Type-Based Derivational Morphology

Reference:
Riehemann, S.Z. (1998). Type-based derivational morphology. *Journal of Comparative Germanic Linguistics*, **2**, 49-77.

This lecture will review an approach to derivational morphology presented by Susanne Riehemann in her paper "Type-Based Derivational Morphology". The claim of Riehemann's paper is that her approach not only accounts for productive affixation, but also "relates exceptions and subregularities to productive rules"

1 The Data

Riehemann's paper is concerned primarily with derivation, more specifically with German *bar*-adjectives (equivalent to English *able*-adjectives).

1.1 German *bar*-Adjectives

Bar-adjectives are typically derived from transitive verbs, but not *all* transitive verbs give rise to *bar*-adjectives. There are also examples of *bar*-adjectives derived from intransitive verbs and of transitive verbs that do not give rise to *bar*-adjectives. The prototypical *bar*-adjective is like the one in ex.(1).

(1) *Sie bemerken die Veränderung.*
'They notice the change'.

Die Veränderung ist bemerkbar.
'The change is noticeable'.

Usually, the accusative object of the verb becomes the subject of the adjective. The dropped (verbal) subject cannot be expressed.

Semantically, a notion of possibility is added.

Although the process of *-bar* affixation is highly productive, not all transitive verbs can serve as a source for the derivation of *bar*-adjectives. It seems that some are excluded on semantic grounds and, therefore, there need to be additional semantic constraints. E.g. a condition that the verbs from which the adjective is derived be (weakly) intentional will account for the non-existence of examples like *?verbitterbar* ('embitterable'), *?enttäuschbar* ('disappointable') and *?überraschbar* ('surprizable').

Examples like (2) clearly show a need for a semantic constraint of some sort.

(2) **1 Kilogramm ist (von dem Buch) wiegbar.*
'1 kilogramme is (by the book) weighable'.

The formulation of a semantic constraint is problematic and other cases demonstrate (example (3)), that an absolute intentionality constraint will be too strong.

(3) *biologisch leicht abbaubare Stoffe*
'biologically easily decomposable substances'

Compare also with derivatives like *resorbierbar* ('absorbable'), *regenerierbar* ('regenerable') and *verformbar* ('deformable').

A lot of the data point to a productive word-formation process with compositional semantics. There are also, however, various exceptions. Riehemann summarizes them as follows:

- phonological:
  - dropping of *'-ig'* in the stem
    (*endschuldigen* 'excuse' ⇒ *entschulbar* 'excusable')
- semantic
  - additional aspect of meaning
    (*essen* 'eat' ⇒ *eßbar* 'safely edible')
  - obligation instead of possibility
    (*zahlen* 'pay' ⇒ *zahlbar* 'payable' ('payable by the 15th' = 'has to be paid by the 15th'))
  - lexicalized in one particular sense
    (*halten* 'hold, keep' ⇒ *haltbar* 'non-perishable, keep-able')
- syntactic
  - from verbs with dative objects
    (*entrinnen* (+Dat) 'escape' ⇒ *unentrinnenbar* 'inescapable')
  - from verbs with prepositional objects
    (*verfügen über* 'have at one's disposal' ⇒ *verfügbar* 'available')
  - from reflexive verbs
    (*sich regenerieren* 'regenerate' ⇒ *regenerierbar* 'regenerable')
  - from intransitive verbs
    (*brennen* 'burn' ⇒ *brennbar* 'inflammable')

- truly exceptional
  - no verbal stem
    (*sichtbar* 'visible')
  - no notion of possibility
    (*fruchtbar* 'fruitful')

2 Productivity and Psycholinguistic Claims

When learning complex words, children first make the phonological generalization, and then gradually acquire more complex rules, as they realize what are the semantic and syntactic relationships between a given complex word and its derivational source.

Word-formation differs from syntax in that complex words are not derived "on the fly" every time they are produced, but are stored as units in the mental lexicon even if they have internal structure and if their meaning is predictable from the meaning of their parts. In principle lexicalization is independent of idiosyncrasy, although it is very often accompanied by it. Once a word has been lexicalized, it can undergo semantic drift.

The approach envisages also schemata for the subregular cases.

It is possible to form new words on the basis of the "subregular" schemata (Riehemann gives as an example the formation of *bar*-adjectives from intransitive and reflexive verbs, and from verbs with prepositional and dative objects). This can happen whenever it is sufficiently clear how the new word would relate to its stem and how it would be interpreted.

All schemata serve primarily to organize the existing lexicon and are only secondarily used in the formation of new words. Word-formation is based on generalizations in the existing lexicon.

Morphological productivity depends upon how evident a given pattern (or schemata) is, frequency of occurrence, how obvious a morphological effect is and how regular the semantic modifications that occur.

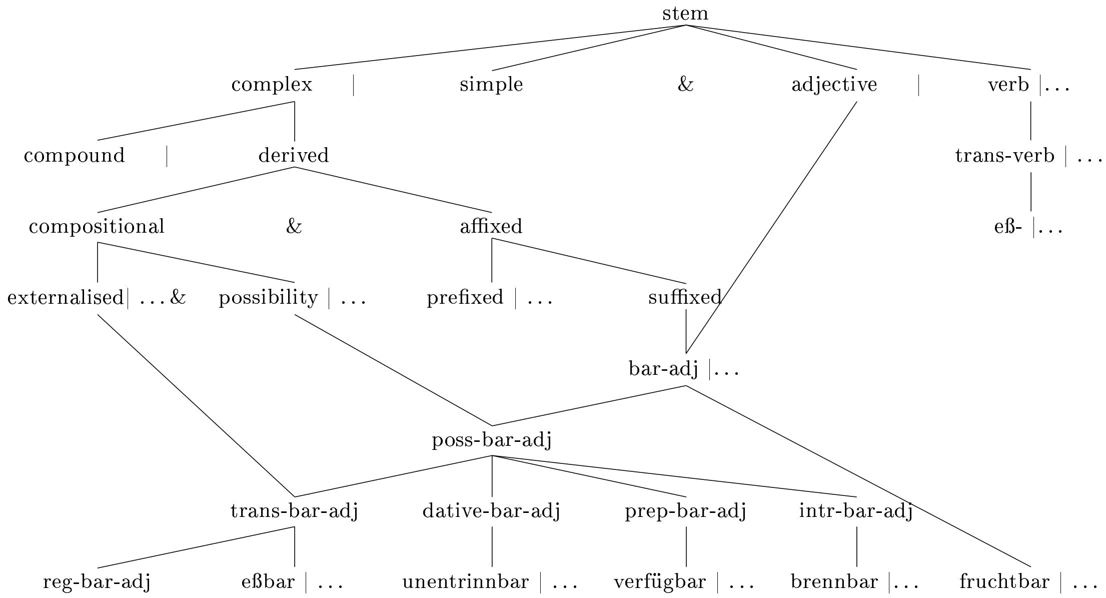
3 The Approach

3.1 A Hierarchy of *bar*-Adjectives

Riehemann's approach crucially relies on the organization of the lexicon in a multiple-inheritance lexical type-hierarchy, like the one shown below, quoted from Riehemann (1998). Some important points to note about this hierarchy: a given type does not have any more subtypes that the ones explicitly given. Every object belongs to a minimal type at the bottom of the hierarchy and if it belongs to a non-minimal type, then it has to belong also to one of its subtypes.

The specific words at the bottom of the hierarchy are those that need to be listed because of certain irregularities. They are also organized in types, however, and can inherit some more general properties from a higher level.

The *trans-bar-adj* schema is the most general one, and is perceived as a productive rule. Nevertheless, there are lexicalized *-bar* adjectives formed from transitive verbs, and those will be listed separately. Adjectives with predictable semantics will belong to the minimal type *reg-bar-adj*.



3.2 The Productive Schema

The schema for fully productive, regular *bar*-adjectives (presented below) says that there is a class of adjectives ending in *-bar* which have transitive verb stems as their first part. It also specifies the syntactic and semantic relationship between the adjective and the verb from which it was derived.

The schema expresses that the accusative object of the verb has become the subject of the adjective (NP:$\boxed{2}$). (Note that the subcategorization requirement for a subject presupposes a predicative use of the adjective.) The adjectives inherits the other complements the verb might have ($\boxed{3}$). The adjective introduces a possibility operator and the semantics of the verb ($\boxed{4}$) is in the scope of this possibility operator.

Note that the *-bar* suffix does not have an entry of its own, but is rather added to the phonology of the verb.

$$
\begin{bmatrix}
\textit{reg-bar-adj} & \\
\textsc{phonology} & \boxed{1} + \textit{bar} \\
\textsc{morph-b} & \left\langle \begin{bmatrix}
\textit{trans-verb} & \\
\textsc{phon} & \boxed{1} \\
\textsc{syn}|\textsc{loc} & \begin{bmatrix}
\textsc{cat}|\textsc{val}|\textsc{comps} & \langle \text{NP[acc]:}\boxed{2} \rangle \oplus \boxed{3} \\
\textsc{cont}|\textsc{nuc} & \boxed{4} \begin{bmatrix} \textsc{act} & \\ \textsc{und} & \boxed{2} \end{bmatrix}
\end{bmatrix}
\end{bmatrix} \right\rangle \\
\textsc{syn}|\textsc{loc} & \begin{bmatrix}
\textsc{category} & \begin{bmatrix}
\textsc{head} & \text{adj} \\
\textsc{valence} & \begin{bmatrix} \textsc{subj} & \langle \text{NP:}\boxed{2} \rangle \\ \textsc{comps} & \boxed{3} \end{bmatrix}
\end{bmatrix} \\
\textsc{content}|\textsc{nucleus} & \begin{bmatrix} \textsc{reln} & \diamond \\ \textsc{arg1} & \boxed{2} \\ \textsc{arg2} & \boxed{4} \end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

The claim is that the approach can handle complex derivation, as the stem itself can be complex. Riehemann gives the following example: the verbal stem *werf* ('throw') can be prefixed to make a complex transitive verb stem — *abwerf* ('throw off') — which can then be used in the productive schema to produce *abwerfbar* ('throw-off-able').

Generalizations can be expressed by allowing types lower in the hierarchy to inherit properties from their supertypes.

Crucially, however, Riehemann relies on the hierarchy to provide information about the morphological structure of a given word and the "history of derivation".

Use of the lexical hierarchy is needed because on her approach only the last step in the derivation is "visible". Since the affix does not have an entry of its own and is not a sign, "[t]his appears to bring a locality effect: the information about previous affixes is not available to further affixations, or to phonology, or syntax"(Riehemann, 1998).

4 Properties of the Approach

A compromise between Item-and-Arrangement Morphology and Process Morphology.

Affixes are not treated as signs, they have no syntax and semantics of their own and cannot be heads.

Rules are seen as generalizations emerging from existing words. No strict distinction is made between exceptions and the general case. These patterns are hierarchically structured with respect to each other.

The approach can handle zero-derivation.
It accounts for productive, less productive and lexicalized examples.