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Shortening as a window on phonological grammar

Abstract: Words originating from shortening, including acronyms and clippings, constitute a treasure trove of insight into phonological grammar. In particular, they serve as an ideal testing ground for Optimality Theory (OT) and its view of grammar as an interaction of markedness constraints, which express (dis-) preferences regarding phonological structure in output forms, and faithfulness constraints, which require output forms to correspond to input structure (Prince and Smolensky 1993). This is because shortenings are characterised by a sharply diminished role of faithfulness, allowing for markedness constraints to make their force felt (“The Emergence of the Unmarked”).

This article aims to demonstrate the heuristic value of shortening data for testing the OT model and for shedding light on various controversies in German phonology. A particular concern is to draw attention to the need for properly sorting the shortening data, to identify influences on phonological structure due to internal domain boundaries or to special correspondence effects potentially obscuring the view on the maximally unmarked patterns.

1 Introduction

Shortenings which form a single phonological word (i.e. a single domain for syllabification and foot formation) exhibit limits on phonological form often violated in the ordinary vocabulary.¹ Such limits are illustrated with the consistent initial stress observed in CVCV-shortenings as in (1), all of which are composed based on the underlined fragments of the respective source expressions given

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¹ Reference to prosodic constituents is in accordance with the theory of Prosodic Phonology (Nespor and Vogel 2007). An early study noting the relevance of acronyms for insight into unmarked phonology is Bat-El (1994).

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to their right (ω = phonological word). Stress always falls on the first syllable, whether the words are based on separate initials as in (1a) (*Initialkurzwörter* in German), on stem-initial strings encompassing the first vowel as in (1b) (*Silbenkurzwörter*), or indicate a mix of those two types as in (1c) (*Mischkurzwörter*).²

- (1) a. ('bafu)_ω BAFU Bundes#amt für Umwelt
 ('lufa)_ω LUFA Landwirtschaftliche Untersuchungs-
 und Forschungs#anstalt
- b. ('nabu)_ω NABU Naturschutz#bund
 ('ʃiri)_ω Schiri Schieds#richter
- c. ('kyfa)_ω Küfa Küche für alle
 ('fama)_ω FAMA Fachverband Messen und Ausstellungen

The uniformity observed in the CVCV-shortenings distinguishes them from comparable ordinary words, where final stress is rather common (cf. 2).

- (2) /ta'bu/ <Tabu> 'taboo', /ze'ni/ <Genie> 'genius', /by'ro/ <Büro> 'office'

The extent of the regularity in question is indicated in the table in (3), which compares relevant ordinary C_0VC_0V -words extracted from the German CELEX corpus (i.e. words ending in a full vowel classified as "monomorphemic") to C_0VC_0V -shortenings from a database called *SDS-corpus*³ ("Single-Domain-Shortening corpus").

(3)	a. Ordinary words (CELEX)		b. Shortenings (SDS-corpus)	
Initial stress	177	75,6 %	606	99,5 %
Final stress	57	24,4 %	3	0,5 %
Total	234	100 %	609	100 %

Below I will argue that even the rare cases of final stress in German C_0VC_0V -shortenings are not sporadic exceptions to the sort of uniformity indicated in (3b) but rather indicate special conditions separating them from the regular cases

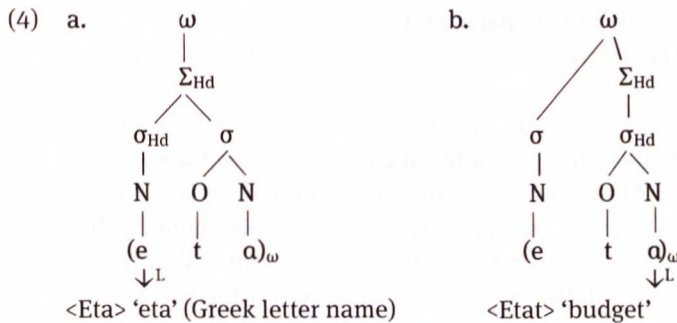
² The terminology used here is consistent with Kobler-Trill (1994).

³ The SDS-corpus (Raffelsiefen in progress) currently includes roughly 1200 entries and includes translations of the full forms into English, which for reasons of space are mostly omitted in the data referred to in this article. The criteria for sorting data are explained further in Section 4. While it is easy to find lists of written abbreviations (e.g. Steinhauer 2005), it is often exceedingly hard to find reliable information on pronunciation. I thank assistants and interns, in particular Alina Behr, Vanessa Dengel, and Bianca Weißinger, for their help with gathering relevant information (finding videos, contacting informants).

(see Section 5).⁴ The uniformity of stress patterns in the shortenings is then arguably absolute, in accordance with the intuition that final stress in for instance the shortening (bafu)_ω <BAFU> in (1a) would be simply impossible in German.⁵ Linguists accordingly need to explain both the (near-)uniformity of the prosodic structure of shortenings in (3) vis-à-vis the potential contrast found in ordinary words and the particular shape of that uniformity (i.e. the occurrence of initial rather than final stress in German C₀VC₀V-shortenings).

Optimality Theory meets this challenge by modelling the relevant conditions in terms of an interaction between correspondence constraints (also known as faithfulness constraints), which preserve (aspects of) input structure, and markedness constraints, which favour phonologically unmarked output structure. The theory thus predicts that irrelevance of faithfulness gives way to unmarkedness, a claim known as TETU (“The Emergence of the Unmarked”).

To assess the adequacy of this model, consider first the issue of markedness pertaining to stress. A possible representation of the contrasting stress patterns observed in German minimal pairs such as (ˈeta) ‘eta’ (Greek letter name) versus (eˈta) <Etat> ‘budget’ in accordance with Prosodic Phonology (Nespor and Vogel 2007) is shown in (4) (ω = “phonological word”, Σ = “foot”, σ = “syllable”, O = “onset”, N = “nucleus”, *Hd* = “head”, \downarrow_L = subphonemic lengthening).



The well-formedness conditions on prosodic organisations as in (4) can be stated in terms of constraints, some of which are assumed to be universally inviolable (Selkirk 1996). So-called alignment constraints require edges of various

⁴ The three exceptions are *Ergee* (see [36]), *atiü* and *BaWiü*, for which stress varies ((baˈvy)_ω–(ˈbavy)_ω, see [44]).

⁵ German differs then from English, where /u/ is never tolerated in the weak syllable of the foot but consistently attracts stress (e.g. main stress in /snæˈfu/ <snafu> [*< situation normal: all fucked up >*] or secondary stress as in /ˈzɑːnu/ <ZANU> [*< Zimbabwe African National Union >*]).

constituents to coincide, capturing the observation that the domains for the prosodic organisation of phonemes necessarily align with morphological boundaries (cf. 5a, b⁶). They further capture the edge-orientation of stress, including the consistent location of the prominent syllable in foot-initial position in languages like English or German. Independent evidence for the specific organisations in (4) comes from contextual conditions on phonetic vowel lengthening indicated by the downward arrow. That is, reference to the trees in (4) allows for lengthening to be associated with vowels in open head syllables in accordance with well-known restrictions on phonetic implementation (i.e. enhancement in a prominent position). Assuming the adequacy of the representations in (4), the preference for initial stress observed in (3) is then captured straightforwardly in terms of universal markedness constraints. Only the trochaic foot structure as in (4a) satisfies the constraints PARSE-SYLL (cf. 5d) and FOOT-BIN (at the syllabic level, cf. 5e⁷) (Prince and Smolensky 1993).

- (5) a. ALIGN (Stem, E; Phonological Word, E): The (left, right) edge of every stem coincides with the corresponding edge of a phonological word.
 b. ALIGN (Phonological Word, E; Stem, E): The (left, right) edge of every phonological word coincides with the corresponding edge of a stem.
 c. ALIGN (Foot, Left; Head of the Foot, Left): Feet are left-headed.
 d. PARSE-SYLL: Syllables are parsed into feet.
 e. FOOT-BIN: Feet consist of either two syllables or of one heavy syllable.

Assuming that the particular stress pattern seen in shortenings indicates an active role of one or both of the constraints in (5d, e), the potential contrasts seen in ordinary words could be captured in terms of faithfulness preserving structure specified in the input.⁸ This assumption is motivated independently by the adaptation of loan words such as English /tæ'bu/ <taboo> versus /'vu,du/ <voodoo> into German, where the relative prominence observed in English is preserved

⁶ The observation that certain morphemes (e.g. vowel-initial suffixes) integrate into the phonological word of the stem (Dixon 1977) indicates that (5a) is violable. The mirror-image constraint in (5b) is universally inviolable.

⁷ The question of the weight of monosyllabic feet in German is addressed in Sections 3 and 4.

⁸ In OT it is generally assumed that there are no restrictions on input forms (ROTB (<Richness of the Base>)). The idea is that for any hypothetical input, the grammar selects the corresponding optimal output. The effect described here is perhaps best conceived of in terms of output-output correspondence, where one type of output (i.e. actual forms encountered by speakers) is associated with another (respective forms produced by the speaker). For a discussion of this question in connection with Spanish truncation, see Piñeros (2000: 65).

in German. The representation of stress in the input forms seems plausible as German speakers can be assumed to be sensitive to perceiving main stress in different positions of a word and moreover can be assumed to have access to the English pronunciations. Once the stress is represented in the input, its preservation can be modelled in terms of a high-ranking correspondence constraint requiring stress patterns in input and output forms to match.

The observation that in general none of the prominence patterns associated with full forms are preserved in shortenings, even when speakers are fully aware of them, indicates some sort of inaccessibility of the structures in question. That inaccessibility is represented informally by the small font in (6c). There surely is a difference between the cases modelled in (6a, b), where prosodic structure is directly associated with a given contiguous phoneme string in the input, and the case involving shortening in (6c), where the material associated with full forms standing in correspondence is often non-contiguous and the formation moreover involves some sort of intermediate representation consisting of mere graphemes (i.e. <BAFU>). Inaccessibility of input structure will forestall any faithfulness effects, with the result that the prosodic organisation of the relevant phoneme strings is shaped by markedness constraints alone. (The segmental structure of the relevant candidates is determined by a faithfulness constraint not indicated in tableau (6), which concerns grapheme-phoneme correspondence conventions based on the grapheme string <BAFU> see Section 3.)

(6) a.	/tæ'bu/ ~ /tə'bu/ ⁹ <taboo>	FAITH(Stress)	FOOT-BIN
	((¹ tabu) _Σ) _ω	*!	
	(¹ta('bu)_Σ)_ω		*
b.	/'vu.du / <voodoo>		
	((¹vudu)_Σ)_ω		
	(vu(¹ du) _Σ) _ω	*!	*
c.	/bʊn.dəs.amt.fʏr.'ʊm.vɛlt/ <Bundesamt für Umwelt>		
	<BAFU>		
	(ba(¹ fʊ) _Σ) _ω		*!
	((¹bafu)_Σ)_ω		

⁹ The word is typically pronounced with /æ/ in American English and with /ə/ in British English. The quality /a/ chosen in the German adaptation is presumably due to spelling.

Once established, the trochaic organisation of a shortening becomes part of the input and is entirely stable, since both faithfulness and markedness favour the same structure.¹⁰

While highlighting the role of input structure for the emergence of the unmarked stress pattern in the shortening, the parallel treatment of the cases in (6) is evidently in need of elaboration. The cases in (6a, b) concern loan word adaptation, pertaining to existing words encountered in acquisition, while the case in (6c) illustrates a special case of word-formation, involving a base (the source expression), from which a new word exhibiting a novel composition of segmental material is derived. The comparison in (6) then concerns only one aspect of the relevant word-formation rule, namely the prosodic organisation of the segmental material.¹¹ Indeed, there are two additional aspects under which shortenings are relevant to learning about the role of phonological markedness in grammar: the selection of material from source forms and the alignment of that material with prosodic domains. As for selection, consider the representation of the initial of the function word *für* in (7a, b), which appears to be motivated by a constraint against hiatus. This is because function words, marked by a small font in (7), are typically passed over when forming acronyms. The preference for representing content words only is manifest in (7c). Here the hiatus is avoided by organising the correspondent of the grapheme <I>, the vowel /i/, in onset position, rendering the inclusion of /f/ superfluous. (The icon “☹” is meant to indicate that the form is not used, despite being phonologically well-formed and similar to existing acronyms.)

- (7) a. Deutsches Institut für DIFE ('di.fə)_ω (☹ ('di.ə)_ω)
 Ernährungs#forschung
 b. Institut für Umwelt#informatik IFU ('i.fu)_ω (☹ ('iu.i)_ω)

10 The grammar in (6) accordingly predicts the unidirectionality of stress shifts. A word borrowed with an unmarked pattern is expected to keep that pattern, resulting in a stable form (cf. *voodoo* in [6b]). A word borrowed with final stress is susceptible to variance, ultimately favouring the less marked form. This development is seen in /kə'nu/ <Kanu> (from English /kə'nʊ/ <canoe>), which varies with more and more preferred /'kanu/. Unidirectionality is predicted because the impact of stress-preserving FAITH(stress) hinges upon speakers' attention to the marked pronunciation, whereas the unmarked form emerges by default. Future changes in the phonological grammar may of course lead to destabilisation of currently unmarked structure.

11 The term “prosodic organization” subsumes all aspects of grouping items into prosodic constituents, including the association of phonemes with syllable positions, the association of syllables with feet, the determination of prominence relations among syllables within feet (i.e. the determination of the head syllable), and prominence relations among feet (i.e. the determination of the head foot).

- | | | | | |
|----|--|-------------------|--|---------------------------|
| c. | <u>I</u> nstitut für <u>U</u> mwelt# <u>p</u> hysik | IUP ¹² | (iʊp) _ω | (⊗ ('i.fu) _ω) |
| d. | <u>U</u> niversitäts# <u>k</u> linikum
Hamburg- <u>E</u> ppendorf | UKE | ((u) _ω (ka) _ω (e) _ω Hd) _{CC} | (⊗ ('u.kə) _ω) |

Yet another way in which shortenings shed light on phonological markedness concerns their mapping into prosodic domains. For shortenings consisting of initials, there is always a grammatical candidate, namely a copulative compound (CC) consisting of the respective letter names (see Section 2). The choice between that particular candidate and its single-domain competitor, whose phonemic content is determined by grapheme-phoneme correspondence, appears to be largely governed by phonological markedness. For instance, in German the organisation as a single phonological word is quite regularly preferred to an alternative letter compound if the string can be parsed into two well-formed syllables, at least one of which has an onset (cf. 7a, b). An exception is seen in (7d), where the relevant single domain candidate ('u.kə)_ω <UKE> ends in the grapheme <E>, which licenses the phoneme schwa. The presence of that schwa together with the absence of a word-initial onset render the candidate ('u.kə)_ω unacceptable. The alternative pronunciation of the acronym as a letter compound results, indicating the active constraints *SCHWA (No schwa) and ONSET (A syllable needs an onset) in the phonology of German.

The few glimpses caught here indicate an extraordinarily complex overall picture, where the selection of material from source forms, the mapping into prosodic domains, and the organisation of phonemes within single domains are strongly influenced by phonological markedness constraints. The dependence of the selection and the domain formation on the phonological shape of the respective output forms argues against modelling shortenings in some sort of flow chart, starting with the selection of material from full forms and ending with its prosodic organisation. Instead the respective dependencies call for a highly complex grammar where inputs consist of full source forms and candidates are evaluated in parallel, mapping every word, including compounds and phrases, to their optimal shortenings.

It is beyond the scope of this article to tackle the concrete modelling of such a shortening grammar; instead its focus is on the prosodic organisation of segmental material forming a single phonological word. This specific choice is motivated by the relative ease with which the relevant generalisations can be delimited along with the particular degree of regularity observed in the patterns in ques-

¹² The word *IUP* (part of Heidelberg University) is homophonous to *Jupp* (a regional variant of the name *Josef*).

tion. For instance, the selection of a consonant as a hiatus buffer as in (7a, b) is common but by no means entirely systematic.¹³ Strict regularity concerns its organisation: an intervocalic single consonant regularly forms an onset, whether that consonant corresponds to a regular initial in a content word as in ('lufa)_ω LUFÄ (see 1a) or to a segment in a function word as in ('di.fə)_ω DIFE (see 7a) (cf. also the regularity shown in 3).

Returning to the analysis in tableau (6), one might consider implementing the idea to model specifically prosodic organisation by simply omitting reference to the full source form from the input, thereby targeting the mapping of the grapheme string <BAFU> to the prosodified optimal output ('bafu)_ω. In this particular case, this would indeed be unproblematic. However, under certain conditions we find that phonological properties pertaining to spoken source forms do affect the prosodic organisation of the shortening (see below). At least those aspects of the phonology of source forms need to be included in input forms then, an observation to be accommodated in full-fledged formal modelling.

The article is organised as follows. Section 2 discusses two competing ideas regarding the phonology of novel words. Section 3 illustrates various generalisations pertaining to the prosodic organisation of single-domain shortenings and discusses more general insights to be drawn from those cases for the phonology of German. Section 4 briefly reviews various shortening types in German and their respective potential to shed light on unmarked phonological structure. Section 5 examines further criteria for sorting the shortening data, emphasising the need to identify all internal phonological word boundaries and likely prosodic correspondence effects. This is to ensure that the cases in question are treated separately and do not “clog up” the window on unmarked structure. Section 6 concludes.

2 Competing proposals

It has been proposed that the prosodic organisation of novel words follows that of comparable familiar words deemed to be sufficiently similar where analogical influences might be enhanced by the token and/or type frequencies of those known words (Schindler 1994). Based on that view it would be entirely

13 Consider the selection of the hiatus buffer in (i), but not in (ii), which may serve to increase the distance between the identical consonant graphemes but could also be more or less random.

(i)	De <u>u</u> t <u>s</u> ch <u>e</u> s I <u>n</u> st <u>i</u> t <u>u</u> t f <u>u</u> r <u>a</u> ng <u>e</u> w <u>a</u> nd <u>e</u> t <u>e</u> D <u>a</u> t <u>e</u> n <u>v</u> e <u>r</u> a <u>r</u> b <u>e</u> i <u>t</u> u <u>n</u> g	DIFAD	('di.fat) _ω
(ii)	B <u>r</u> e <u>m</u> e <u>r</u> I <u>n</u> st <u>i</u> t <u>u</u> t f <u>u</u> r <u>a</u> ng <u>e</u> w <u>a</u> nd <u>e</u> t <u>e</u> S <u>t</u> r <u>a</u> h <u>l</u> e <u>n</u> t <u>e</u> c <u>h</u> n <u>i</u> k	BIAS	('bi.as) _ω

possible for the shortening NABU (see 1b) to exhibit final stress in analogy with an existing word such as *Tabu*, especially if that word were particularly frequent or part of a larger group of words ending in stressed /u/. Such an idea could in principle be integrated into the model in (6), by associating inputs with “clouds” of comparable words familiar to the speaker, where this enriched input then serves as a base for faithfulness constraints. However, the ratio in (3) argues against such enriched input structures. Indeed there is scant evidence for analogy to existing words in the prosodic organisation of shortenings in German.

Interestingly, Schindler’s claims concerning the prosodic organisation of novel words are based not on shortening data but rather partly on stress variation in loan words (with no regard for the directionality of possible shifts) and partly on a survey where students were asked to pronounce written nonce words spelled with all caps such as <USPIK>. The lack of variation in the pronunciation of genuine acronym data calls into question the value of that particular elicitation technique, where responses might be guided by a concern for producing “correct” answers, and analogy with the known may indeed be a significant factor.¹⁴ The sort of uniformity observed in the shortening data vis-à-vis experimental data is then significant in itself, presumably indicating a lessened role of orthoepic concerns or of deliberate reflection on how to pronounce shortenings.¹⁵ Hence the particular value of shortening data for studies of phonological grammar.

While shortenings do not lend themselves to analyses based on similarity to individual existing words, they also fail to support the opposing view of preferences cultivated specifically in that type of word-formation (Ronneberger-Sibold 1992). Examples for alleged differences among preferences pertaining to shortenings (based on her corpus of ca. 150 items to be described further below) vis-à-vis the ordinary vocabulary in German stated by Ronneberger-Sibold (1992: 123) are cited in (8):

14 In connection with a study of the preferred position for main stress in three-syllable nonce words, Janßen (2004: 65) reports that some subjects chose either consistently initial or consistently final main stress for each of the test items, regardless of syllable structure. This indicates certain more or less arbitrary speculations about phonological rules, which appear to not affect the pronunciations of shortenings. See also footnote 21.

15 Let me share an anecdote here. When noting the initials MEK on a museum in Berlin (*Museum Europäischer Kulturen* ‘Museum of European cultures’), I asked the staff how they pronounce this word. One woman responded, “*Wir nennen das einfach /mek/*” (‘We just call it /mek/’), which set off an amused chuckle among her fellow workers. The source of the humor may have been that they had never before consciously reflected on the question of how to pronounce this acronym (?/mek/, ?/mek/), yet they were in perfect agreement about the outcome.

(8) Preferences in shortenings	Preferences in the “normal” vocabulary
a. open syllables	closed syllables
b. closed syllables in word-initial position	closed syllables in word-final position
c. initial stress	penult stress in words with three syllables
d. (almost) no schwa	Schwa (“most frequent vowel”)
e. vowels: o - i - a	vowels (in stressed syllables): e - i - a
f. equal preference for short and long vowels	short vowels

The juxtaposition in (8) does not express the remarkable difference concerning the uniformity of shortenings vis-à-vis the more varied patterns found in ordinary words observed in (3). What is the reason for this? An inspection of the corpus compiled by Ronneberger-Sibold shows indeed many apparent counterexamples to the claim that C_0VC_0V -shortenings are regularly organised as trochees, including her examples in (9):

- (9) /be^hha/ BH < Büsten#halter ‘bra’ /a¹de/ a.D. < qußer Dienst ‘retired’, /t^se¹te/ c.t. < cum tempore ‘academic quarter’, /a¹ge/ AG < Arbeits#gemeinschaft ‘working group’

It turns out that almost all of Ronneberger-Sibold’s examples of word-final main stress are letter compounds in which each of the graphemes included in the written form of the shortening is associated with a stem form representing the conventional German letter name (<A> = /a/, = /be/, <C> = /t^se/, etc.). Significantly, there is clear evidence that these stems form separate phonological words (cf. the alignment constraint in 5a). The classification of the relevant compounds as copulative follows from the equal morphological and semantic status of the respective constituent members.¹⁶

- (10) <BH> ⇒ [[be]_{STM}[ha]_{STM}]_{CC} ⇒ ((be)_ω(ha)_{ωHd})_{CC}

The prosodic organisation of letter words as copulative compounds shown in (10) is manifest in systematic correlations between syllable structure and stress. First, final consonants in letter names form codas even when a vowel follows

¹⁶ This condition also captures final main stress in compounds consisting of phonologically similar meaningless syllables such as ((pi)_ω(pa)_ω(po)_{ωHd})_{COP-COMP} *Pipapo*, English ((tik)_ω(tæk)_ω(təu)_{ωHd})_{COP-COMP} *tic-tac-toe*. The relevant stress rules for copulative compounds in German and English appear to be the same.

(e.g. /ɛs.ɛm.fau/, see (11)), which clearly indicates intervening phonological word boundaries (i.e. ((ɛs)_ω(ɛm)_ω(fau)_{ωHd})_{CC}). Second, the consistent placement of main stress on the final letter name is in accordance with the regular head finality characteristic of copulative compounds. This is illustrated in (11b), where the rightmost member of a copulative compound always forms its prosodic head and attracts main stress, regardless of how many members there are in total.

- (11) a. Büsten#halter ‘bra’
 Schüler#mit#verwaltung
 ‘student representation’
 Öffentlicher Personen#nah#verkehr
 ‘public transportation’
- b. ((be)_ω(**ha**)_{ωHd})_{CC} BH
 ((ɛs)_ω(ɛm)_ω(**fau**)_{ωHd})_{CC} SMV
 ((∅)_ω(pe)_ω(ɛn)_ω(**fau**)_{ωHd})_{CC}
 ÖPNV

Ronneberger-Sibold’s non-consideration of internal prosodic domain boundaries is then a serious shortcoming, which leads to results of little or no significance (e.g. the ratio of final stress basically indicates the ratio of letter compounds in the relevant corpus) and moreover obscures relevant generalisations (e.g. the absolute regularity of initial stress in C₀VC₀V-shortenings seen in 3).

There is a second reason for why the sort of remarkable regularity seen in (3) does not manifest in Ronneberger-Sibold’s juxtaposition of phonological properties in (8). This is the lack of discrimination between aspects of structure determined by the *prosodic organisation* of given phonemic material versus those concerning the *selection* of segmental material from full forms. Consider the distribution of open versus closed syllables in the *Initialkurzwörter* illustrated in (12):

- (12) a. ('da.pi)_ω DAPI Deutsches Arznei#prüfungs#institut
 ('a.gra)_ω Agra Arbeits#gemeinschaft der Redakteur#ausschüsse
- b. ('al.fu)_ω Alfu Arbeits#losen#fürsorge#untersuchung
 ('at.go)_ω Adgo Allgemeine Deutsche Gebühren#ordnung

The syllable boundaries indicated in (12) are supported by the evidence from phonetic vowel lengthening: the long pronunciation of stressed /a/ in (12a) indicates open head syllables while vowel shortness despite the initial main stress in (12b) indicates closed syllables. Syllable structure is then plausibly determined by sonority (see Section 3), such that single intervocalic consonants or clusters exhibiting a sharp increase in sonority form onsets (see 12a), while other clusters are heterosyllabic (see 12b). While these generalisations concerning the prosodic organisation of given phonemic material are without exception, the respective distribution among open versus closed syllables depends on the material in the respective full forms. Here faithfulness (including grapheme-phoneme corre-

spondence constraints) comes into play, where resulting structures ultimately reflect the distribution of graphemes in stem-initial positions in full forms (cf. the underlined graphemes in 12). That distribution is hardly of interest to linguists and neither is the resulting ratio of closed versus open syllables in shortenings.

It is of course conceivable that the selection of segmental material from source forms is affected by phonological markedness constraints, and as noted earlier, there is indeed clear evidence for that kind of impact. The extent of this impact is arguably best captured in an OT grammar, where markedness constraints interact with faithfulness aiming to preserve the segmental structure of full forms. An investigation of the SDS-corpus mentioned above has yielded no conclusive evidence for a specific avoidance of consonants whose presence would result in closed syllables (cf. Raffelsiefen in progress).¹⁷ Even when markedness can be shown to influence the selection of segmental material, the effects are not as regular as those associated with the prosodic organisation of that material. For instance, it is true that there is a tendency to avoid schwa in shortenings (cf. Ronneberger-Sibold's claim in 8), in that the grapheme <E> in full forms is often not selected when its correspondent phoneme in the shortening were to be located at the end of the phonological word and therefore, by regular grapheme-phoneme correspondence, associated with /ə/ rather than the full vowel /e/ (cf. *JuZ* < *Jugend#zentrum* 'youth center' versus *JuPo* < *Jugend#posaunenchor* 'youth trombone choir').¹⁸ Significantly, the phonological

¹⁷ Specifically, it is shown that the distribution of open versus closed syllables in German shortenings can be captured in terms of interacting faithfulness and markedness constraints, where shortening itself is driven by the markedness constraint *STRUC (No Structure), which bans structure altogether (see Prince and Smolensky (1993: 25), who credit Cheryl Zoll for proposing that constraint). The prevalence of open syllables in German shortenings is then due to the absence of markedness constraints favouring coda segments (as opposed to those favouring segments in the nucleus). There simply is no evidence for an active role of the constraint NOCODA mitigating against closed syllables in the phonological grammar of German shortenings.

This result challenges Ronneberger-Sibold's idea that special phonological preferences linked specifically to shortenings can be established by way of counting occurrences of various segments or syllables (open versus closed) and then comparing the relevant counts in shortenings versus ordinary words. The validity of that approach, along with her criteria for categorising shortening data, has largely eluded scrutiny. Nübling (2001: 185) praises the *sound statistical results* ("fundierte statistische Ergebnisse") in Ronneberger-Sibold (1992), whose methodology has been adopted in various studies (Leuschner 2008, Lux 2016). (See also footnotes 37, 42 below.)

¹⁸ The association of the grapheme <E> with schwa in word-final position or before word-final {r,l,n} blocks its regular correspondence with full vowels. The tendency to pass over the grapheme <E> when selecting material for shortenings pertains only to these narrow contexts, evidently motivated by the avoidance of the highly marked vowel /ə/ itself (see footnotes 19, 45). Data from the SDS corpus hence do not corroborate Ronneberger-Sibold's claim that /e/ and /ɛ/ are generally avoided in unstressed syllables (2007: 286). For instance, among the trochaic shortenings ending in

preference in question can be overridden by other constraints, including the need to represent the initial of salient words (cf. the inclusion of <E> in (^ldifə)_ω <DIFE> in 7a). The current count of schwa-final words among the C₀VC₀V-shortenings in the SDS-corpus is 22, after all amounting to 3.4% of those cases. It is true that the ratio of schwa-final trochees in the ordinary vocabulary is far higher, but this does not prove distinct preferences for schwa in the relevant data sets but may reflect on distinct (historical) origins of that vowel.¹⁹ Indeed, one may doubt all of the opposing preferences in (8) claimed by Ronneberger-Sibold: the observed asymmetries may well be consistent with a single phonological grammar for German (i.e. a single ranking of constraints), where shortenings exhibit less marked structure due to the absence of prosodic faithfulness effects along with access to alternative organisations such as letter compounds (cf. 7d).

3 Unmarked prosodic organisation of single-domain shortenings

The empirical validity of the model outlined in the preceding section hinges both on the determination of prosodic organisation by segmental structure only (mediated by grapheme-phoneme correspondence) and on the analysability of the relevant patterns in terms of independently motivated markedness constraints. Some examples for restrictions on prosodic organisation observed in the SDS-corpus are listed in (13). The names are added merely for ease of reference:

- (13) a. 2σ-RULE: Disyllabic phonological words not ending in one of the sonorants {r,l,n} have initial stress, regardless of whether their syllables are open or closed.
- b. 3σC-RULE: Trisyllabic phonological words with an open penult ending in a consonant other than {r,l,n} have initial main stress and secondary stress on the final syllable.

a closed syllable, there are 32 cases with unstressed /ɛ/ (e.g. ('vivep)_ω *WIWeB* (< *Wehrwissenschaftliches Institut für Werk- und Betriebsstoffe*)), compared to 16 cases with unstressed /ɔ/ (e.g. ('buvɔk)_ω *BUWOG* (< *Bundeswohnungsgesellschaft*)). This ratio also casts doubt on Ronneberger-Sibold's claim concerning the distribution of full vowels in shortenings cited in (8).

¹⁹ An active role in the history of German of the markedness constraint *SCHWA (No schwa), which has caused the loss of all schwas not needed to satisfy higher-ranking constraints, is motivated in Raffelsiefen (1995, 2000). There is then no "preference" for schwa in the regular vocabulary.

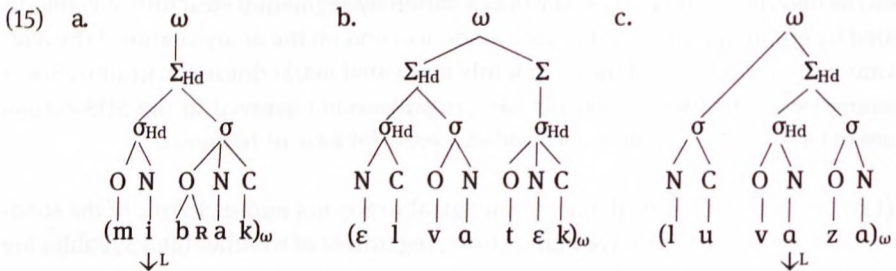
- c. 3σV-RULE: Trisyllabic phonological words with an open penult and ending in a vowel have penult main stress by default (see below).
- d. σ^{op/clos}-RULE: The nuclei of open syllables are restricted to peripheral vowels; the nuclei of closed syllables are restricted to centralised vowels.

The feature [±peripheral] (Lindau 1978), motivated by the more peripheral tongue position associated with the vowels in the upper row compared to the respective vowels listed underneath, is meant to represent a proportional vowel quality opposition shown in (14):

(14)

	high			mid			low	
[+peripheral]	/i/	/y/	/u/	/e/	/ø/	/o/	/a/	(/æ/) ²⁰
[-peripheral]	/ɪ/	/ʏ/	/ʊ/	/ɛ/	/œ/	/ɔ/	/a/	-

The generalisations in (13) are illustrated by the prosodic representations in (15). (Apparent exceptions will be discussed below.)



- (mi.brak)_ω MIBRAG Mitteldeutsche Braunkohlengesellschaft mbH
- (ɛl.va₁tɛk)_ω Elwatec Elektrolyse- und Wassertechnik GmbH
- (lu'va.za)_ω Luwasa Luft Wasser Sand

²⁰ The vowel /æ/ is parenthesised because contrasts like /t^hæ/ <zäh> ‘tough’ vs. /t^he/ <Zeh> ‘toe’ exist for only roughly half of German speakers, mostly located in western areas and in Switzerland. The fact that /æ/ is the only vowel lacking an opposition member in (14) is presumably due to its markedness, as it is both low and front. (The phonological lowness of the vowel in words like /t^hæ/ <zäh> ‘tough’ is often overlooked, perhaps due to an unfortunate convention to transcribe that vowel with the symbol /ɛ:/. See Raffelsiefen (2018) for discussion of the historical origin of that convention as well as its empirical inadequacy.)

The trochaic organisation of the disyllabic tree in (15a) illustrates the dominance of the constraints FOOT-BINARITY (specifically the branching of the foot into two syllables) and PARSE-SYLLABLE (see 5d, e). The fact that not both of these constraints can be fully satisfied in trisyllabic words yields special insight into constraints on foot formation and syllable weight in German. Specifically, the relevance of the closedness of the final syllable for the regular occurrence of initial main stress in trisyllabic words indicates that that syllable forms a separate foot (cf. 15b).²¹ The preceding two syllables are then organised into a trochee functioning as the head foot, resulting in main prominence on the initial syllable. This pattern is in accordance with independent evidence for the assumption that only closed syllables are heavy in German, which also fits with the depiction of vowel length as a purely phonetic property (Vennemann 1991a, 1991b).²² The observation that such a monosyllabic final foot, unlike disyllabic feet, does not attract main stress within the phonological word indicates an overall preference ranking among feet as follows (Σ/σ^L = a foot dominating a single light [i.e. open] syllable, Σ/σ^H = a foot dominating a single heavy [i.e. closed] syllable, $\Sigma/\sigma\sigma$ = a foot dominating two syllables).

(16) worse feet $\Sigma/\sigma^L \gg \Sigma/\sigma^H \gg \Sigma/\sigma\sigma$ better feet

The generalisation is then that a final closed syllable regularly licenses a separate foot but is not “good enough” to form a head foot. This is what leads to initial main stress in shortenings like *Elwatec*. In vowel-final trisyllabic words such as

²¹ These patterns are obscured not only by the stress variety found in ordinary words (e.g. (kle^lmat^s)_ω <Klematis> ‘clematis’, (kaza^ttʃɔk)_ω <Kasatschok> ‘Kozachok’) but also by the variation found in experimental studies with nonce words. Janßen (2004: 70) finds a mere preference for initial main stress in the relevant trisyllabic nonce words (i.e. *Binsakaf* and *Fekomot*), not the near-categorical pattern observed in shortenings:

nonce word	^l σ σ σ	σ ^l σ σ	σ σ ^l σ
Bin.sa.kaf	107 51,2%	48 23%	54 25,8%
Fe.ko.mot	99 42,3%	46 19,7%	89 38%

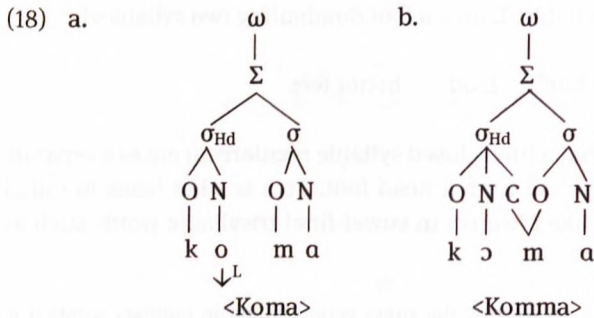
²² Vennemann’s argument against the analysis of vowel length in German as a phonological property concerns the instability of penult stress on phonetically long vowels (e.g. *Al^t[o:]na* ~ *Alt[o]na*) versus the stability of penult stress on short vowels (e.g. *Ma^d[ɔ]na* (**Madonna*)) (Vennemann 1991a, 1991b, 1998). This indeed robust pattern shows that vowel length is not a phonological property that attracts stress but rather a subphonemic process affecting vowels in stressed open syllables. The stability of penult stress in words like *Madonna* corresponds to that seen in closed penult syllables in words such as *Veranda*, suggesting that the stress stability in *Madonna* is due to (ambisyllabic) syllable closure as well (i.e. the /n/ closing the syllable; cf. the discussion of the contrast in German *Koma* versus *Komma* in [18] below). Evidence that closed syllables count as heavy while open syllables count as light has also been noted for Dutch (Visch and Kager 1984).

Luwasa, this parsing is not available as the final syllable is open and light; the (default) rule here is to group the last two syllables into a trochee and leave the initial syllable unparsed as in (15c).

Consider next the generalisation concerning the distribution of peripheral versus centralised vowels in (13d), which corresponds directly to the independently motivated markedness constraints in (17).²³

- (17) a. $*\sigma^{\text{open}}/N^{[-\text{per}]}$: No centralised vowel in the nucleus of an open syllable.
 b. $*\sigma^{\text{closed}}/N^{[+\text{per}]}$: No peripheral vowel in the nucleus of a closed syllable.

Both constraints are consistently obeyed in shortenings, including the cases illustrated in (15). They are arguably obeyed in the ordinary vocabulary as well, assuming that for instance contrasts such as (*koma*)_ω <Koma> ‘coma’ versus (*kɔma*)_ω <Komma> ‘comma’ are represented as follows:



The vowel contrast as in (18a, b) can be modelled by assuming a high-ranking faithfulness constraint FAITH([±peripheral]), which preserves the value for this feature encountered in the relevant input forms. Assuming the inviolability of the markedness constraints in (17), the association of the intervocalic single consonant with the coda and the concomitant violation of the markedness constraint (*AMBISYLLABILITY [“No ambisyllabicity”]) is the “price” paid in the phonological grammar

²³ The markedness constraints in (17) appear to manifest in neutralisation patterns concerning certain vowel quality differences in open versus closed syllables in various languages, including French. While the quality differences in question are referred to by various labels (e.g. [±tense], [±ATR]), even height in French (low-mid : high-mid), there is a consistent affinity between more centralised vowels and closed syllables (e.g. /ɛ/, not */e/, in closed syllables in French /tɛt/ <tête> ‘head’) versus more peripheral vowel in open syllables (e.g. /o/, /ø/, not */ɔ/, */œ/, in open syllables in French /bo/ <beau> ‘beautiful’ or /fø/ <feu> ‘fire’). The relevant distribution makes no reference to vowel length, only to vowel quality.

of German for the increase of the contrastive potential manifest in minimal pairs such *Koma* versus *Komma*.²⁴ The absence of this type of contrast in shortenings, where the unmarked organisation as in (18a) prevails, can again be explained with reference to the relevant input forms. Assuming that not the phonemes in the full forms but rather the graphemes representing the shortenings are accessed, the unmarked organisation emerges as a TETU-effect. This is because every German vowel grapheme corresponds to both a peripheral vowel phoneme and its centralised opposition member, the choice among which is determined by the respective position of the corresponding phoneme in an open versus closed syllable along with markedness (i.e. the constraints in 17). Some graphemes, including <E>, correspond to additional phonemes whose distribution is also governed by context.²⁵

- (19) <A> : {/a/^[+per], /a/^[-per]}
 <E> : {/e/^[+per], /ɛ/^[-per], /ə/}

The availability of these choices, and the particular ways in which they are resolved, depending on context, contributes to making single domain shortenings such a rich source of insight into phonological grammar.²⁶ The observed patterns support the high ranking of the constraints in (17) in German, thereby also indicating the relevance of syllable structure (open versus closed) and associated markedness constraints.²⁷ Here sonority plays a key role, as has been noted already with regard to the syllabification of intervocalic consonant clusters in (12). The idea, originating with Whitney (1861),²⁸ is that there is correlation between inherent articulatory

²⁴ The relevant fragment of the phonological grammar of German, which forces a single intervocalic consonant to close the syllable when a centralised vowel precedes, is expressed in the ranking below (cf. Raffelsiefen 2016). The subscript “_{PROM}” links the effect to vowels in prominent (e.g. stressed) position, a case of so-called “Positional Faithfulness” (Beckman 1998).

*σ^{open}/N^[-per] >> FAITH([±peripheral])_{PROM} >> *AMBISYLLABICITY

²⁵ Correspondences involving grapheme clusters such as <EI> or <IE> take precedence over simple graphemes via the *Elsewhere Principle* (cf. Section 5).

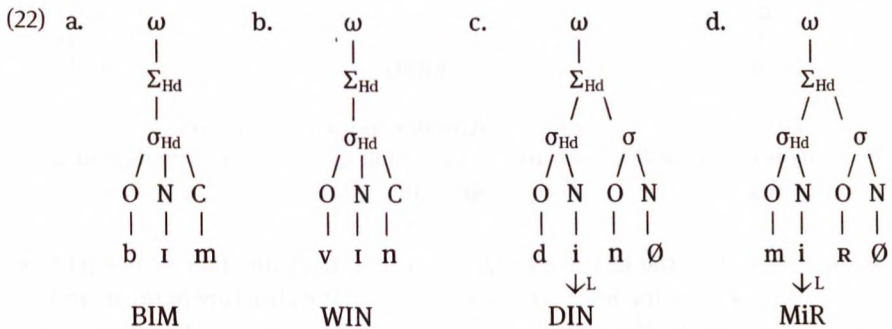
²⁶ By the same token the absence of choices pertaining to the association between graphemes and corresponding letter names (e.g. <A> = /a/, <E> = /e/, <Y> = /ypsilon/, etc.) renders letter compounds as in (11b) much less interesting to phonologists. Still, these cases shed light on phonological constraints affecting copulative compounding (see Raffelsiefen in progress).

²⁷ Reference to vowel length in Ronneberger-Sibold’s study (cf. [8f]) is of questionable value, as it essentially compares the distribution of stressed open syllables to that of all remaining syllables.

²⁸ Although his original ranking shown in (i) (Whitney 1861, 1874) has gained wide recognition, Whitney is rarely credited with the idea. (The ranking “*M/R >> *M/l” in [20] matches a

- c. (iyl)_ω JüL Jahrgangs#übergreifendes Lernen
 (dɪl)_ω DIL Deutsches Institut für Lebensmitteltechnik
 d. (mɪR)_ω / *(mɪR)_ω MiR Musiktheater im Revier

Assuming the inviolability of the markedness constraints in (17), the distribution among peripheral and centralised vowels shown in (21) entails that final /m/, like final obstruents, always closes the syllable (22a), whereas the most sonorous consonant, /r/, resists association with the coda and forms an onset instead (22d).³⁰ Final /n/ (and /l/) can associate with either margin position (22b, c), allowing for both types of vowels to precede.³¹ The association of this effect with the word-final position only is due to a restriction on empty nuclei to the effect that they are banned from occurring word-internally (cf. Harris and Gussman 2002).



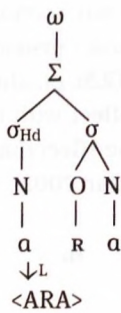
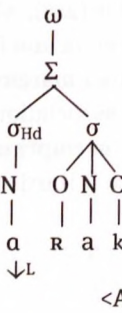
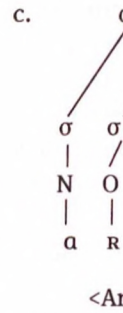
The shortening data then provide significant support for the ranking among the sonorants in (20), which is obscured in ordinary words, where peripheral and centralised vowels contrast before both /r/ and /m/ (e.g. (hɛR)_ω <Heer> ‘army’ versus (hɛR)_ω <Herr> ‘mister’, (lɑm)_ω <lahm> ‘lame’ versus (lɑm)_ω <Lamm> ‘lamb’).³² The inviolability of the constraints in (17) and the consequent representation of final

³⁰ The phonetic implementation of the phoneme /r/ in this particular onset position is conducive to articulatory weakening, manifest in vocalisation in German (see Schiller and Mooshammer 1995). Vocalisation also affects /r/ in the coda, though to a lesser degree.

³¹ The conditions on syllabification shown in (22a) can be expressed in OT in terms of local constraint conjunctions (Smolensky 1997), such that the ranked anti-association constraints are conjoined with the constraint NoCoDA.

³² The potential for this contrast in the ordinary vocabulary can again be linked to the accessibility of the relevant feature values in the input. That potential indicates that FAITH([±peripheral]) dominates the markedness constraint *N/∅ (No empty nuclei) as well, such that /r/ is forced to close the syllable in cases like (hɛR)_ω <Herr>, where a centralised vowel precedes. Word-final /m/, on the other hand, is forced to form the onset of a syllable with an empty nucleus in cases

/R/ as an onset of a syllable with an empty nucleus as in (22d) is supported by stress. Specifically, such a representation accounts for the potential presence of main stress on vowels preceding one of the sonorants {r,l,n} in word-final position, thereby accounting for the difference in stress in the shortenings illustrated in (23):

(23) a.  b.  c. 

('ara) _ω	ARA	<u>A</u> bwasserre <u>inigungs</u> an <u>l</u> age
('arak) _ω ~ ('arak) _ω	ARAG	<u>A</u> llgemeine <u>R</u> echtss <u>ch</u> utz <u>V</u> ersicherungs <u>AG</u>
(a'ral) _ω	Aral	<u>A</u> romate + <u>A</u> liphate

In all cases in (23) the last two syllables form a disyllabic foot whose leftmost syllable functions as the head. The words differ in the structure of the word-final syllable, in particular the presence of an empty nucleus licensed by the presence of stem-final /l/. The openness of the syllable preceding /l/ in (23c) is indicated by the lengthening of the vowel in the nucleus.³³

like (lam)_ω <lahm>, as a stressed peripheral vowel precedes (cf. Raffelsiefen 2016). The relevant ranking is stated below (cf. footnote 24):

$$*σ^{closed}/N^{[+per]} \gg \text{FAITH}([\pm\text{peripheral}])_{\text{PROM}} \gg *N/\emptyset$$

33 Interestingly this pattern of head foot formation is far more regular in shortenings with three (non-catalectic) syllables (e.g. (f'tyro'por)_ω *Styropor* (< *Polystyrol* + *porös*), (alu'zil)_ω *Alusil* (< *Aluminium* + *Silicium*)) than in shortenings with two (non-catalectic) syllables (e.g. ('zial)_ω (< *Silicium* + *Aluminium*)). Here we find that word-final {r,l,n} exhibit regular onset behavior only when a high vowel precedes, manifest in the peripherality of that vowel (e.g. ('e,kiR)_ω, not *('eKiR)_ω *EKiR* (< *Evangelische Kirche im Rheinland*)). Even peripheral vowels in that particular context (i.e. a single syllable precedes, word-final {r,l,n} follows) often associate with secondary rather than primary stress (e.g. ('e,kiR)_ω, not *('e'kiR)_ω).

The observation that the stressed vowel in ARAG may resist lengthening, as opposed to the stressed vowels in the other two words in (23), is of particular interest here as it sheds light on the phonological status of vowel quality, length, and syllable structure. The possible pronunciation of the stressed syllable with a short vowel is linked to the presence of a following unstressed closed syllable, where both syllables include vowels sharing the features for height, backness, and roundedness. This indicates an active vowel harmony constraint applying within feet, whereby a centralised vowel causes the vowel in the preceding stressed syllable to be centralised as well, especially when this harmony results in identical vowels.³⁴ (The stressed centralised vowel then conditions the association of the following consonant with the coda, to satisfy the constraint in (17a). Hence the ambisyllabicity and lack of phonetic lengthening.) Evidence for the activity of this harmony constraint in German strongly supports the assumption of a vowel quality opposition [\pm peripheral] as in (14). This is because harmony is known to refer to segmental quality features but never to length (i.e. mora structure) or syllable structure.

Insights to be gained from the shortening data accordingly include generalisations pertaining not only to unmarked prosodic organisation but also to notorious controversies in German phonology including syllable weight, vowel length, and abstractness of representation. Evidence for sonority rankings comes not only from syllable structure and the respective distribution of peripheral and centralised vowels but also from foot formation, as can be illustrated by certain systematic exceptions to the “default” pattern of penult stress in vowel-final trisyllabic shortenings shown in (24a).

- | | | | |
|---------|---|----|--------------------------------------|
| (24) a. | ('hari ₁ bo) _ω Haribo < <u>H</u> ans <u>R</u> iegel, <u>B</u> onn | b. | *(ha ¹ ribo) _ω |
| | ('dimi ₁ do) _ω Dimido < <u>D</u> ienstag, <u>M</u> ittwoch, <u>D</u> onnerstag | | *(di ¹ mido) _ω |
| | ('mali ₁ mo) _ω Malimo < <u>M</u> auersberger aus <u>L</u> imbach-
Oberfrohna, <u>M</u> olton | | *(ma ¹ limo) _ω |
| | ('romi ₁ ka) _ω Romika < <u>R</u> ollmann, <u>M</u> ichael & <u>K</u> aufmann | | *(ro ¹ mika) _ω |

³⁴ The harmony constraint can be observed in ordinary words as well, accounting for the occurrence of short centralised stressed vowels in cases like ('tabak)_ω *Tabak* 'tobacco', ('nubok)_ω *Nubuk* 'nubuck' versus (gopak)_ω *Gopak* 'Russian dance', or the city names ('boχɔlt)_ω *Bocholt* versus ('boxom)_ω *Bochum*. The constraint is not equally pervasive in all contexts and for all speakers, but many will likely agree that for instance the vowels in the stressed syllables in the names ('zara)_ω *Sarah*, ('tilo)_ω *Tilo* are necessarily peripheral, subject to lengthening, whereas the corresponding vowels in the names *Harald*, *Philipp* can be centralised and short (i.e. ('harald)_ω ~ ('harald)_ω, ('filp)_ω ~ ('filp)_ω). (Cf. the variation noted in the shortening in [23a, b].)

The fact that the potential final trochees shown in (24b) typically exhibit a sonorant in foot-initial position along with the vowel /i/ in the nucleus of the head syllable indicates the relevance of sonority constraints (Kenstowicz 1997). Reference to /i/ in the head syllable supports the ranking of /i/ as the least sonorous vowel and therefore worst vocalic nucleus in a prominent syllable,³⁵ reference to sonorants in foot-initial position supports their ranking as the most sonorous consonants and therefore least preferred occupants of the syllable margin. In conjunction the relevant constraint violations lead to the elimination of the relevant foot parsings (see 24b).³⁶ A final trochee afflicted with only one of these problems (only a marked foot-initial onset as in 25a or only /i/ in the head syllable as in 25b), is accepted.³⁷

- | | | | | |
|------|----|------------------------|--------|---|
| (25) | a. | (zo'lavi) _ω | SoLaWi | <u>S</u> olidarische <u>L</u> and <u>w</u> irtschaft |
| | | (ha'nuta) _ω | Hanuta | <u>H</u> aseln <u>u</u> sstafel |
| | b. | (me'dima) _ω | Medima | <u>M</u> edizin in <u>M</u> aschen |
| | | (ge'ziba) _ω | GESIBA | <u>G</u> emeinnützige <u>S</u> iedlungs- und
<u>B</u> auaktiengesellschaft |

The picture that emerges is that prosodic organisation of phonemic material is fundamentally determined by phonemic content and domain boundaries. Phonemic content determines not only syllable structure (open or closed) but also the organisation of syllables into feet and the concomitant relative prominence relations, which in turn determine the phonetic implementation, causing strengthening of the articulation in prominent positions (e.g. vowel lengthening in open head syllables). Shortenings provide an ideal window for studying markedness constraints, as their effects are minimally obscured by faithfulness constraints.

³⁵ That status is confirmed by the fact that /i/ is the only vowel that can form an onset in German (cf. the shortening (iɔp)_ω <IUP> in [7c]).

³⁶ Here again we see the value of shortenings as a window on unmarkedness, as the relevant stress regularities are obscured by a preference for word-final trochees in feminine proper names (e.g. *Karina*, *Marita*, *Elisa*; cf. also *Maria*, *Sofia* versus (ʰbebr̩i,a)_ω *BEBRIA* (< *Berliner Briefmarken-Ausstellung*), (ʰvidi,a)_ω *Widia* (< *Wie Diamant*)). The effect of constraint conjunction was also seen in connection with the data in (7a, b) versus (7d).

³⁷ These correlations between sonority and stress argue against Ronneberger-Sibold's claim that penult stress as in (25) is due to a special Romance stress rule in German (2015: 489). Her idea of multiple stress rules in German associated with specific subsets of the vocabulary has been criticised by Vennemann (1998: 236).

4 Shortening types and prosodic domains

This section gives a brief overview of the major shortening types in German, mainly to motivate the particular restrictions on the single-domain shortening corpus on which the generalisations illustrated in the preceding section (see 3, 8) were based.³⁸

Before reviewing the main types of single domain shortenings below, I will briefly illustrate the two main types of multi-domain shortenings, both of which are compounds with internal morphological structure. The first type consists of copulative compounds, typically letter compounds as in (26a), which are characterised by the equal status of all members and main stress on the final member. The second type consists of determinative compounds (DC), where the final stem in the source form is fully retained and functions as the morphological head of the compound. The preceding part of the source form is shortened, represented for instance by a letter name as in (26b), which then forms a separate phonological word constituting the prosodic head of the compound.

(26)	source form	spelling and morphology	prosodic organisation
a.	<u>D</u> eutsche <u>B</u> ahn	[[de][be]] _{CC} <DB>	((de) _ω (be) _{ωHd}) _{CC}
b.	<u>S</u> tadt <u>b</u> ahn	[[εs][ban]] _{DC} <S-Bahn>	((εs) _{ωHd} (ban) _ω) _{DC}

Apart from a few cases of so-called hidden compounds (see Section 5), both types in (26) are easily identified and all relevant diagnostics consistently support the respective separate prosodic domains for syllabification and foot formation.

The first three of the single domain shortenings in (27) have already been mentioned. They are characterised by correspondences to graphemes located at the left edge of multiple morphemes in the source form. Additional material can be included, as in (27b, c), but only when forming a contiguous string, typically up to and including the first syllabic vowel.

(27)	shortening type	source form	spelling and morphology	prosodic organisation
a.	Initialkurzwort	<u>U</u> mwelt# <u>b</u> undes# <u>a</u> mt	[UBA] _{N-NEUT}	('uba) _ω
b.	Silbenkurzwort	<u>K</u> inder# <u>t</u> ages# <u>s</u> tätte	[Kita] _{N-FEM}	('kita) _ω
c.	Mischkurzwort	<u>J</u> ugend# <u>k</u> ultur# <u>z</u> entrum	[Jukuz] _{N-NEUT}	('iøkʊt ^s) _ω
d.	Clipping	<u>I</u> nformation	[Info] _{N-FEM}	('ɪfno) _ω

³⁸ The classification is adapted from Bergström-Nielsen (1952) and Kobler-Trill (1994).

Necessary reference to a morpheme-initial segment and contiguity of all additional material standing in correspondence is also characteristic for clippings illustrated in (27d). Clippings differ from other shortenings in that they correspond to a single contiguous string, which may allow for source forms to be recovered more easily by hearers. Clippings also differ in that they appear to require less reference to written forms.

There is a question then of whether to merge all of the different types of single domain shortenings shown in (27) into a single corpus or whether to treat them separately. This is ultimately an empirical question, answered by an examination of the relevant patterns. The approach is to establish a baseline by examining a clearly defined subset upon which to base the comparison with additional types of data. Assuming then the patterns observed in the first three types of shortenings in (27) as a basis for comparison, it may first appear that clippings conform to the relevant generalisations. The prosodic shape of the clippings in (28) entirely matches that of the shortenings studied so far: disyllabic strings are organised as trochees, regardless of the stress patterns and prosodic boundaries given in source forms. Intervocalic single consonants yield two open syllables, and vowels in open head syllables are phonetically lengthened. (The relevant portion of source forms is represented phonologically.)

(28)	(^l gefi) _ω	Geschi	(gə) _σ (^l ʃiçts) _ω . . .	<u>Ge#schichts#</u> unterricht
	(^l ʰula) _ω	Zula	(^l tʰu) _ω (^l lasuŋs) _ω . . .	<u>Zu#lassungs#</u> arbeit
	(^l tʰivi) _ω	Zivi	(tʰi ^l vil) _ω . . .	<u>Zivil#dienst#</u> leistender
	(^l ʃpetʰi) _ω	Spezi	(ʃpe ^l tʰial) _ω . . .	<u>Spezial#</u> freund

As for the last generalisation mentioned above, a systematic difference is, however, seen in many other clippings, which favour centralised vowels in head syllables, even when only one consonant follows (see 29b), where parentheses in the source forms indicate phonological word boundaries). They therefore contrast with *Silben-*, *Misch-*, and *Initialkurzwörter* as in (29a), which exhibit peripheral vowels:³⁹

³⁹ Clippings containing only mid vowels constitute a systematic exception as they favour peripheral vowels instead (cf. [i]). This pattern is reminiscent of evidence for ATR-harmony restricted to specific vowel heights (Archangeli and Pulleyblank 1989). If indeed systematic and indicative of a constraint requiring harmony, this would further support the assumption of a vowel quality opposition (see the discussion of *ARAG* in [23b]).

(i)	/ʃoko/	Schoko	(Schokoláde)	/ˈdeko/	Deko	(Dekoratió)
	/ˈkroko/	Kroko	(Krokodíl)	/ˈvelo/	Velo	(Velozipéd)
	/ˈøko/	Öko	(Ökologie)	/ˈmemo/	Memo	(Memorándum)

(29)	(^t eli) _ω	ZeLi	<u>Z</u> ehlendorfer	b.	(^r eli) _ω	Reli	(<u>R</u> eligións)
a.			<u>L</u> ichtspiele				unterricht
	(^f abi) _ω	Stabi	<u>S</u> taats# <u>b</u> ibliothek		(^a bi) _ω	Abi	(<u>A</u> bitúr)
	(^f ino) _ω	Stino	<u>s</u> tink# <u>n</u> ormaler		(^l imo) _ω	Limo	(<u>L</u> imonáde)
			Mann				
	(^b ema) _ω	Bema	<u>B</u> ewertungs#		(^k rimi) _ω	Krimi	(<u>K</u> riminál)
			<u>m</u> aßstab				roman
	(^b una) _ω	Buna	<u>B</u> utadien mit		(^u ni) _ω	Uni	(<u>U</u> niversitât)
			<u>N</u> atrium				
	(^z ovi) _ω	SoWi	<u>S</u> ozial#		(ⁿ avi) _ω	Navi	(<u>N</u> avigatións)
			<u>w</u> issenschaften				gerät
	(^m oma) _ω	Moma	<u>M</u> orgen- <u>M</u> agazin		(^p romi) _ω	Promi	(<u>p</u> rominénte)
							Person

The assumption that the peripheral vowels in (29a) represent unmarkedness whereas the centralised vowels in (29b) indicate correspondence (i.e. faithfulness to input structure) is supported by the contingency of the latter on a narrow prosodic context. The strings affected by correspondence in the relevant source forms, underlined in (29b), consist of two contiguous syllables, located at the left periphery of the source form where they precede the syllable carrying main stress. This context favours rhythmic accent on the initial syllable, where the association of prominence with phonetic vowel shortness is prone to be interpreted as indicative of a centralised vowel⁴⁰ (cf. Vennemann 1991a: 236, Becker 1998: 95). This (re)analysis leads to the occurrence of a centralised vowel in the clipped forms in (29b) via correspondence. The contrast between the unmarked organisation of a *Silbenkurzwort* such as (^teli)_ω *ZeLi* in (29a) and the organisation resulting from correspondence in a clipping such as (^reli)_ω *Reli* in (29b) can then be represented analogous to the contrast between (^koma)_ω *Koma* and (^kɔma)_ω *Komma* shown in (18a, b).

The relevance of the presence of a contiguous disyllabic string for this sort of correspondence effect can be demonstrated with *Silbenkurzwörter* as in (30), which are characterised by noncontiguity of the relevant syllables in the source form. Here the peripherality value of the vowel in the source form, regardless of its prominence, is not regularly preserved in the shortening.

⁴⁰ This is because peripheral vowels are phonetically lengthened under stress whereas centralised vowels remain short.

- | | | | | | |
|---------|---|--|----|-------------------------------------|-------|
| (30) a. | (¹ kɪʀʃ) _ω ... | <u>K</u> irsch- <u>B</u> anane-Saft | b. | (¹ ki.ba) _ω | Kiba |
| | (mɔlkə ¹ rai) _ω ... | <u>M</u> olkerei# <u>p</u> rodukte | | (¹ mo.pro) _ω | Mopro |
| | (io ¹ hanɪs) _ω ... | <u>J</u> ohannis# <u>b</u> eeren,
<u>S</u> tachel# <u>b</u> eeren | | (¹ ɪs.ta) _ω | Josta |
| | (¹ ybər) _ω ... | <u>Ü</u> berlandwerke und
<u>S</u> traßenbahnen Hannover AG | | (¹ vs.tra) _ω | Üstra |

The claim that vowel correspondence in clippings requires a matching disyllabic string is supported by the monosyllabic clippings, which are indistinguishable from *Initial-* or *Mischkurzwörter*. Before final obstruents or /m/ only centralised vowels precede as in (31a); before /l/ or /n/ both types of vowels are possible (cf. 31b).

- | | | |
|----------------|--|--|
| (31) Clippings | | <i>Initial- or Mischkurzwörter</i> |
| a. | (¹ bɪp) _ω Bib (<u>B</u> ibliothék) | (¹ pɪp) _ω PiB <u>P</u> flegekinder in <u>B</u> remen |
| | (¹ tʊt) _ω Tut (<u>T</u> utórium) | (¹ bɔp) _ω BOB <u>B</u> ayerische <u>O</u> berland <u>b</u> ahn |
| b. | (¹ gɛl) _ω Gel (<u>G</u> elatíne) | (¹ dɪn) _ω DIN <u>D</u> eutsches <u>I</u> nstitut für
<u>N</u> ormung |
| | (¹ ʃɪl) _ω Phil (<u>P</u> hilosophíe) | (¹ tɪl) _ω TiL <u>T</u> alent im <u>L</u> and |

Recall that the correspondence effect in question requires not only a contiguous disyllabic string in the source form but also the containment of that string in a single phonological word where the first syllable is more prominent than the second (cf. 29b versus 28). The effect presupposes then the correspondence of entire trochees. This is the type of condition on systematic correspondence necessarily referring to spoken source forms alluded to in Section 1. Importantly, such cases influenced by correspondence need to be treated separately so as not to distort the insight that the type of organisation seen in (18a) is unmarked in German.⁴¹

As for sorting the data consider finally the question of how to treat so-called *Kunstwörter* illustrated in (32):

⁴¹ The view of the open syllables as in *Koma* (see [18a]) as unmarked prosody in German is challenged by the fact that the ambisyllabic structure as in *Komma* (see 18b) dominates in certain contexts (e.g. expressions such as (¹mama)_ω *Mama*, (¹pɪpi)_ω *Pipi* in children's speech) and appears to be linked to a more casual register. Here another markedness constraint known as Prokosch's Law, which requires stressed syllables to be heavy (i.e. closed in German), may come into play. This may account for variation in a few shortenings (e.g. (¹ʃtuka)_ω ~ (¹ʃtuka)_ω *Stuka* (< *Sturzkampfflugzeug*)).

- (32) Elsa Tesmer ('teza)_ω Tesa (adhesive tape)
Emil Pauly (mi'lupa)_ω Milupa (baby food)
Bizer Balingen (bi't^sɛR.ba)_ω Bizerba (scales)
Hermann Tietze ('hɛR.ti)_ω Hertie (department store)
Adi Dassler ('adi,das)_ω Adidas (sportswear)
Wie Diamant ('vidi,a)_ω Widia (steel tools)
Perborat & Silikat (pɛR'zil)_ω Persil (laundry detergent)

Kunstwörter stand apart from all remaining shortening types in that they are not necessarily coreferential with respect to their source form nor is their gender determined by that form. (The name *Elsa Tesmer* refers to a female individual, whereas *Tesa* is a neuter noun referring to a brand of adhesive tape.) Unlike regular shortenings, which aim to provide an alternative expression of an independently existing source form, the formation of a *Kunstwort* aims to create a novel expression, typically a trademark. This difference in function correlates with frequent violations of rules determining the formation of regular shortenings: there is no necessary reference to the left edge of morphemes, no necessary preservation of the linear order of the material as given in source forms, and no need to select contiguous material or to obey the limits on segments to be represented. For instance, none of the boldface segments in (32) would be included in a regular *Silbenkurzwort*.

Although it seems plausible to separate all *Kunstwörter* due to these rather striking differences in function and form, the comparison of the relevant patterns to the baseline established with reference to *Initial-*, *Silben-*, and *Mischkurzwörter* indicates that the patterns are largely alike. A few examples comparing the *Kunstwörter* introduced above in the lefthand column to regular shortenings to their right are given in (33).

- (33) ('teza)_ω ≈ ('geza)_ω Gesa Gefangenen#sammelstelle
(mi'lupa)_ω ≈ (zo'lavi)_ω SoLaWi Solidarische Landwirtschaft
(bi't^sɛR.ba)_ω ≈ (ge'dɛlfi)_ω Gedelfi Großeinkauf Deutscher
Lebensmittelfilialbetriebe
('hɛRti)_ω ≈ ('ɛlfi)_ω Elphi Elbphilharmonie
('adi,das)_ω ≈ ('asfi,nak)_ω ASFINAG Autobahnen- und
Schnellstraßen-Finanzierung-
Aktiengesellschaft
('vidi,a)_ω ≈ ('bebri,a)_ω BEBRIA Berliner Briefmarken-
Ausstellung
(pɛR'zil)_ω ≈ (ha'bil)_ω Habil Habilitationschrift

Kunstwörter are therefore included in the SDS-corpus, as long as they are indeed formed by shortening. Other novel words used for brand names, including so-called fantasy words, which have no recognisable source form, are not included due to their likely origin in intended shapes in the minds of speakers, to which they are then molded. Indeed, fantasy words often violate constraints on prosodic organisation not violated in any shortenings (e.g. final main stress in /bala'he/ <Balahé>, a brand name for perfume).⁴²

5 Screening the shortening data for potential interferences

All claims regarding the regularity of the prosodic organisation of given phoneme sequences presuppose both single phonological word domains and the lack of prosodic correspondence effects. The purpose of this section is to further clarify these two prerequisites and explain apparent counter-examples as a consequence of non-adherence to one or the other.

5.1 Cases of non-obvious internal phonological word boundaries

In this section I will draw attention to a few cases of likely internal phonological word boundaries motivating the exclusion of shortenings from the SDS-corpus.

Consider the shortening *Meckpomm* in (34a), where final stress seemingly violates the 2σ -RULE stated in (13a). The closed syllables deviate from the selection patterns characteristic of German *Silbenkurzwörter*. They indicate the presence of two consecutive shortenings [mæk] and [pɔm], organised as a copulative compound (cf. 34a) in analogy with the source expression, a two-member copulative compound consisting of the names of two states. The output to be expected from a more typical shortening of the source compound, two open syllables organised as a trochee within a single phonological word, is illustrated in (34b).

⁴² Ronneberger-Sibold separates all product names from her main corpus, based on her claim that their phonological shape is characterised by the intent to attract attention, leading to deliberate deviations from the prosody of other shortenings (1992: 116). Plausible though this idea may seem, it is not corroborated by the data.

- (34) a. Mecklenburg-Vorpommern ((mɛk)_ω(pɔm)_{ωHd})_{CC} *Meckpomm*
 b. Mecklenburg-Vorpommern ('mefo)_ω *MEVO*⁴³

Another violation of the generalisations likely to result from internal phonological word boundaries concerns the word-final stress in the shortening *rororo* (trade name for a publishing company) shown in (35a). While indicating the selectional patterns of a regular *Silbenkurzwort*, that word is special in that it consists of three identical syllables, thereby inviting a reanalysis as a copulative compound [[RO][RO][RO]]. This organisation results in final main stress (cf. 35b).

- (35) a. /RORO'RO/ *rororo* Rowohlt Rotations Romane b. ((RO)_ω(RO)_ω(RO)_{ωHd})_{CC}

Final stress in the trade names in (36) is associated with written representations likely to conceal letter compounds, as these shortenings are parsable into consecutive stems associated with the boldfaced initials in the source forms. Final stress then again follows from the regular head status of the rightmost member of a copulative compound.

- (36) /ɛlbe'o/ Elbeo Louis Bahner Oberlungwitz (tights) ((ɛl)_ω(be)_ω(o)_{ωHd})_{CC}⁴⁴
 /ɛs'tʰɛt / Eszet Staengel & Ziller (chocolate) ((ɛs)_ω(tʰɛt)_{ωHd})_{CC}
 /tʰe've/ CEWE Carl Wöltje (photo technology) ((tʰe)_ω(ve)_{ωHd})_{CC}
 /fau'de/ Vaude Albrecht von Dewitz (sportswear) ((fau)_ω(de)_{ωHd})_{CC}
 /ɛR'ge/ Ergee Edwin Rössler, Gelenau/Erzgebirge (tights) ((ɛR)_ω(ge)_{ωHd})_{CC}⁴⁵

⁴³ This particular shortening is uncommon as it is blocked by the common abbreviation in (34a). Significantly, it can be pronounced only with peripheral vowels and initial stress.

⁴⁴ It goes without saying that concealed letter compounds invite “mispronunciations” as a single phonological word, which would destabilise final main stress and, for this phoneme sequence, allow for a shift to penult stress (cf. ('rode_{o,ω}) ~ (ro'deo)_ω <Rodeo> 'rodeo'). The originally intended copulative compound structure of *Elbeo* can be verified by examining commercials for this product, where the final main stress along with the glottalisation of the vowel /o/, due to its phonological word-initial position, is unmistakably heard.

⁴⁵ The doubling of the final vowel in the written form might be intended to forestall GP-CORR constraints, which would map a single final <E> (as in <Erge>) to schwa. The alleged motivation of <Ergee> as an acronym based on the graphemes underlined in *Edwin Rössler, Gelenau/Erzgebirge* is then possibly a case of backronymy. *CEWE* and *Vaude* are not included in the set of apparent counter-examples in (3) because their status as concealed letter compounds is not in question.

An additional case of somewhat hidden internal domain boundaries concerns (quasi)prefixes, which in German are not integrated into the phonological word of the stem. Consider the shortening /de'statɪs/ in (37a), where violations of both the $\sigma^{\text{op/clos}}$ -RULE in (13d), which requires a centralised vowel in a closed syllable (cf. (mɛs'titʰə)_ω <Mestize> 'mestizo', (tɛs'tikəl)_ω <Testikel> 'testicle') and the 3σC-RULE in (13b), which predicts word-initial main stress, indicate the recognition of a quasi-prefix *de-*. The relevant prosodic organisation as a Composite Group (CG) is shown in (37b) (Nespor and Vogel 2007: xvii). A few related cases of quasi-prefixes and their effect on prosodic organisation are listed below.

(37) a.	/de'statɪs/	Destatis	<u>De</u> utsches <u>Statistik</u> - Informationssystem	b.	(de('statɪs) _ω) _{CG}
	/ge'stapo/	Gestapo	<u>Ge</u> heime <u>Staats</u> polizei		(ge('stapo) _ω) _{CG}
	/pro'medɔs/	Promedos	<u>Pro</u> grammierte <u>Medikamenten</u> - <u>Dosierung</u>		(pro('medɔs) _ω) _{CG}

Yet another case of potential internal domain boundaries concerns (quasi)compounds, where the recurrence of sound and meaning at the right periphery as in (38a, b) ([pol] matches the beginning of the word [poli'tʰai] <Polizei> 'police' and refers to police organisations, [mil] matches the beginning of the word [mɪlç] <Milch> 'milk' and refers to milk products marketed as baby food) invite an analysis as determinative compounds (e.g. [[ɔiɾo][pol]], [[milu][mil]]). The respective prosodic organisations are shown in the righthand column. The examples in (38c) show the distinct stress patterns resulting from the organisation of a three-syllable shortening ending in /l/ as a single phonological word:

(38) a.	/'ɔiɾo.pol/	Europol	<u>Eu</u> ropäisches <u>Pol</u> izeiamt	((ɔiɾo) _ω Hd(pol) _ω) _{END-COMP}
	/'ɪntɛɾ.pol/	Interpol	<u>Int</u> ernationale Kriminal- <u>pol</u> izeiliche Organisation	((ɪntɛɾ) _ω Hd(pol) _ω) _{END-COMP}
b.	/'aptɑ.mil/	Aptamil	<u>Adapt</u> ierte - <u>a</u> - <u>Milch</u>	((aptɑ) _ω Hd(mil) _ω) _{END-COMP}
	/'milu.mil/	Milumil	<u>Milupa</u> <u>Milch</u>	((milu) _ω Hd(mil) _ω) _{END-COMP}
c.	/penɑ'zɔl/	Penasol	<u>Pen</u> aten + Latin <u>sol</u> 'sun'	(penɑ'zɔl) _ω
	/vita'mol/	Vitamol	<u>Vit</u> amin + <u>O</u> leum morrhuae	(vita'mol) _ω

While it could be argued that the shortenings in (38c) are also morphologically complex and contain a (pseudo)suffix *-ol*, it holds in general that vowel-initial suffixes form a single phonological word with the preceding stem (Raffelsiefen forthc.). The phonological word structure shown in (38c) is therefore adequate, regardless of whether a suffix *-ol* is recognised.

5.2 Cases of potential interference from correspondence with prosodic structure

Some evidence for systematic prosodic correspondence effects has already been noted in connection with clippings (see Section 4). Here I wish to draw attention to further cases illustrating the potential distortion of unmarked prosody resulting from such influences.

The perhaps most obvious case of prosodic correspondence concerns borrowed shortenings with their original stress pattern preserved, such as Greek (pa'sɔk)_ω PASOK. Here final stress simply corresponds to the pattern in the Greek source expressions. The problem raised by some of the stress-preservation cases lies in their subsequent association with reconstructed source forms based on German words, which may give them the appearance of having been coined natively. Examples are shown in (39):

(39)		Source forms:	Reconstructed full forms?	
	(dia'mat) _ω	DIAMAT	Russian diamát	(Dialektischer <u>Ma</u> terialismus)
	(bi'onik) _ω	Bionik	English biónics	(<u>Bi</u> ologie + <u>Techni</u> k)

If the stress patterns in (39) are borrowed they do not count as counterexamples to the claim that trisyllabic words ending in a closed syllable are regularly organised with initial main stress (see 13b).⁴⁶

⁴⁶ There is no need to treat separately all shortenings of foreign origin. Especially those showing signs of assimilation to the phonology of German, most notably cases where letter compounds in the source language are reorganised as single-domain acronyms in German, are included in the SDS-corpus.

Source	Acronym	Source language (English)	German
Factory_Outlet_Center	FOC	((ɛf) _ω (əu) _ω (si) _{ωHD}) _{COP-COMP}	(fɔk) _ω
free on board	fob	((ɛf) _ω (əu) _ω (bi) _{ωHD}) _{COP-COMP}	(fɔp) _ω

Certain shortenings originating in Swiss German are, however, to be treated separately due to the preference for initial stress in that variety of German (e.g. ('riko|la)_ω *Ricola* (< *Richterich* & *Compagnie*, *Laufen*) (candy)).

- (42) a. No Motte -a (. . .('mɔtə)_ω . . .) (no'mɔtə)_ω Nomotta (moth repellent)
Sanne & Ella (. . .('ɛla)_ω) (za'nɛla)_ω Sanella (margarine)
nicht knitternd -a
 (. . .('knɪtərnd)_ω . . .) (ni'knɪtə)_ω Niknitta (fabric)
- b. Adressiermaschine (a'drɛma)_ω Adrema (mailing machine)
 ((adrɛ'sɪr)_ω . . .)
Metallbohrdreher ((me'tal)_ω . . .) (me'tabo)_ω Metabo (metal drill)
Haselnusstafel (. . .('nʊs)_ω . . .) (ha'nuta)_ω Hanuta (candy)

Similar effects connected to phonological salience are seen in (43a), where the most prominent foot, when located at the right periphery in the source form, is preserved in the shortening, leading to deviations from the generalisations in (13) (i.e. 2σ-RULE, 3σ-RULE). Those conditions do not obtain in (43b) and the shortenings fully conform to the generalisations in (13):

- (43) a. Bacteri Trimetoprim (. . . (trimeto'prim)_ω) (bak'trim)_ω Bactrim
Rifampicin Trimetoprim (. . . (trimeto'prim)_ω) (rifa'prim)_ω Rifaprim
lavare + Automat (. . . (auto'mat)_ω) (lava'mat)_ω Lavamat
- b. durare + Cefadroxil (. . . (t'sɛfadrɔk'sil)_ω) ('dura₁t'sɛf)_ω Duracef
Flores Europa(e) (. . . (ʒi'rɔpa)_ω) ('flɔɪrɔp)_ω Fleurop
Milchrahm (('milç)_{ωHD} ('ram)_{ωDC}) ('mɪlram)_ω Milram

A possible highly restricted condition on prosodic correspondence presupposes vowel markedness associated with foremost prominence in the source form. Relevant cases are shown in (44):

- (44) a. Atmosphären#über#druck atü (a'ty)_ω
Baden-Württemberg BaWü (ba'vy)_ω ~ ('ba.vy)_ω
- b. Regen#über#lauf#becken ('yβər) RÜB (ryb)_ω⁴⁸

'bushes'). This presumably relates to the fact that only among high vowels are peripheral vowels unmarked vis-à-vis centralised vowels (see footnote 29).

48 The assumption of a voiced obstruent here is motivated by the organisation of that obstruent in onset position due to the preceding peripheral vowel. In onset position, the relevant GP-CORR convention associates the grapheme with the phoneme /b/, as opposed to the coda position in cases like *PfÜB* in (45b), where that grapheme links to /p/ instead. (De)voicing is then relegated to phonetic implementation, affecting obstruents preceding a word-final empty nucleus (a process of articulatory weakening akin to the vocalisation of /r/ in final onset position, see footnote 30). Evidence for the need to discern such cases of phonetic Final Devoicing from a markedness constraint restricting all coda obstruents to voiceless phonemes is discussed in Raf-felsiefen (2016).

Here correspondence leads to violations of $\sigma^{op/clos}$ -RULE and 2σ -RULE in the shortenings, where final main stress in the shortenings mimics the main prominence of the corresponding syllable in the source form. The relevance of the conjoined conditions in question is supported by the absence of a correspondence effect when only one (or none) of the conditions is met. A source form whose main stressed syllable contains an unmarked vowel (cf. 45a) or a marked vowel that fails to carry main stress (cf. 45b) yields shortenings which conform to the generalisations in (13).

- | | | |
|---------|---|---------------------------|
| (45) a. | <u>B</u> und <u>e</u> s <u>g</u> á <u>r</u> tenschau | BUGA ('buga) _ω |
| | <u>K</u> arl- <u>I</u> ó <u>s</u> ef | Kajo ('kaio) _ω |
| | <u>B</u> ayerische <u>Ö</u> berland# <u>b</u> ahn (. . .('obəR). . .) | BOB (bɔp) _ω |
| | b. <u>T</u> echnischer <u>Ü</u> ber <u>w</u> á <u>c</u> hungs- <u>V</u> erein (. . .('ybəR). . .) | TÜV (tʏf) _ω |
| | <u>P</u> fändungs- und <u>Ü</u> ber <u>w</u> é <u>i</u> sungs# <u>b</u> escheid | PfÜB (pʰʏp) _ω |
| | (. . .('ybəR). . .) | |
| | <u>N</u> eue <u>Ö</u> konomische <u>P</u> olit <u>i</u> k (. . .('øko. . .) . . .) | NÖP (nœp) _ω |

Consider next the possible explanation for the violation of regular prosody (i.e. $\sigma^{op/clos}$ -RULE) in (46) due to so-called apronymy, a term referring to the deliberate modelling of shortenings on existing words.

- | | | | |
|------|--|--------|---------------------|
| (46) | Kaffee- <u>H</u> andels- <u>A</u> ktiengesellschaft | Kaffee | Kaffee |
| | | HAG | (hag) _ω |
| | <u>S</u> taatliche <u>E</u> rfassungsgesellschaft für öffentliches <u>G</u> ut | STEG | (ʃteg) _ω |

The idea that the brand name *Kaffee HAG* is intended to evoke the positive connotations associated with the stem *hag* (cf. *be(hag)_ωlich* 'content', *Be(hagan)_ω* 'contentment') is supported by the odd shortening pattern leaving the first word of the source form intact (instead of forming a *Silbenkurzwort* "Kaha" or a *Mischkurzwort* "Kahag").⁴⁹ Also in STEG, the representation of the content word *öffentlich* is skipped, apparently to achieve homophony with the existing word (ʃteg)_ω *Steg* 'footbridge'.

⁴⁹ A rare case of a regular shortening exhibiting a deviation from unmarked phonology likely motivated by analogy is ('kvabi)_ω *Quabi* (< *Qualifizierter beruflicher Bildungsabschluss*), which appears to be modelled directly on *Quali* (also a degree in the Bavarian school system), and perhaps *Abi*. Both *Quali* and *Abi* are clippings (< *qualifizierender Abschluss der Mittelschule*, < *Abitúr*), characterised by a centralised stressed vowel. Such influences may require similarity regarding both form and meaning.

The vowel geminate in (48a), by contrast, induces an organisation as a letter compound. This somewhat cumbersome structure resolves the dilemma between a pronunciation $(dat)_w$, with inadequate grapheme-phoneme correspondence in the head syllable, and $(dad)_w/(dat)_w$, which violate the constraint against (word-final) empty nuclei or against peripheral vowels in closed syllables. Here we see an interesting asymmetry and gain insight into the relation between written and spoken language, where shortenings again provide a unique window.

6 Conclusion and outlook

This article aims to draw attention to the unique potential of shortenings to serve as a window on unmarked phonological structure. To fully explore this potential, it is necessary to properly sort the shortening data, to ensure the presence of proper domains (single phonological words) and the absence of prosodic correspondence effects. It is further necessary to refer to a specific degree of abstractness of phonological representation. When executed with care, this approach can be shown to reveal remarkably regular sound patterns, which can then be further explored by phonologists aiming to model phonological grammar. The patterns appear to lend themselves to an analysis in terms of independently motivated phonological markedness constraints in accordance with Optimality Theory.

In view of the regularity and consistency observed in the properly sorted SDS-corpus, one could argue that despite its relatively small size (currently roughly 1200 items) it is more valuable to phonologists than vast corpora of unsorted speech. The extraction of statistical patterns based on raw phonetic data, regardless of the size of the corpus, is indeed of dubious interest to linguists interested in phonology at the word level. Even careful and consistent annotations, which are hard to find, will not help discern the inherited and imitated from the unmarked patterns to be identified in a phonological grammar aiming at explanatory adequacy.

References

- Archangeli, Diana & Douglas Pulleyblank. 1989. Yoruba vowel harmony. *Linguistic Inquiry* 20, 173–217.
- Bat-El, Outi. 1994. The optimal acronym word in Hebrew. In Päivi Koskinen (ed.), *Proceedings of the 1994 Annual Conference of the Canadian Linguistic Association*, 23–37. Toronto: Toronto Working Papers in Linguistics.

- Becker, Thomas. 1998. *Das Vokalsystem der deutschen Standardsprache*. Frankfurt am Main: Lang.
- Beckman, Jill. 1998. *Positional faithfulness*. Amherst, MA: University of Massachusetts Amherst dissertation.
- Bergström-Nielsen, Henrik. 1952. Die Kurzwörter im heutigen Deutsch. *Moderna Språk* 46. 2–22.
- Dixon, Robert Malcolm Ward. 1997. Some phonological rules in Yidiny. *Linguistic Inquiry* 8. 1–34.
- Harris, John & Edmund Gussman. 2002. Word-final onsets. *UCL Working Papers in Linguistics* 14. 1–42.
- Janßen, Ulrike. 2004. *Untersuchungen zum Wortakzent im Deutschen und Niederländischen*. Düsseldorf: University of Düsseldorf dissertation.
- Kenstowicz, Michael. 1997. Quality-sensitive stress. *Rivista di Linguistica* 9. 157–188.
- Kobler-Trill, Dorothea. 1994. *Das Kurzwort im Deutschen: Eine Untersuchung zu Definition, Typologie und Entwicklung*. Tübingen: Max Niemeyer.
- Leuschner, Torsten. 2008. Kurzwortbildung im Deutschen und Niederländischen: Grundlagen und Ergebnisse eines prototypischen Vergleichs. *Germanistische Mitteilungen* 57. 247–261.
- Lindau, Mona. 1978. Vowel features. *Language* 54. 541–563.
- Lux, Barbara. 2016. *Kurzwortbildung im Deutschen und Schwedischen: Eine kontrastive Untersuchung phonologischer und grammatischer Aspekte*. Tübingen: Narr Francke Attempto Verlag.
- Nespor, Marina & Irene Vogel. 2007. *Prosodic phonology*. Berlin: de Gruyter.
- Nübling, Damaris. 2001. *Auto – bil, Reha – rehab, Mikro – mick, Alki – alkis*: Kurzwörter im Deutschen und Schwedischen. *Skandinavistik* 31. 167–199.
- Piñeros, Carlos-Eduardo. 2000. Prosodic and segmental unmarkedness in Spanish truncation. *Linguistics* 38. 63–98.
- Prince, Alan & Paul Smolensky. 1993. *Optimality theory: Constraint interaction in generative grammar*. New Brunswick, NJ: Rutgers University Center for Cognitive Science.
- Raffelsiefen, Renate. 1995. Conditions for stability. *Arbeiten des Sonderforschungsbereich 282* (69).
- Raffelsiefen, Renate. 2000. Constraints on schwa apocope in Middle High German. In Aditi Lahiri (ed.), *Analogy, levelling, markedness*, 125–170. Berlin: de Gruyter.
- Raffelsiefen, Renate. 2016. Allomorphy and the question of abstractness: Evidence from German. *Morphology* 26. 235–267.
- Raffelsiefen, Renate. 2018. Phonologische Abstraktheit und symbolische Repräsentation. In Angelika Wöllstein, Peter Gallmann, Mechthild Habermann & Manfred Krifka (eds.), *Grammatiktheorie und Empirie in der germanistischen Linguistik*, 549–586. Berlin: de Gruyter.
- Raffelsiefen, Renate. Forthc. Morpho-phonological asymmetries in affixation. In Peter Ackema, Sabrina Bendjaballah, Eulalia Bonet & Antonio Fábregas (eds.), *The Wiley Blackwell Companion to Morphology*. New York: John Wiley & Sons.
- Raffelsiefen, Renate. In progress. The grammar of shortening in German (including the SDS-corpus). Mannheim: Leibniz-Institut für Deutsche Sprache.
- Ronneberger-Sibold, Elke. 1992. *Die Lautgestalt neuer Wurzeln: Kürzungen und Kunstwörter im Deutschen und Französischen*. Freiburg: Albert-Ludwigs-Universität Freiburg im Breisgau Habilitationsschrift.

- Ronneberger-Sibold, Elke. 2007. Zur Grammatik von Kurzwörtern. In Jochen Bär, Thorsten Roelcke & Anja Steinhauer (eds.), *Sprachliche Kürze*, 276–291. Berlin: de Gruyter.
- Ronneberger-Sibold, Elke. 2015. Word creation. In Peter Müller, Ingeborg Ohnheiser, Susan Olsen & Franz Rainer (eds.), *Word formation: An international handbook of the languages of Europe*, 485–499. Vol. 1. Berlin: de Gruyter.
- Schiller, Niels & Christine Mooshammer. 1995. The character of /r/-sounds: Articulatory evidence for different reduction processes with special reference to German. In Kjell Elenius & Peter Branderud (eds.), *Proceedings of the XIIIth International Congress of Phonetic Sciences, Stockholm 1995*, 452–455. Vol. 3. Stockholm: the Congress organisers at KTH and Stockholm University.
- Schindler, Wolfgang. 1994. Analogische Wortakzentvergabe im Deutschen. *Sprachtypologie und Universalienforschung* 47. 355–370.
- Selkirk, Elisabeth. 1996. The prosodic structure of function words. In James Morgan & Katherine Demuth (eds.), *Signal to syntax: Bootstrapping from speech to grammar in early acquisition*, 187–213. Mahwah/NJ: Lawrence Erlbaum Associates.
- Sievers, Eduard. 1876. *Grundzüge der Lautphysiologie zur Einführung in das Studium der Lautlehre der indogermanischen Sprachen*. Leipzig: Breitkopf und Härtel.
- Smolensky, Paul. 1997. Constraint interaction in generative grammar II: Local conjunction. Talk presented at the Hopkins Optimality Theory Conference.
- Steinhauer, Anja. 2005. *Duden: Das Wörterbuch der Abkürzungen*. 5th ed. Mannheim: Dudenverlag.
- Vennemann, Theo. 1988. *Preference laws for syllable structure and the explanation of sound change*. Berlin: de Gruyter.
- Vennemann, Theo. 1991a. Syllable structure and syllable cut prosodies in Modern Standard German. In Pier Marco Bertinetto, Michael Kenstowicz & Michele Loporcaro (eds.), *Certamen Phonologicum II: Papers from the 1990 Cortona Phonology Meeting*, 211–243. Turin: Rosenberg & Sellier.
- Vennemann, Theo. 1991b. Skizze der deutschen Wortprosodie. *Zeitschrift für Sprachwissenschaft* 10. 86–111.
- Vennemann, Theo. 1998. Prosodie und Wortgewinnung. In Matthias Butt & Nanna Fuhrhop (eds.), *Variation und Stabilität in der Wortstruktur: Untersuchungen zu Entwicklung, Erwerb und Varietäten des Deutschen und anderer Sprachen*, 225–244. Hildesheim: Georg Olms Verlag.
- Visch, Ellis & René Kager. 1984. Syllable weight and Dutch word stress. In Hans Bennis & Wus van Lessen Kloeke (eds.), *Linguistics in the Netherlands*, 197–205. Amsterdam: Benjamins.
- Whitney, William Dwight. 1861. On Lepsius's standard alphabet. *Journal of the American Oriental Society* 7. 299–332.
- Whitney, William Dwight. 1874. *Oriental and linguistic studies*. Second series. New York: Scribner, Armstrong, and Company.