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On the emergence of reduplication in German morphophonology

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Abstract: This paper discusses reduplication as a technique of word formation in German. In contrast to previous approaches, which consider reduplication as extra-grammatical and unproductive, this study identifies rhyme and ablaut reduplication as truly reduplicative processes in the morphology of German. A sizeable corpus of these reduplications and an acceptability rating study attest the productivity of this phenomenon. Other contemplable cases of reduplicative structures are properly treated as either phonological doubling, lexical sequencing, or (special cases of) compounding. An analysis in terms of Optimality Theory (OT) is offered which suggests that both rhyme and ablaut reduplication emerge when a segmentally and prosodically underspecified expressive morpheme is attached to a base – given that the base strictly obeys certain word prosodic requirements. The present approach considers the morphophonology to be blind to morphosyntactic structure and consequently eschews constraints that make explicit reference to base-reduplicant correspondence. The OT grammar successfully models the emergence of the fixed bipedal structure, the obligatory segmental deviance of the reduplicant, non-exponence of the expressive morpheme in the case of non-trochaic bases, the variable linearization of base and reduplicant in ablaut reduplication, and the interaction of reduplication with segmental alternations. Certain (crosslinguistic) correlations regarding constraints on reduplicative word formation and poetic devices, such as rhyme and meter, are discussed.

Keywords: ablaut, German, Optimality Theory, reduplication, rhyme

1 Introduction

This paper discusses reduplication as a technique of word formation in German. The central morphological devices for word formation in German, viz. derivation via affixation and compounding, generally concatenate segmentally speci-

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fied bound or free morphs. The reduplicative exponent, in contrast, is a chameleon – its segmental realization is variable as it is largely determined by the stem to which it is attached. As an example, in the word *Hinkepinke* 'hopscotch' < *hinken* 'to hobble', the suffixed reduplicant[1] is disyllabic [pɪŋkə] while in the case of *Quitschquatsch* 'Fiddelsticks!' < *Quatsch* 'nonsense', the reduplicant is the prefixed monosyllable [kvɪtʃ]. The apparently flexible anchoring in addition to the variable segmental and syllabic structure of the reduplicant, and the playful and facetious connotation of these words suggest that this process is "extragrammatical" (Dressler 2000). In the same vein, Barz notes that reduplication in German "can hardly be dealt with systematically" (Barz 2015: 2407).

This treatise provides evidence to the contrary. Its objective is to demonstrate that reduplication in German not only deserves a systematic treatment, but also that it is possible to give an explicit formal account that captures the essential morphophonological features of reduplication. As opposed to previous work on reduplication in German (Bzdęga 1965; Schindler 1991; Wiese 1990), I suggest that the great diversity of seemingly or effectively reduplicating patterns, their use in mainly non-standard, spoken registers, and their unpredictability, have obscured the morphophonological regularity, and productivity, of two kinds of reduplication, namely rhyme reduplication (1) and ablaut reduplication (2).

(1) *Schickimicki* (< *schick*), *Hasepase* (< *Hase*), *popelmopel* (< *Popel*)
trendy type (< posh), sweetheart (< bunny), nose picker (?) (< bogy)

(2) *Wirrwarr* (< *wirr*), *Mischmasch* (< *misch*), *Krimskrams* (< *Krams*)
jumble (< woozy), hotchpotch (< mix), bric-a-brac (< stuff)

Alongside of rhyme and ablaut reduplication, several other kinds of reduplicative structures exist in German. In Section 2, I will propose and motivate a new taxonomy of the various structures, and discuss their status in the lexicon or grammar of German.

The morphophonological properties of rhyme and ablaut reduplication will be presented in detail in Section 3. It will be shown that these types of reduplication are closely related and subject to the same morphophonological constraints. The productivity of rhyme and ablaut reduplication in German is attested by a (most probably inexhaustive) corpus of previously undocumented

1 I use the terms *base* and *reduplicant* in a pre-theoretic, merely descriptive way: the base is the part of the reduplication most faithful to the stem's canonical realization while the reduplicant is the (partial) copy, which may deviate from the stem w.r.t. its segmental makeup; the identification of base and reduplicant is not possible in cases of identical reduplication.

cases (n > 150) of rhyme and ablaut reduplication (the corpus is listed in the appendix). Apart from the corpus, the acceptability of rhyme and ablaut reduplication is backed up by a questionnaire.

The sizeable number of these two types of reduplications, and their regular shape substantiate their morphological productivity. This motivates a grammatical analysis, formulated in terms of Optimality Theory (Section 4). This analysis suggests that rhyme and ablaut reduplication are in fact the result of quite regular morphological concatenation with the unusual proviso that the morpheme attached to the base be segmentally underspecified. It will be shown that the reduplicative nature of these words is due to purely phonological constraints. In Section 5, I discuss issues that the OT model does not resolve, and certain crosslinguistic correlations regarding constraints on reduplication and poetic devices, such as rhyme and meter. Section 6 concludes the paper.

2 Reduplicative structures in German

The diversity of reduplicative forms in German was documented by Bzdęga (1965) who presents an impressive collection of approximately 1880 reduplicative tokens gleaned from a broad range of dialectal and historical strata of German. However, only a subset of the patterns identified by Bzdęga (1965) are actually attested in modern Standard German, with only about 100 in general use (Wiese 1990). The two biggest classes of reduplicative structures in Bzdęga's collection are in fact forms with rhyme or ablaut, but many either lack a synchronically transparent morphological base (e.g. *Kuddelmuddel* 'mess'), or correspond to two stems (e.g. *Schnippschnapp* < *schnippen* 'to snip', *schnappen* 'to snatch') and are thus more properly treated as a special kind of compound (cf. Section 2.2). Other tokens are clearly reduplicative in nature but do not exhibit rhyme or ablaut (e.g. *Mama* 'Mum', *Kuckuck* 'cuckoo'). It thus appears that there is no uniform analysis available for the various patterns of reduplication found in German. Therefore, given the great diversity of reduplicative structures and their marginal status in morphological descriptions of German, a delimitation of the different types of reduplication is in order. To unveil the grammar of reduplication, it is necessary to isolate those patterns from the diverse set that are unambiguous instances of reduplication, and to assign the dubious cases a proper place in the lexicon and/or grammar of German.

As a first approach towards reduplicative structures in German, I propose a taxonomy of this diverse phenomenon. The taxonomy takes its cue from the degree of lexicality of the reduplicated form and the correspondence to an iden-

tifiable morphological base. It thus differs substantially from Bzdęga's classification, which is solely based upon the phonological makeup. The proposed classification is depicted in (3).[2] This taxonomy distinguishes i) syntactically autonomous, i.e. non-incorporated, interjections (3-I), ii) words used as lexical items (3-II), and iii) structures beyond the word, i.e. reduplicative phrases (3-III).

(3) Reduplicating structures
- I reduplicative interjections
  - (i) restricted to paralinguistic use, violating word phonotactic principles ([ts.ts.ts] – sound marking disapproval, *hahaha*, *hihi* – laughter, *rattattattatta* – imitation of machine gun)
  - (ii) phonotactically legal (onomatopoeic) interjections without lexical base (*dingdong* – imitation of doorbell, *piffpaff* – imitation of gun)
- II reduplicative forms used as lexical items
  - (i) no morphological base identifiable
    - a. purely phonological doubling, onomatopoetic words (*Mama*, *Kuckuck*)
    - b. synchronically unrecoverable base (*Techtelmechtel*)
  - (ii) with single morphological base: Rhyme and ablaut reduplication *Schickimicki* (1), *Krimskrams* (2)
  - (iii) combination of two stems
    - a. blends (*Schnippschnapp*), (recursive) compounds (*Kindeskind* 'grandchild', lit.: 'child of the child')
    - b. identical constituent compounds (*Reis-Reis* 'rice-rice')
- III reduplicative phrases
  - (i) frozen coordinations (*fix und foxi* 'to be done for')
  - (ii) X-and-X-construction (*teuer und teuer* 'expensive and expensive')
  - (iii) lexical sequence (*sehr sehr schön* 'very very nice', *schnell schnell* 'quick quick')

According to a widely accepted definition (Rubino 2011), reduplication in the strict sense is understood as a repetition of phonological material within a word for grammatical or semantic purposes. Generally, the base for reduplication is a segmentally specified string, and a morphologically complex word is formed by adding a copy of (some part of) the base (but see Inkelas and Zoll [2005];

2 Here, and in the following, I will disregard reduplications with linking elements (*klapperdiklapp* < *klappern*, *Edepopede* < *Ede*, proper name) and exceptional cases like triplication (*pipapo* < ?, *rirarutsch* < *rutsch* 'slide').

Inkelas [2008] for a different definition including doubling at the morphosyntactic level). From the diverse set of reduplicative structures in (3), only the type in (3-II-ii), viz. rhyme and ablaut reduplications, accords with Rubino's definition. All other kinds of structures either lack the status as word (3-I) and (3-III) or do not form morphologically complex words (3-II-i), or operate on more than a single base (3-II-iii).

The distinction between reduplication proper and the various other reduplicative structures will be made explicit in the following subsections. The class of interjections (3-I) will be disregarded.

2.1 Phonological doubling

The above definition of reduplication, in making explicit reference to a morphologically defined base, justifies a distinction between reduplication of an (or part of an) identifiable morph on the one hand and "phonological doubling" (4), where no morphological base can be identified.

(4) a. *Mama*, *Papa*, *Pipi*, *Kaka*
Mum, Dad, pee, poo-poo

b. *Tamtam*, *plemplem*, *ballaballa*
fuss, batty, crazy

Conceivably, the underlying segmental specification for the words in (4a) consists in just a consonant and a short vowel, e.g. [ma] in the case of *Mama*. In order to become a legitimate word, the segmental structure needs to be augmented to form at least a bimoraic foot; doubling might serve this need. In that sense, words like those in (4a) do not operate on, or add, morphological structure; instead, the whole word becomes the morphological stem that is then open to morphological processes such as inflection or compounding. According to Saba Kirchner (2010), the kind of purely phonological doubling might be characterized as a repair mechanism that becomes necessary when the segmental specification of the morpheme is too sparse to form a minimal word on its own.[3]

In contrast to (4a), the duplicated forms in (4b) do not suffer from moraic sparseness. However, since the base for the doubling process does not have a

3 Note that, in German, the unreduplicated forms *Ma* [ma:] and *Pa* [pa:] are not uncommon. They are, however, clearly perceived as anglicisms. Therefore, I assume that these forms are the result of hypocoristic truncation that is common in English (e.g. Lappe 2008; Alber and Arndt-Lappe 2012) rather than bases for reduplication themselves.

morphological status on its own, these cases are subsumed under the same rubric.

It is interesting to note that phonological doubling generally preserves segmental identity between base and copy while the prototypical cases of morphological reduplication, i.e. rhyme and ablaut reduplication (*Hinkepinke*, *Quitschquatsch*), generally foster non-identity of base and reduplicant. The issue of segmental (non)identity in reduplication will be discussed further in the Sections 2.3, 3, and 4.

2.2 Reduplication vs. compounding

If more than one base can be identified, the resulting word may be considered a (special kind of) compound or blend – irrespective of the segmental similarity between the bases (cf. Bzdęga 1965; Schindler 1991). This holds especially for paronomastic words like *Klimperwimper* ('person blinking one's eyes' < *klimpern* 'to tinkle' and *Wimper* 'eyelash') or *Schnippschnapp* ('snap' < *schnippe(l)n* 'to flick' and *schnappen* 'snap') that resemble rhyme or ablaut reduplications.[4] Often, however, in these cases, we cannot definitely exclude reduplication proper as the responsible process of word formation – it is at least conceivable that the reduplicant is accidentally homophonous to a stem that is not actually part of the word formation. As a case in point, consider the nickname *Sillepille*, derived from *Sille* (which in turn is a hypocoristic version of the female proper name *Silke*): the rhyming counterpart to *Sille* may be used as a noun (*Pille* 'pill' or 'ball'), but there is no obvious way to interpret *Sillepille* as a compound of the stems *Sille* and *Pille*; there is simply no semantic trace of *Pille* as denoting "ball" or "pill" in *Sillepille*. Moreover, according to the rules of compound formation in German, *Pille* would be assigned the role of head, and thus this compound would typically denote some kind of pill or ball. In contrast, *Sillepille* is exclusively used as a (facetious) reference to a person with the proper name *Sille*. I therefore treat cases of this kind as reduplications with segmental alternations (see below).

Krimskrams (< *Kram(s)* 'stuff') represents another problematic case: **Krim(s)* is most likely diachronically related to *Krümel* 'crumb'; however, there is no synchronically available stem **Krims* that would permit a transparent analysis as compound. I therefore treat *Krimskrams* as ablaut reduplication. A

4 The question of whether *Schnippschnapp* is a blend or a compound and whether blending is just a special form of compounding is beyond the scope of this paper. The reader is referred to the discussion in Ronneberger-Sibold (2006).

conceivable alternative would be to analyze **Krims* as a "cranberry morpheme" that attaches uniquely to *Krams*. This analysis however would beg the question of why the two stems are identical except for the ablauting vowel, a fact that is straightforwardly explained under the reduplication analysis (see Section 4). Several similar items exist in which only one of two diachronically identifiable stems are synchronically used.

A further case of doubtfulness concerns the verbs *schlampampen* < *schlampen* 'to be sloppy', *rumpumpeln* < *rumpeln* 'to rumble', *klimpimpern* < *klimpern* 'to clink'. Wiese (1990) treats these cases as reduplications that come about due to the affixation of an underspecified syllable, segmental copying, and subsequent resyllabification. However, these verbs also allow for an analysis as blends where two phonologically similar stems are interleaved (cf. *schlampen + pampen*, *rumpeln + ʔpumpe(l)n*, *klimpern + pimpern*). Whichever analysis is to be chosen as the correct one depends on the synchronic availability of the stems involved. In any case, this pattern does not appear to be productive and I am not aware of other tokens of this kind.

As these examples show, it is necessary to closely inspect the word under consideration in order to distinguish between reduplication and paronomastic compounding or blending. Whenever two synchronically transparent stems can be identified as constituting the word, the more conservative approach would suggest (a special form of) compounding – as long as there is no compelling morphosyntactic or semantic evidence against it (see above discussion on *Sillepille*).

2.2.1 Recursive compounds and identical constituent compounds (ICC)

Recursive compounds like *Kindeskind* 'grandchild' (lit.: 'child of the child'), while presenting iterating phonological material, are not considered reduplications in the strict sense. The semantic transparency of these words suggests that they have to be treated as regular compounds made up of two identical stems. Note that the interpretation of *Kindeskind* is entirely analogous to other endocentric compounds like *Arbeiterkind* 'working-class child' (lit.: 'child of a worker'). The linking element, which is often found in German compounds, is independent evidence for the compound analysis of these cases. Recursive compounds are restricted to only a few relational nouns like *Kind* 'child', *Helfer* 'helper', *Freund* 'friend'.

As English and several other languages, modern Standard German exhibits identical constituent compounding (ICC) (Finkbeiner 2014; Freywald 2015; Hohenhaus 2004) a.k.a. contrastive focus reduplication (Ghomeshi et al. 2004).

Like recursive compounds, German ICC inherently involves doubling of a word, but ICCs are not confined to nouns (5a) but also used with adverbs (5b) or (predicative) adjectives (5c). Freywald (2015), who reports on a large-scale corpus search, did not find any verbs as bases for German ICC.

(5) a. *Nimmst Du Basmatireis oder einfach Reis-Reis?*
'Do you take basmati rice or just rice-rice (i.e. prototypical rice, standard variety rice)?'
b. *Was meinst Du mit 'jetzt' – jetzt-jetzt oder in zwei Minuten?*
'What do you mean by 'now' – now-now or in two minutes?'
c. *Der Typ ist echt schlau – nicht nur gewieft, sondern schlau-schlau.*
'This guy is really smart – not just slick, but smart-smart.'

As Ghomeshi's term 'contrastive focus reduplication' suggests, ICCs are used exclusively in contrastive contexts to denote the stem's prototypical features vis-à-vis less prototypical but contextually available alternatives. I will follow Hohenhaus (2004) and argue that ICC are best analyzed as a special form of endocentric compound: as in endocentric compounds, the first, accented, part restricts the meaning of the (identical) head – in this case by emphasizing the head's prototypical or ideal properties. Ghomeshi et al. (2004) explicitly discard the compound analysis as ICC may involve parts-of-speech not typically used in compounding.

In fact, it may be that this type of word formation is more promiscuous than canonical compounds w.r.t. to the stem that is used: ICC may target adverbs that are not typically used as stems in compounds. In contrast to canonical compounds, linking elements are banned in ICC. However, the promiscuity regarding the stems involved and the lack of linking elements are by no means compelling arguments against the compound analysis. Note that German makes productive use of phrasal compounds (Meibauer 2007), which generally lack linking elements. Furthermore, (phrasal) compounds may involve parts of speech in head or modifier position that are not typically found in canonical compounds (e.g. pronouns: *Über-Ich* 'superego', *Ich-AG* 'You Inc.', *Wir-Gefühl* 'group identity' or adverbs *im Hier und Jetzt* 'in the here and now').[5]

A cross-linguistic comparison buttresses the hypothesis that ICCs are properly treated as compounds: While German speakers find that the left part of an ICC modifies the meaning of the right part (the head), Italian and French speakers – to the extent that they use ICC in their native languages (Wierzbicka

5 Admittedly, in head position, those pronouns are certainly converted to nouns that may take a determiner.

2003) – identify the left part as head and the right part as modifier (Emanuela Sanfelici and Fatima Hamlaoui, p.c.). This correlates perfectly with the head-modifier ordering in canonical compounds in these languages. The head initial ordering of romance is also used in the Linnaean binomial nomenclature of biological taxonomy that makes use of latinate bases. As in romance ICC, identical names for biological genus (left member, head) and species (right member, modifier) likewise indicate the species' prototypicality (e.g. *Bubo bubo* denoting the "prototypical" – from a eurocentric viewpoint – Eurasian eagle owl, as opposed to e.g. the snowy owl *Bubo scandiacus*).

Furthermore, again in parallel to phrasal compounds but in contrast to rhyme and ablaut reduplication, ICC are generally not lexicalized – instead, they are created *ad hoc* as they are bound to a salient contrastive context in order to be used.[6] Furthermore, other than rhyme and ablaut reduplication, ICCs do not appear to be prosodically constrained (see Section 2.3).

On the basis of these arguments, both recursive compounds and ICC may be distinguished from proper reduplication and assigned a place in the realm of German compounding (cf. discussions in Finkbeiner 2014; Freywald 2015; Hohenhaus 2004).

2.3 Reduplication and stem correspondence beyond the word – lexicalization versus *ad hoc* construction

Two constructions with corresponding stems that are not part of the same word are related to reduplication and therefore deserve at least brief discussion here.

First, many frozen coordinations ("Paarformeln" Müller 1997; Cooper and Ross 1975) also involve two phonologically corresponding, yet non-identical, stems as conjuncts (6).

(6) a. *hegen und pflegen* 'to nourish and cherish'
schalten und walten 'to have carte blanche'
b. *fix und foxi* 'to be tuckered out'
dies und das 'this and that'

These constructions are generally lexicalized and idiomatic. Furthermore, these binomials appear to be prosodically constrained, that is, the conjuncts are usu-

6 Based on a questionnaire study, Finkbeiner (2014) notes that ICCs may be plausibly interpreted even without explicit information about the context. However, the participants in her experiment also showed a high degree of uncertainty as to how to interpret ICCs in isolation.

ally confined to the size of a prosodic foot. Many, but not all, of these frozen coordinations display a rhyme or ablaut relationship of the conjuncts involved.[7] In these respects, they resemble the canonical cases of reduplication in (1) and (2). In contrast to reduplication, however, the rhyming or ablauting conjuncts are generally both lexical words – but the meaning of the coordination phrases is not necessarily compositionally transparent.[8]

As a counterpart to frozen coordinations, the "X-and-X-construction" (7) is a coordination of two identical (lexical) words (Finkbeiner 2012, for German).

(7) X-and-X-construction
   a. *Schade dass die so teuer sind.*
      'It's a shame they are so expensive.'
   b. *Naja*, **teuer und teuer** – *wenn die Qualität stimmt, dann finde ich den Preis okay.*
      'Well, expensive and expensive – if the quality is good, the price is fine with me.'
      (Finkbeiner 2012: 1)

The coordinative construction contributes a contrastive reading of the two instances of the same word. As the core lexical meaning of the two conjuncts is trivially identical, the contrast is only valid when the specific situational context and the relevant pragmatic meaning are taken into account. That is, the X-and-X-construction is used to "negotiate the situational meaning of a previously used lexical item" (Finkbeiner 2012: 1, and references therein). Interestingly, the X-and-X-construction is a syntactically and prosodically autonomous entity. It cannot form a syntactic argument unless in existential constructions. Correspondingly, X-and-X-constructions are intimately bound to a context in which the lexical item X has previously been used. As such, they are used productively and are generally *ad hoc* constructions that rarely become lexicalized.

Comparing, on the one hand, rhyme and ablaut reduplication with identical constituent compounding (ICC, cf. Section 2.2.1), and, on the other hand, frozen coordination with the X-and-X-construction, an interesting correlation arises concerning the segmental (non-)identity and the ability to become lexicalized (see Table 1). This correlation appears to hold on the word level and on

7 *Kaffee und Kuchen*, lit.: 'coffee and cake', 'five o' clock tea' makes use of alliteration to establish a phonological correspondence between the conjoined stems.

8 There are several frozen coordinations, in which one stem is synchronically not in use, e.g. *holtern und poltern*, lit.: 'to ? and to rumble.'

Table 1: Correlation of segmental identity and lexicalization in word-like and phrase-like reduplicative constructions.

	word level	**phrasal level**
lexicalized (segmental non-identity, prosodically constrained)	heterogeneous reduplication *Schickimicki*, *Mischmasch*	frozen coordination *hegen und pflegen* *fix und foxi*
ad hoc (segmental identity, prosodically unconstrained)	ICC *Ausbildung-Ausbildung* *Reis-Reis*	X-and-X-construction *gerecht und gerecht* *teuer und teuer*

the phrasal level: Both ICC and the X-and-X-constructions are characterized by segmental identity of the stems involved. These constructions are generally unconstrained by prosodic factors, that is, non-trochaic or polysyllabic bases can easily undergo ICC or may be used in X-and-X constructions.[9] At the same time, these nonalternating constructions are usually contextually bound *ad hoc* formations which rarely become lexicalized.

In contrast, rhyme/ablaut reduplication and frozen coordinations necessitate segmental alternation of the constituting feet/stems; they are generally morphologically simple lexical items or at least lexicalizable (the latter in spite of their phrasal nature) and, furthermore, prosodically constrained. At this point it is not clear to me what may cause this correlation of lexical status and segmental (non-)identity/prosodic shape, but since it holds on the word and on the phrasal level, it is most probably not accidental. However, the fact that ICC and X-and-Xconstructions are neither affected by segmental alternation nor by prosodic shape constraints indicates that their segmental material is fully specified in the input. This again lends credibility to the claim that ICCs are not reduplications in the strict sense, but (phrasal) compounds.

2.4 Lexical sequences

There are several cases in which the base is clearly a word (*hopp* 'lollop, get a move on') yet, in contrast to rhyme and ablaut reduplication, appears to reduplicate without alternation (*hopp hopp* 'Get a move on!').

9 Likewise, morphologically complex bases can undergo ICC or be used in X-and-X constructions.

(8) Lexical sequences[10]
dalli-dalli, *hopp hopp*, *los los*
hurry up, get a move on, go

The great majority of these cases has to be distinguished from proper reduplication as they fail to abide by the imperative of lexical integrity. Remember that, according to the above definition, the product of reduplication be a word. Schindler (1991) provides compelling reasons to question the lexical integrity of structures like *hopp hopp* or *dalli dalli*. Any sequence of identical morphs that is open to violations of lexical integrity (compare *dalli dalli* vs. *dalli*, *los*, *dalli*) qualifies as a lexical sequence rather than a word formed by means of reduplication in the strict sense. A concomitant of the separability is the possibility to unboundedly iterate the base, as in *sehr sehr sehr sehr schön* 'very very very very nice'. As Schindler (1991) notes, neither is characteristic of reduplication as a word formation technique (*Krimskrams* 'bric-a-brac' < *Kram(s)* 'stuff', **Dieser Krims*, *verdammt*, *(dieser) Krams*, **Krimskramskrims*). I will conclude that, whenever the lexical integrity of the reiterated forms are compromised, we can safely relegate these cases to the syntax.

3 Rhyme reduplication and ablaut reduplication

The two biggest classes of reduplication identified in the collection by Bzdęga (1965) are rhyme reduplication and ablaut reduplication. These are the only kinds of proper reduplication (as identified in the above section) that appear to be productive. An online search of these types of reduplication unearthed a wealth (> 150) of forms most of which have not previously been reported in the context of a treatise on reduplication let alone in a dictionary. Many but not all of these forms are derived from proper names; they may regularly be found as usernames in online platforms. Apparently, the obligation to create a unique username in internet forums leads to various kinds of formal augmentation (e.g. *vera123*, *Vera1982* < *Vera* etc.), and reduplication may serve the same purpose (*Veramera*), while adding a hypocoristic or facetious connotation. Consequently, when used as username or hypocoristic formation, reduplication results in nouns or, more specifically, proper names. In significantly rarer cases, bare verb stems may reduplicate, too. These may be used as proper names

10 The orthographic representation of these sequences is quite variable. *Dallidalli*, *dalli-dalli*, and *dalli dalli* are all attested.

(*Schwippschwapp* < *schwappen* 'to slosh', brand name for a lemonade), as interjections, e.g. in chat conversations (*mogelpogel* < *mogeln* 'to cheat'), but are also used frequently as modifiers within compounds where bare stems are commonplace (*Flitterflatter-Seidenband* < *flattern* 'flittering silk ribbon').

In general, apart from the use in online platforms, reduplications are commonly found in substandard registers of oral language, e.g. in playful conversation, not only with children. However, while rhyme and ablaut reduplications are mainly used in oral registers, they may also appear in press releases of big companies (cf. the following excerpt from a news item of a car manufacturer from 2002 in [9]). The fact that reduplications are used in such official contexts may be taken as a confirmation of the general intelligibility and acceptability of these word formations.

(9) *Knister-Knaster-Team bei AUDI spürt Geräusche auf.*[11]
'Crackle-RED-team at AUDI traces noises.'

The corpus currently consists of 94 rhyme reduplications and 61 ablaut reduplications that were collected by the author. These forms were either reported by informants, but also obtained via opportunistic searches in German-speaking internet domains. This list only features words with a single synchronically available base, so (paranomastic) compounds which, like *Klimperwimper* (< *klimpern* 'to tinker', *Wimper* 'eyelash'), are related to two bases, were excluded. Likewise, exceptional cases such as triplication and reduplication with linking elements were not collected. It has to be noted that the collection process was mostly blind to dialectal variation (but see discussion on $^{*/?}$*Michimachi* below), i.e. some of the tokens may be unacceptable in certain dialects. While the list is most probably not unbiased (as the author/collector is a native speaker of a northern variant of Standard German, his intuitions certainly affected the search for these forms), it may serve as a starting point for a more thorough investigation of this type of word formation. The examination of the corpus reveals a number of generalizations and several interesting correlations regarding the type of reduplication (rhyme vs ablaut) and other morphophonological properties of these words. These generalizations are listed in the following section.

11 http://www.presseportal.de/pm/6730/351204 [retrieved on May 20, 2016].
Note that *Knaster* 'weed, tobacco' is a lexical word in German. However, in *Knister-Knaster*, *Knaster* does not seem to hold any semantic relation to 'weed' or 'tobacco', and is therefore considered as reduplicant to *knister* 'to crackle'.

3.1 Morphophonological features of rhyme and ablaut reduplication

The examples in (10) and (11) illustrate the productivity of the two kinds of reduplication. Many of the forms listed are documented here for the first time.

(10) Rhyme reduplications
  a. suffixing reduplikation
    (i) monosyllabic base
    Heinzpeinz, *Ralfpalf*, *Matzpatz*
    (ii) disyllabic base
    Doppelmoppel, *Hasemase*, *Kallepalle*, *Popelmopel*, *Schorlemorle*, *Nickipicki*, *Michipichi*, *Rikepike*, *Silkepilke*
  b. prefixing reduplications not attested

(11) Ablaut reduplications
  a. suffixing reduplication
    (i) monosyllabic base
    Mischmasch, *Ticktack*, *Wirrwarr*, *Stinkstonk*
    (ii) disyllabic base
    Sillesalle, *Rikerake*, *Flügelflagel*, *kritzelkratzel*, *giggelgaggel*
  b. prefixing reduplications
    (i) monosyllabic base
    Krimskrams, *Frinzfranz*, *Quitschquatsch*, *Zickzack*, *Mitzmatz*, *Mitschmatsch*, *schwippschwapp*, *Schnickschnack*, *pitschpatsch*, *plitschplatsch*
    (ii) disyllabic base
    nigelnagel(neu), *schwibbelschwabbel*, *pipelpopel*, *rischelraschel*, *pickepacke(voll)*, *flitterflatter*, *krikelkrakel*

On the basis of the data in (10) and (11), several generalization w.r.t. the morphophonological behavior of rhyme and ablaut reduplication can be formulated:

(12) a. Reduplication results in strictly bipedal words[12]
  b. The foot structure is strictly trochaic (bimoraic monosyllable or disyllabic trochee)

12 Reduplication with an unparsed linking element, e.g. $[[Ede]_{\Sigma}po[pede]_{\Sigma}]_{\omega}$ (reduplication of proper name *Ede*) are attested but I treat them as exceptional.

c. Base and reduplicant display the same number of syllables
d. The segmental makeup of base and reduplicant must not be fully identical → rhyme or ablaut
e. The sequencing of base and reduplicant is co-determined by phonological constraints in ablaut reduplication

These generalizations are in line with the fact that trisyllabic or quadrisyllabic bases (ˀ*Nataliepatalie* < *Natalie*;[13] **Kunigundepunigunde* < *Kunigunde*, proper name) or iambic bases (**Ivonnepivonne* < *Ivonne* [ʔiˈvɔn]) cannot undergo reduplication without previous truncation to a trochaic foot via i-formation (*Ivipivi* < *Ivi* < *Ivonne*) (cf. Féry 1997; Grüter 2003; Itô and Mester 1997; Wiese 2001, on the grammar of i-truncations). Likewise, disyllabic words that superficially display a trochaic strong-weak syllabic pattern, yet consist of two feet, cannot become reduplicated. This ban holds for compounds (**Bahnhofpahnhof* < $[Bahn]_{\Sigma}[hof]_{\Sigma}$ 'train station') and for synchronically unanalysable yet prosodically complex proper names (**Gerhardperhard* < $[Ger]_{\Sigma}[hard]_{\Sigma}$, **Manfredpanfred* < $[Man]_{\Sigma}[fred]_{\Sigma}$).

3.1.1 Rhyme reduplication

The sequencing of base and reduplicant is fixed in rhyme reduplications but not in ablaut reduplications. In rhyme reduplications, the reduplicant invariably follows the base (see Table 2).[14]

The initial segment of the reduplicant is generally a labial, mostly [p], sometimes [m]. Koronal [d] is attested in loans from English (*okidoki*, *superduper*). The ban of segmental identity of base and reduplicant is reflected by the fact that bases with an initial labial invariably harness a different labial for the reduplicant (*Matzepatze* < *Matze*, **Matzematze; Pepemepe* < *Pepe*, **Pepepepe*). The question of why the suffixed reduplicant preferably starts in a labial sound cannot be answered with certainty. However, it is worth noting that, firstly, frozen co-ordinations exhibit the same tendency regarding the sequencing of

13 *Nataliepatalie* is only once attested on a German website; interestingly, it seems to be more commonly found on English-speaking websites although it is by far outnumbered by the reduplicated truncation *Nattipatti*. In general, it seems that English speakers find it easier to reduplicate trisyllabic bases. This fact may possibly buttress approaches to English metrical phonology that assume a greater variety of licit feet, e.g. including dactyls (Burzio 1994).
14 Compare this ordering to English reduplications like *helterskelter* < *skelte* (Old English) 'to hasten', *humblejumble* < *jumble* in which the meaningful base follows the reduplicant (Benczes 2012).

Table 2: Ordering of base and reduplicant, broken down by type of reduplication (rhyme versus ablaut). A chi-square test attests the non-independence of reduplication type (rhyme versus ablaut) and morph order ($\chi^2 = 61.42$, $p < 0.001$).

	Reduplication type	
Morph order	**Rhyme**	**Ablaut**
Base > Red (suffixing)	94	28
Red > Base (prefixing)	0	33

Table 3: Length of reduplication in number of syllables, broken down by type of reduplication (rhyme versus ablaut). A chi-square test attests the nonindependence of reduplication type (rhyme versus ablaut) and length in number of syllables ($\chi^2 = 25.97$, $p < 0.001$).

	Reduplication type	
No. of syllables	**Rhyme**	**Ablaut**
2 (monosyll. base)	5	24
4 (disyllabic base)	89	37

foot-initial segments (*hegen und pflegen* 'to nourish and cherish', *schalten und walten* 'to have carte blanche', *mit Sack und Pack* 'with bag and baggage') (Müller 1997) and this tendency appears to hold for other languages as well (Cooper and Ross 1975). Secondly, there is a general tendency for labials to occupy a foot-initial position (Torre 2003), and speakers may comply with this preference when given the occasion vis-à-vis a segmentally underspecified morph. The same tendency is reflected in children's and adult's productions when asked to provide a rhyme to a nonce word (Fikkert et al. 2005). Moreover, labials are used as onsets in several languages that make use of echo reduplication (Stolz 2008).

Rhyme reduplications exhibit a strong bias towards disyllabic trochees as the constituting feet (see Table 3). Monosyllabic bases are only rarely attested in the corpus (e.g. *Ralfpalf/Ralfmalf* < *Ralf*, *Heinzpeinz* < *Heinz*). These names seem to be more readily used in rhyme reduplication when augmented with the hypocoristic *-i*-suffix, resulting in disyllabic trochees *Ralfipalfi/Ralfimalfi* < *Ralf*, *Heinzipeinzi* < *Heinz*.

Furthermore, the corpus suggests that rhyme reduplications are avoided when the base presents with a complex onset (Table 4). In the rare cases of bases with a complex onset, the reduplicant invariably features a single onset consonant. Furthermore, apart from complexity, the onset of base and reduplicant are in most cases distinguished by the phonological feature, with the re-

Table 4: Onset complexity of the base, broken down by type of reduplication (rhyme versus ablaut). A chi-square test attests the non-independence of reduplication type (rhyme versus ablaut) and onset complexity ($\chi^2 = 14.61$, $p < 0.001$).

	Reduplication type	
Onset complexity	**Rhyme**	**Ablaut**
Singleton	85	39
Complex	9	22

duplicant presenting a single labial onset (*Fritzepitze*, *?Fritzepritze* < *Fritz(e)*, *Klausipausi*, *?Klausiplausi* < *Klaus(i)*).

The rhyme reduplications described here have to be distinguished from another case of reduplicative rhyming, viz. *shm*-reduplication (e.g. Nevins and Vaux 2003), that is found in Yiddish, in certain English registers and also, but only very marginally, in German (there are a couple of search engine hits for *Liebe Schmiebe* < *Liebe* 'love and such'). In contrast to rhyme and ablaut reduplication, *shm*reduplication may apply irrespective of the prosodic shape of the stem, at least in English (Saba Kirchner 2010).

3.1.2 Ablaut reduplication

The curious fact about ablaut reduplication is the variable ordering of base and reduplicant. Both prefixing and suffixing reduplicants are well attested (see Table 2 above). That is, any (morphological) constraint responsible for the ordering of base and reduplicant must be distinctly weaker than the phonological constraint regulating the ablaut order of the vowels [+high, +front] > [+low, +back]. In this respect, ablaut reduplication differs from other means of word formation in which the morph order is fixed.[15] While monosyllabic and disyllabic bases are equally attested (see Table 3 above), ablaut reduplication requires strict segmental restrictions w.r.t. the base in order to apply. Ablaut reduplication is prohibited if the stem vowel of the base cannot undergo ablaut, i.e. ablaut reduplication is restricted to bases with [i], [ɪ] or [a], [o], [ɔ].[16] Interesting-

15 In certain types of blends ("*Konturkreuzung*", Ronneberger-Sibold 2006), the fashion in which the morphs are interleaved or linearized is probably motivated by segmental or word prosodic features of the involved stems.

16 The only counterexample I am aware of is Christian Morgenstern's fictuous character *Flügelflagel* [fly:gəlfla:gəl] < *Flügel* 'wing'. Note however, that [y] is an acceptable off-rhyme to [i] (Primus 2002).

ly, in contrast to English ablaut reduplications (Minkova 2002) that invariably feature lax vowels, German ablaut reduplications also present tense vowels, although to a lesser extent (*nigelnagel* [niːgəlnaːgəl], *pipel-popel* [piːpəlpoːpəl]).

The requirement of ablautable vowels excludes bases with diphthongs and also those that exhibit more than one stem vowel (not counting schwa). Proper names like *Ina*, *Karlo*, *Tilo*, *Anna* have corresponding rhyme reduplications, but it is impossible to form ablaut reduplications like **Inaana*, **Kirlokarlo*, **Tilotalo*, **Innaanna*. Importantly, however, as an apparent exception to this generalization, stems that end in the i-suffix, which is productively used in truncations, can undergo ablaut reduplication *Mischimaschi* < ??*mischi* < *misch* 'mix', *Mitzimatzi* < *Matzi* < *Matthias*. That is, it appears that the hypocoristic i-suffix is invisible to this constraint on ablaut reduplication.

Ablaut reduplication appears to be blocked when it would entail further segmental alternations in the base or the reduplicant. A case in point is the [ç]-[x] alternation in Standard German, which demands that back vowels must not be followed by tautomorphemic [ç] (Wiese 1996). Consider the conceivable ablaut reduplication ?*Michimachi* < *Michi* < *Michael*. While attested in German internet domains, the places of discovery suggest that this reduplication is restricted to Upper German dialectal areas, likely those in which [x] may be used in the context of front vowels.[17]

The reason for the unacceptability of ?*Michimachi* in Standard German is most probably due to the alternation of the dorsal fricative triggered by the low back vowel ablaut [a] in the reduplicant, resulting in [mɪçimaxi]. While both feet are phonotactically well-formed, [mɪçimaxi] is not a licit reduplication in Standard German. This fact documents that base and reduplicant may only minimally diverge. A stronger correspondence between base and reduplicant would be warranted by the forms [miximaxi] or [miçimaçi], both of which are phonotactically illicit in Standard German. The same holds for the prefixing reduplication *Krichkrach* < *Krach* 'noise', which is attested in an Austrian source but does not seem to be felicitous in Standard German.

As in the case of rhyme reduplication, ablaut reduplication exhibits the same phonological tendencies w.r.t. morph sequencing as frozen coordinations, as witnessed by *dies und das* 'this and that'; *fix und foxi* 'to be tuckered out'. In fact, the ablaut ordering constraint requiring precedence of [i], [ɪ] over [a],

17 *Michimachi* and a dactylic variant *Michelemachele* are attested in the context of a sneering nursery rhyme with Upper German lexis (i) (*prunzt* for 'pee-3SG.PRS', *Kachi* for 'potty'), supporting the view that this specific token is restricted to this dialectal stratum:

(i) *Michimachi prunzt ins Kachi.*
'Michimachi pees into the potty.'

[o], [ɔ] appears to be universal (e.g. Cooper and Ross 1975). The ablaut order has been deemed a corollary of the general tendency to order short vowels before long ones (Minkova 2002), as the intrinsic length of the low vowels is generally greater than that of high front vowels (Lisker 1974).

> The essential empirical observation is that the stressed vowel in the left foot of these words is the shortest vowel in the system. Choosing the shortest possible vowel [ɪ] for the left peak of monosyllabic trochees would be the default case [...]. The stressed syllable of the right foot, on the other hand, fills its peak with the phonetically longest vowel available in the system which does not categorically violate the quantitative identity of the two parts. (Minkova 2002: 153)

Summarizing so far, the morphophonological regularity and productivity of rhyme and ablaut reduplication suggests that reduplication is synchronically available in the morphophonology of German. This does not imply that every speaker actively uses reduplication in everyday speech, the phenomenon remains one of the substandard (save a few forms that are in general use, e.g. *Mischmasch*, *Wirrwarr*, *Schickimicki*). However, it is predicted that forms that do not abide by the generalizations in (12) will be rejected by native speakers, while the ones that follow the generalizations should be acceptable. The following section reports on a questionnaire that puts this prediction to a test.

3.2 Experiment (questionnaire study)

In order to validate the generalizations stated in (12), an online questionnaire (SoSciSurvey, Leiner 2015) was devised in which participants judged the acceptability of various conceivable reduplicative structures. Specifically, participants judged prefixing and suffixing rhyme reduplications, prefixing and suffixing ablaut reduplications, full (or total) reduplications and reduplications of a single syllable. Moreover, the possibility of ablaut reduplication involving [ç]-[x]-alternation or ablaut reduplication of bases involving two full vowels was scrutinized. Finally, participants were asked to rate reduplication of non-trochaic bases.

3.2.1 Participants, materials and procedure

The questionnaire was announced in several introductory linguistics classes at Goethe University Frankfurt, usually taken by first year students of German. All in all, 72 students completed the questionnaire. Of these, 64 fulfilled the requirement of being native speakers of German (as per self report).

Participants were asked to judge whether a given base word could undergo reduplication when used in a playful context. Depending on the base, participants were given four, five or six reduplicative alternatives. Their task was to rate each of these on a five point Likert scale. The five points were assigned the following meanings:

5: I could use this word myself;
4: conceivable word, heard before;
3: conceivable word, never heard before;
2: virtually inconceivable that someone would use this word;
1: unacceptable as a word.

Five sets of items were devised. For the first set of items (set "r" for "rhyme"), four simple trochaic words were chosen: *Hansi* [proper name]; *Heinzi* [proper name]; *mogeln* 'to cheat'; *hinken* 'to hobble'. Apart from the suffixing rhyme reduplication (*Hansipansi*), participants were given a prefixing rhyme reduplication *Pansihansi*, the full or total reduplication *Hansihansi*, and a syllabic reduplication *Hahansi*.

With the second set of items (set "tri" for "trisyllabic"), the potential of (rhyme-)reduplication of four non-trochaic (amphibrachic) proper names (*Susanne*, *Tobias*, *Sabine*, *Elias*) was tested. Participants rated six reduplicative options: Rhyme reduplication (suffixing and prefixing: *Sabinepabine*, *Pabinesabine*), leftanchored and stress-anchored truncated rhyme reduplication *Sabipabi*, *Binepine*, full reduplication *Sabinesabine* and syllabic reduplication *Sasabine*.

The third item set (set "a" for "ablaut") was devised to test the potential of ablaut reduplication: eight trochaic bases with stem vowel /ɪ/ (*Sille* [proper name]; *prickel* 'tingle') or /a/, /ɔ/ were chosen (*Gammel* 'rot'; *Quatsch* 'nonsense'; *zappel* 'to fidget'; *Zottel* 'dag'; *Matsch* 'mud'; *Mops* 'pug dog'). Here, participants were presented with ablaut reduplication (*Gimmelgammel*), the reverse ablaut reduplication (/a/, /ɔ/ > /ɪ/: *Gammelgimmel*), full (*Gammelgammel*), and syllabic reduplication (*Gagammel*).

A fourth item set (set "cx" for "[ç-x]-alternation") was administered to probe the viability of ablaut reduplication when ablaut would induce [ç]-[x]-alternation. Four trochaic bases with /ɪ/ or /a/ followed by the dorsal fricative were chosen (*Michi* [mɪçi], *Achi* [axi], [proper names]; *Krach* [kʁax], 'noise'; *sicher* [zɪçɒ], 'sure'). Again, ablaut and reverse ablaut reduplication, full reduplication and syllabic reduplication were given as candidates to be evaluated.

The final item set (set "vv" for "two full vowels") consisted of four trochaic bases with two full, potentially ablautable vowels (*Sara*, *Tilo*, *Jutta*, *Nina* [proper names]). Participants evaluated five options: reduplication with ablaut *Nina-*

nana and reverse ablaut *Nananina* of the head vowel as well as of the non-head vowel *Nininina*, *Ninanini* and full reduplication *Ninanina*.

The items of all five sets were presented in four differently randomized lists that were randomly assigned to participants. Every participant who answered the full item set was presented every item (24 items × 64 participants) and, for each item, judged four, five, or six reduplicative options. All in all, 6252 ratings were obtained.

3.2.2 Results and discussion

The following figures depict the ratings for i. the set of potentially rhyming reduplications (item set "r" and "tri"; Figure 1) and ii. the set of potentially ablauting reduplications (item sets "a", "cx", and "vv"; Figure 2). The diverging stacked bar charts (Heiberger and Holland 2015) represent the results of the Likert ratings as follows: the further to the right, and, concomitantly, the wider the lighter bar segments, the more acceptable the condition was rated. The two darkest shades represent the values "unacceptable" and "hardly acceptable". The three lighter shades represent "possible" or "conceivable" words with different degrees of familiarity or acceptability ("never heard – heard before – could use it myself"). The vertical reference line is set between the ratings representing "hardly acceptable" and "conceivable, never heard". In the following discussion of results, I will assume this line to represent the cut-off between acceptance and rejection.

As shown in Figure 1, suffixing rhyme reduplications of trochaic bases were deemed conceivable words in more than 80 % of responses, with nearly 50 % of cases for which raters reported to have heard or could use the words themselves. Prefixing rhyme reduplications, and full or total reduplications were clearly considered less acceptable (with rejection rates of ~50 %). Syllabic reduplications were rejected in ~80 % of responses. In the case of non-trochaic bases (set "tri"), acceptance rates for both types of truncated rhyme reduplications and the non-trochaic suffixing rhyme reduplication reached acceptance rates of close to 70 % (or were rejected in more than 30 % of cases). They were thus rated distinctly less acceptable than rhyme reduplication of trochaic bases. Prefixing rhyme reduplication, full reduplication and syllabic reduplication were rejected in the great majority of responses.

Similar results were obtained for ablaut reduplications based on monosyllabic stems or trochaic stems ending in a schwa syllable (set "a", Figure 2). Ablauting reduplications obeying the ablaut order of the vowels were rated as possible words in more than 80 % of cases. The reverse ablaut reduplication,

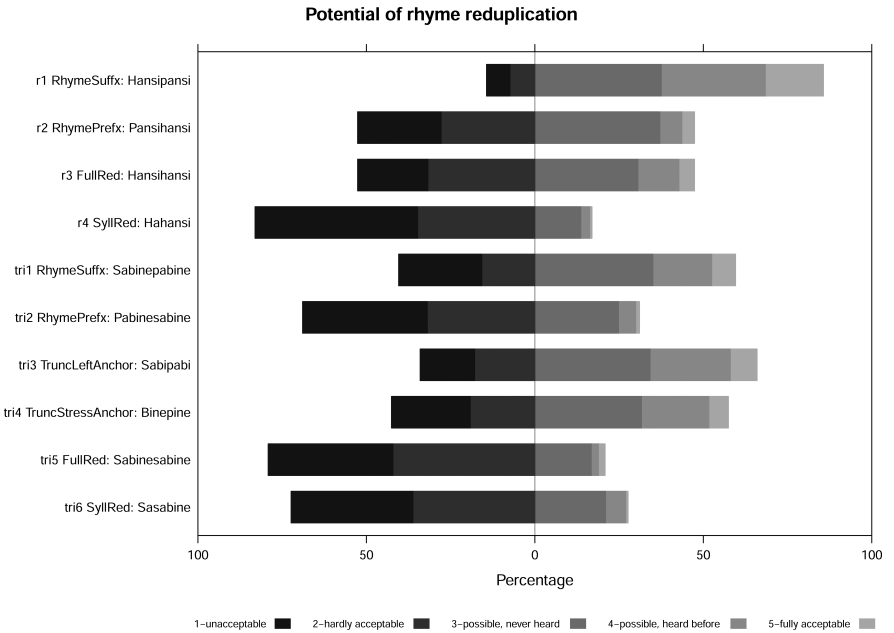


Figure 1: Ratings for rhyme reduplication and potential alternatives in item sets "r" (upper four bars) and "tri" (lower six bars). See main text for details.

full reduplication and syllabic reduplication were deemed acceptable in only 50 % of cases (full reduplication) or less (reverse ablaut and syllabic reduplication). The acceptance rate for ablaut reduplication is clearly reduced if ablaut induced the alternation of the dorsal fricative (set "cx", acceptance rate ~30 %) or when it was applied to bases with more than one full vowel (set "vv", showing acceptance rates of around 50 % for ablaut).

The results of the questionnaire largely confirm the predictions that result from the opportunistic word search reported above. Summarizing the findings, the great majority of responses indicate a general acceptance of rhyme and ablaut reduplications based on monosyllabic or trochaic bases. Ablaut reduplication is acceptable both for bases with /i/ and with /a/ as stem vowel, supporting the prediction that ablaut governs morph order. At the same time, the experiment yields corroborating evidence for the claim that ablaut reduplication is prohibited when it involves alternation of the dorsal fricative and when applied to bases with more than one stem vowel.

As expectable, the results of the experiment are graded rather than categorical. Not all participants were equally strict in rejecting candidates that the majority would deem unacceptable. However, the consistently high rejection

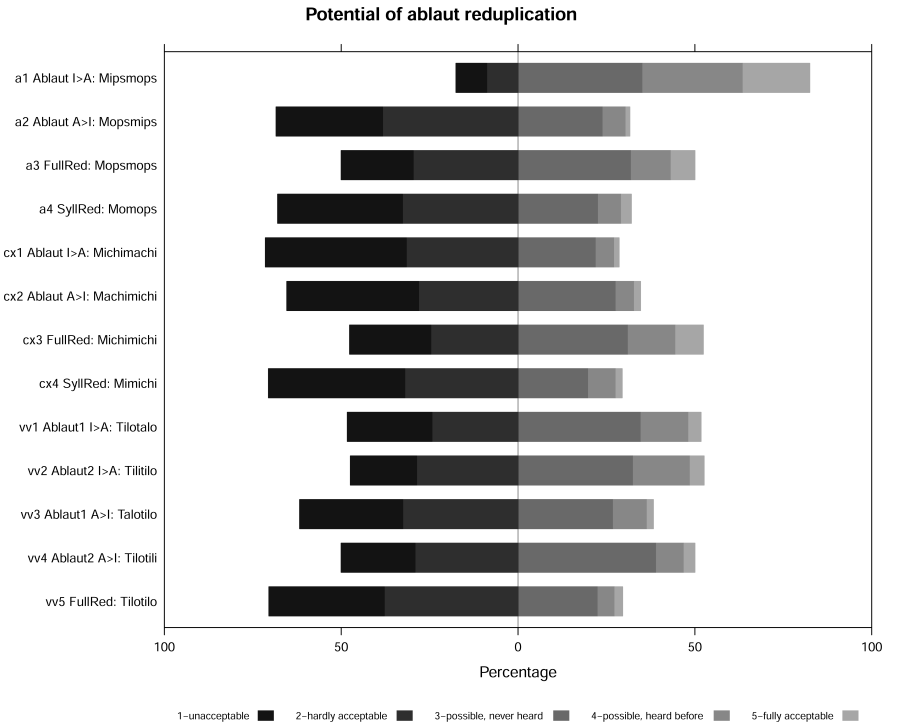


Figure 2: Ratings for ablaut reduplication and potential alternatives in item sets "a" (upper four bars), "cx" (5th to 8th bar from top), and "vv" (lower five bars). See main text for details.

rates for full reduplication, prefixing rhyme reduplication, reverse ablaut reduplication (/a/ > /i/) and syllabic reduplication suggest that, even though reduplication may be a phenomenon of playful substandard registers, there are clear boundaries to what is licit, and these boundaries may well be set by grammatical constraints that hold for the language at large. In the following section, I will put forward an OT-account sketching the grammar of rhyme and ablaut reduplication in German.

4 Rhyme and ablaut reduplication in OT

The optimality theoretic analysis entertained here follows the spirit of Bermúdez-Otero (2012) and Saba Kirchner (2010) who assume a strict division of labor between morphology and phonology, such that morphosyntactic information is

not directly visible to the phonology module and vice versa. In this modular approach, the morphology's role is to assemble roots, stems, and affixes from the lexicon and concatenate them, thus determining a sequence of morphs complete with their lexically specified phonological content. The role of the phonology, then, is limited to interpreting this sequence of morphs without consideration of, or access to, the syntactic features or the morphological status (root, stem, or affix) of the underlying morphemes. Reduplication results when a segmentally underspecified prosodic constituent attaches to a base and needs to be spelled out. Provided that the empty morph cannot be filled with epenthetic material for independent reasons, it inherits segmental material from the base, leading to repetition of phonological material. In this latter respect, the present approach follows older ideas by Marantz (1982) and McCarthy and Prince (1995) et seq. who assume that reduplication is generally driven by the need to fill prosodic positions with segmental material.

However, in contrast to McCarthy and Prince's Base Reduplicant Correspondence Theory (BRCT, McCarthy and Prince 1995), the phonology in the present approach does not directly interact with, and remains blind to, morphosyntactic structure. Note that, according to McCarthy and Prince (1995), the phonology does not only regulate the mapping of underlying and surface structure; in addition, correspondence theory assumes parochial constraints for the mapping of input and reduplicant (IR-faithfulness), and, moreover, output-output correspondence, with faithfulness constraints evaluating the identity of base and reduplicant (BRfaithfulness). Equipped with this reduplication-specific machinery, the phonology has direct access to morphological information about which portion of the output corresponds to the base and which represents the reduplicant. Thus, BRCT assumes constraints that are specific to reduplication and are only relevant when an input morpheme is specified as being reduplicative (Red). Correspondingly, reduplication would be conceived of as a given morphological process rather than a phenomenon emerging within the phonology.

I will show here that rhyme and ablaut reduplication in German can be modeled without recourse to reduplication specific correspondence constraints. They can instead be modeled with purely phonological constraints that are anyway needed in the morphophonology of German and that are thus motivated independently.

In assuming a segmentally underspecified morph as the driver of reduplication, the present analysis contrasts with another take on reduplication, viz. morphological doubling theory (Inkelas and Zoll 2005; Inkelas 2008). Morphological doubling theory holds that reduplication is the result of concatenating two (segmentally specified) allomorphs, (each of) which may or may not be

subject to certain construction-specific phonological processes (i.e. truncation). That is, reduplication is motivated in the morphology and as such, the repetition is already part of the input to the phonology; it does not serve phonological needs. Prime examples of morphological doubling in German were discussed above in section 2.2.1: recursive compounds and ICC, both of which have been shown to involve repetition at the morphosyntactic level and which do not adhere to the kinds of phonological conditions that affect rhyme and ablaut reduplication (i.e. segmental non-identity, fixed prosodic shape).

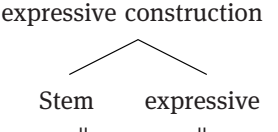
As discussed above, reduplication in German is mainly used for expressive purposes. Following Saba Kirchner's (2010) approach, I assume that reduplication results when a segmentally unspecified morpheme merges with a base. Given i) the strict footsized shape of the base and ii) the bipedal structure of German rhyme and ablaut reduplication, the expressive morpheme has to correspond to a foot (Σ) in these constructions (13). The foot, however, is underspecified w.r.t. its syllabic structure. The native lexicon of German mainly consists of monosyllabic or bisyllabic trochees (Eisenberg 1991); consequently, reduplications are either bisyllabic or quadrisyllabic.

(13) $\Sigma \leftrightarrow$ [+ expressive]

At the morphosyntactic level, the structure of rhyme and ablaut reduplication may be represented as the merger of a stem with an expressive head (14a). I assume the expressive morpheme itself to be morphosyntactically underspecified. As is often assumed for root compounds (e.g. Bauke 2014; Harley 2012; Roeper et al. 2002), a morpheme may take on various syntactic categories or it may remain a non-categorical root morpheme. This assumption fits well with the syntactic heterogeneity that is found in rhyme and ablaut reduplication: while many reduplications are hypocoristic or teasing forms of proper names (nominals), there are also verbal and adjectival reduplications, and also category-free instantiations used as modifiers in compounds (as in *Flitterflatter-Seidenband*, 'flittering silk ribbon').[18] The heterogeneity on the morphosyntactic side, however, by no means implies general irregularity. In fact, as described above and formalized below, the morphophonology is quite regular and may simply be assumed as a concatenation of the stem and the segmentally unspecified foot corresponding to the (syntactically likewise unspecified) expressive morpheme (14b).

18 Note that the word *schickimicki* can be either a (masculine) noun ('posh person') or a predicative adjective ('posh').

(14) a. Morphosyntax:



b. Morphophonology: /stɛm/$_{\Sigma}$ + /Σ/

In the analysis to follow, I will specifically attend to the morphophonological level and its phonetic interpretation, ignoring for the most part the morphosyntactic features of reduplication.

Following the modular approach as expounded above, I will eschew constraints that are specifically geared towards reduplication. Instead, reduplication is shown to emerge from general phonological constraints that come into force whenever a segmentally underspecified morpheme is attached to a base. In line with Saba Kirchner (2010), the general scenario can be summarized as an interaction of the constraints in (15a)–(15c) and the ranking in (15d).

(15) a. MaxFoot: every foot in the input corresponds to a foot in the output.
b. Dep: Every element in the output has a correspondent in the input (no epenthesis).
c. Integrity: No morph in the input has multiple correspondents in the output.
d. MaxFoot >> Dep >> Integrity (Int)

The ranking of the constraint Dep (banning epenthetic material) over Integrity (banning the re-use of morphs) ensures that underspecified morphemes surface as copies of the base. The trochaic template of reduplication is the result of constraints on foot structure that are active elsewhere in the grammar of German, e.g. for the expression of plural (Eisenberg 1991; Wegener 2004; Wiese 2009), hypocoristics (Féry 1997; Itô and Mester 1997; Wiese 2001), and diminutives (Fanselow and Féry 2002). The following Tableau 1 depicts the emergence of reduplicative morphology in such a case (for ease of exposition, the factors determining the prosodic size of the reduplicant and leading to segmental alternation between base and reduplicant are ignored in this Tableau; see below for more details).

Non-exponence of the expressive morpheme (candidate a.) is infelicitous as it induces a fatal violation of MaxFoot. The affixation of epenthetic material *bla* (candidate b.) is not an option due to Dep. However, the violation of low-ranking Integrity is acceptable, as witnessed by the grammaticality of the

Tableau 1: The grammar of reduplication.

/mɪʃ/$_{\Sigma}$ + /Σ/		MaxFoot	Dep	Int
a.	mɪʃ	!*		
b.	mɪʃ-bla		!*	
c. ☞	mɪʃmaʃ			*

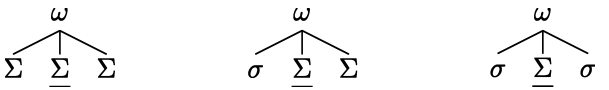
reduplicated *Mischmasch* [mɪʃmaʃ].[19] Further conditions on reduplication in German will be discussed in turn.

4.1 Prosodic shape constraints

The most important constraints on the output in the case of rhyme and ablaut reduplication are the following. First, the output prosodic word is strictly bipedal, and no unfooted syllables are allowed; non-trochaic polysyllabic bases cannot reduplicate. This state of affairs suggests that MaxFoot – and by transitivity Dep and Integrity as well – are dominated by constraints that regulate the prosodic structure of the reduplication. For this purpose, I adopt here familiar constraints on foot structure (Footform = Trochee, requiring feet to be trochaic, i.e. surfacing as bimoraic monosyllable or a disyllable with strong-weak pattern), parsing of syllables (Parse-*σ*, militating against unfooted syllables), and the notion of Hierarchical Alignment (discussed in Itô et al. [1996] and elaborated on in Ussishkin [2000]). Hierarchical Alignment requires each prosodic constituent to be edge-aligned with some prosodic constituent containing it. In the examples in (16), the edges of prosodic words (*ω*) to which the feet are properly aligned are marked with "‖" to the left or right, respectively. These structures thus obey Hierarchical Alignment. In contrast, (17) lists several structures, in which the underlined feet fail to align to an edge of a prosodic word, incurring a violation of Hierarchical Alignment.

(16)

19 I assume the segmental string *bla* in candidate b. to be epenthetic material with no phonological relation to material of the stem. In contrast, *masch* in candidate c. holds a specific phonological relation to the segmental structure of the stem and is thus not deemed epenthetic.

(17) 

Alignment to the edge (left or right) of some larger constituent amounts to the expression of prominence within that larger constituent, and, more importantly, obeying this requirement gives rise to maximally binarily branching prosodic words – without the stipulation of a binary maximum. Specifically, Hierarchical Alignment ensures that polypedal bases cannot reduplicate even if the involved feet do not violate the trochaic requirement: in (18), the failure of the innermost feet (underlined) to align to an edge of the prosodic word leads to non-exponence of the expressive reduplicant in the case of *Kunigunde*.

(18) **Kunigundepunigunde* < *Kunigunde* (proper name)
*[[kuː.ni]$_\Sigma$[gʊn.də]$_\Sigma$[puː.ni]$_\Sigma$[gʊn.də]$_\Sigma$]$_\omega$ < [[kuː.ni]$_\Sigma$[gʊn.də]$_\Sigma$]$_\omega$.

For ease of exposition, we assume a prosodic meta-constraint Prosody dominating MaxFoot. This meta-constraint entails the above constraints, namely Parse-σ, Trochee and Hierarchical Alignment. For the present case of reduplication, nothing hinges on their exact intrinsic ordering.

4.2 Segmental non-identity

Apart from the strict prosodic requirements, it was shown that the two feet must not be fully identical. Non-identity is achieved by rhyme or ablaut, depending on the segmental makeup of the base. Bases with more than one full vowel or vowels other than /i/, /ɪ/, /a/, /o/, /ɔ/ can only be reduplicated via rhyme reduplication. However, which technique is used is not fully predictable, as some bases allow both rhyme or ablaut reduplication (*Sillepille*, *Sillesalle* < *Sille*). To cover the nonidentity requirement, I will make use of two constraints (19a) and (19b) proposed for the analysis of haplology in German and English (Plag 1998), and extend their use to the foot level. These two constraints are context-sensitive versions of the more general markedness constraint (19c). Together with (20), these constraints guarantee that adjacent feet be distinct in either the onset or the nucleus of the head syllable.

(19) a. Ocp$_{nucleus}$: the nuclei of (the head syllables of) adjacent feet must not be identical.
b. Ocp$_{onset}$: the onsets of (the head syllables of) adjacent feet must not be identical.
c. Ocp: adjacent feet must not be identical.

Tableau 2: The grammar of rhyme and ablaut reduplication.

		PRSDY	MAX_{Σ}	ID_F	OCP	OCP_o	OCP_n
/mɪʃ/$_{\Sigma}$ + /Σ/							
a.	[mɪ[mɪʃ]$_{\Sigma}$]$_{\omega}$	*!	*				
b.	[[mɪʃ]$_{\Sigma}$]$_{\omega}$		*!				
c.	[[mɪʃ]$_{\Sigma}$][bla:]$_{\Sigma}$]$_{\omega}$			**!*			
d.	[[mɪʃ]$_{\Sigma}$[mɪʃ]$_{\Sigma}$]$_{\omega}$				*	*	*!
e. ☞	[[mɪʃ]$_{\Sigma}$[maʃ]$_{\Sigma}$]$_{\omega}$			*		*	
f.	[[mɪʃ]$_{\Sigma}$[paʃ]$_{\Sigma}$]$_{\omega}$			**!			
/ʃɪki/$_{\Sigma}$ + /Σ/							
a.	[ʃɪ[ʃɪki]$_{\Sigma}$]$_{\omega}$	*!	*				
b.	[[ʃɪki]$_{\Sigma}$]$_{\omega}$		*!				
c.	[[ʃɪki]$_{\Sigma}$][bla:]$_{\Sigma}$]$_{\omega}$			**!*			
d.	[[ʃɪki]$_{\Sigma}$[ʃɪki]$_{\Sigma}$]$_{\omega}$				*	*	*!
e. ☞	[[ʃɪki]$_{\Sigma}$[mɪki]$_{\Sigma}$]$_{\omega}$			*			*
f.	[[ʃɪki]$_{\Sigma}$[maki]$_{\Sigma}$]$_{\omega}$			**!			

(20) IDENT-IO$_F$: The segmental features of the output are identical to the ones specified in the input.

Tableau 2 depicts the workings of PROSODY, MAXFOOT, and the interaction of the three OCP constraints with featural faithfulness IDENT-IO$_F$ (lower ranking DEP and INTEGRITY are ignored here for ease of exposition); this grammar derives both ablaut reduplication (upper half, *Mischmasch* < *misch*) and rhyme reduplication (lower half, *Schickimicki* < *schick(i)*). The constraint hierarchy prevents reduplication resulting in words with unparsed syllables (candidates a.) or non-exponence of the expressive foot (candidates b.). Filling the underspecified foot with epenthetic material is ruled out (candidates c.), as is total, i.e. identical reduplication (candidates d.). Tying OCP and IDENT-IO$_F$, and ranking them above the likewise tied OCP_{onset} and $OCP_{nucleus}$, prevents simultaneous application of rhyme and ablaut, cf. the opaque candidates f. The juxtaposition of rhyme and ablaut reduplication in this Tableau demonstrates that both types of reduplication are subject to the same basic constraint hierarchy.

Note that the OCP constraints are generally violated in ICC and recursive compounds (see Section 2.2.1), while rhyme and ablaut reduplication strictly observe the non-identity requirement. The reason for this discrepancy lies in the nature of the input. Take, for example, a recursive compound like *Kindeskind*, lit.: 'child of the child', 'grandson'; given the compositional transparency of this compound, I assume the input */Kind/ + /Kind/*. A high-ranking con-

straint MAX-IO (requiring that the output entails the complete featural specification of the input) will prohibit OCP to make any change to the onset or stem vowel (**Kindespind*, **Kindeskand*). In contrast, in the case of the unspecified expressive morpheme in rhyme and ablaut reduplication, MAX-IO has no say about the realization of the reduplicant, so OCP will decide about its surface appearance.[20]

The constraint ranking in the above Tableaux suggests that rhyme and ablaut reduplication are both grammatical options. In Tableau 2, the unattested rhyme reduplication *Mischpisch* for the base *misch* would fare as well as the grammatical candidate *Mischmasch*; likewise, unattested *Schickischacki* would be considered optimal alongside *Schickimicki*. This result is desirable because there are evidently bases that show both options of reduplication (e.g. *Sillesalle*, *Sillepille* < *Sille*). The choice between rhyme and ablaut reduplication is therefore considered to be made outside the phonology proper, unless there are phonological reasons that prohibit one of these options.[21] One such case is considered in the following subsection.

4.2.1 Dorsal fricative alternation blocks ablaut reduplication

The constraint hierarchy in Tableau 2 entails the imperative of a minimal difference between base and reduplicant (cf. the ungrammaticality of candidates d. and f.). As discussed above, ablaut reduplication is blocked when the ablaut would trigger further segmental alternation in the reduplicant (**Michimachi* [mɪçimaxi] < *Michi* [mɪçi]). The relevant alternation is generally conceived as an assimilation process in which [+back] vowels trigger the backness of a following, tautomorphemic dorsal fricative (/a/ is considered [+back] in German), see (21).

(21) AGREE$_{[back]}$: The dorsal fricative agrees with a preceding tautomorphemic vowel concerning the feature [+/–back].

As shown in Tableau 3, applying ablaut while observing high ranking Agree$_{[back]}$ necessarily leads to a fatal violation of IDENT-IO$_F$ due to the alterna-

20 Assuming, as expounded above, that they are a special kind of endocentric compound, ICCs likewise do not adhere to the prosodic constraints that are active in rhyme and ablaut reduplication; generally, in compounds, the compound members are segmentally specified in the input and given high ranking MAX-IO constraints, they are immune to prosodic shape constraints.

21 This kind of indeterminacy is certainly not unique to reduplication, witness the coexistence of diminuntive affixes *-chen* and *-lein* in German (*Röslein*, *Röschen* 'rose-dim' < *Rose*).

Tableau 3: Dorsal fricative alternation blocks ablaut reduplication.

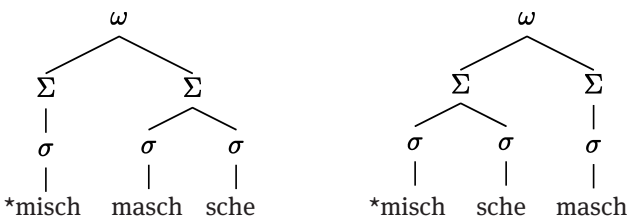
/mɪçi/$_\Sigma$ + /Σ/		AGREE$_{[back]}$	MAX$_\Sigma$	ID$_F$	OCP	OCP$_o$	OCP$_n$
a. ☞	[[mɪçi]$_\Sigma$[pɪçi]$_\Sigma$]$_\omega$			*			*
b.	[[mɪçi]$_\Sigma$[mɪçi]$_\Sigma$]$_\omega$				*	*	*!
c.	[[mɪçi]$_\Sigma$[maxi]$_\Sigma$]$_\omega$			**!		*	
d.	[[mɪçi]$_\Sigma$]$_\omega$		*!				
e.	[[mɪçi]$_\Sigma$[maçi]$_\Sigma$]$_\omega$	*!		*		*	
f.	[[mɪxi]$_\Sigma$[maxi]$_\Sigma$]$_\omega$	*!		**		*	

tion of the dorsal fricative (candidate c). Correspondingly, the winning candidate a. is a rhyme reduplication.

4.3 Prosodic parallelism

A conceivable alternative to segmental variation (rhyme or ablaut) as guarantor of non-identity is excluded in reduplication: bipedal forms like (22) with one branching and one non-branching foot are illegitimate reduplications. That is, a difference between base and reduplicant concerning the prosodic shape is prohibited.

(22)



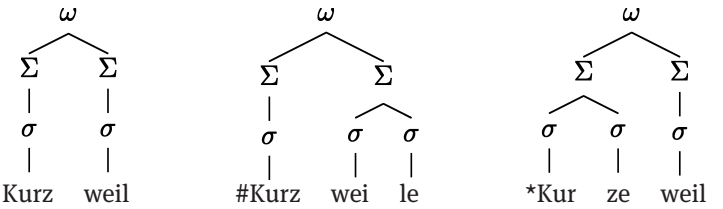
The facts in (22) can be related to a constraint on prosodic parallelism (23) that was recently proposed by Wiese and Speyer (2015). PROSODIC PARALLELISM calls for a symmetric makeup of adjacent prosodic subconstituents (e.g. prosodic words within a prosodic phrase).

(23) PROSODIC PARALLELISM: Adjacent prosodic subconstituents are symmetric.

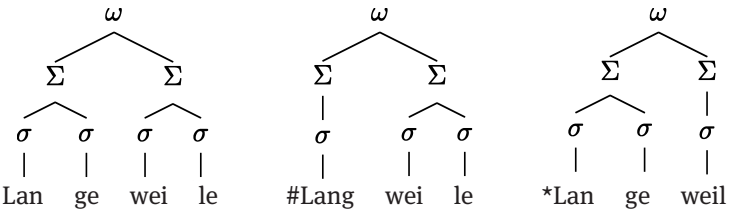
Evidence for this constraint comes from various instances of schwa-alternation in German morphophonology. A case in point is the contrast in (24) featuring

compounds including the head noun *Weil(e)* (engl.: 'while').[22] In this case, as depicted, the schwa-appearance on the head of the respective compound correlates with schwa-appearance on the modifier. The resulting compound thus obeys prosodic parallelism. Numerous examples of this sort are listed in Wiese and Speyer (2015).

(24) a. *Kurzweil* 'pastime', lit.: 'short while'



b. *Langeweile* 'boredom', lit.: 'long while'



A constraint Prosodic Parallelism is obviously suitable to prohibit ungrammatical reduplications like (22) and, as it has been shown to be effective beyond reduplication, it seems specifically preferable within an account that renounces reduplication-specific constraints that would explicitly call for base-reduplicant correspondence (cf. arguments in Saba Kirchner 2010). As the exact rank of Prosodic Parallelism in the constraint hierarchy cannot be determined here, we may subsume it under the meta-constraint Prosody.

4.4 Ablaut and morph order

The order base before reduplicant is observed in all rhyme reduplications but not necessarily in ablaut reduplication. To capture this fact, I use the Ablaut constraint (25) ensuring the order of [+high, front] before [–high, back] among the stem vowels.

22 I thank Birgit Nutz, to whom I owe these examples.

Tableau 4: The grammar of prefixing ablaut reduplication.

/tsakə/$_\Sigma$ + /Σ/		MAX$_\Sigma$	OCP	ABLAUT	LINORDER	INT
a. ☞	[[tsɪkə]$_\Sigma$[tsakə]$_\Sigma$]$_\omega$				*	*
b.	[[tsakə]$_\Sigma$[tsɪkə]$_\Sigma$]$_\omega$			*!		*
c.	[[tsakə]$_\Sigma$[tsakə]$_\Sigma$]$_\omega$		*!			*
d.	[[tsakə]$_\Sigma$]$_\omega$	*!				

(25) ABLAUT: If two feet, one with the high front stem vowel (/i/ or /ɪ/) and one with the non-high back stem vowel (/a/, /o/, or /ɔ/), are conjoined within a prosodic word, the foot with the high front vowel precedes the one with the non-high back vowel.

The ABLAUT constraint interacts with a stipulated constraint LINEAR ORDER. This constraint demands that the exponent most faithful to the stem precedes the exponent of the unspecified morpheme.

(26) LINEAR ORDER: Prosodic constituents that are segmentally specified precede segmentally unspecified prosodic constituents.

That is, if the base features /a/ as stem vowel, the reduplicant with /ɪ/ will be prefixed (*zick(e)zack(e)* < *Zacke*), incurring an acceptable violation of LINEAR ORDER while, in the case of bases with /ɪ/, the reduplicant will be suffixed. Note that the violation of ABLAUT is only crucial in the case of underspecified input. High-ranking faithfulness constraints concerning the linearization of the segmental input (LINEARITY, McCarty and Prince 1995) will spare bipedal stems like *harakiri* from reordering to **hirikara* or **kirihara*. As LINEARITY has no say regarding segmentally empty morphemes, ABLAUT may decide about the order of feet in these cases.

As for rhyme reduplications, the order of faithful and deviant exponent is fixed by LINEAR ORDER, since ABLAUT is irrelevant in the case of two feet with identical stem vowels.

4.5 Non-exponence of the expressive morpheme

The findings of the internet search and the questionnaire attest that non-trochaic bases cannot reduplicate (with the possible exception of dactylic bases, witness ?*Nataliepatalie*). That is, the underspecified foot corresponding to the expressive morpheme does not surface when the base fails to satisfy PROSODY, hence

Tableau 5: Non-exponence of expressive morpheme in the case of non-trochaic bases.

/i'vɔn/ + /Σ/		IdStress	Prosody	$Max_{Σ}$	Ocp
a.	$[ʔi[ˈvɔn]_{Σ}pi[ˈvɔn]_{Σ}]_{ω}$		**!$_{Parse\text{-}σ}$		
b.	$[[ʔi[ˈvɔn]_{Σ}[pi[ˈvɔn]_{Σ}]_{ω}$		**!$_{Trochee}$		
c.	$[[ˈʔivɔn]_{Σ}[ˈpivɔn]_{Σ}]_{ω}$	*!			
d.	$[ʔi[ˈvɔn]_{Σ}ʔi[ˈvɔn]_{Σ}]_{ω}$		**!$_{Parse\text{-}σ}$		*
e.	$[ʔi[ˈvɔn]_{Σ}[ˈpivɔn]_{Σ}]_{ω}$		*$_{Parse\text{-}σ}$ *!$_{Parallel}$		
f. ☞	$[ʔi[ˈvɔn]_{Σ}]_{ω}$		*$_{Parse\text{-}σ}$	*	

the ungrammaticality of **Ivonnepivonne* < *Ivonne*. The model predicts that any prosodic deviance, be it unparsed syllables or non-native foot structure, leads to ineffability of rhyme/ablaut reduplication. This is because reduplication will invariably repeat and thus double the prosodic badness of the form (cf. candidates a., b., d. in Tableau 5). As the ungrammaticality of the fully trochaified **'Ivonne'pivonne* (cf. candidate c. in Tableau 5) shows, it is impossible to alter the lexical prosodic specification of the stem in order to make it trochaic and thus reduplicable. Presumably, a high-ranking faithfulness constraint (Ident Stress) prevents the deviance from word stress specified in the input. If the reduplicant abides by the trochaic ideal while the base keeps its lexically specified iambic shape to avoid a violation of Ident Stress,[23] Parallelism and Parse-*σ* will conspire to prohibit the candidate from being realized (cf. candidate e). The winning candidate is therefore the one showing non-exponence of the expressive morpheme.

5 Discussion

The previous section provides an OT approach to the grammar of German rhyme and ablaut reduplication. The analysis does not treat reduplication as a morphological operation but as a phenomenon emerging within the phonology. Accordingly, reduplication surfaces in the face of segmentally underspecified morphs, and it does so without assuming a specific reduplicative morpheme or morphological process calling for segmental copying.

Summarizing the most important points, MaxFoot is dominated by a bundle of constraints (Prosody for short) which govern the prosodic makeup of

23 Strictly speaking, the present purely phonological model cannot distinguish between base and reduplicant as it is blind to morphological affiliation.

the reduplication. This ranking prohibits reduplication of non-trochaic stems and leads to non-exponence of the expressive morpheme in these cases (as evidenced by the ungrammaticality of **Ivonnepivonne*). The ranking in (27a) leads to strictly bipedal, trochaic reduplications, ensuring the non-identity of base and reduplicant. (27b) covers the variable ordering of faithful and deviant exponent in ablaut reduplication while ensuring fixed order in rhyme reduplications. Finally, the ranking in (27c) derives the non-viability of ablaut reduplication when this would lead to additional segmental alternations (**Michimachi*). It also reflects the ban of opaque reduplications that apply both rhyme and ablaut at the same time.

(27) a. PROSODY >> MAX_{Σ} >> OCP >> DEP >> INTEGRITY
b. MAX_{Σ} >> ABLAUT >> LINEAR ORDER
c. AGREE_{back} >> MAX_{Σ} >> IDENT-IO_{F}, OCP >> OCP_{onset}, $\text{OCP}_{nucleus}$

This OT grammar was shown to successfully model the emergence of the fixed bipedal structure, the obligatory segmental deviance of the reduplicant, non-exponence of the expressive morpheme in the case of non-trochaic bases, the variable linearization of base and reduplicant in ablaut reduplication, and the interaction of reduplication with segmental alternations.

Several aspects of reduplication, however, remain unaccounted for. For one thing, it is as yet unclear what exactly conditions the choice between ablaut and rhyme reduplication. The evaluation of the collection of rhyme and ablaut reduplication provides some hints: the avoidance of complex onsets and the bias towards disyllabic bases in the case of rhyme reduplication shows that the segmental and syllabic makeup of the base co-determines the kind of reduplication. However, cases of optionality (*Sillesalle ~ Sillepille < Sille*) show that the grammar does not enforce the choice between these structures.

Secondly, the present OT model, while predicting the impossibility of reduplication in the case of non-trochaic bases, does not offer a solution as to how the grammar might resort to other ways to reveal the semantics associated with the expressive morpheme. Note that the findings of the questionnaire suggest that reduplication is fairly acceptable with stems that were truncated to a trochee *Susepuse*, *Sannepanne*, ?/**Susánnepusànne < Susanne*. Forms like *Susepuse < Susanne* may be considered "templatic backcopies", in which the base is truncated to match the prosodic form of the truncated reduplicant.[24] Truncation

24 Interestingly, templatic backcopying in reduplication has been argued to be nonexistent in natural languages (Spaelti 1999, among others). The German data presented here, along with data from Guarijio (Caballero 2006), clearly attest to the existence, and thus refute the alleged impossibility of backcopying.

is a well established process of German prosodic morphology. The most common way of truncation is hypocoristic *-i*-formation (Féry 1997; Grüter 2003; Itô and Mester 1997; Wiese 2001). In contrast to reduplication, for *i*-truncations, the prosody of non-trochaic stems may be tweaked to fit a trochaic template. A case in point is the nickname *Ivi* [ʾʔivi] < *Ivonne*. Interestingly, the output of *i*-truncation may well become the input of reduplication, as witnessed by *Ivipivi* < *Ivi* < *Ivonne*. That is, the faithfulness constraints (IDENTSTRESS) that dominate constraints on prosodic structure in the case of reduplication are themselves dominated by prosodic constraints in the case of *-i*-truncation. This state of affairs strongly suggests different constraint rankings for the two morphological processes. A possible solution to this dilemma would be a stratal organisation of grammar with different cyclic domains for *i*-truncation and reduplication (Bermúdez-Otero 2012). Alternatively, either one or the other process has to be deemed outside grammar proper – Bye and Svenonius (2012) opt for the latter and suggest truncation to be extragrammatical in the sense of Dressler (2000). In any case, with the paradoxical ranking of IDENTSTRESS and PROSODY, it seems to be impossible to model both reduplication and templatic truncation within a single grammatical stratum.

Before concluding, I note in the following paragraph certain cross-linguistic correspondences between reduplication and the grammar of metered verse in German(ic) and Romance.

5.1 Reduplication reflects versification and poetic rhyme

The fact that reduplication is mainly used for expressive purposes in playful registers and the term "rhyme reduplication" are suggestive of the poetic dimension of language. It may not come as a surprise then, that we find certain relations between reduplicative word formation and poetry. In this context, it is interesting to note that, while rhyme and ablaut reduplication in German(ic) are based on the prosodic foot, resulting in either disyllabic or quadrisyllabic reduplications, reduplication in French is strictly syllable-based, resulting in disyllabic words (e.g. *dodo* < *dormir* 'to sleep', *gaga* < *gateux* 'crazy') (Scullen 2002; Lambert 2004). Likewise, Italian reduplications, which may be found in reduplicating truncations (Alber 2010), always result in disyllables (*Gigi* < *Luigi*, *Lele* < *Elena*). This crosslinguistic difference is reflected in the versification of the respective languages: While German poetry counts stresses i.e. feet, leaving some freedom regarding the number of syllables in a verse, French and Italian poetry are more strictly based on the number of syllables. Any deviance from the syllable number determined by the poetic meter is considered infelicitous in these languages.

The cross-linguistic correspondence concerning the prosody of poetry and reduplication is enhanced by a segmental correspondence between these domains. That is, French and Italian reduplications often preserve the identity of base and reduplicant and, at the same time, these languages allow identical rhymes in poetry (e.g. Aroui 2005). In contrast, German(ic) generally disallows identical reduplication and, coincidentally, identical rhymes in poetry are clearly considered unsatisfactory. A correspondence of this kind is most probably not accidental.

However, the observation of the prosodic and segmental correspondence in word formation and poetry does not explain why there is identity avoidance between corresponding feet (Germanic) and identity observance between corresponding syllables (French, Italian). I will leave this issue open at this point. Note however that, to the marginal extent that syllabic reduplication is active in German (cf. the cases of phonological doubling in (4) and a couple of nicknames: *Vivi* < *Viola*, *Kiki* < *Kirsten*), the identity of the syllables is observed, too.

6 Conclusion

I have provided evidence for the claim that reduplication in German deserves a systematic treatment and is amenable to a formal analysis. The perspective on reduplicative word formation offered here provides new insights into German morphophonology. The proposed taxonomy of this diverse phenomenon takes its cue from the lexicality of the form and leads to a delineation which identifies rhyme and ablaut reduplication as the only productive, truly reduplicative processes in the morphology of German. All other contemplable cases are properly treated as either phonological doubling, lexical sequencing or (special cases of) compounding.

The informal corpus search and the acceptability rating study attest the productivity and regularity of rhyme and ablaut reduplication and thus call for a formal treatment of these processes. The OT analysis demonstrates that both rhyme and ablaut reduplication may emerge when a segmentally and prosodically underspecified expressive morpheme is attached to a base – given that the base strictly obeys certain prosodic requirements, esp. concerning its foot structure. The present approach to reduplication eschews constraints that make explicit reference to base-reduplicant correspondence. Rather, reduplication is shown to be a special case of concatenative morphology, where the morpheme attached to the base is a plagiarist that avails itself of the segmental material of the base, making only slight changes to the original.

The OT grammar submitted here successfully models the emergence of the fixed bipedal structure, the obligatory but minimal segmental deviance of the reduplicant, the non-exponence of the expressive morpheme in the case of non-trochaic bases, the variable ordering of base and reduplicant in ablaut reduplication, and the interaction of reduplication with segmental alternations (blocking of ablaut reduplication in the face of [ç-x]-alternation).

I leave for future work the interaction of i-truncation and reduplication that poses several problems. Wiese (2001) has emphasized the kinship of these two instances of prosodic morphology. However, the kinship is a complicated one: How is it that the same grammar that blocks reduplications of non-trochaic bases (**Ivonnepivonne* < *Ivonne*) is able to trochaify exactly those bases to build *i*-truncations (*Ivi* < *Ivonne*), which can then serve as the input to reduplication (*Ivipivi* < *Ivi*)?

To conclude, while reduplication may be considered marginal in German (because German linguistics has assigned it a marginal status), it is certainly not to be taken as (typologically) exceptional or rare (cf. Dingemanse [2017] for a distinction between marginalia and rara; Joseph [1997] on the importance of marginalia). Instead, I hope to have shown that reduplication systematically adheres to grammatical constraints that are known to be active in the morphophonology of German (and elsewhere), and is thus part of German speakers' linguistic competence.

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Appendix

List of reduplications

A.1 Ablaut reduplication

A.1.1 Prefixing ablaut reduplication

flickerflacker < flacker
flitterflatter < flatter
Gimmelgammel < Gammel
Hickhack < hack
Kitzekatze < Katze
Krikelkrakel < krakel
Krimskrams < Kram
Mimpfmampf < Mampf
Mipsmops < Mops
Mitschmatsch < Matsch
Mitzematze < Matze
Mitzmatz < Matz
nigelnagel(neu) < Nagel
pickepackevoll < pack
pipelpopel < Popel
pitschpatsch < patsch
plipperplapper < plapper
plitschplatsch < platsch
Quitschquatsch < Quatsch
rickerracker < Racker
Rilleralle < Ralle ~ Ralf
rimmelrammel < rammel
rischelraschel < raschel
ritzirotzi < Rotz
schnickschnack < schnack
schwibbelschwabbel < schwabbel
schwippschwapp < schwapp
Stipstop < stop
tipptopp < top
tiptap < tapp

Zickezacke < Zacke
zippelzappel < zappel
Zittelzottel < Zottel

A.1.2 Suffixing ablaut reduplication

Brillebralle < Brille
fimmelfammel < Fimmel
Flügelflagel < Flügel
giggelgaggel < giggel
Kippelkappel < kippel
Knister-knaster < knister
Krillekralle < Krille ~ Christian
Kritzelkratzel < kritzel
Mischmasch < misch
Mixmax < Mix
Pickelpackel < Pickel
Pimmelpammel < Pimmel
prickelprackel < prickel
Prinzpranz < Prinz
Rikerake < Rike
ritzeratze < Ritze
Schlingelschlangel < Schlingel
Singsang < sing
schwingschwang < schwing
Sillesalle < Sille ~ Silke
Stinkstonk < stink
ticktack < tick
Tingeltangel < tingel
Wiebkewabke < Wiebke
Wirriwarri < wirr
Wirrwarr < wirr
Zipfelzapfel < Zipfel
Zwickzwack < zwick

A.2 Rhyme reduplication

Achimpachim < Achim
Andimandi < Andi
Andipandi < Andi
Annapanna < Anna
Annipanni < Anni
Binemine < Bine ~ Sabine
Binepine < Bine ~ Sabine

Buckelmuckel < Buckel
Compipompi < Compi ~ Computer
Daddelpaddel < daddel
Danimani < Dani ~ Daniel, Daniela
Danipani < Dani ~ Daniel, Daniela
dengelbengel < dengel
Doppelmoppel < doppel
Franzipanzi < Franzi
Fritzefitze < Fritz(e)
Furzipurzi < Furz(i)
Fusselpussel < Fussel
Hasemase < Hase
HaukePauke < Hauke
Heikepeike < Heike
Heinzipeinzi < Heinz(i)
Heinzpeinz < Heinz
Hennapenna < Henna
Hinkepinke < hink
Horstiporsti < Horst(i)
Ilsebilse < Ilse
Inamina < Ina
Inapina < Ina
Ingopingo < Ingo
Kallepalle < Kalle ~ Karsten
Karloparlo < Karlo
kitzelbitzel < kitzel
Klausipausi < Klaus(i)
Kuschelmuschel < kuschel
Kuschelpuschel < kuschel
Larsiparsi < Lars(i)
Mannipanni < Manni ~ Manfred
Manupanu < Manu ~ Manuel, Manuela
Matzepatze < Matze ~ Matthias
Matzpatz < Matz ~ Matthias
mausipausi < Maus(i)
meikepeike < Meike
Michipichi < Michi ~ Michael, Michaela
Miekepieke < Mieke
Mietzepietze < Mietze
mogelpogel < mogel
motzipotzi < motz(i)
müffelpüffel < müffel
Muschipuschi < Muschi
Nickipicki < Nicki ~ Nicole, Nikolas
okidoki < OK
Pepemepe < Pepe
Popelmopel < Popel
Pupsidupsi < Pups(i)

Putzimutzi < putz
Ralfipalfi < Ralf(i)
Ralfmalf < Ralf
Ralfpalf < Ralf
rammelpammel < rammel
Rikepike < Rike
Rotzipotzi < Rotz(i)
Rotzpotz < Rotz
Rubbeldubbel < rubbel
Schickimicki < schick(i)
schlingelpingel < Schlingel
Schorlemorle < Schorle
Schusselpussel < Schussel
Sebimebi < Sebi ~ Sebastian
Silkepilke < Silke
Sillepille < Sille ~ *Silke*
Sinebine < Sine ~ Sina, Sabine
Steffenpeffen < Steffen
Stinkipinki < stink
Stoffelpoffel < Stoffel
Stöpselpöpsel < Stöpsel
superduper < super
Susepuse < Suse ~ Susanne
Susipusi < Susi ~ Susanne
Thilopilo < Thilo
Trippelpippel < trippel
Udopudo < Udo
Ulfipulfi < Ulf(i)
Ullipulli < Ulli ~ Ulrich, Ulrike
Veramera < Vera
Wickeldickel < wickel
Wimmelbimmel < wimmel
Wollebolle < Wolle ~ Wolfgang
Wollemolle < Wolle ~ Wolfgang
Wollepolle < Wolle ~ Wolfgang
wuselpusel < wusel
Zottelmottel < Zottel
Zottelpottel < Zottel
zuckelmuckel < zuckel