Rhythmic phrasing of prosodic words: a diachronic perspective from Old English, supported by experimental evidence from German*

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1. Introduction

It is generally assumed that prosodic constituent structure reflects syntactic constituent structure (e.g., Selkirk 1986, Nespor and Vogel 1986). *Match theory* (Selkirk 2011), for example, proposes that each syntactic clause corresponds to an intonational phrase (ι), each syntactic phrase corresponds to a phonological phrase (φ), and each syntactic word corresponds to a prosodic word (ω). On the other hand, substantial evidence on the non-isomorphism between syntactic and prosodic constituency has been compiled (e.g., Jun 1993, Cheng 1973, Ferreira 1991). Especially function words are often phrased together with larger prosodic units in disregard of any intervening syntactic boundaries (e.g., Selkirk 1995, Gee and Grosjean 1983). Such findings have led to an amended syntactocentric approach to the interface, e.g., in the form of the *Lexical Category Condition*, which states that the matching between syntactic and prosodic constituents only applies to lexical categories and their projections, but not to functional ones (Truckenbrodt 1999:226).

On the other hand, different views on the nature of prosodic phrasing in Germanic languages are proposed, for example, in Lahiri and Plank (2010), who claim prosodic phrasing to be determined by rhythmic principles (see also, e.g., Sweet 1904, Sievers 1901b). Based on diachronic evidence, Lahiri and Plank (2010) assume the trochaic foot to be the fundamental driving force behind prosodic phrasing (see also, e.g., Abercrombie 1971, Cutler 1996, Wheeldon and Lahiri 1997), and a leftwards oriented encliticisation of function words regardless of syntactic constituency. These findings tie in with the frequently found mismatches between syntactic and prosodic constituency, and support a (non-syntactocentric) view of prosodic structure as an independent module of grammar with its own

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module-specific principles and constraints, where syntactic constituency is only one of many possible influencing factors (Beckman 1996, Shattuck-Hufnagel and Turk 1996).

This paper takes a closer look at the relation between the morphologically complete word and the prosodic word with respect to the two approaches discussed above. By means of a corpus study of Old English orthography (Section 3) and a production experiment in Modern German (Section 4), the paper explores whether the division of a string into morphosyntactic words coincides with the division into prosodic words. The results are not compatible with the idea of a 1:1 match between the morphosyntactic and the prosodic word, but neither are they explained by rhythmic principles alone. It is shown that only an interaction between lexical prosodic information and postlexical rhythmic restructuring mechanisms yields the correct results (Section 5).

2. Prosodic words as a challenge for the syntax-prosody interface

The prosodic word is ususally assumed to include a lexical word and any adjacent function words (e.g., Selkirk 1986, 1995). However, the inclusion of function words into the preceding prosodic word is not obligatory, especially if the function words carry stress (see Shattuck-Hufnagel and Turk (1996) for references). At the same time, a morphosyntactic word can consist of more than one prosodic word, as in compounds and particle verbs (see, e.g., Dehé 2015). In this paper, a third option will be explored, namely, whether it is possible that a prosodic word boundary is placed within a morphosyntactic word and the first part of that morphosyntactic word is then phrased together with a previous word (see example (1)).

While the first two options can be explained from a syntactocentric perspective, the latter option can only be explained (and predicted) if prosodic structure is assumed to have its own set of rules and constraints, allowing it to autonomously create prosodic constituents. If prosodic words are formed according to the trochaic foot, the mismatches discussed in this paper should specifically occur in the context of a stressed ultimate syllable followed by an unstressed initial syllable in the next word (as shown in example (1)), i.e., in the cases where the trochaic foot is not word-initial, but is preceded by an unstressed syllable.

(1) morphosyntactic phrasing: ́x] [x ́x x]
prosodic phrasing: ́x x)(́x x)

Examples for this type of prosodic word formation can be found in literature more concerned with the prosodic grouping in an utterance (and not with the question of what this might mean to a particular theory of grammar). Sweet (1904), for example, teaches Germans how to properly pronounce and (prosodically) group spoken English. His instructions include examples like (2) where the first unstressed syllable of the lexical word ‘afraid’ is grouped together with the preceding pronoun-auxiliary contraction (see also Steele 1969 for more English examples; Sievers 1901a, Eisenberg 2006 for German).

(2) aim̲ə freid ‘I’m afraid’ (Sweet 1904:74)

Similar patterns can be found in Old English orthography, where morphosyntactic boundaries are often not represented in the writing and words (especially unstressed function words) are often written together without intervening space. One group where the morphosyntactic boundaries are often not reflected in the orthographic representation are verbs starting with the prefix *ge-*. While extinct in Modern English, this prefix has been retained and is still productive in Standard German. The following two sections will take a closer look at the prefix *ge-* as it is orthographically represented in Old English, followed by a production experiment in German to measure whether there are any acoustic indicators for the positioning of the prosodic word boundary.

3. Corpus study: the prefix *ge-* in Old English orthography

In Old English orthography, text string division often does not follow the division into morphosyntactic units as found in Modern English; function words often group together, while compounds are often divided into two words.[1] One possible explanation is that these groupings reflect prosodic units (e.g., Nübling 1992, Fleischer 2009), an artefact of the *scriptio continua* in Ancient Greek where the written text was seen as a representation of oral communication (Frey 1988, Parkes 1992), a tradition that might have continued into the Middle Ages (Treitler 1984).

The unstressed Old English prefix *ge-* (most likely pronounced [jə]) is very common across word categories. In verbs, *ge-* often indicates a participle with a resultative meaning (McFadden 2015), but is not restricted to this function. Throughout the Middle English period the prefix (in the form of an *i-*) becomes more marginal and is gradually lost on the way to Modern English. In the Old English orthography, *ge-* is frequently separated from the following verb, either to stand by itself, or to be attached to the preceding word (even across line breaks). Example (3) shows a sample excerpt from the entry of the year 917 in the Parker Chronicle (Flower and Smith 1941).

(3) 

and him with gefuhton and hie gefliemdon

'... and they fought with them and put them to flight'

In this example, both *ge-*prefixes are clearly separated from the following verb forms and attached to the previous material.

3.1 Method

For the corpus study a facsimile (Flower and Smith 1941) of manuscript A of the Anglo-Saxon Chronicle was used (commonly referred to as the 'Parker chronicle'). The chronicles were written by a single scribe until the year 891, then followed by a number of other hands. The Old English portion of the chronicle ends with the entry in the year 1070.

[1] Similar patterns can be found at least in Old Irish and Old High German texts as well.

First, a Perl script was used with a transcribed version of the chronicles[2], which extracted all verbs prefixed with *ge-* and the year entries in which they occurred. As all online transcriptions are only available with modern word division, the orthographic status of each *ge-* with respect to the preceding/following word had to be manually checked in the facsimile. The manual classification included several levels, as it was often difficult to decide whether a short white space was a clear word division or whether it was simply a widening in the handwriting. These uncertain cases made up ca. 16% of the data and were not included in the results. Further information that was included in the manually compiled overview was the category of the preceding word (e.g., N, A, Adv), as well as the number of syllables in the preceding word and the following verb form.

3.2 Results of the corpus study

The total number of verbs with the prefix *ge-* found in the corpus was 457; of these, 215 were preceded by lexical words and 236 by function words (six could not be identified). The majority of the lexical words have two or more syllables (81%); the monosyllabic variants carry lexical stress. The function words, on the other hand, are overwhelmingly monosyllabic and unstressed (91%). This latter group also includes the Tironian symbol *et* (⁊) for the conjunction 'and' which in this dataset is always orthographically attached to the following material. Overall, there are four possible distributions of the *ge*-prefix:

1. **word *ge*-verb**: *ge-* attached to the verb (the expected case)
2. **word-*ge* verb**: *ge-* attached to the preceding word, detached from the verb
3. **word-*ge*-verb**: *ge-* attached to the preceding word and the verb
4. **word *ge* verb**: *ge-* stands by itself

The following table shows the cases where the distribution of *ge-* with respect to these word division possibilities was clearly marked in the script. The table also includes how often these cases were preceded by a functional (including ⁊) or a lexical word category.

(4) *Distribution of* ge-*, including preceding word type*

Type of division	Total	Prec. function word	Prec. lexical word
1. word *ge* – verb	215	72	139
2. word – *ge* verb	40	35 (15 are ⁊)	5
3. word – *ge* – verb	87	77 (21 are ⁊)	10
4. word *ge* verb	43	18	24

3.3 Discussion

The results in Table (4) do not give an explicit answer to the research question. However, there are some interesting results pointing in a particular direction. The corpus study found

[2]The transcribed version was taken from the open access Wikisource site: https://en.wikisource.org/w/index.php?title=Anglo_Saxon_Chronicle_(A-Prime)&oldid=9421418

215 cases where the prefix occurs together with the verb. In these cases, approximately 2/3 are preceded by a lexical word. The results also show 112 (76 without ⁊) occurrences where the *ge*-prefix is attached to preceding material (division types 2 and 3). Here, the vast majority of the preceding material are function words. Finally, with division type 4, the lexical words are again slightly prevalent.

While there seems to be a correlation between attachment type (1 vs. 2 and 3) and preceding word type, it is important to remember that word type is also in correlation with the phonological form of the word. As noted above, function words are mostly monosyllabic and unstressed, and thus most likely prosodically 'deficient'. Lexical words, on the other hand, mostly consist of two or more syllables and include lexical stress, thus forming complete prosodic words. It might well be the case that the prefix is attached to previous material to add more prosodic 'weight' to the function words and that it is less likely to do so with prosodically complete lexical words.

The data presented so far is inconclusive with respect to the research question above. It is not the case that the *ge*-prefix only detaches from the verb to form a trochaic foot pattern. It is however very likely that the prefix has a tendency to react to its prosodic environment and it might be the case that it adheres to a rhythmic pattern not visible in the manuscript. In order to pursue this question in more detail, the following production experiment looks at rhythmic patterns found with the *ge*-prefix in Modern German.

4. Production experiment: the prefix *ge-* in Modern German

In German, the usage of the prefix *ge-* is similar to Old English and can be found across several word categories. In verbs, the prefix productively indicates participle constructions by forming a circumfix with the suffixes *-t, -et*, or *-en*. It is unstressed and pronounced with a stop ([gə] in Standard German). There is regional variation in that some Northern German dialects pronounce the prefix as [jə] and Southern German dialects tend to delete the vowel or even the complete prefix in some contexts.

4.1 Material

The material consisted of 70 sentences with a subject-auxiliary-object-verb structure similar to the one in (5) in order to avoid any variation caused by differing syntactic structures.

(5) Johann hat den Ball ge-tret-en
John has.PRES.3.SG the ball PTCP-kick-PTCP
'John has kicked the ball.'

The participle verb always contained three syllables: the unstressed prefix *ge-* and the disyllabic trochaic verb stem (X –). The subject consisted of a disyllabic trochaic foot. The object noun had three possibilities:

(6) *Stress patterns and syllable structure in object nouns*

	Num. of syll.	Stress pattern	Example		Num. of sent.
a)	1	(X)	*'Ball*	'ball'	26 sentences
b)	2	(X –)	*'An.trag*	'application'	22 sentences
c)	2	(– X)	*Ver.'trag*	'contract'	22 sentences

Following up on the discussion in Sections 1 and 2, the hypothesis was that if the prefix *ge-* is phrased on the basis of the trochaic foot (and not according to morphosyntactic boundaries), it is more likely to phrase with conditions a) and c). Indications for prosodic phrasing were assumed to include Sandhi processes at the morphosyntactic word boundary and differences in the duration of the boundary-related interval (e.g., Fougeron and Keating 1997), in particular the closure duration of [g]: If the *ge*-prefix is phrased with the previous material, the closure duration should decrease; if prosodically phrased with the following verb, the duration should increase, thus signalling a preceding prosodic word boundary.

4.2 Participants

Six female participants took part in the study and received payment for their participation. They were all members of the University of Konstanz and had grown up in Southern Germany. One participant could not be included in the study, because her dialect was too pronounced.

4.3 Procedure

Recordings were made in the soundproof booth of the phonetics laboratory in Konstanz. All 70 target sentences were randomised and presented on screen for each participant to produce at 'natural speed'. This resulted in 350 sentences for the analysis.

4.4 Data analysis

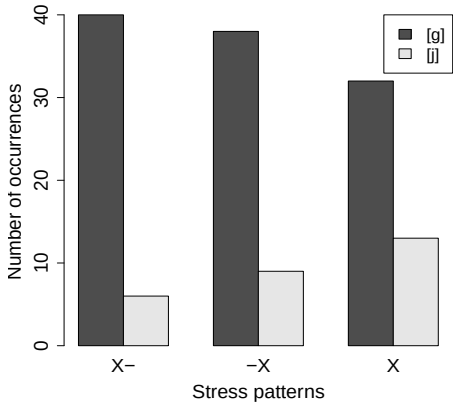
Each utterance was manually annotated for the closure duration of the prefix-initial [g]. The duration intervals were extracted automatically and analysed with respect to the stress patterns discussed above. For the statistical analysis of the durational measurements, a linear mixed effects regression model (lmer) was used, with stress patterns as fixed factors and subjects and items as random factors. The analysis also included the registration of any phonological processes found at the boundary.

4.5 Results of the production experiment

The statistical analysis shows that the closure duration of [g] significantly decreases when following a stressed syllable, in condition a) ((X): β = -0.0048, SE = 0.002, t= -2.4, $p < 0.05$) as well as in condition c) ((– X): β = -0.0043, SE = 0.002, t= -2.36, $p < 0.05$) in comparison to condition b) where *ge* followed a complete trochaic foot (X –).

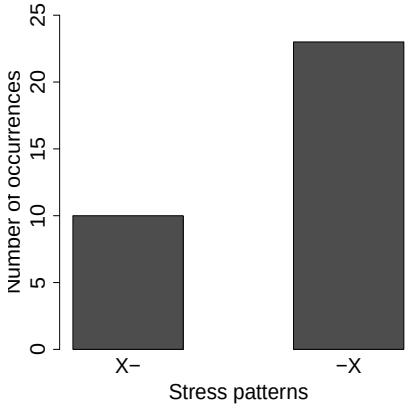
In addition, the results of the phonological analysis showed that [g] can be subject to spirantisation ([j]) if following an object-final vowel or liquid. This particular process is more likely if *ge-* directly follows a stressed syllable.

(7) *Realisation as [g] or [j] following vowels/liquids*



Furthermore, as can be seen in Figure (8), [g] is more likely to merge with a preceding coda-final stop if following a stressed syllable.[3]

(8) *Merging of final plosives with following [g]*



4.6 Discussion

Although not unanimous, the results from the production experiment show a very clear tendency towards stress-related phrasing patterns of the *ge*-prefix, from a phonetic as well as a phonological perspective. The decrease of the closure duration immediately following a stressed syllable indicates that the *ge*-prefix is phrased together with the previous word into a trochaic foot, thus contradicting the idea of a 1:1 match between the morphosyntactic

[3]Figure (8) only shows a comparison of the disyllabic conditions, because the distribution of coda-final plosives is the same in the disyllabic material, but not in the data with the monosyllabic object.

and the prosodic word. The increase in the closure duration of [g] following an object with a complete trochaic foot, on the other hand, is an indicator for a prosodic boundary preceding the prefix. This is in opposition to the formation of a dactyl (X – –) which could be expected in this context if prosodic phrasing was generated solely on the basis of rhythmic principles with each stressed syllable indicating the start of a prosodic word. The results with respect to the closure duration are supported by two phonological processes, the spirantisation and the merging of [g], which tend to be more likely in the context where the prefix forms a trochaic foot with the preceding stressed syllable.

The material only controlled the stress distribution in the object, and to some extent also the final coda of the object. Further experiments should also take the onset of the verb stem into consideration to see whether there are some phonetic and phonological effects if the prefix is phrased with the previous material. Other possibilities include unstressed vowel-initial prefixes (e.g., *er-*) where resyllabification patterns could indicate the presence or absence of a prosodic word boundary, and data sets where the initial unstressed syllable is not a separate morpheme so it can be confirmed that the observed effects are not related to the morpheme boundary following the prefix.

5. Analysis

The results from the corpus study and from the production experiment suggest that the phrasing of a string into prosodic words is only partially guided by rhythmic principles and that the morphosyntactic word does not automatically stand in a 1:1 correspondence with the prosodic word. This section will introduce a model of the interface where syntax and prosodic structure are independent but interacting modules with their respective principles and constraints, and where the interpretation of prosodic constituency can be shared among several modules of grammar.

5.1 The syntax-prosody interface

The modular, generative framework of Lexical-Functional Grammar (LFG; Bresnan 2001, Bresnan and Kaplan 1982) provides the perfect environment for the divison of labour between syntax, prosodic structure, and the lexicon. LFG has a projection architecture, where different levels of representation are related to each other via mathematically defined projections. There are two syntactic representations: c(onstituent)-structure, which represents linear order, hierarchical relationships and constituency in a syntactic tree, and f(unctional)-structure, which represents basic predicate-argument relations and functional information via an attribute-value matrix. LFG has a rich lexicon and follows the lexicalist hypothesis in that only morphologically complete words can enter the syntactic tree.

Over the years, more projections have been argued for, among them s(emantic)-, i(nformation)-, and p(rosodic)-structure, each with its own set of principles and constraints. The LFG grammar architecture allows for complex interactions across these projections via projection functions, while at the same time maintaining modularity (see Dalrymple 2001 for a general overview). While syntactic and semantic structures are well-established, the prosodic module has received considerably less attention (in LFG, and elsewhere).

In Bögel (2015), the interface between syntax and prosody is controlled by two transfer processes. The *Transfer of Structure* exchanges information on phrasal/clausal syntactic and prosodic constituents and on intonation via the projection function ♮. The *Transfer of Vocabulary* associates morphosyntactic and phonological information on lexical elements via the projection function ρ.

P-structure is encoded in the p-diagram, a linear, syllablewise representation of the 'speech signal' in time and subject to language-specific phonological processes, including post-lexical phonology and prosodic restructuring. The following figure shows the p-diagram for part of example (5) (... *Ball getreten* '... ball kicked'). Each syllable is part of a vector relating the syllable with its associated values, among them a list of segments that are part of that syllable, lexical stress if present, or the prosodic phrasing unit it is part of. The vector S_n, for example, represents a syllable σ with the segments /b/ /a/ and /l/ that carries primary stress. Higher prosodic constituents are indicated as part of the PHRASING attribute: In the following p-diagram, the intonational phrase boundary $)_\iota$ is part of vector S_{n+3}.

(9) *The p-diagram for 'Ball getreten' (ball kicked)*

...	...	...	...	...	...
PHRASING	...	σ	σ	σ	$\sigma)_\iota$
LEX_STRESS	...	prim	–	prim	–
SEGMENTS	...	/bal/	/gə/	/tre:/	/tn̩/
V. INDEX	...	$\mathbf{S_n}$	$\mathbf{S_{n+1}}$	$\mathbf{S_{n+2}}$	$\mathbf{S_{n+3}}$

The input to the p-diagram comes from c-structure (*Transfer of Structure*) and the lexicon (*Transfer of Vocabulary*).

5.1.1 The Transfer of Vocabulary

The *Transfer of Vocabulary* associates morphosyntactic and phonological information on lexical elements via a multidimensional lexicon and makes them available to the appropriate modules. Following ideas as proposed by, for example, Levelt et al. (1999), each lexical item has several dimensions, among them the s(yntactic)-form and the p(honological)-form. Table (10) illustrates the s-form and p-form entries for *Ball* 'ball' and *getreten* 'kicked'.

(10) *The multidimensional lexical entries for 'Ball' and 'getreten'*

s(yntactic)-form			**p(honological)-form**	
getreten V	(↑ PRED)	= 'treten⟨SUBJ, OBJ⟩'	P-FORM	[gətretn̩]
	(↑ TENSE)	= pres	SEGMENTS	/g ə t r e t n/
	(↑ VFORM)	= ppast	METR. FRAME	σˈσσ
Ball N	(↑ PRED)	= 'Ball'	P-FORM	[bal]
	(↑ PERS)	= 3	SEGMENTS	/b a l/
	(↑ NUM)	= sg	METR. FRAME	ˈσ

The (incomplete) s-form is a typical lexical entry found in LFG, with information on word category, tense, person, or number. The p-form includes information on the single segments found in a word, on the number of syllables, and on lexical stress. P-form entries can also include information on (prosodic) clitic status or lexical tones.

The multidimensional lexicon is strictly modular in that each lexical dimension only encodes information from the corresponding module and can only be accessed by this module, i.e., c-structure can only access s-form information and p-structure can only access p-form information. However, the lexicon also has a translation function. Once a dimension within the lexical entry is accessed, the other dimensions are activated as well. Thus, if c-structure accesses a specific s-form, the associated p-form and all the information stored within is activated and becomes available to p-structure.

5.1.2 The Transfer of structure

In addition to the phonological information stored in the lexicon, p-structure also requires information on larger prosodic constituents. This information is made available via the *Transfer of structure*. Following the assumptions made in *Match* (Selkirk 2011), larger syntactic units are associated with higher prosodic constituents (S/IP/CP → ι, XP → φ). In LFG, this relation between syntactic and prosodic constituency is established via projection functions associated with the annotation of a specific syntactic node.

(11) *T*he projection function associated with a clausal node:
($\natural(T(*))$ S_{min} PHRASING) = $_{\iota}($
($\natural(T(*))$ S_{max} PHRASING) = $)_{\iota}$

The projection function in (11) can be translated as "for all terminal nodes T of the current node (*), take the syllable with the lowest (min)/highest (max) vector index, and for the attribute PHRASING add a left/right intonational phrase boundary". This effectively inserts intonational phrase boundaries at the position of the first and the last syllable associated with a clausal syntactic node. Similar functional annotations are included with any XPs, where they refer to phonological phrase boundaries. Taken together, the *Transfer of Structure* and the *Transfer of Vocabulary* provide the initial input to p-structure as shown in Figure (9). This initial input is subject to further language-specific phonological processes and prosodic restructuring within p-structure.

5.2 The phrasing of the prosodic word

In the framework sketched above, there are three possible ways to encode prosodic words: a) as part of the *Transfer of Structure*, where each terminal node would project a prosodic word to p-structure (roughly following *Match*), b) as part of the lexical entry, where 'lexical' words would receive full prosodic word status, and function words/clitics could be encoded as prosodically deficient units (see Bögel 2015 for details), and c) as part of p-structure alone, where a prosodic word boundary could be associated with each lexically stressed syllable. This leads to the following predictions:

(12) *Prosodic word phrasing predictions for the prefix* ge-

	Approach	**Stress pattern**	**Prosodic phrasing**
a)	Projected from syntax (*Match*)	(X)	*ˈBall)$_\omega$ (ge.ˈtreten*
		(X –)	*ˈAn.trag)$_\omega$ (ge.ˈschrie.ben*
		(– X)	*Ver.ˈtrag)$_\omega$ (ge.ˈschrie.ben*
b)	Encoded in lexicon	(X)	*ˈBall)$_\omega$ (ge.ˈtre.ten*
		(X –)	*ˈAn.trag)$_\omega$ (ge.ˈschrie.ben*
		(– X)	*Ver.ˈtrag)$_\omega$ (ge.ˈschrie.ben*
c)	Rhythmic principles (p-structure)	(X)	*ˈBall ge)$_\omega$ (ˈtre.ten*
		(X –)	*ˈAn.trag ge)$_\omega$ (ˈschrie.ben*
		(– X)	*Ver.ˈtrag ge)$_\omega$ ˈschrie.ben*

The results from the corpus study and the production study suggest that prosodic words are at least partially determined by stress patterns. These patterns cannot be accommodated by a direct match between a syntactic terminal node and the prosodic word as suggested by option a)/*Match*. This approach only indirectly refers to stress patterns through a distinction of function words and lexical words and their projections. However, as mentioned in Section 2, not all function words are necessarily unstressed. Furthermore, lexical words have varying stress patterns and the results above show that these have an effect on the phrasing of the following prefix. This cannot be accounted for by the syntactocentric approach.

Table (12) also shows that neither the encoding of prosodic word status in the lexicon, nor the phrasing of prosodic words according to rhythmic principles alone yield the correct results. While option c) provides the appropriate phrasing patterns for the cases where *ge-* directly follows a stressed syllable (forming a trochaic foot), it also predicts a dactyl if the prefix is preceded by an unstressed syllable/an already complete trochaic foot. However, the results of the production study reported in Section 4 point towards the opposite direction, namely that in these cases, *ge-* is phrased together with the following verb: ˈ*An.trag*)$_\omega$ (*ge.*ˈ*schrie.ben*.

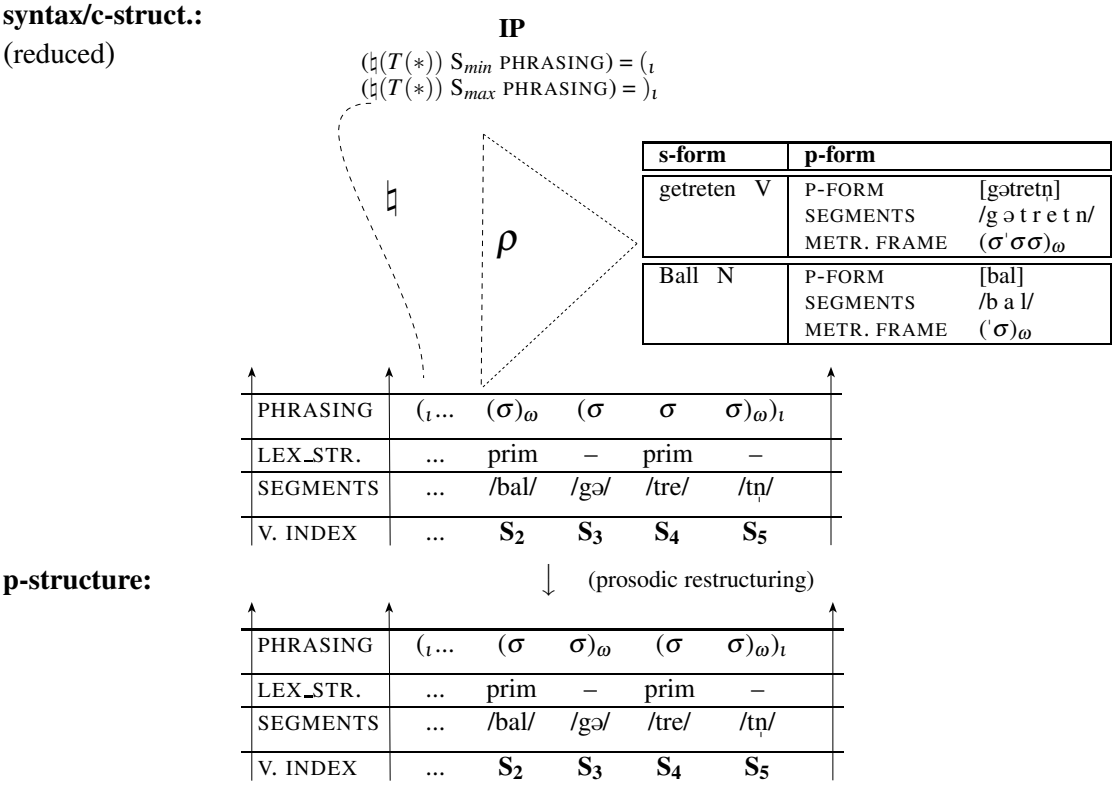
The only option to satisfy all possibilities is a combination of lexical phonological information and p-structure internal restructuring constraints. In this approach, the lexical p-form of each morphosyntactic word includes its prosodic status: (*Antrag*)$_\omega$, (*Ball*)$_\omega$, and (*geschrieben*)$_\omega$ would all receive full prosodic word status. Once the p-form information is passed to p-structure via the *Transfer of Vocabulary*, language-specific restructuring rules

apply; in the case of German and English, these rules would include a preference for the trochaic foot, but not necessarily a dactylic foot across morphosyntactic word boundaries. This interplay between different modules and constraints would result in the correct phrasing patterns for all possibilities.

(13) a. *ˈBall ge)$_{\omega}$ (ˈtre.ten)$_{\omega}$*
b. *ˈAn.trag)$_{\omega}$ (ge.ˈschrie.ben)$_{\omega}$*
c. *Ver.ˈtrag ge)$_{\omega}$ (ˈschrie.ben)$_{\omega}$*

These phrasing patterns on the lower level are further constrained via the larger prosodic phrase boundaries (ι/φ) as projected by the *Transfer of Structure*. Figure (14) illustrates the complete analysis at the interface, where ω-phrasing is achieved through the complex interaction of several modules.

(14) *The syntax-prosody interface and p-structure*



6. Conclusion

This paper pursued the question whether morphologically complete words can be split by a prosodic word boundary, where the initial part of the word is phrased with the previous material. The underlying goal was to establish whether prosodic word structure is determined by syntactic structure or by rhythmic principles, more specifically by a preference for the trochaic foot. The investigation focussed on the verbal prefix *ge-* in Old English

and in Modern German. Results from a corpus study on Old English orthography and a production study in Modern German suggested that *ge-* is often subject to rhythmic considerations and that syntactic constituency cannot be pivotal. However, as discussed in Section 5.2., the sole phrasing of the prosodic word according to rhythmic principles does not yield the correct results. Only the collaboration of several independent modules, that is, lexically encoded prosodic information and p-structure internal principles and constraints, results in the correct phrasing patterns at the level of the prosodic word.

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