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Julia Schlüter

7 Rhythmic influence on grammar: scope and limitations

1 Introduction

The present contribution concentrates on the grammatical repercussions of the most fundamental principle of rhythmic organization: the alternation of stressed and unstressed syllables, known as the Principle of Rhythmic Alternation (PRA).¹ It is based on the analysis of historical and present-day collections of written texts (prose fiction, drama and newspapers), which, as will be shown, allow for the distinction of stressed and unstressed syllables (while higher-level prosodic structure is difficult to ascertain on the basis of written data alone). The corpus studies to be sketched in section 2 present some synchronic snapshots of the competition between morphological and syntactic variants drawn from the larger-scale studies described in detail in Schlüter (2005). The data illustrate the influence of rhythm on grammatical variation; they are, however, embedded in an interplay of competing factors (such as semantic or stylistic distinctions, emphasis, iconicity, syntactic requirements, processing strategies, regularization and standardization tendencies etc.). Their relative degrees of influence have waxed and waned in the history of English, and the role of rhythm in this context of diachronic change will be pointed out. The aim of this contribution is thus to analyse the scope and the limitations of rhythmic influence on grammatical variation and change in English.

At the outset, it should be noted that the alternation of stressed and unstressed syllables is of course first and foremost a principle of the rhythmic organization of language and is frequently implemented on the phonological level without recourse to grammatical adjustments. Consider, for instance, the examples in (1), where the stress pattern of the words is indicated as a sequence of stress-carrying and stressless syllables.

- | | | | | |
|-----|----|-------------------------------|-------------|----------------------|
| (1) | a. | <i>twenty thousand people</i> | ó σ ó σ ó σ | rhythmic alternation |
| | b. | <i>six girls</i> | ó ó → σ ó | beat deletion |

¹ For some (congruent) versions of the PRA, see, for instance, Sweet ([1887] 1970: 92), Jespersen ([1909] 1965: 156; 1972: 97), Nespor and Vogel (1989: 69, 82).

- c. *seventy researchers* $\acute{\sigma} \sigma \sigma \sigma \acute{\sigma} \sigma \rightarrow \acute{\sigma} \sigma \acute{\sigma} \sigma \acute{\sigma} \sigma$ beat addition
- d. *fourteen players* $\sigma \acute{\sigma} \acute{\sigma} \sigma \rightarrow \acute{\sigma} \sigma \acute{\sigma} \sigma$ stress shift

Only example (1a) satisfies the PRA without further adjustment. In (1b), two stressed syllables are adjacent, which calls into action a rhythmic repair strategy known as beat deletion. As a result, the stress on the weaker of the two clashing syllables is reduced so as to mitigate the stress clash. (1c) violates the PRA in a different way in that it contains a sequence of two or more stressless syllables. While such a stress lapse appears to be less strongly avoided than a clash (cf. Nespor and Vogel 1989: 87; Kager 1995: 372), it can in many cases simply be amended by the beat addition rule, which supplies a stress interrupting this objectionable sequence. Finally, certain words containing more than one stressable syllable allow a stress shift from one to another if the former would otherwise produce a stress clash with a neighbouring syllable. The numeral *fourteen* in (1d), which has final stress in its citation form, serves as an example of this stress shift rule, also known as the *Thirteen-Men Rule*.²

While in many formal linguistic frameworks it has been contested that phonological preferences such as the PRA can exert an influence beyond the phonological component (or module) at all, functional conceptions involve an interpenetration of phonological, morphological, syntactic, semantic and other requirements. Thus, if the present functionally inspired discussion distinguishes morphological and syntactic consequences of rhythmic alternation from purely phonological ones, this subdivision merely serves expository purposes. As will be made clear in the concluding section 3, the discussion hinges on the bidirectional interaction of what are traditionally considered components or modules of the linguistic system. This being said, let us turn to the morphological and syntactic effects of the PRA.

2 Evidence

The evidence for rhythmic influence on morphology and grammar is culled from different phenomena of morphological and syntactic variability. Due to limitations of space, the data sketched in the following diagrams as a rule reduce a multidimensional reality to a single dimension, namely the distinction between contexts liable to produce a stress clash and other, unproblematic contexts. This

² For a more in-depth discussion of these rhythm rules see, for instance, Kager (1995: 385–386), Hayes (1995: 36–37), Nespor and Vogel (1989: 75–112).

means that changes in the distribution of variants in the diachronic dimension and the effects of interacting factors are not illustrated with exact quantitative information, but are summarized in the discussion. For further details on these issues, see Schlüter (2005).

2.1 Rhythmic influence on morphology

While even formal approaches taking a modular view of language have never contested the relevance of phonology (including rhythm) for morphological choices at word level (both for inflectional and lexical morphology), the following studies concentrate on rhythmic influences across word boundaries. In other words, they concern productive, run-of-the-mill processes that happen all the time when speakers produce utterances, aligning words into phrases, sentences and utterances. As the three following case studies will show, the avoidance of stress clashes plays an important role in the selection of morphological alternatives available to a speaker.

2.1.1 Redundant comparative marking

The first study concerns the suppletive comparative *worse* and its redundantly marked competitor *worser*, which carries the ordinary inflection of English comparatives. Etymologically, the form *worser* has no justification, but the reason for its appearance is obvious: integration into the paradigm of comparatives. The form enjoyed a considerable popularity in standard Early Modern English (and continues to do so in present-day non-standard usage), as did other double comparatives and superlatives (cf. *OED Online* 2011: s.v. “*worser*, adj. and adv.”).

The following data are drawn from two literature collections covering the 16th and 17th centuries, *Early English Prose Fiction* (EEPF; 211 works dated 1518–1700) and the first part of *English Prose Drama* (EPD; 308 works dated 1540–1700). Since *worse* appears in most fictional and dramatic works in the databases, but *worser* figures in only 47 of them, only these were subjected to a search for *worse*, *worser* and their several spelling variants. As mentioned before, the hits for the standard form and its redundantly suffixed variant were categorized according to whether their contexts are liable to produce a stress clash or not. In the present case, this means that all occurrences where the comparatives are followed by a stressed syllable are rhythmically critical and all those where they are followed by an unstressed syllable or punctuation mark (indicating a pause) are rhythmically uncritical. Consider the examples in (2) and (3). (Stress marks have been added.)

- (2) a. ... *I should be sorry to procure your disturbance by my presence, since my intention is to do you acceptable service, though I am now designed to a wórse énd*; ... (Sir Percy Herbert: *The Princess Cloria*, 1661; EEPF)
- b. ... *there are millions of Hellish imps of the wórser sórt, who continually attend the motions of the malicious and revengeful*, ... (Richard Head: *The English Rogue*, part 3, 1671; EEPF)
- (3) a. ... *at least, a suddaine death is happinesse to him that feares wórse*. (Kingsmill Long: *Barclay His Argenis*, 1625; EEPF)
- b. ... *sin is so evil, it is not capable of any Work of God to sanctifie it for good and therefore wórser than any Affliction*. (Benjamin Keach: *The Progress of Sin*, 1684; EEPF)

Examples (2a) and (b) show two exemplary occurrences preceding stressed syllables. This is typically the case when the comparatives are used in attributive position since about 85 % of English nouns in running text are initially stressed or monosyllabic (cf. Schlüter 2005: 62–64). Examples (3a) and (b) illustrate cases where an unstressed function word or a pause follows. This is often the case in other than attributive (i.e., predicative or adverbial) uses. Crucially, if *worse* is used preceding a stressed syllable, a stress clash arises, as in (2a), while *wórser*, on account of the additional unstressed syllable provided by the suffix, prevents the succession of two stresses, as in (2b). In contrast, preceding an unstressed syllable or a pause, suffixless *worse* is unproblematic from a rhythmic point of view,

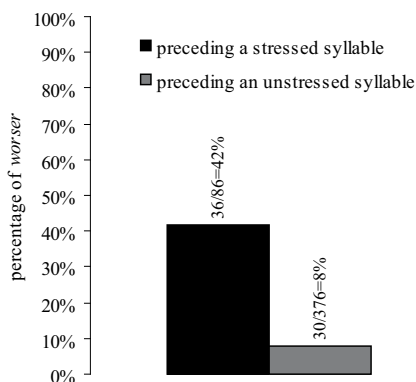


Figure 1: The distribution of *wórser* (expressed as a percentage of the total of *wórser* + *worse*) in selected works from EEPF + EPD (1518–1700)

while *worser* adds a superfluous unstressed syllable. This merely leads to a stress lapse, a mild violation of the PRA. Based on rhythmic considerations, we would thus expect *worser* to occur preferentially before stressed syllables. The analysis in Figure 1 puts this prediction to an empirical test.

It is immediately obvious that the prediction is borne out by the data. The share of *worser* in stress-clash contexts rises to 42 %, while it accounts for only 8 % of the examples in other contexts ($\chi^2 = 65.62$, $df = 1$, $p = 5.47 \cdot 10^{-16}$). Thus, whether *worse* is redundantly suffixed or not depends to a large extent on the rhythmic nature of the following item, and we have a first example of rhythm impinging on morphological choices in language production.

It is of course true that considerations of style, emphasis and parallelism with coordinated comparatives play a (subordinate) role as well, and in the long run, the forces favouring the redundantly marked comparative were eventually superseded by standardization pressures that incriminated the logical redundancy of the form (for details see Schlüter 2001, 2005: 67–79). However, the influence of the PRA also manifests itself in the fact that during the decline of *worser* in standard usage, the form was preserved longest in prenominal uses, where it continued to prevent stress clashes.

In this context, it is interesting to note that Bolinger (1965: 153–154) assumes rhythmic pressures to have contributed to the preservation of synthetic comparison despite the longstanding tendency in English towards analytic patterns. This suggests that the PRA may have massive effects on the drift of the grammatical system of English that go far beyond what has been shown in the present case study.

2.1.2 Suffixation of past participles

The five pairs of variants subsumed in this section foreground the two past participial suffixes *-(e)n* and *-(e)d*. The suffixation of past participles has been and still is an extremely complex area of morphological variation: Strong verbs as a rule used the suffix *-(e)n*, but (partially) shed it in the Middle and Modern English eras; weak verbs are regularly inflected in *-(e)d*, which is syllabic if following a stem ending in a /t/ or /d/, but may also be contracted with these consonants. What is more, there has always been a considerable intermingling of strong and weak inflections. To make things even more complex, every verb has followed its own path, and the trajectories of change are often contradictory. Full details for the five verbs considered here (*drink*, *break*, *strike*, *knit* and *light*) from Middle English onwards are provided in Schlüter (2005: 86–112).

Since a binary contrast between stressed and unstressed contexts would oversimplify the matter here, a three-way distinction is used that focuses on the grammatical function of the past participles in question. The first group, single unmodified attributive uses, is the only rhythmically problematic category since, as pointed out above, the participles immediately precede nouns. As illustrated by the representative example in (4), drawn from the *British National Corpus (BNC)*, nouns are in the vast majority of cases initially stressed. While the so-called complex attributive uses also premodify nouns, the participles do not appear in isolation here. Subtypes of complex attributive structures include prefixed uses (5a), compounded forms (5b), adverbially premodified uses (5c) and coordinated uses where the participle in question is separated from another attribute by *and*, *or* or a comma (5d).

- (4) *He tied one end to the stub of a bróken áerial housing.* (P. Darvill-Evans: *Deceit*, 1993; BNC)
- (5) a. *Charlie grabbed a seat in the corner of an únlit cárriage and stared out of the grimy window at a passing English countryside he had never seen before.* (Jeffrey Archer: *As the Crow Flies*, 1991; BNC)
- b. *He reminded Dexter of a pánic-strícken móle who had suddenly found himself trapped outside his burrow.* (Trevor Barnes: *Taped*, 1993; BNC)
- c. *We've always been a rather lóosely-knít fá mily, and I've never seen him.* (Ellis Peters: *City of Gold and Shadows*, 1989; BNC)
- d. *... Corbett had to listen carefully to understand the man's drúnken, slú rred spée ch.* (P.C. Doherty: *Crown of Darkness*, 1991; BNC)

From a rhythmic point of view, what the different constellations in (5) have in common is the fact that the stress clashes do not arise in the first place or are averted through the application of stress rules: In (5a), in accordance with the stress shift rule, the stress in the citation form *unlit* shifts onto the prefix if preceded by another stressed syllable. The compound in (5b), as a result of the compound stress rule, has its main stress on the first element, leaving *stricken* only with secondary stress. In the adverbially premodified use of *knit* in (5c), the stress shift rule moves the main stress to the adverb so as to mitigate the clash between *knit* and *family*. If the participle in question is used as the non-final element of a coordinated attributive structure, the following pause as in (5d) or unstressed *and/or* avoids the immediate adjacency of another stressed syllable.

Finally, the third category of grammatical functions comprises all non-attributive uses of the past participles, such as postnominal, predicative or nominalized uses as well as verbal uses in the perfect tenses and in passives. Example (6) may suffice since it is representative of most non-attributive uses, which rarely incur a stress clash since they are generally followed by unstressed function words or pauses.

- (6) *Some of the glass in the windows was bróken, a huge door stood ajar.* (E.R. Taylor: *Pillion Riders*, 1993; BNC)

Thus, from a rhythmic point of view, complex attributive and other (non-attributive) uses together form a group with low stress clash potential, while from a grammatical point of view, single unmodified and complex attributive uses together are opposed to non-attributive uses. Figure 2 shows a present-day snapshot of this complex situation.

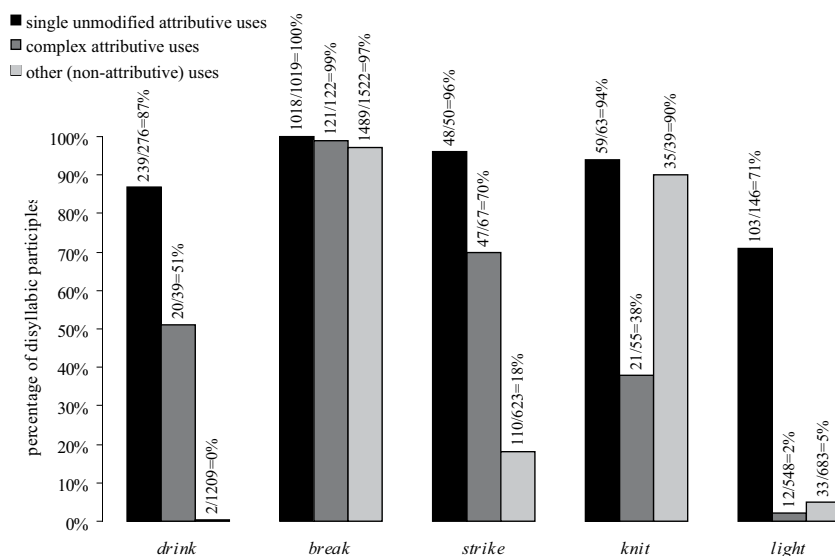


Figure 2: The distribution of mono- and disyllabic variants of the participles of selected verbs in the fictional prose part of the BNC (1960–1993)

Due to lack of space, a few notes on every verb must suffice in this context. As for the verb *drink*, its disyllabic participle *drunken* had virtually disappeared from non-attributive uses by the end of the Middle English era, but due to the

rhythm factor, it was preserved fully intact in attributive uses until most recently. Present-Day English grammars still give it as the attributive form, though *drunk* is becoming more common in this function, too. This is particularly true for complex uses, where stress clashes are excluded, but also in single attributives (e.g. *a sléep-drùnk cóastguard*, *a súitably drùnk cústomer*, *drùnk Bríttons*). The distribution seen in Figure 2 is thus a mix of rhythmic and grammatical influences, with significant distinctions between single and complex attributive uses, but also between complex attributives and non-attributives ($\chi^2 = 1215.57$, $df = 1$, $p = 1.12 \cdot 10^{-264}$).

While *broken* has never been under serious competition from *broke* in attributive position (again, for rhythmic reasons), in non-attributive uses it has performed a U-turn, dropping to only 35 % in the 18th century. As Figure 2 shows, it is now almost completely re-established, the few exceptions coming from renditions of non-standard speech. A likely reason behind this reversal of the rhythmically motivated distribution is the influence of prescriptive grammar, which favoured a formal distinction between the past tense *broke* and the past participle *broken*. Yet, we can witness remnants of the earlier distribution even in the late 20th century: The contrast between single attributive and non-attributive uses is statistically highly significant, complex attributives like *unbroken tone*, *best-broke greyhounds*, *so broken an estate* and *his broken-down state* are intermediate, and the only exception among 1019 single unmodified attributive uses involving monosyllabic *broke* is an example where *broke* is used in the specialized meaning of ‘penniless, bankrupt’ (*a broke student*), which is normally encoded in predicative position (*to be broke*) ($\chi^2 = 20.41$, $df = 1$, $p = 3.70 \cdot 10^{-5}$).

While the current distribution of *struck* and *stricken* resembles that of *drunk* and *drunken*, disyllabic *stricken* was under considerable pressure in the eighteenth century. It had dropped to only 3 % in non-attributive uses and 20 % in complex attributive uses, but was best preserved in single attributive uses, where it helped to prevent stress clashes (67 %). While this partly rhythmically, partly grammatically motivated ranking has remained in place today ($\chi^2 = 208.11$, $df = 1$, $p = 6.44 \cdot 10^{-46}$), Figure 2 indicates that prescriptive forces have succeeded in raising the shares of *stricken* once more, though the situation continues to be highly variable.

Among the weak verbs included in this study, two opposite diachronic pathways can be observed, though with comparable outcomes. The current situation of *knit* is the result of an increasing regularization of the contracted past participle *knit*, which is the only form occurring in the data for Early Modern English. Beginning in the 18th century, *knitted* rises rapidly in single attributive uses, followed about a century later by non-attributive uses. This delay can be ascribed to the effects of the PRA. Interestingly, complex attributive uses follow this trend

only to a limited extent. Since stress clash avoidance is not an issue here, they form a remarkably conservative environment, involving high-frequency combinations such as *tight(ly)-knit*, *clóse(ly)-knit*, *lóose(ly)-knit*, but nevertheless remaining highly productive in other collocations ($\chi^2 = 53.31$, $df = 1$, $p = 2.65 \cdot 10^{-12}$).

At the same time, *light* has pursued the reverse development of an increasing irregularization since the 19th century, having almost reached the endpoint in both types of rhythmically uncritical contexts. The striking preservation of *lighted* in single attributive uses is clearly due to the – in this case conservative – influence of the preference for rhythmic alternation ($\chi^2 = 611.03$, $df = 1$, $p = 2.08 \cdot 10^{-133}$). It is noteworthy that complex attributive uses were clearly ahead of non-attributive uses in the abandonment of *lighted* in the 19th century. Obviously, rhythmically acceptable attributive structures such as *an únlit háll*, *the fire-lit library* and *the dímy lit schóol-room* were quickly favoured over such containing stress lapses with disyllabic *lighted*.

The distribution of *lit* and *lighted* is thus most pronouncedly rhythmically determined among the five pairs of participial variants; the grammatical distinction between attributive and non-attributive uses is irrelevant here. *Knit* and *knitted* are extraordinary insofar as the fact that the disyllabic form is functionally superfluous in complex attributive uses has a retarding effect on its introduction in this environment. In other cases, the rhythmically determined distribution has congealed into a grammatically motivated one, as was and to some extent still is the case with *drink*, *break* and *strike*: In these examples, complex attributive uses tended and still tend to pattern with single unmodified attributive uses, although the former do not pose the same rhythmic problem as the latter. Considering that in earlier centuries complex attributive structures used to be much less frequent than simple ones, and also much less frequent than they are today (cf. Schlüter 2005: 145–146), it can be argued that they were dominated by the larger group of simple attributives and therefore adhered to the prototypical choice of participial variant in the super-category ‘attributives’. Both pathways of linguistic change and both types of synchronic distribution are thus heavily influenced by the PRA; they can be disentangled by studying the behaviour of complex attributive uses.

2.1.3 Adverbial marking

The variable marking of adverbs by means of the suffix *-ly* has a time depth similar to that of participles, and individual members of the class of adverbs have also exhibited widely discrepant developments, including reversals of temporary trends. The following snapshot concentrates on a collection of prose texts entitled *Eighteenth-Century Fiction (ECF)* since variability in *-ly* marking was

greatest in the 18th century (not only for the two adverbs *quick(ly)* and *slow(ly)* considered here; cf. Nevalainen 1997: 172). As unmarked adverbs rarely occur in pre-verbal position, only post-verbal uses are included in the data summarized in Figure 3. The two constellations distinguished for both adverbs (before stressed and unstressed syllables or pauses) are exemplified for *quick* and *quickly* in (7) and (8).

- (7) a. *Then stepping quick úp to me: My Jeronymo! ---; Did I see you before? and stroked my cheek.* (Samuel Richardson: *Sir Charles Grandison*, 1754; ECF)
- b. *He came quickly úp with me, and, seizing me by the Neck, he cast me on my Back.* (Henry Brooke: *The Fool of Quality*, 1765; ECF)
- (8) a. *He came up almost as quick, and appeared as little fatigued, as if he had never left us.* (Samuel Richardson: *Sir Charles Grandison*, 1754; ECF)
- b. *... and I found quickly, by my Glass, that there were one and twenty Savages, three Prisoners, and three Canoes; ...* (Daniel Defoe: *Robinson Crusoe*, 1719; ECF)

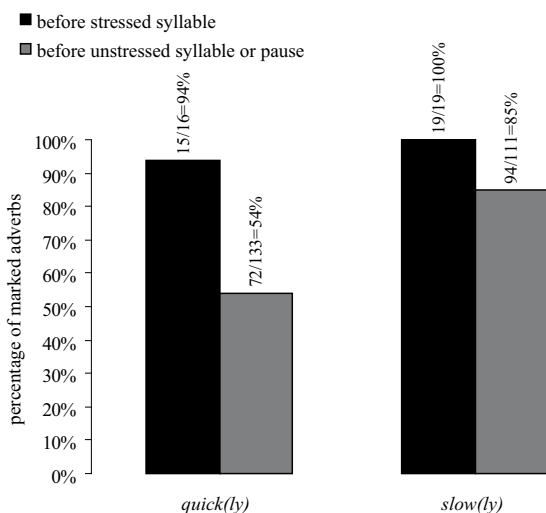


Figure 3: The distribution of suffixed and suffixless uses of the adverbs *quick(ly)* and *slow(ly)* in ECF (1705–1780)

As can be seen from the absolute numbers given in Figure 3, the vast majority of adverbs precede unstressed syllables (mostly function words) or punctuation marks (indicating pauses). This is due to the fact that, unlike the attributive structures considered in sections 2.1.1 and 2.1.2, syntactic structures in the body of the sentence are relatively flexible and function words often intervene between more strongly stressed lexical items. As a result, rhythmic alternation is not as much at risk here as it is within closely knit noun phrases. Nevertheless, the special behaviour of contexts representing potential loci for stress clashes is evident (*quick(ly)*: $\chi^2 = 9.22$, $df = 1$, $p = 0.002$; *slow(ly)*: $\chi^2 = 3.35$, $df = 1$, $p = 0.067$ (narrowly failing the significance test)): Even though suffixless adverbs are relatively common in this dataset, there is just one example of *quick* before a stressed syllable (7a) and not a single one of *slow*. Thus, the avoidance of stress clashes plays a major role in the licensing of suffixless adverbs: 18th century standard grammar does tolerate them, but their occurrence depends on rhythmic conditions.

As a side remark, parallel data for other periods, both before and after the 18th century, confirm the difference between the two adverbs discernible in Figure 3: *Quick* is used relatively more often without a suffix than *slow* (cf. Schlüter 2005: 163–178). This effect can probably be ascribed to an iconic motivation, giving a shorter expression to an action or event taking up only a short moment in the real world and a longer one to a more time-consuming one.

2.2 Rhythmic influence on syntax

If, in formal linguistic theory, phonological influence has widely been rejected for morphological choices that go beyond the word level, this is even more true of syntactic choices. Nevertheless, we can find syntactic phenomena from a variety of areas that testify to the importance of rhythmic alternation. The following four case studies will show that rhythm is one of the factors co-determining the selection of syntactic variants.

2.2.1 Infinitival marking

The English infinitive marker *to* began to establish itself in its current function in the Middle English era. From this period onwards, there has been a distinction between main verbs, tending to take marked infinitival complements, and auxiliaries, as a rule taking unmarked infinitives. This functional split was and still is accompanied by massive variability, partly due to the fact that the distinction between main and auxiliary verbs is far from clear. For instance, *make* is gener-

ally considered a full verb, but *dare* is in its origin an auxiliary; yet, marked and unmarked dependent infinitives alternate after both. The secondary literature has adduced a variety of factors impinging on the use or omission of *to*, among them stress clash avoidance (Bihl 1916: 223–225, Visser 1973: 2303, Fijn van Draat 1967: 73–77), but its effect has never been quantified (but see Schlüter 2005: 185–209, also for a summary of other influences).

The following corpus studies concentrate on three specific contexts of use of these verbs in earlier periods of English, which can be delimited as follows. First, after active *make*, followed by an object and an infinitive, the infinitive marker had virtually disappeared by the 19th century. The count summarized in Figure 4 focuses on active *make* followed by full noun phrase objects in the 16th and 17th centuries, where marked infinitives were relatively better preserved than after pronominal objects at this time (search strategy: all forms of *make* followed by *the*). Stress clashes can arise in this context if the following infinitive is initially stressed, as in example (9a), but not if the infinitive has non-initial stress, as in (9b). The first pair of columns in Figure 4 indicates that initially stressed infinitives are clearly more often preceded by *to* than non-initially stressed ones ($\chi^2 = 9.29$, $df = 1$, $p = 0.0023$). Note that the stress level of the syllable preceding the locus of the infinitive marker also plays a role, but is not controlled for here. A parallel investigation of preceding and following syllables, described in Schlüter (2005: 194–197), however confirms the importance of stress clash avoidance.

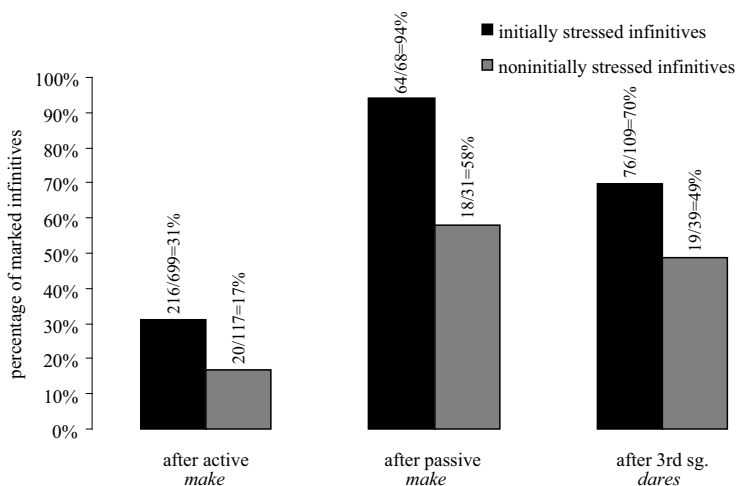


Figure 4: The distribution of the marker *to* before infinitives dependent on selected verb forms in *EEPF + EPD* (for active and passive *make*, 1518–1700) and *NCF* (for *dares*, 1782–1903)

- (9) a. ...; *one night coming home three quarters drunk, she acted the part of Zantippe, and máde the Hóuse to ríng with her scolding.* (Richard Head and Francis Kirkman: *The English Rogue*, Part 2, 1668; EEPF)
- b. *This they affirmed to be the true cause both of the saltness, and the ebbing and flowing motion of the Sea, and not the jogging of the Earth, or the secret influence of the Moon, as some others had máde the Wórlđ believe.* (Margaret Cavendish: *The Description of a New World*, 1666; EEPF)

Second, in contrast to active uses of *make*, passive uses have always involved a higher share of marked infinitives (probably due to the greater processing load inherent in passives, necessitating more explicit grammatical structures; cf. Rohdenburg and Schlüter 2000: 446–447).³ In Present-Day English, the split between active *make* followed by unmarked infinitives and passive *make* followed by marked ones is virtually complete. In Early Modern English, however, passive uses still had variable infinitive marking, though at a noticeably higher level than active uses. Due to the subjectivization and fronting of the logical object in passivization, the monosyllabic form *made* is in most cases immediately followed by the infinitival complement, so that a stress clash arises when the infinitive is initially stressed and not buffered by *to*. The second pair of columns in Figure 4 distinguishes between passive *made* ± *to* followed by initially and noninitially stressed verbs, as in (10a) and (b), respectively (search strategy: all forms of *be* followed by *made*).

- (10) a. *Upon that the Fire was máde to bróil his Flesh, he was stript naked, and tyed to the Tree; ...* (Anon.: *Vertue Rewarded*, 1693; EEPF)
- b. *Besides the Priests who were máde believe, they should still continue their jurisdiction over the peoples actions, were also induced to a compliance to that purpose, ...* (Sir Percy Herbert: *The Princess Cloria*, 1661; EEPF)

As can easily be seen, the contrast between rhythmically critical and uncritical contexts not only replicates that found for active *make*, but is significantly more pronounced ($\chi^2 = 19.46$, $df = 1$, $p = 1.03 \cdot 10^{-5}$). Thus, despite the processing complexity of passive constructions, the grammatical marker *to* is relatively often omitted if it is rhythmically superfluous. Besides processing complexity, stress

³ The preference for explicit grammatical structures in the case of increased grammatical complexity in general is framed in Rohdenburg's Complexity Principle (cf., e.g., Rohdenburg 1996).

clash avoidance is also likely to have helped to preserve marked infinitives in constructions with passive *make*. Schlüter (2005: 201) finds a time lag of about two centuries in the full establishment of the marked infinitive between initially stressed verbs and the more conservative noninitially stressed ones.

The third superordinate verb included in this study differs from *make* in that it originates as a modal auxiliary, but it resembles *make* in that it involves long-standing variation in the selection of marked and unmarked infinitives. The fact that marked infinitives after *dare* have generally been on the increase since Early Modern English has been taken as indicative of an increasing de-auxiliarization of the verb, i.e. it is assumed to be moving from the closed class of modal auxiliaries to the open class of verbs taking infinitival complements (see, e.g., Beths 1999). While this is probably the case, the evolution of *dare* is a highly differentiated process, with individual verb forms following different trajectories of change (for details, see Schlüter 2010). Thus, the count visualized in the third pair of columns in Figure 4 concentrates on the third person singular *dares* in the nineteenth century (based on a prose collection entitled *Nineteenth-Century Fiction, NCF*). As before, the stressed monosyllabic form of the superordinate verb provides a potential locus for a stress clash if followed by an initially stressed infinitive, as in (11a). The infinitive marker functions as a stress clash buffer here, but it can be dispensed with when the infinitive is noninitially stressed, as in (11b).

- (11) a. *The man who dáres to lóve her ought at any rate to be something in the world.* (Anthony Trollope: *The Duke's Children*, 1880; NCF)
- b. *“Bring him forward,” said the King; “place the man before my face who dáres maintáin these palpable falsehoods.”* (Sir Walter Scott: *Quentin Durward*, 1831; NCF)

The results are, once again, very clear: There is a marked contrast between initially and noninitially stressed infinitives ($\chi^2 = 5.51$, $df = 1$, $p = 0.019$), which is by the way also found in earlier and later centuries (see Schlüter 2005: 206–209; 2010). Thus, the selection of marked or unmarked infinitives is not only a matter of the degree of auxiliarihood of *dare*, but is also determined by rhythmic preferences.

2.2.2 Sequencing of colour adjectives

A completely different area where syntax offers alternative options is the sequencing of items in a coordinated structure. The focus in this case study is on bino-

mials consisting of two colour adjectives, which have, along with other types of binomials, made the subject of a substantial body of research.⁴ In brief, the main findings are that the sequencing is determined by semantic and phonological preferences. While the former favour an ordering according to perceptual factors such as importance, accessibility and salience for the speaker, the latter can be reduced to the principle of ‘short and simple before long and complex’. Thus, *red and yellow* is the preferred choice in (12a) both because *red* describes a more eye-catching colour than *yellow* (cf. Berlin and Kay 1969: 4) and because *red* is monosyllabic, while *yellow* is disyllabic. In addition, rhythmic alternation comes into play if the pair of colour adjectives is placed in attributive position preceding an initially stressed noun, as in (12b). In this case, *red* in second position would lead to a stress clash with the noun, which is averted by the use of disyllabic *yellow* in this position.

- (12) a. *It has wheels, large wooden ones, decorated in fine patterns of red and yellow.* (*The Guardian*, 1991)
- b. *At the same time he's an unsettled artist, and his red and yellow painting is much better than the canvases on either side.* (*The Guardian*, 1990)

The following corpus study tests the hypothesis that the preference for the sequence ‘mono- before disyllable’ should be reinforced (beyond the expected imbalance) where a stressed syllable follows. This is once more usually the case before (initially stressed) nouns, where there is a close syntactic connection between attributive structure and noun. Figure 5 draws on a large collection of modern British newspapers and compares the frequencies of the two possible orderings of the disyllable *yellow* connected by *and* or *or* with one of the monosyllables *blue*, *brown*, *green*, *pink* and *red*.⁵

⁴ Some more recent work on binomials in general includes Ross (1982), Landsberg (1994), Müller (1997), Benor and Levy (2006), Lohmann (2012) and Mollin (2012). For a fuller list of references, see Schlüter (in prep.).

⁵ The numerous examples of *yellow and red card(s)* and the considerably less numerous examples of *red and yellow card(s)* have been discounted because they would have distorted the picture. The reason behind the striking and – from a rhythmic and perceptual point of view – unexpected preponderance of *yellow and red card(s)* over *red and yellow card(s)* is most probably the temporal sequence in which these cards are shown to offending players in various team sports. Combinations with *black*, *white* and *gray/grey* have not been included since these ‘non-colours’ generally tend to come in second position for perceptual reasons.

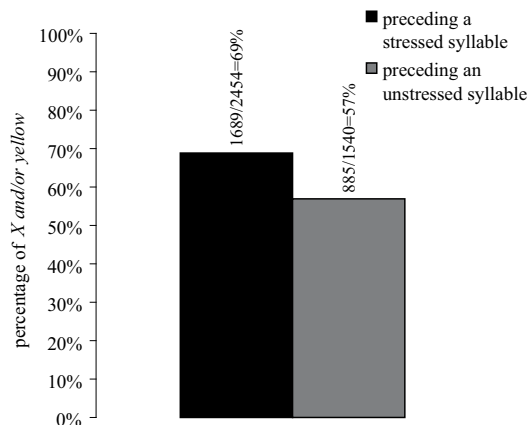


Figure 5: The sequencing of pairs consisting of *yellow* and a monosyllabic colour adjective in British newspapers (*The Daily Telegraph* 1991–2000, *The Guardian* 1990–2000, *The Daily Mail* 1993–2000, *The Times* 1990–2000)

The diagram shows that, first of all, it is true that the longer colour adjective *yellow* is used in second position of binomials more often than a chance distribution would lead us to expect (57 % in rhythmically unproblematic contexts as opposed to 50 %). What is more, the predicted effect of stress clash avoidance is even clearer: In cases where the order disyllable before monosyllable would provoke a stress clash with the following syllable, the rhythmically optimal order is found significantly more often than in rhythmically uncritical cases (69 % as opposed to 57 %; $\chi^2 = 53.28$, $df = 1$, $p = 2.89 \cdot 10^{-13}$). Note that semantic/perceptual constraints such as the salience or relative dominance of the two colours concerned play a prominent role in the selection of these syntactic variants (for more details, see Schlüter 2005: 124–129 and in prep.). However, in written newspaper data, which can only be analyzed independently of their situational context, it would be impossible to control for such effects. Above and beyond such incalculable factors, the PRA has been shown to assert its influence on the sequencing of coordinated colour adjectives.

2.2.3 Placement of intensifier *quite*

The case of the placement of *quite* intensifying adjectives is comparable to the previous example in two ways. On the one hand, rhythm becomes an issue when the adjectives modified by *quite* appear in attributive position. In combination

with the indefinite article, there are two possible loci for *quite*, either in the usual position of an intensifier between article and adjective illustrated in (13a), or in the non-canonical pre-determiner position exemplified in (13b).

- (13) a. *After some time one became aware that members of a quite different clan were also to be found scattered in little clusters ...* (Michael Dibdin: *Dirty Tricks*, 1991; BNC)
- b. *In a month, she thought, in just a month, I might be looking at quite a different view.* (Joanna Trollope: *The Rector's Wife*, 1993; BNC)

The non-canonical order of *quite* preceding the unstressed indefinite article can thus prevent the adjacency of two stressed syllables: The sequence of *quite* and an initially stressed adjective is interrupted. As the examples in (13) further show, both arrangements are possible with the same adjective.

The second aspect that makes the following study comparable with the previous one is the fact that the secondary literature has accumulated numerous insights into semantic factors that are adduced as constraints on the pre- and post-determiner use of *quite*. These concern, for instance, the degree of emphasis, differences in scope, differences in meaning (maximizer vs. moderator) and differences in the type of adjective that is modified (cf., e.g., Allerton 1987: 25–26 and Paradis 1997: 17–18; for a survey, see Schlüter 2005: 112–124). As in the previous case study, however, semantic nuances are hard to disentangle in a corpus study aimed at quantitative evidence. While care has been taken to exclude all non-gradable adjectives, other semantic effects have not been monitored. The count in Figure 6 thus concentrates exclusively on the distinction between examples involving initially stressed adjectives as in the examples in (13) and such involving noninitially stressed ones (e.g. *absurd*, *convincing*, *delightful*, *distinctive*, *extraordinary* and *unnecessary*).

The results indicate that the pre-determiner placement of *quite* is considerably more frequent if the adjective modified begins with a stressed syllable ($\chi^2 = 18.50$, $df = 1$, $p = 1.70 \cdot 10^{-5}$). Thus, beyond all semantic influences on the placement of *quite*, rhythmic considerations account for a difference of 18 % between examples where the indefinite article can serve as a stress clash buffer and such where no buffer is required.

Historically, the pre-determiner position of *quite* is a relatively late development: The transition from post- to pre-determiner use only gained momentum in the 18th century, and in the 19th century it almost ousted the post-determiner variant. This was a change from below, spearheaded by spoken and informal registers. However, since Early Modern English times, rhythmically critical contexts

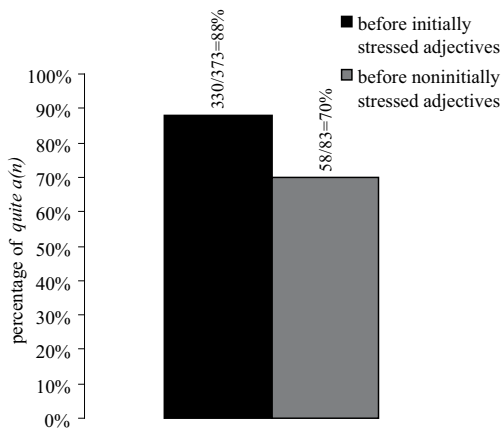


Figure 6: The distribution of *quite a(n)* compared to *a quite* preceding attributive adjectives in the fictional prose part of the *BNC* (1960–1993)

have been ahead of uncritical ones. Thus, the striving for rhythmic alternation can be considered one of the driving forces behind the development of this non-canonical attributive structure, in particular since initial stress is more frequent in adjectives than non-initial stress (cf. Schlüter 2005: 118–119).

2.2.4 Negation of attributive adjectives and sentence adverbs

The negation of attributive adjectives by the negator *not* (e.g. **a not happy person*) is heavily restricted, so much that Huddleston and Pullum (2002: 809) consider it in general impossible. What is unclear, however, is which factors are behind this restriction and why they do not apply to certain exceptions to the rule. Examples of negated adjectives premodifying nouns that can be found in a corpus of Present-Day English newspapers are given in (14) and (15) (search strategy: *a not/the not*).

- (14) a. *Expense is relative. However, this week I parted with a nót insubstantial sum for a very small thing indeed. (The Times, 2000)*
- b. *As a result, she could no longer blink – a nót uncómmón phenomenon. (The Guardian, 2000)*

- c. *They turn up most days at nine or nine-thirty, work reasonably conscientiously [sic], even at deadly boring jobs, and take a nót excéssive number of days' sick leave.* (*The Times*, 2000)
- (15)
- a. *I am a vegan. One of the nót sò rare breeds that A A Gill would like to see pursued by horse and hound.* (*The Times*, 1998)
 - b. *In comedy terms, *Big Train* was the nót vèry vérsatile love child of Monty Python's *Flying Circus* and *Not the Nine O'Clock News*.* (*The Daily Mail*, 2000)
 - c. *Computer chips may be able to crunch their way through millions of calculations per second but meeting one is a nót particularly exhilarating experience.* (*The Times*, 1999)

The explanations typically adduced for the acceptability of these structures hinge on the presence of a negative prefix in the adjective, as exemplified in (14a) and (b) (for a review, see Schlüter 2005: 129–143 and references therein). However, as can be seen from example (14c), other noninitially stressed adjectives can also be found in this construction. What is more, all kinds of attributive adjectives can be negated by *not* on condition that they are premodified by one of a variety of adverbs, illustrated in (15). These adverbs are mostly short intensifiers or downtoners, the most frequent ones being *so*, *too*, *very* and *quite*, but there are also longer ones, such as *particularly* in (15c). In view of such examples, Bolinger (1980) shifts the explanatory burden to the rhythmic makeup of the attributive structure. According to his intuition, the stress clash between *not* and an initially stressed attributive adjective is responsible for the unacceptability of the construction, while the absence of such a clash in the case of a noninitially stressed adjective or of an intervening, destressed adverb renders the structure viable. It is true that the high incidence of such intervening adverbs (in 77 % of the 2277 corpus matches studied here) and their limited semantic contribution lends credence to Bolinger's hunch that they primarily serve rhythmic purposes and are inserted as semantically more or less empty buffer elements. Quantitative evidence for their eminent role in connection with initially stressed adjectives compared to noninitially stressed ones comes from the count presented in Figure 7.

As can be seen from the first pair of columns, intervening adverbs are virtually obligatory before initially stressed adjectives in attributive position. They are used strikingly less often before noninitially stressed ones ($\chi^2 = 975.02$, $df = 1$, $p = 4.84 \cdot 10^{-214}$). Thus, as long as one of these conditions is fulfilled and a stress clash is avoided, the negation of attributive adjectives is fully grammatical, *pace* Huddleston and Pullum (2002). Initially stressed adjectives are even almost twice

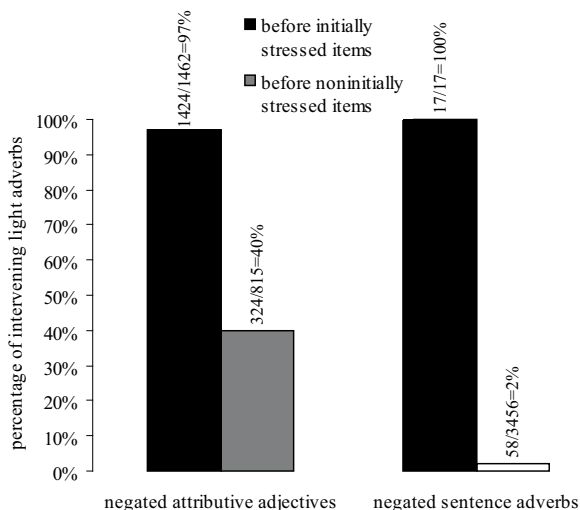


Figure 7: The distribution of light adverbs intervening between the negator *not* and attributive adjectives in *The Daily Telegraph* 1998–2000, *The Guardian* 1998–2000, *The Daily Mail* 1998–2000, *The Times* 1998–2000

as frequent in it as are noninitially stressed ones, and intervening adverbs seem to be inserted for rhythmic rather than semantic reasons.

Similar restrictions apply to the negation of sentence adverbs. Among the accounts provided in the secondary literature, only Bolinger's (1980) rhythmically based account is apt to capture the generalization that noninitially stressed sentence adverbs, just like attributive adjectives, are licensed to take *not*-negation, while initially stressed ones have to be accompanied by an intervening semantically and rhythmically light buffer adverb. Examples without and with such adverbs are given in (16) and (17).

- (16) a. *England's predicament on the field is, nót surprisingly, a reflection of their situation off it: ...* (*The Daily Telegraph*, 1999)
- b. *Nót uncómically, the organisers insist that "at least two" of the five judges, chaired by Ben Okri, will be African.* (*The Times*, 1999)
- (17) a. *Portillo's friends claim, nót whòlly crédibly, that an integral aspect to Portillo's politics, the compassionate social tolerance, has been obscured ...* (*The Guardian*, 1999)

- b. *Voters also get uneasy when their governments are running huge budget deficits, so Bill Clinton has gained credit, nót entirely justly, as the president who got rid of the red ink. (The Times, 1998)*

The relative incidences of intervening adverbs are compared in the second pair of columns in Figure 7. Despite the sizeable newspaper database, we find only 17 examples of initially stressed negated sentence adverbs, but not a single one occurs without an intervening modifier. In contrast, noninitially stressed adverbs occur freely in this structure ($\chi^2 = 774.00$, $df = 1$, $p = 2.42 \cdot 10^{-170}$). This categorical difference indicates that the stress pattern of the adverb is the single most decisive factor in the licensing of negated sentence adverbs. The two related phenomena investigated in this case study present very clear-cut examples of a rhythmic determination of syntax. What is more, they seem to provoke minor adjustments on the semantic level if we assume that buffer adverbs are inserted not so much on account of their semantic necessity, but to prevent infractions of the PRA.

3 Discussion and conclusion

The present contribution has so far shown some exemplary data from a larger project described in full in Schlüter (2005). To summarize these findings, it has been argued that many deviations from rhythmic alternation in the construction of an utterance are adjusted through the application of rhythm rules such as beat deletion, beat addition and stress shift, since rhythm is first and foremost a phonological preference. Such effects can however not be investigated based on written corpus data. If phonology-internal repair strategies are not adequate to solve the problem, it is passed on to the next higher level, morphology.

The case studies sketched in section 2.1 have presented a variety of morphological phenomena that take place in the concatenation of free and bound morphemes such as happens in the online production of utterances. A few words are in order concerning the scope of these morphological adjustments. As is well-known, English is a language that possesses only very few grammatical morphemes due to a longstanding drift towards analyticity. Moreover, the distribution of these morphemes is highly standardized so that there is very little room for variation. Grammatical suffixes in Present-Day English are *-(e)s* in the third person singular present tense, *-(e)d* in the past tense, *-(e)d* and *-(e)n* in the past participle, *-ing* in the present participle, *-(e)s* in the plural and genitive of nouns, *-(e)r* and *-(e)st* in the comparison of adjectives and *-ly* in the formation of deadjectival adverbs. Among these, only syllabic allomorphs can in prin-

ciple be implicated in rhythm-induced adjustments as long as there is no overriding grammatical necessity. Considering this limited array of morphemes and allomorphs, the amount of variation attributable to rhythmic influences in the studies in section 2.1 is remarkable. Moreover, if the full diachronic background of these phenomena is taken into account, rhythm turns out to be a major factor in the distribution and evolution of comparative *-er* in *worse(r)*, in the preservation of the strong past participle ending *-(e)n* in *drunken*, *broken* and *stricken* and in the choice between contracted and regularly suffixed variants of *knit/knitted* and *lit/lighted*, as well as in the optional marking of the adverbs *quick(ly)* and *slow(ly)*.

Turning to syntax, section 2.2 has portrayed a larger variety of phenomena. While semantic effects also play an important role in the marking of infinitives after *make* and *dare*, in the sequencing of pairs of colour adjectives, in the pre- or postdeterminer placement of the intensifier *quite* and in the negation of attributive adjectives and sentence adverbs, rhythmic preferences have been shown to be responsible for a more or less sizeable margin of difference between contexts involving a potential stress clash and uncritical contexts. Thus, we can conclude that rhythmic problems can in fact percolate to the syntactic level when rhythmic repair strategies or morphological alternatives are unavailable. Yet, seen against the immeasurable range of syntactic constructions and the enormous flexibility of English sentence patterns, the four (types of) structures surveyed in section 2.2 appear relatively isolated and insignificant. Thus, pending further relevant discoveries in the area of syntax, the interim conclusion from the present study has to be that rhythmic influence in this domain is more limited in scope than in morphology. Similar conclusions have been reached for complementizer omission by Lee and Gibbons (2007) and for the genitive alternation by Shih, Grafmiller, Futrell and Bresnan (this volume) and Ehret, Wolk and Szmrecsanyi (2014). This imbalance between morphology and syntax receives substantial support from the more comprehensive range of studies presented in Schlüter (2005).

Finally, some of the corpus studies have suggested that rhythm may even have repercussions on the semantic contents of an utterance (in terms of the choice of lexical items). The clearest example of this is the insertion of adverbial modifiers that may not be strictly necessary from a semantic perspective but serve as stress clash buffers. In other cases, it may be the case that the semantic forces influencing infinitival marking, the sequencing of colour adjectives, the placement of the intensifier *quite* and even the redundant comparative marking of *worser* are overridden by rhythmic requirements, though such trade-off phenomena are impossible to prove on the basis of written corpus data.

In conclusion, other sources of evidence are ultimately needed to confirm the interdependence of rhythmic, morphological, syntactic and semantic processing, for instance, experimental and neurophysiological insights. Irrespective of such

further research, the corpus evidence accumulated here and in Schlüter (2005) independently fosters a layered conception of the structure of linguistic processing corresponding to the one assumed in standard neural network models (see, e.g. McClelland and Rumelhart 1981, Rumelhart and McClelland 1982, McClelland 1987, Levelt 1989, Lamb 1999). Furthermore, a quantitative assessment of the evidence available suggests that the intensity of rhythmic effects decreases with an increasing distance between the linguistic subsystem concerned and the rhythmic system. The latter is part of the phonological layer, which, by hypothesis, borders on the morphological layer (comprising affixes as well as free grammatical words), which, in turn, connects with the syntactic layer, which is itself framed by the vast system of semantic concepts. Thus, in the production of an utterance, the linguistic system seeks to solve a problem of rhythmic well-formedness by means of minimal modifications as close as possible to the level where the problem arises. For this reason, most rhythmic problems are solved on the rhythm-internal level, many are solved on the morphological level, some on the syntactic level and only a few on the semantic level. The layers replace the modules in traditional grammatical theory, but in contrast to these, they interpenetrate each other (as argued in Schlüter 2003), though only to a limited extent. In other words, morphological choices are very strongly determined by the resultant rhythmic constellations, syntax is much less under the sway of rhythm, and semantics tolerates at most minimal adjustments in favour of a better rhythm.

Another type of limitation of the scope of the PRA has been mentioned several times in passing: If the grammar makes morphological and syntactic alternatives available, rhythmic adaptation is only one of the factors that determine the choice of these variants. As noted earlier, the redundantly marked comparative *worser*, the unmarked past participles *broke* and *struck* and unmarked adverbs such as *quick* and *slow* came under pressure from and partly succumbed to standardization tendencies inspired by the ideal of a biunique relation between form and function. This ideal is not merely the invention of 18th century prescriptivism, but is functionally motivated: Language processing is facilitated if one and the same function is invariably encoded in the same form. Yet, loss of variability goes at the expense of rhythmic adaptability. Another important limiting factor is semantics: Morphological and syntactic variants are often endowed with fine semantic nuances. Thus, since the special meaning ‘penniless, bankrupt’ is typically encoded in predicative position, it has become associated with the monosyllabic form *broke*, which, when used attributively, results in a stress clash. Similarly, *worser* may be seen to have a stronger meaning than *worse*, marked and unmarked adverbs and infinitives have been argued in the literature to differ slightly in meaning, and semantic/perceptual distinctions of intensity/salience (in the case of colour adjective sequences), maximization/moderation (in the

case of *quite*) and gradability (in the case of negated attributive adjectives) play an important role in competition with rhythmic constraints. Other interfering factors include stylistic distinctions, emphasis, iconicity, processing strategies etc. Thus, rhythm is only one of a complex network of determinants, but a frequently underestimated one.

Eventually, if rhythm in language is ultimately grounded in neurophysiological properties of the human brain, it should be self-evident that it is effective not only word-internally (as described, e.g., in Chomsky and Halle 1968), but also across word boundaries in the online production of utterances. The mechanism by which rhythm influences morphological and syntactic choices in a neural network model has been hypothesized in Schlüter (2005: 257–306) to be an optimization of the flow of activation, ultimately conditioned by the refractoriness of nodes. It is assumed that there is a phonological node responsible for the feature ‘stress’ in a syllable. Activation of the node should ideally be followed by a recovery phase, during which it takes additional effort to re-activate it. While the principal direction of activation in language production is ‘top to bottom’, i.e. from semantics via syntax and morphology to phonology (and vice versa in language perception), such a network is necessarily bidirectional in nature, so that a blockage at a lower level is fed back to higher levels. Since the immediate re-activation of the feature ‘stressed syllable’ is disfavoured, the flow of activation seeks out a bypass on higher levels of the network that incurs no such problem. This bypass may consist in the selection of a different morphological or syntactic (or, more rarely, semantic) structure. Thus, dealing with rhythm beyond the word also improves our understanding of other parts of linguistic structure, e.g. questions such as why a certain morphological or syntactic form is chosen rather than a competing one.

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