are also PR which neither serve a syntactic function nor offer candidates for the vocabulary. An example of this sort is the
German diminutive suffix -\textit{chen}. Diminutives are in line with inflectional categories like plural, comparative, past tense.

Summarizing the observations above, the following hypotheses can be formulated:

(i) There are particular conditions for lexicalization.

(ii) Several functions of PR can be distinguished:
- naming conceptual structures, i.e., lexicalization,
- use in syntactic contexts, i.e., recategorization,
- systematic modification of the meaning of the base.

(iii) PR may be specialized in one of these functions. It seems to be the case that rules effecting only recategorization primarily serve to form \textit{ad hoc} words, i.e., words which are only made up for the actual speech situation. Rules which involve recategorization and semantic effects may serve as naming devices and syntactic functions. (Cf. agent nouns, nominalization with -\textit{ung} and adjectives with -\textit{bar}). Rules which do not change the category seem to have a tendency toward inflectional processes.

4. Rules of analysis

As already mentioned lexicalized derivations exhibit regularities which can be covered by the term dependent information. We may assume that native speakers have access to this kind of information. If we omit psychological aspects we may postulate rules of analysis (hereafter AR) which cover all dependent information of LE in the vocabulary of a language. AR, then, have a purely abstract function. The notion dependent information needs some refinement. It does not comprehend arbitrary relations between LE but only regularities pertaining to derivational processes. The domain of these processes is determined by the nature of PR. In this technical sense we may say that AR are degenerated PR. We may also imagine a non-technical interpretation of the term degenerated, i.e., consider the historical perspective. In this case, however, dependent information conveyed by an AR need not necessarily go back to a former PR.
Processes of lexical change may well lead to common properties of LE. Thus the polysemy of many affixes in lexicalized derivatives need not be based on rules. In our view the description of dependent information in LE and the psychological reality of this information are two levels of scientific consideration.

To give an impression of the descriptive task, some examples will be considered. It seems to be plausible to distinguish at least four types of Lexicalization:

(i) There are derived words which are only derivatives as to their morphological form:

\begin{align*}
\text{aus-merzen, aus-wend-ig, ein-sam, ver-lier-en, offen-bar, laut-bar, sonder-bar, Bür-de, ... } \\
\text{These words are semantically opaque, i.e., their meaning is not composed from the meaning of the two constituents. Neither the base nor the affix includes a separate meaning. Nevertheless some morphological regularities are recognizable. Although the bases of these words are not related to separate LE the affix has to be analyzed as an affix. This analysis is necessary because there are some regular morphological processes which refer to the respective information. For example, ver-lieren has to be analyzed as a prefix verb, since the rule for past participle refers to this information. Cf.:} \\
\text{binden} & \quad \text{ge-bund-en} \\
\text{ver-binden} & \quad \text{ver-bund-en} \\
\text{ver-lieren} & \quad \text{ver-loren} \\
\text{*ge-ver-loren} &
\end{align*}

(ii) In other cases the meaning of the affix is lost but the base has a separable meaning. Cf.:

\begin{align*}
\text{frucht-bar, kost-bar, ehr-bar, Kehr-icht, Dick-icht, Zier-de, ... } \\
\text{-icht and de are nominal affixes which are not involved in any active process in modern German morphology. -bar appears only in deverbal adjectives in contemporary German. Although the affix has no separate meaning the meaning of the base is transparent in the semantic form of the deri-}
\end{align*}
vative. **Frucht-bar** is derived from **Frucht** in the non-literal sense 'success' and paraphrased by 'Frucht eintragend' (producing success).

(iii) There are lexicalized derivatives which are fully transparent but not the product of an active PR. The German lexicon for example includes many derived adjectives with -lich and -sam which, as to their semantic form, correspond to the productive PR introducing the suffix -bar. **begrifflich**, **beatechlich**, **beweglich**, **erschwinglich**, ... **bieg-sam**, **einpräg-sam**, **(un)aufhalt-sam**, **unbeug-sam**, ...

(iv) In general we may assume that PR produce words which can be lexicalized, if certain conditions are met. The dependen t information of the lexicalized items is in this case identical with the information provided by the representation of products of the PR. There are, for example, lexicalized derivatives of the highly productive PR's generating -bar and -los adjectives: **essenbar**, **genießbar**; **zweifellos**, **sorglos**, **arglos**, ...

The analysis of cases like (i) has to provide LE for each derivative which comprehend all idiosyncratic properties. The very restricted regularity that **ver**- and **-bar** are considered affixes may be represented in the description of the phonological form of the derivative. The information may, of course, also be attached to an AR introducing the affix, its lexical category and diacritic features. In this case the LE has to include a rule feature, say +(AR-bar).

The same description is appropriate for (ii). The difference to (i) is simply that the base in (ii) is identical with an LE. This relation can be accounted for if we assume that there are word families, i.e., systems which order derivatives of the same base. Each distinct meaning of an LE may have its own family.

As far as (iii) is concerned the dependent information can be described by AR illustrated in (i):
Thera seems to be no fundamental difference between AR-lich\textsubscript{1} and the corresponding PR introducing -bar. The only difference is that AR-lich\textsubscript{1} does not allow for the generation of new words. If we accept the impoverished-entry theory, which seems to provide the simplest description, each lexicalized derivative to which the rule applies has to be marked properly, e.g.:

\[
\begin{array}{c}
\text{\[ / \text{erträg} \text{-} / \]}
\text{+[AR-lich\textsubscript{1} ]}
\end{array}
\]

Lexicalized products of an PR do not demand any particular AR. The dependent information, in this case, may be supplemented by the respective PR, i.e., we may assume that PR may also function as AR. The LE of the lexicalized derivative has to be marked as to the PR, e.g.:

\[
\begin{array}{c}
\text{\[ / \text{genieß} \text{-} / \]}
\text{+ [PR -bar ]}
\end{array}
\]

If we restrict grammatical analysis to a formal representation of regularities in derived words there is no reason to make up an LE if the derivative in question is entirely analyzed by a PR, i.e., we need only provide an LE in case (iv) if the derivation exhibits idiosyncratic information. In our view ARONOFF's (1976: 23) conviction that 'each word may be entered in the dictionary as a fully specified separate item ... Independent item dictionary entries are not dependent on one another or on rules. Each one is a complete sign in itself' may only be proved on extragrammatical grounds.
In the preceding sections we considered PR and AR presupposing a clear-cut distinction between active and non-active processes. Although there are some highly productive derivational processes in German and many other languages we should not overlook, that the majority of derivational processes creates troubles as to the question whether it is active or non-active. There is a scale of productivity ranging from fully productive processes to entirely unproductive ones. Productivity is understood as the probability of a potential rule product to appear in texts. This definition is slightly different from ARONOFF's (1976: 37) who restricts the notion to the probability of a potential derivation to be entered in the lexicon. This, however, takes only one of the functions of derivatives into account.

In practical research two sorts of troubles very often arise:

(i) It is, in some cases, extremely difficult to define the class of bases and the semantic effect of a morphological process. MOTSCH (1979).

(ii) The output of tentative rules is, in many cases, not really acceptable, i.e., the tentative word sounds somehow strange and odd.

Because acceptability judgements may depend on the adequacy of the description of a rule the problems are still further complicated. A second disadvantage is the lack of sufficiently elaborated acceptability criteria.

To go into more detail, let us consider some examples from German word formation. It is important to note that even highly productive rules may predict words which are not fully acceptable. Take, for example, German agent nouns like: Weiner, Hoffer, Lerner, Kocher.

These derivatives are not part of the German vocabulary and occur scarcely in ad hoc usage. Albeit occasional use must not be excluded. The German writer H. HESSE has formed Lerner in
contrast with Lehrer, as ERBEN (1973: 10) observed. To explain the strangeness effect of Lerner and Kocher, a phenomenon called blocking has been claimed. ARONOFF (1976: 181). Lerner and Kocher are blocked by the LE Schüler, Lehrling and Koch, respectively. More precisely, not an LE blocks the rule, but the lexicalization of a rule product may be blocked if there is a synonymous LE. In this case the ad hoc use may be restricted, too. Thus, blocking is a phenomenon which does not enter the description of PR.

An example of semi-productive processes in German derivational morphology are the following prefixed verbs:

ent-last-en, ent-rost-en, ent-staub-en, ent-öl-en,
ent-laus-en, ent-wanz-en, ent-keim-en, ent-grät-en, ...

The process corresponds to English debug, delouse, defrost. There is a considerable list of words pertaining to this type. We observe that the process is not inactive. The rule takes nouns, adds the prefix ent- and yields verbs meaning roughly 'to cause that the object denoted by the noun disappears'. In addition a positive attitude is involved, i.e., the state of affairs that an object denoted by the noun is present is evaluated negatively. Words like *ent-freud-en 'to take away pleasure' and *ent-lust-en 'to take away desire' are not acceptable, but this depends on pragmatic knowledge. Grammatically the application of this rule is restricted to non-complex words. *ent-kehr-icht-en, *ent-ab-fall-en, *ent-fett-fleck-en are not well-formed. Potential new words are:

ent-dreck-en, ent-schmutz-en, ent-schäl-en, ent-hüls-en,
ent-sand-en, ent-kies-en, ent-stroh-en, ent-heu-en,
ent-knoch-en.

These words sound somehow strange, although they are easily analyzable. Ent-schälen is perhaps blocked by the synonymous simple verb schälen. We do not see any reason why the conceptual structure pertaining to entgräten, i.e., 'to remove fish-bones' is stored in memory but the corresponding entknochen, i.e., 'to remove bones' is not. ent-bein-en seems to be antiquated.
Another example are dejectival adjectives with -lich:

ärm-lich, ält-lich, dümm-lich, dick-lich, lang-lich, rund-lich; ...
gelb-lich, röt-lich, weiß-lich, blau-lich, grün-lich, ...

The underlying rule has the semantic effect of restricting the property denoted by the base. The rule is restricted to simple, i.e., non-derived and non-compound words. Cf. fleiß-ig-lich, streb-sam-lisch, be-greif-lich-lich, ein-sam-lisch. While colour adjectives enter, without any problem, the rule, its application to other sorts of adjectives is problematic. Cf.:

?reich-lich (ärm-lich)
?jüng-lich (ält-lich)
?klug-lich (dümm-lich)
?breit-lich (lang-lich)

It can hardly be decided whether this rule is restricted to colour adjectives or productive in a low degree.

The same troubles arise with adjectives denoting that something is made from a certain material. Cf.:


The underlying rule is restricted to nouns denoting solid materials mehle Suppe, milchener Brei, butterne Figuren, wässerner Saft are not well-formed. Although coinings with nouns denoting trees, stones and metals have a high frequency among the lexicalized words of this type, the following derivatives are strange and will scarcely appear in texts:


We have to take into account that there are two alternative types of linguistic structures expressing the same semantic content, compounds and prepositional phrases of the form aus noun. Cf.:

To give a further example, there is a rule in German derivational morphology which forms adjectives from nouns with the semantic effect 'something is similar to the object denoted by the noun'. Cf.:

schwamm-ig, kalk-ig, milch-ig, ...
aff-ig, bull-ig, fisch-ig, fuchs-ig, ...
flegel-ig, knirps-ig, ries-ig, schuft-ig, ...
klump-ig, kegel-ig, kapsel-ig, spiral-ig, bauch-ig, ...

The property denoted by these adjectives has to be inferred from properties of the base word. In lexicalized adjectives the inferred property seems to be part of the semantic form of the LE. strohig means 'dry like straw', riesig 'large like a giant', kuglig 'round like a ball'. If, however, a new word is made up, a typical property of the base noun has to be inferred. MOTSCH (1977: 184). Adjectives like:

stock-ig, brett-ig, turm-ig, gert-ig, lów-ig, schläng-ig
are odd because they contain base nouns denoting objects which exhibit no typical property. The type of knowledge involved seems to be prototype knowledge. It is not part of the semantic representation. The existence of idiomatic expressions like:

steif wie ein Stock, hart wie ein Brett, hoch wie ein Turm,
schlank wie eine Gerte, falsch wie eine Schlange

does not necessarily exhibit prototype knowledge. Therefore the existence of a formula of this type does not predict the acceptability of corresponding adjectives. PLANK (1981: 164). We may summarize that some of the words the rule predicts are outruled by the violation of pragmatic conditions on interpretation.

It should be noted that there are many affixes entering processes with the same semantic effect. Cf. the following examples:
The productivity of these processes may differ in degree but there is no doubt about the activity of the underlying rules. Note that there is scarcely blocking involved:

aff-ig, äff-isch, affen-haft, affen-artig, affen-mäßig.

Blocking seems to be restricted to areas of the vocabulary calling for more or less fixed terminologies, e.g. the terminology of occupational names contains Koch and blocks Kocher. If a conceptual structure is not integrated in such systems of lexical ordering no blocking occurs. There are, on the contrary, sorts of texts which demand stylistic variability. In this case synonymy is not excluded but desired rather. DORNSEIFF (1959: 50), MOTSCH (1983: 116). PR making up adjectives which denote a similarity between the governing noun and the base noun are essentially of this kind. If there exists a fixed lexical system a word is taken from this system. It would be an offence against valid norms to use a new mark for the stored and socially agreed word. If, however, stylistic variability is demanded the use of rules to make up new words is very likely. But again we are beyond the borderlines of grammar.

In the framework of GG problems of productivity have been discussed extensively by ARONOFF, BAUER (1983: 82), PLANK (1981). These authors share the view that semi-productivity has to be treated as an extralinguistic phenomenon. In the morphological component of a grammar only the distinction between PR and AR is allowed which establishes two kinds of research; word formation and word analysis. It is also agreed that there is a third area which contributes to the study of possible words, i.e., word formation by analogy. This area is also called creative word formation in contrast with rule-governed word formation LYONS (1977: 543), BAUER (1983). TOMAN (1983) takes the stand that there exists a separate module accounting for analogous
processes in morphology. This is to say, the notion 'possible word' is defined in part by rules, i.e., by devices which allow for strict predictability and in part by analogy, i.e., devices with probabilistic predictability. Frequency of use of a PR and acceptability of their products depend on factors which have been partially demonstrated by ARONOFF (1976; 1983), BEARD (1977) and BAUER (1983: 62), among others.

This clear-cut distinction between rule and analogy on the one hand and activity and nonactivity on the other is due to methodological prerequisites. In the framework of GG there is no place for scales expressing degrees of properties, or similarities of units. Many interesting problems put forward by traditional grammarians and other directions of morphological research in our time have no place in the framework of GG, e.g.:

(i) Why do derivational processes typically impose strong restrictions on their base words?
(ii) Is there a universal inventory of semantic categories preferably expressed by devices of derivational morphology?
(iii) Why are derivational affixes polysemic in a high degree and why are there so many processes with the same semantic effect?
(iv) What is the role of functions? Do they correspond to formal properties of rules?
(v) Are there paradigms in derivational morphology and what is their influence on morphological processes?

This list could be continued. It is obvious that questions of this kind can only be answered if historical and crosslinguistic facts are studied systematically. As can be observed in approaches of DRESSLER and BYBEE, extralinguistic facts and theoretical instruments have to be taken into account.

A crucial point in our discussion is word formation by analogy. In a previous article I argued for an extension of the notion of analogy to all kinds of word formation processes. MOTSCH (1977). The main issue which was inspired by PAUL, is the following:
We may assume fully specified LE for lexicalized derivatives and compounds. This implies that the dependent information is not separated in the representation of a complex LE. LE enter systems of lexical ordering like word fields, terminologies, frames, etc. LUTZEIER (1985). They are also integrated into morphological networks like word families or derivational paradigms. VAN MARLE (1985). Beside these lexical ordering systems it is possible to detect similarity, i.e., dependent information in LE. This capacity becomes evident if new words are coined conforming to existing ones. The creation of new words, however, presupposes rules. But rules need not have an existence of their own. We may conceive of rules as the result of a process of analysis operating on similarity of items of the vocabulary. The task arises to find out conditions encouraging vs. restraining the extraction of rules from information in LE and, of course, to describe the properties of this rule extracting device. The following assumptions seem to be serious hypotheses:

The recognizability of dependent information in an LE depends on:

(1) the frequency of stored words, including the same dependent information,
(2) qualitative properties of dependent information, e.g., on the generality of conditions of the base and on the nature of the semantic effect of a process,
(3) the degree of opaqueness of dependent information,
(4) the frequency of rule extracting processes. It may be assumed that the more frequent LE with the same dependent information are analysed in order to extract a rule, the more transparent the dependent information will be.
(5) It seems plausible, to assume that frequent reconstruction of dependent information may result in separate psychological existence of PR.

These assumptions, of course, have to be justified by empirical evidence. I believe that this is possible in principle. Without any doubt there are facts involved which pertain to language use, in particular to performance processes and memory storage.
of linguistic expressions. In this framework the pure grammatical distinction between PR and AR is projected on to a continuum of the capacity of dependent information to be analysed and used for the creation of new words. Fully productive PR are only one end of the continuum. If there are no separate rules in the memory the forming of new words is a creative process. This may explain the stylistic evaluation of some new coinings. It can also explain the fact that writers and journalists very often create new words of a certain type which are not usual in common language. The German writer LION FEUCHTWANGER, for example, frequently uses the inactive process underlying deverbal adjectives with -sam. Cf. FLEISCHER (1983: 278)

seine gleichmäßige lehrsame Stimme
s ie tanzt schamlos und rührend.

We may assume that the native speaker has the capacity to extract rules from dependent information of LE and to store them even if the process is inactive. The form and functioning of the process of rule extraction has to be studied in more detail in order to establish a serious field of research.

In my opinion, the grammatical approach in GG and the analogy approach are not alternative theoretical approaches but consistent types of analysis pertaining to methodologically different levels of research. The grammatical analysis attempts to describe the rules determining morphologically well-formed structures in a language on universally constrained grounds. This kind of research does not care about facts like productivity, acceptability and analogical word formation. The grammatical analysis specifies representations of well-formed morphological structures and the rules determining them in a purely formal way, i.e., independent of the psychological realization of the respective knowledge. The purely computational nature of this description of knowledge must be feasible by psychological processes but this is only a very abstract condition of the grammatical description.

It is a quite different level of research if we ask for the psychological background of processes in which grammatical
knowledge is involved. To come to an end: in my view the study of analogy in word formation is an interesting field of research. It presupposes without any doubt notions defined in the theory of grammar but essentially it pertains to another level of research. We may also expect that increasing knowledge about analogous processes in word formation will be useful for deeper insight into historical and crosslinguistic issues.

References


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