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The Emergence of the *ed in Word (De-)Formation*

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Abstract

Inflection and derivation are usually expressed by concatenative affixation, but there are non-concatenative forms of morphological operations in the form of infixation, affixation of phonological features, templatic reshaping involving deletion, epenthesis and metathesis, reduplication and subtraction. Language games (secret languages or ludlings) make use of the same strategies of word formation to deform and conceal words. We show how some language games fill the gaps in the typology of prosodic morphology if analyzed in terms of Direct Optimality Theory, an approach to lexical storage in which morphemes are represented as the (decisive) constraint violations incurred by their exponents. Theoretically costly assumptions made in previous accounts of language games, such as Anti-Faithfulness and game-specific constraints are rendered unnecessary in the Direct OT approach.

Keywords: prosodic morphology; language games; Direct Optimality Theory

Resum. *L'aparició de l'*ed en la (de)formació de paraules*

Els processos de flexió i derivació s'expressen generalment mitjançant la concatenació d'afixos. Ara bé, també existeixen operacions morfològiques que no són concatenatives com ara la infixació, l'afixació de trets fonològics, l'alteració de patrons prosòdics que impliquen elisió, epèntesi i metàtesi, reduplicació i subtracció. Els jocs de llenguatge (o llengües secretes) fan ús de les

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mateixes estratègies de formació de paraules amb l'objectiu de deformar i ocultar el sentit de les paraules. En aquest article mostrem com alguns jocs de llenguatge omplen buits en la tipologia de la morfologia prosòdica si s'analitzen en termes de la Teoria de l'Optimitat Directa, un enfocament a l'emmagatzematge lèxic segons el qual els morfemes es representen com violacions (decisives) de restriccions fonològiques que han d'incórrer els exponents fonològics. Els supòsits teòricament costosos fets en aproximacions anteriors als jocs de llenguatge, com ara les restriccions d'antifidelitat o restriccions específiques pel que fa als jocs de llenguatge, esdevenen innecessaris en una aproximació feta des de la Teoria de l'Optimitat Directa.

Paraules clau: morfologia prosòdica; jocs de llenguatge; Teoria de l'Optimitat Directa

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1. Introduction

Prosodic Morphology is conventionally divided into four types: root-and-pattern morphology, of the kind found in Arabic and other Semitic languages, templatic truncations and blends (including nicknames), infixation, and reduplication (Downing 2018). A central claim of much work in this area is that all kinds are subject to The Emergence of The Unmarked (TETU, McCarthy & Prince 1994), such that the phonology of reduplicants and root-and-pattern formation is unmarked compared to the phonology of the language at large. Thus, Ancient Greek allowed aspirated stops, complex onsets, and codas but they are simplified in reduplication (Zukoff 2012):

(1) TETU in Ancient Greek reduplication

pe–p^heuga	'has fled'	reduplicant lacks aspiration
te–t^hnɛ:ka	'has died'	reduplicant lacks aspiration, complex onset
pe–pemptai	'has been sent'	reduplicant lacks coda

We agree that reduplication is generally TETU, but disagree that this is the case for prosodic morphology generally. Consider three forms in Arabic (Watson 2002). The simple past *katab* 'he wrote', often taken to be the base form, has a coda and a voiced stop, both phonologically marked. The templatic form *kuttab* has two codas, one caused by a derived geminate; since codas and geminates are marked in the languages of the world, *kuttab* contains all of the markedness of *katab* and then some, in a superset relation. The templatic form *kitaab* has a long vowel, also marked, making it more marked than the *katab* form as well.

(2) TET* in Classical Arabic verbal morphology

katab	'he wrote'	coda, voiced stop
kuttab	'elementary school'	coda, coda, geminate, voiced stop
kitaab	'book'	long vowel, coda, voiced stop

If they are derived from *katab*, then, *kuttab* and *kitaab* cannot be the result of TETU. As noted often in the literature, *one* root-and-pattern template might well be TETU, but if a language has multiple such templates, the others must be marked—they can't all arise from TETU (Ussishkin 2000, 2003; Downing 2006, 2018). The base *katab* violates a proper subset of the constraints that its templatic offspring violate, *kuttab* and *kitaab*.

For this reason, we will analyze morphological deformations of this kind as The Emergence of the *ed (Golston & Krämer 2018), employing Representation as Pure Markedness in Direct OT (Golston 1996; Golston & Riad 2000; Klein 2000; Archangeli 2003). Templatic morphology, we note, violates not only Markedness constraints but also Faithfulness constraints (therefore TET*, not TETM).

Morphologically induced violations of Faithfulness come in two kinds, violations of MAX and violations of DEP. Morphologically induced violations of MAX result in subtractive morphology, clippings, and nicknames; the morphology requires violation of MAX (TET*) and the phonological grammar takes care of the rest (TETU). Morphologically induced violations of DEP result in the insertion of an empty mora, syllable or foot, resulting in reduplication (Marantz 1982), which also involves morphologically induced violation of the OCP. Templatic morphology of the kind found in Semitic and Penutian languages involves violation not only of Faithfulness but of Markedness constraints LIKE NOCODA, NOSUPERHEAVY; ALIGNL(ω,φ); CONTIGUITY and LINEARITY.

Exactly parallel facts are found in Language Games (LGs, Bagemihl 1995), the other type of word deformation we explore here. In language games the words of a language are systematically distorted to conceal the meaning to outsiders, or just for fun (Laycock 1972; Bagemihl 1988, 1995; Davis 1993; Vaux 2011). The manipulation operations applied in language games form a typology of additive, subtractive, infixing, and transposing games, as well as games mixing these types (for more comprehensive typologies, see Krämer &Vogt, forthcoming). In a nutshell, additive games intentionally violate DEP, subtractive games violate MAX, infixing games violate CONTIGUITY, and transposing games violate LINEARITY. The stress patterns of some games introduce marked metrical patterns as well, that are otherwise avoided in the language at hand.

The rest of the paper lays this out for non-concatenative morphology (§2) and language games (§3), followed by a conclusion (§4).

2. Nonconcatenative Morphology in Direct OT

Morphemes in Direct OT are represented purely in terms of their markedness, literally by the constraints that they violate. Yokuts *–t* RECENT PAST always surfaces as a (word-final) coronal stop in the coda and is thus represented in terms of markedness as:

(3) Desiderata for Yokuts *–t* RECENT PAST

*COR	*STOP	NOCODA
D	D	D

The desiderata means that recent past should surface as [t]. Note that the constraint ranking is irrelevant here, a function of the grammar not the individual morpheme. There is no need in Direct OT to make individual morphemes come with diacritics pointing to different constraint rankings, or to have a different grammar for different morphemes. The desiderata are realized as well as possible given the grammar of the language, requiring that a faithful rendition have as many of the desiderata as possible.

Similarly, Yokuts *xat–* 'eat' is represented by the constraints it violates:

(4) Desiderata for Yokuts *xat–* 'eat'

*DOR	*CONT	*LOW	ALIGN-L(COR,ω)	ALIGN-L(STOP, ω)
D	D	D	D	D

Non-concatenative morphology is likewise represented by its surface markedness, as we see now.

2.1. Subtractive morphology

Subtraction is one of the most startling non-concatenative processes and impossible to analyze in terms of morpheme concatenation (Anderson 1988). Perfectives in Tohono O'odham are a well-studied case, formed by deleting the final syllable of the stem: *cikapana* > *cikapa* 'worked' and *bisiceka* > *bisice* 'sneezed' (Zepeda 1983). Golston (1996) treats it as an intentional violation of faithfulness, i.e., of Max-σ. Positional faithfulness to the left edge (Beckman 1998) and avoidance of medial loss (Contiguity) results in loss of material word-finally, an effect of TETU.

Truncation also involves loss of underlying material and although the phonology of truncation is well-studied (Benua 1995), what drives it has been ignored. We suspect that intentional violation of Max is the driving force, but leave a full account of that to later work. Anchoring to an edge (*Mike* < *Michael*) or to a prominent syllable (*riz* < *charisma*) shows that TETU (alignment, faithfulness) interacts with TET* (truncation) in an optimality theoretic way (Alber & Arndt-Lappe 2022). Systematic trisyllabic clippings suggest reduction to a layered foot (Krämer 2018; Martínez-Paricio & Torres-Tamarit 2019; Cabré et al. 2021); the markedness of such truncations is clear given how clippings are usually di- rather than tri-syllabic. Truncation in language acquisition (*nana* < *banana*) seems to proceed along a similar course (Dyga 2023), though the truncation is likely a function of child-phonology rather than morphological specification.

2.2. Reduplication

The role of TETU in the phonology of reduplication is well-studied (McCarthy & Prince 1994, 1995, 1999), but the driving force behind it is stipulated: why should a reduplicant sound like its base and what part of grammar lies behind the notion RED? Golston's Direct OT treatment of it as violation of FILL-σ (1996) accounts for the size of the reduplication but not its copying of root-material. For this reason, Golston & Thurgood (2003) propose that the marked property of reduplication is its *echoing of as much of the base as possible* and treat it as violation of *ECHO, a markedness constraint (Yip 1993, 1998; cf. Dressler 1976, Menn & McWhinney 1984). Consider total reduplication in Yawelmani Yokuts *wiyi*-formations (Newman 1944: 37), for which the desideratum is simply violation of *ECHO (in correspondence theoretic terms, violation of INTEGRITY):

(5)	t'ap–t'ap–wiyi	'slap'
	gom–gom–wiyi	'make loud noises'
	buk'uk'–buk'uk'–wiyi	'bulge out several times in several places'
	gabab–gabab–wiyi	'wave the hands several times'

Partial reduplication is also common across languages, as in Yawelmani's INTENSIVE POSSESSOR:

(6)	dam'–dam'ut–	'one with a long beard'
	k'ɔh–k'ɔhis–	'one with a large rump'
	ṭɔt'–ṭɔt'iy–	'one with a large penis'

The size of the reduplicant is given by violation of Zoll's (1998) constraint *STRUC(σ), which prohibits syllables:

(7) Desiderata for Yawelmani Yokuts INTENSIVE POSSESSOR

*ECHO	*STRUC(σ)
D	D

Bontok shows a rare three-way contrast of reduplication for distinct morphological categories (Thurgood 1997). INTENSIVE reduplicates a light syllable, PROGRESSIVE a heavy, and REPETITIVE a disyllabic foot:

(8)	ka–kamaŋan	'hurry a lot'	INTENSIVE	σ_{μ}
	ʔik–ʔikkan	'be doing''	PROGRESSIVE	$\sigma_{\mu\mu}$
	ʔana–ʔanap	'keep looking for fish'	REPETITIVE	σσ

A tableau shows what each of the three violates, providing their desiderata (D):

(9) Desiderata for Bontok reduplicants (Golston & Thurgood 2003)

	*ECHO	*STRUC(σ)	*STRUC(μ)
INTENSIVE σ_{μ}	D	D	D
PROGRESSIVE $\sigma_{\mu\mu}$	D	D	DD
REPETITIVE σσ	D	DD	DD

This approach to reduplication models both the echoing and the size of the reduplicant with constraints that are independently motivated, avoiding the creation of reduplication-specific constraints like RED=σ. Under- and overapplication of phonological processes are modeled with the grammar, using TETU as in standard approaches. REPETITIVE *ʔana–ʔanap*, for instance, undercopies [p] in order to respect NOCODA.

2.3. *Root-and-pattern morphology*

The kind of root-and-pattern morphology found in Semitic (Arabic, Hebrew) and Penutian languages (Miwok, Yokuts) has often been modeled with foot-sized templates (McCarthy & Prince 1990 for Arabic; Archangeli 1991, Guekguezian 2017 for Yokuts), but the foot templates required for the morphology often do not match those required for the phonology, as Archangeli points out for Yokuts. In addition, most of these languages have multiple morphological templates, making an analysis in terms of TETU impossible: they can't all be unmarked.

Based on much previous analysis, especially McCarthy & Prince (1990), Golston (1996) argues that traditional Arabic templates are best understood in terms of pure markedness. As noted above, if *katab* 'he wrote' is prosodically unmarked, *kuttab* 'elementary scool' and *kitaab* 'book' cannot be; if there are *n* templates in a language, *n*-1 must be marked in some way. The following desiderata capture the basic verbal templates of Arabic:

(10) Desiderata for Arabic binyanim (Golston 1996: 737)[1]

	NOCPLXONS	NOCPLXNUC	NOCODA
CV.CVC			
CVC.CVC			D
CVV.CVC		D	
CμCV.CVC	D		
CμCVC.CVC	D		D
CμCVV.CVC	D	D	

1. A better analysis than NOCPLXONS would adopt Kiparsky's (2003) proposal that word-initial clusters in Arabic include a moraically licensed first C; we do not pursue that here, as the markedness issue is the same, regardless of which constraint is violated. Kiparsky's LICENSE-C requires that every C be dominated by a syllable.

The nominal forms known as Masdars, e.g. CVC.CVVC, have similar desiderata but with an added violation of NoCplxNuc and concomitant violation of NoClash, since both syllables are stressed.

As already mentioned, Yokuts provides another very rich system of templatic morphology (Newman 1944; Collord 1968; Gamble 1978). Some suffixes cause alternations in the stem that deform its prosodic shape, as in (11b), from Adisasmito-Smith, Wyatt & Wyatt (2023):

(11) Chukchansi verbal morphophonology

a. Not templatic
/taʔʃ-it / taʔʃ-it ‘see-REC.PAST’
/taʔʃ-e / taʔʃ-e ‘see-FUT.’

b. Templatic
/taʔʃ-iʧʾ / taʔaːʃ-iʧʾ ‘see-AGENTIVE’

The language family has at last 14 different templates (Newman 1944), and each language makes use of up to half of them. While the templates have been analyzed as CVCVC-type templates or feet (e.g., Archangeli 1991; Guekguezian 2017), Golston & Krämer (in prep) argue that they consist of desired violations of segmental and phonotactic markedness constraints. The template in (11b), for instance, violates *LongVowel and AlignL(Wd, Ft) (i.e., [ta(ʔaː)ʃiʧʾ] ‘see-AGENTIVE’). A compelling piece of data is a template found in Yawelmani that displays superheavy syllables that are otherwise actively avoided in Yawelmani and all Yokuts languages. Consider the second syllable of [ʔu.ṭʰoːl.suh.nuʔ] ‘one who makes (people) play music repeatedly’. The suffix *–ls* CAUSATIVE/REPETITIVE turns the root—whatever its underlying shape—into a LH̄ structure, ending in a superheavy (H̄):

(12) The superheavy template in Yawelmani (Newman 1944: 94)

ʔu.ṭʰoː-l.s-	‘play.music–CAUS/REP’	< ʔuṭʰ
ta.ʔeː-l.s-	‘come.to.life–CAUS/REP’	< taʔl
ni.neː-l.s-	‘be.still–CAUS/REP’	< nineː
ʔɔ.pʰeː-t.s-	‘get.up–CAUS/REP’	< ʔɔpʰɔːtʰ

As Newman himself observes, “this stem violates the rule of vowel shortening… The oː or eː vowel of the final stem syllable is not shortened, although that syllable is closed by the addition of the following suffixes” (1944: 52). The RETARDATIVE aspect of Wikchamni likewise produces superheavy syllables otherwise not encountered in the language, e.g., [tʰuːh.wit] ‘spit slowly’ (Gamble 1978: 41). We analyze superheavy targets like these as a volitional violation of the otherwise undominated constraint against trimoraic syllables, *$\sigma^{\mu\mu\mu}$.

3. Language Games

Although language games lie outside core grammar, they lie inside phonology (Bagemihl 1995, *et alii*). Regarding size requirements, they have been analyzed as templatic (Bagemihl 1988, 1995; Yu 2008), violating INTEGRITY or DEP, in games where material is interrupted or added, and MAX, in games where material is deleted (comparable to subtractive morphology), cf. §1. For a typology of language games and the respective terminology see Laycock (1972) and Krämer & Vogt (forthcoming).

Morphological templates in natural language are subject to other processes arising from The Emergence of The Unmarked (TETU, e.g., the formation of nicknames or clippings) or from The Emergence of the Marked (TET*, §2 above). In the following we discuss whether the same holds for language games. We analyze these as word deformation processes which intentionally violate not only markedness constraints such as LINEARITY and CONTIGUITY (rearrangement games, §3.1), but also violate the faithfulness constraints MAX (contraction games, §3.2) and DEP (expansion games, §3.3). §3.4 shows how the fixed segmentism of expanding games violates featural markedness constraints like *LABIAL, something that all affixes do, but also promotes unmarkedness, through TETU.

3.1. Rearrangement language games as violation of LINEARITY

Kitaoka & Mackenzie (2021) discuss a Japanese game *Sakasa kotoba* that shows complete reversal of the input string:

(13)	sa.ku.ra	→ ra.ku.sa	3-2-1	'cherry blossom'
	to.do.ro.ki	→ ki.ro.do.to	4-3-2-1	'roar'

Their analysis explains the complete reversal of the relevant constituents, in this case moras, by ranking CONTIGUITY-μ above LINEARITY (cf. the definition of the constraints in McCarthy & Prince 1999: 195, 296) and introducing a game-specific constraint CROSS-ANCHOR, which is violated by any form that has at least one edge corresponding to the same edge in the base form (14).

(14) *Sakasa kotoba* adapted from Kitaoka & Mackenzie (2021: 61)

/to.do.ro.ki/	CONTIGUITY	CROSS-ANCHOR	LINEARITY
a. to.do.ro.ki		*!	
☞ b. ki.ro.do.to			******
c. do.to.ro.ki	*!	*	*
d. to.do.ki.ro	*!	*	*
e. to.ro.do.ki	*!	*	*
f. do.ro.ki.to	*!		***

We suggest instead that the point of the game is to respect CONTIGUITY *while violating LINEARITY once*; if this is right, the *ad hoc* and game-specific constraint CROSS-ANCHOR isn't needed and we can represent the game in terms of the constraints it must respect (TETU, CONTIGUITY) and those that it must violate (TET*, LINEARITY):

(15) *Sakasa kotoba* constraint violations

	/to.do.ro.ki/	CONTIGUITY	LINEARITY
a.	to.do.ro.ki		Ɖ!
b. ☞	ki.ro.do.to		D***
c.	do.to.ro.ki	*!	D**
d.	to.do.ki.ro	*!	D**
e.	to.ro.do.ki	*!	D***
f.	do.ro.ki.to	*!	D*

In the tableau above, candidate (a) fails because it doesn't play the game: it's just regular speech and lacks the desired violation of LINEARITY (with double-strikethrough "Ɖ" showing that the desideratum is not realized). Candidates (c)-(f) have the LINEARITY violation (D) required for playing the game, but they fatally violate CONTIGUITY, making them non-optimal compared to (b), which has the desired violation of LINEARITY but respects CONTIGUITY. Note that the only way to respect CONTIGUITY while violating LINEARITY at least once is to violate it multiple times: nothing else keeps every surface mora next to its corresponding input mora. No game-specific constraint is necessary on our analysis and the game can be represented solely by the constraint that has to be violated in order to play the game (16).

(16) Desiderata in *Sakasa kotoba*

LINEARITY
D

We stress that the game must be played using the grammar of Japanese, a set of ranked and violable constraints, in which LINEARITY and CONTIGUITY are undominated. This guarantees that the desideratum in (16) will be noticed and that CONTIGUITY will be available to rule out marked contenders in a TETU fashion.

The French language game *Verlan* combines complete reversal (17a) with a limited partial reversal (17b,c), as detailed in Plénat (1995):

(17) a. ri.go.lo → lo.go.ri 'fun' (3-2-1, complete reversal)
b. po.si.bl → si.blœ.po 'possible' (2-3-1, first syllable to end)
c. ko.mã.se → se.ko.mã 'to start' (3-1-2, last syllable to beginning)

Following Bachmann & Basier (1984: 176) we conclude: “Le verlan n’est pas le produit d’un mécanisme unique […]” and analyze it as a single game with two ways of winning. We analyze complete reversal as we do *Sakasa kotoba*, with CONTIGUITY ranked above Linearity and one desired violation of the latter:

(18) Complete reversal in French *Verlan*

	/ri.go.lo/	CONTIGUITY	LINEARITY
a.	ri.go.lo		Đ!
b. ☞	lo.go.ri		D**
c.	lo.ri.go	*!	D*
d.	go.lo.ri	*!	D*
e.	go.ri.lo	*!	D**
f.	ri.lo.go	*!	D**

Again, (a) involves failure to play the game (Đ!); (c)-(f) involves playing the game but violating CONTIGUITY, which is fatal as long as there is a way to play the game and respect CONTIGUITY, which is (b). The best way to play the game is (b), which is just marked enough (D) to be interesting and otherwise as unmarked as possible given the grammar.

The opposite constraint ranking gets us the partially misordered candidates (c, d):

(19) Partial reversal in French *Verlan*

	/ri.go.lo/	LINEARITY	CONTIGUITY
a.	ri.go.lo	Đ!	
b.	lo.go.ri	D**!	
c. ☞	lo.ri.go	D*	*
d. ☞	go.lo.ri	D*	*
e.	go.ri.lo	D**!	*
f.	ri.lo.go	D**!	*

Candidate (a) involves not playing the game; candidates (b, e, f) involve playing the game in excessive violation of LINEARITY. Candidates (c, d) violate LINEARITY as little as possible, while still playing the game. No better candidates are available, so these are licit moves in the game.

We combine the two ways of winning using Anttila’s multiple grammars model (2007), in which certain constraints operate like a revolving door. Half the time LINEARITY outranks CONTIGUITY, in the present scenario, and (c, d) win; the other half the time Contiguity outranks Linearity and (b) wins. Candidates (a, e, f) lose no matter the ranking of the two constraints. An anonymous reviewer rightly asks whether we require a different ranking of constraints in the game (*Verlan*) than in the language in which it is played (French). We do not require this, since the constraints in question are unranked in French; neither compels violations of the other, showing that they are mutually unranked, as we require in the game. That said, a Direct OT analysis of ludlings cannot preclude the possibility of a game having rankings that differ from those of the language it is used in.

The point of *Verlan*, then, is to alter the linear order of the syllables in the base form, which violates the constraint Linearity (McCarthy & Prince 1999: 296); the desideratum for this language game is accordingly violation of Linearity:

(20) Desiderata in *Verlan*

Linearity
D

The difference between Japanese *Sakasa kotoba* and French *Verlan* is not the desiderata: both involve a single violation of Linearity. The difference lies in how Contiguity plays into the game: in *Sakasa kotoba* it is more important than Linearity, in *Verlan* the importance of the two is in flux—there are two ways to win the game—with the result that total and partial reorderings both obtain.

Rearrangement games have been analyzed with the help of a game specific Anti-Faithfulness constraint, Linearity (Borowsky 2012; Gotowski 2019), but this seems *ad hoc*, in part because it multiplies constraints rather than making use of existing ones. If violation of Linearity is a desideratum of the game, as we propose, there is no need for game specific Linearity. The fact that the output is marked, as well as the details of *how* it is marked are both directly encoded in the desideratum as part of a general theory of how morphemes are represented. As is generally the case in OT, the output in *Sakasa kotoba* is the most faithful version of the input compatible with the grammar. The input is the Japanese word plus a set of desiderata, constraint violations that show exactly how marked the output is supposed to be. OT studiously avoids constraints opposites to avoid becoming vacuous: Onset has no doppelgänger "NoOnset" in OT, because it is a markedness constraint that defines a lumpy phonological universe—"NoOnset" cannot be a constraint in OT because onsets are linguistically unmarked. Similarly for Max, the faithfulness constraint that bans deletion; it cannot have a doppelgänger "NotMax" because that would require that languages generally prefer deletion to retention. Direct OT allows us to capture the markedness of specific constructs, templates, ludlings—without introducing constraints like Linearity into phonological theory.

Long distance rearrangement of this kind is unattested as a regular morphological operation (Buckley 2011; Krämer & Vogt, forthcoming) and morphological metathesis is extremely rare as well. This makes clear the markedness of transposing games and the utility of Direct OT in showing how TET* arises in them.

3.2. Contraction language games in Direct OT: violation of Max

In morphological subtraction, truncation targets a syllable, mora, onset or coda. The same holds for contraction games. The deleted material is a prosodic constituent: the initial syllable, the final rhyme, and so on:

(21) a. Initial μ deletion in a Javanese game (Laycock 1972: 78)
silit ku kèpèt dilaten → lit ku pèt laten

b. Final μ deletion in a Javanese game (Bagemihl 1988: 438)
aku arep tuku klambi → ak ar tuk klam ‘I want to buy a dress.’

c. Final μμ deletion in Japanese *Nyobo Kotoba* (Blake 2010: 232)
kawameshi → o-kawa ‘rice with red beans’
sushi → o-su-moji

Assuming that codas are not moraic in Javanese, each of the output words in (21) has exactly one less mora than its input. The game in (21a) involves intentional violation of Max-σ and violation of left-anchoring, so that the first syllable is lost (TET*) but the rest of the word remains (TETU):

(22) Desiderata for Javanese initial μ deletion:

Max-μ	AnchorL(Base, PWd)
D	D

Monomoraic words like *ku* are exempt because of high-ranking Exponence, a TETU effect that keeps entire morphemes from deleting without a trace. The game in (21b) is similar but crucially *respects* AnchorLeft, so that the *final* syllable is lost (TET*) but the rest of the word remains (TETU), as we often find with subtraction in ordinary language (§2.1).

(23) Desiderata for Javanese final μ deletion:

Max-μ
D

Complex coda reduction can explain why *klambi* reduces to *klam* rather than **klamb* in (21b), and why *arep* reduces to *ar* rather than **arp*. This is a TETU effect, as (Malangan) Javanese disallows consonant clusters word-finally (Yannuar et al. 2022).

The Japanese case in (21c) seems to involve violation of Max-Ft, since feet are bimoraic in Japanese (Poser 1990). A TETU constraint like Exponence keeps a bimoraic word like *sushi* from disappearing entirely, with the result that monomoraic *su* is the optimal output for *sushi*, while *kawa* is for *kawameshi.* This game then involves violating Max-Ft while still respecting Exponence, part TET*, part TETU.

3.3. Expansion language games: violation of metrical constraints

Expansion games that use dummy affixes are usually not analyzed as templatic (but see Riad 2022a, to which we turn shortly). In the case of copied material, they resemble reduplication, as has been shown for Chinese Fanqie secret languages (Yip 1982). Copying can be analyzed as compensatory reduplication at the expense of DEP in order to fulfill a prosodic template. In Direct OT this can be achieved directly via violation of *ECHO and size restrictor constraints (see § 2.2).

Iterative affixation to onsets, rhymes, or nuclei expands every syllable into a foot or a prosodic word with a fixed metrical pattern. Thus, the affix—filling in a prosodic template—is inserted for rhythmic reasons. If every syllable of every word is expanded into a prosodic word or a bisyllabic foot, rhythmic effects arise in these polysyllables that are similar to metrical patterns in poetic meter.

(24) English ubbi-dubbi: (Yu 2007)
speaking → *spubeakubing* [ˈspʌbiˌkʌbɪŋ]

Yu (2008: 518) gives an overview of infixing language games with affixal iterativity and shows that the output of these language games is subject to strict rhythmic alternation and parsing of the output forms into metrical constituents.

Some of these arguable result in TETU, with feet recognizable from the stress systems of actual languages. A Hausa game that results in trochees, for instance, parses words into disyllabic feet with an alternating high tone (source syllable) and low tone (inserted syllable); see below in table 25 (adapted from Yu 2008). Another Hausa game parses words into uneven iambs with *dà*- prefixed to each source syllable. When the source syllable to which *dà*- is prefixed is short, it lengthens in order to form an uneven iamb, ʔàbù > (dàʔáa)(dàbúu).

Other games result in TET*. Very unusual 'feet' may result. No natural language makes use of dactyls, amphibrachs, or anapests in its stress system, so the target prosody of σσσ games below in Hausa, Tagalog, and Greek are surely TET* (cf. Nespor 1993: 164). The primus and quartus paeons in the σσσσ games below are marked even in poetry, as no poem to our knowledge has ever been written in primus paeons (HLLL) or quartus paeons (LLLH). There is little evidence for any feet other than iambs and trochees in natural language (Hayes 1995).

(25) Typology of output metrical conditions in infixing ludlings (Yu 2008)[2]

σσ	Trochee	Hausa: hátsíi 'millet' → (há**bà**)tsí
		German: Knabe 'boy' → (kná**bi**)(bé**bi**)
	Iamb	Hausa: ʔàbù 'thing' → (**dà**ʔáa)(**dà**búu) dáudàa 'personal name' → dàdáudàdáa)
		Tagalog: salá:mat 'thank you' → (s**ag**á:)(l**ag**á:)(m**ag**át)

2. Table (25) is reproduced from Yu (2008), including transcriptions. Accents indicate tone in Hausa (Hausa has no stress) and stress in the other languages.

σσσ	Dactyl	Hausa: búuláalàa ‘whip’ → (bù**gùdù**)(lá**gádá**)làa
	Amphibrach	Tagalog: hindíq ‘no, not’ → (hi**gíːdi**n)(di**giːdi**q)
	Anapest	Greek: alékos ‘Alec’ → (a**kakár)darakaká(**le**kekér) derekeké(**kos**kokór)doroskokós**
σσσσ	Primus paeon	Hausa: màimúnàa ‘personal name’ → (màa**ʔàsàdà**i) (múu**ʔúsúdú**)nàa
	Quartus paeon	Greek: alékos ‘Alec’ → a**kakár(darakaká)** le**kekér(derekeké)**kos**kokór(doroskokós)**

These marked metrical templates are of course not found in the actual phonologies of German, Greek, Hausa, and Tagalog. Likewise, the games in (26) use feet that are not found in the phonologies of Kuna, Italian or German.

(26) a. Kuna language game (Sherzer 1982: 179-180)
macéret ‘man’ → cimácicécirét (.x)

b. Italian language games
mi áma → cotimí cotiá cotimá ‘he loves me’ (..x) (Niceforo 1897: 76)
lunátici → lu-gusú na-gasá ti-ghisí ci-ghisí (..x) (Bertinetto 1987: 890)

c. German language game (Geiger’s 2015 “dialect” of Löfflisch)
gut → gulevút (..x)
Besuch → belevèsulevúch (..x..x)

Although the Kuna game in (26a) is iambic, stress in actual Kuna/Guna is trochaic:

(27) Kuna/Guna regular footing: trochaic and edge-aligned (Smith 2014: 48-49):
(mádu) ‘bread’
bu(nólo) ‘girl’
ar(báe) ‘to work’

Similarly, the games in (26b,c) use anapests, while actual Italian and German feet are trochaic (Krämer 2009 and Alber 2020, respectively); a different form of Löfflisch uses dactyls (Vogt 2013). All of the ‘feet’ used in table (25) are demonstrably TET* for the languages in question.

To strengthen our point that language games often show stress patterns deviating from default stress in the base language we examine two specific cases from Turkish and Berber in some detail.

Turkish language games that create final stress (28b, from Suzuki 2021) seem to mimic Turkish word stress, as most words in Turkish have word stress on the ultima, other than place and personal names (the verb in (28a) has irregular stress).

(28) Turkish iterative infixation (Şahin 2008)

a. Ben sen–í sev–íyor–um.
1SG 2SG–ACC like–PROG–1SG
'I like you.'

b. Begén segénigí segévigíyogórugúm

The majority view on Turkish default stress, however, is that it is trochaic (Charette 2008; Özçelik 2014). We follow Özçelik (2014) here, who shows that the default foot in Turkish is trochaic and that word/phrase-final prominence is actually a boundary tone. Thus, the final stress in (28b), which looks at first like TETU is in fact TET*. The iterative stress in the game is also TET*, as Turkish has no iterative stress.

There are plenty of cases in which the stress pattern of the language game is clearly not the stress pattern of the language it is played in. The point is especially clear when we have several language games with different prosodic patterns in one and the same language, as we saw in Tagalog (iamb and amphibrach), Hausa (iamb, trochee, dactyl and primus paeon) and German (anapest and dactyl). Italian games differ, some using anapests as we have seen, others using native trochees iteratively, so that *passáto* 'passed' becomes *pávasávatóvo* (Niceforo 1897: 76).

For the very common games with expansion of every syllable into two syllables, it is tempting to say that every syllable expands into a foot rather than a prosodic word. For the trisyllabic patterns one might suspect that every syllable is expanded into a ternary or layered foot, as has been proposed for the analysis of ternary rhythm and related phenomena, such as trisyllabic hypochoristic nicknames (Martínez-Paricio & Torres-Tamarit 2019), e.g., ((x.).), (.(.x)), and (.(x.)) or ((.x).), respectively (though, cf. Golston 2021). Alternatively, these patterns can arise in Direct OT via intentional violation of FtBin (Prince & Smolensky 1993/2004). Tetrasyllabic expansions (.(.(.x))) are difficult on either assumption, unless we conclude that in some games the domain of each expansion is a prosodic word.

There are other details pointing in the direction of expansion to prosodic words. The exhaustive footing in the Turkish game in (28b) goes against Turkish prosody, since Turkish words have only main stress, no secondary stresses.

The Tagalog game provides the same kind of evidence for the prosodic word as the domain of expansion. Tagalog words with iteratively infixed -*gV*- impose iterative iambic stress on every word (Nagaya & Uchihara 2021). Tagalog main word stress is cumulative and lexical, restricted to a two-syllable window at the end of the word.

(29) Tagalog LG-words (Nagaya & Uchihara 2021)

a.	búkas	→	bugúkagás	'tomorrow'
b.	bukás	→	bugúkagás	'open'
c.	k-um-áʔin	→	kugúmagáʔigín	'ate'

According to Llamzon (1966), secondary stress only occurs in words of four or more syllables and is usually placed at the beginning of the word (Llamzon 1966: 35-36). This can result in considerable lapses, as in [kàpəyəpaʔán] 'peace'. A game form like *bugúkagás* thus does not look like one prosodic word, but two.

Tagalog has infixation as a grammatical process, with maximally one infix per word (Nagaya & Uchihara 2021). A form such as *kugúmagáʔigín* 'ate' in (29) contains the grammatical infix *um-* and three game infixes of the form *-Vg-*. This leads Nagaya & Uchihara to conclude that each syllable expands into a prosodic word.

Analyses of such expanding games usually deal with the landing site of the infixes, but rarely consider the resulting prosodic pattern as part of the game. Rare exceptions are Yu (2008) and Riad (2022a,b). Both relate the prosodic patterns created in language games to poetic meter.

Riad analyzes two language games in Tashlhiyt Berber as complementing the prosodic templates of the language with a pattern closely related to one of the verse types used in the language. The examples in (30) illustrate patterns in the two Tashlhiyt Berber secret languages *Taqjmit* and *Tagnawt*.

(30) Berber secret languages (Riad 2022a)

Tashlhiyt	**Taqjmit**	**Tagnawt**	**Stem**	**Gloss**
iksudˤ	ti-kkasdˤ-ju-sdˤ	aj-kkasdˤ-wa-sdˤ	kasd	'be afraid'
izwir	ti-zzawr-ju-wr	aj- zzawr-wa-wr	zawr	'be the first'
wwarg	ti-wwarg-ju-rg	aj- wwarg-wa-rg	warg	'dream'
tafruxt	ti-ffarx-ju-rx	aj- ffarx-wa-rx	farx	'girl'
sawl	ti-ssawl-ju-wl	aj- ssawl-wa-wl	sawl	'speak'

Both show a combination of infixation, gemination and reduplication. The stems that serve as the bases of manipulation are triconsonantal roots, as in Arabic. Tashlhiyt Berber is well-known for its extensive use of syllabic consonants (Dell & Elmedlaoui 2002). In the language game, two of the root consonants end up as syllable nuclei. With a careful choice of which parts count and which don't, Riad ends up identifying an L.LL.L (L=light syllable) template for both, as indicated in (31) (from Riad 2022a).

(31) Base extraction: *tafruxt* → /frx/ 'daughter'

Taqjmit	ti-	ff	a	rx	-ju-	rx
Tagnawt	aj-	ff	a	rx	-wa-	rx
		L.	L	L.		L

When stressed, this metrical structure is (. (x.) .), violating *Lapse with two unstressed syllables on the right side. And this is the essential violation characterizing the secret language template, the Desideratum that forces TET*.

We analyze the prosodic patterns in other such language games in the same way. Every syllable is expanded into a prosodic word, as shown by the iterative Turkish pattern and the violation of infixation restriction in Tagalog. The foot in each of these words necessarily violates *Iamb or *Trochee, whether this is the default foot of the base language or not. If the game has the same foot type as the base language, no Desideratum is needed, since the language's basic constraint hierarchy also restricts game forms via TETU. Patterns that go beyond two syllables (or moras, in mora counting languages), violate *Lapse, as we saw with *Taqjmit* and *Tagnawt*. The .x. pattern can arise in two ways: the footing .(x.) is intentional violation of AlignL(Ft, Wd) and *Trochee, while the footing (.x). is intentional violation of *Iamb while respecting AlignL(Ft, Wd). Dactyls (x.). result from violating *Trochee and NoLapse. Anapests .(.x) result from violating AlignL(Ft, Wd) and Trochee. The paeons violate Steriade's version of Saussure's Tribrach Law, which says that tribrachs are bad anywhere in a phrase (Steriade 2018). The quantitative first paeon (HLLL) of Hausa respects the fact that phonemic vowel length is compromised by morphology word-finally[3], a TETU fact. The Greek use of the fourth paeon is stress-based and violates NonFinal (Prince & Smolensky 1993/2004).

(32) Language game / poetic meter: prosodic patterns and desiderata

Length	**Form**	**Desiderata**
bisyllabic	x.	*Trochee
	.x	*Iamb
trisyllabic	(x.).	*Trochee, *Lapse
	.(.x)	*Iamb, *Lapse
	.(x.)	*Trochee**,** *AlignL(Ft, Wd)
	(.x).	*Iamb
tetrasyllabic	x . . .	* Tribrach
	. . . x	*Tribrach, *NonFinal

As an example case, consider the Italian game in which every syllable expands into ..x (26b), e.g., *lunático* 'lunatics' is realized as *lu-gusú na-gasá ti-ghisí ci-ghisí*. We know that Italian ranks *Iamb above *Trochee and aligns stress with the right edge of the word, with lexical stress in a three-syllable window at the word's right edge. Accordingly, AlignL(word, foot) is ranked very low. *Lapse does not play any noteworthy role in the grammar of Italian stress either. The violation profile for any syllable expanded in this language game is as shown in (33).

3. Non-finally, "vowel length functions lexically, e.g. *fiitòo* 'whistling' vs. *fitòo* 'ferrying'; *faasàa* 'postpone' vs. *fasàa* 'smash'; *duukàa* 'beating' vs. *dukà* 'all'. In final position, however, its function is to a great extent morphological and grammatical, e.g. *hannuu* 'hand' vs. *'à hannu* 'in the hand'; *fitaa* 'going out' vs. *fita* 'go out'; *shi* 'him (direct object form)' vs. *shii* 'him (independent form)'; *saaboo* 'new' vs. *Saabo* 'proper name'", Newman (1997: 541).

(33) Italian -*gVsV*- language game

	/lunatici/	*Iamb	AlignR	AlignL	*Lapse	*Trochee
a.	(lúgu)su				*	*
b.	(lugú)su	*	*			
c.	lu(gúsu)			*		*
d. ☞	lu(gusú)	*		*	*	

Accordingly, the prosodic Desiderata for this game are the following:

(34) Desiderata for Italian -*gVsV*- LG

*Iamb	AlignL	*Lapse
D	D	D

One of the two desiderata AlignL and *Lapse is redundant and might be left out.

In summary, cross-linguistic data show that prominence placement and metrical patterns in language games are often TET* and not always TETU.

3.4. Fixed segmentism in expansion language games: violation of *[+*Feature*]

The dummy affixes in language games usually consist of reduplicative vowels and lexically specified consonants, like the last example from Italian, with infixation of -*gVsV*- (or of - *VgVs*-, depending on where exactly one assumes the infix to be anchored; see Bertinetto 1987 for more details). The vowels are often underspecified and copy a base vowel. We will discuss invariant vowels briefly below. Invariant consonants show a tendency to unmarkedness, as observed by Krämer & Vogt (2018) and others. But it is rarely the same epenthetic consonant used elsewhere in the language (Bagemihl 1988; Vaux 2011; Krämer & Vogt 2018). Accordingly, they have to be prespecified. In our approach this is achieved with Desiderata involving segmental markedness constraints, such as *[dorsal] for /g/ and *[continuant] for /s/.

We collected a database of 82 language games from the published literature and internet, of which 68 have some kind of fixed segmentism.[4] There are no prespecified segments or segment combinations in any of the dummy affixes that are not segments of the respective base language. Structure preservation keeps such things at bay in language games, unlike having iambs in a trochaic language or superheavy syllables in Yokuts templates.

4. As already noted, data sets are still focused on games played by European or Asian speakers. More language games have to be collected to reach a better understanding of this “pan-cultural” (Frazier & Saba Kirchner 2011) phenomenon. Using data from other surveys (e.g. Laycock 1972; Sherzer 1982), we didn’t check the original sources. Orthographic transcriptions may lead to misinterpretations.

Considering place of articulation, non-reduplicated segments in dummy affixes tend to be marked in onsets and unmarked in codas, as shown in (35). Labials dominate in onsets, while coronals dominate in codas.

(35) Place of articulation in dummy affixes

Place	**Onset**[5]	**Coda**
Labial	**34** (48.6%)	1 (4.8%)
Coronal	20 (28.6%)	**18** (85.7%)
Dorsal	12 (17.1%)	2 (9.5%)
Glottal (h)	4 (5.7%)	0
Total	70	21

Our data largely confirm what has been found in other surveys: thus Frazier & Saba Kirchner (2011) also found that labials occur more often than other places of articulation and found that obstruents occur more often than sonorants, with [p] the most commonly used fixed segment (see also Botne & Davis 2000).

Across language games, the consonant inventory is reduced to the places of articulation that are most common across languages. More marked options, such as retroflex consonants or clicks, do not seem to be used. Within this reduced inventory, however, the most marked is prevalent, with labials more frequent in onsets than coronals or dorsals. Labials are rarely the default consonant in neutralisation or insertion processes, so our language games likely involve intentional violation of *[labial].

Frazier & Saba Kirchner (2011) analyze the fixed segments as epenthetic consonants: for them, game-specific constraint rankings of *[feature] constraints make segments appear in language games as the least marked, even though they are marked in natural languages. Direct OT does this more straightforwardly: fixed segments are the result of TET*, not the result of game-specific TETU.

Manner of articulation behaves in a similar way. We find more obstruents, predominantly stops, in onsets and more sonorants in codas. Both trends are expected if low sonority is unmarked in onsets and high sonority is unmarked in codas.

(36) Manner of articulation in dummy affixes

Manner	**Onset**	**Coda**
Stop	**34** (48.6%)	1 (4.8%)
Fricative	26 (37.1%)	4 (19%)
Nasal	6 (8.6%)	5 (23.8%)
Other sonorant	4 (5.7%)	**11** (52.4%)
Total	70	21
Complex (gr, dr, sk)	3	1

5. We count also segments that are inserted only in case of otherwise missing onsets, like [h]/[m] in Pig Latin: *honest* > *onest-may* or *onest-hay*.

Fricatives, nasals, and other sonorants violate constraints against high sonority onsets, assuming there are such (Clements 1990), as well as featural constraints like *[+continuant], *[nasal], and *[+sonorant].

Prespecified vowels in language games are usually not the epenthetic vowels of the language in question. They are [a, e, i, o, u, ə], with the back vowels less common.

Complex margins are very rare (36). The few that do occur are relatively unmarked. The item *sk* among the complex onsets nicely illustrates how language games tend to stay inside the bounds of the base language's grammar. [sk] is prefixed to every word in English *Skimono Jive* (Blake 2010: 232). When this would create an ungrammatical cluster, because the word already has a consonantal onset, a schwa separates the *sk*- from its host according to Blake:

(37) English *Skimono Jive*

I've had a skinful and so have you.

Skive sk(e)had ska sk(e)skinful skand sk(e)so sk(e)have sk(e)you.

Compare this moderate segmental markedness with *Damin*, a subsidiary ceremonial language used by Lardil speakers. *Damin* makes extensive use of consonants that are not found in Lardil, including clicks, ingressives, ejectives, and a bilabial trill (Hale & Nash 1997). This ceremonial language, however, cannot be classified as a language game, because it does not distort existing words in Lardil—it has its own lexicon.

We conclude that the TET* effect in language games at the segmental level mostly affects place of articulation in onsets, while coda segments display a show of markedness mostly by the fact of being codas, i.e., a desired violation of NoCoda.

4. Conclusions

Morphological templates are not prosodic units or underspecified prosodic units and they do not arise from TETU. They are generally TET*. The marked structures created by templates violate syllable markedness, creating heavy or even superheavy syllables, leave syllables at edges unfooted, gratuitously epenthesize segments, and so on. We analyze this formally using Direct OT (Golston 1996). Language games by and large use the same mechanisms as non-concatenative/prosodic morphology, so we account for language games in the same way: the systematic patterns of word distortion we observe are the result of intentional constraint violation.

The approach has a range of advantages. First, truncation, reduplication, shortening, and other non-concatenative forms of morphology are represented in the same way as run-of-the-mill segmental or featural morphemes, as intentional constraint violations. The same holds for language games. Anti-Faithfulness is not needed for transposing games in Direct OT and the desideratum violating Faithfulness is expected, rather than a curiosity. Expanding language games that use what look like prosodic or metrical templates in morphology and poetic meter, emerge straightforwardly from the systematic violation of prosodic markedness constraints, such as *Lapse, *Iamb, and the Tribrach Law.

Indeed, language games complement prosodic morphology and fill gaps in the typology. For example, long-distance metathesis is common in games but unattested in regular morphology. We observe a general difference here between morphology and the pseudo-morphological operations of games, in that morphological operations apply locally, while pseudo-morphological operations of games apply globally. Games that shift syllables or moras often do so across the whole word, rather than by a single position. Expanding games have the expanding effect on every syllable, not just at one edge of the base form. Future research, we hope, will shed more light on this fine difference.

References

Adisasmito-Smith, Niken, Wyatt, Holly & Wyatt, Jane. 2023. *Bilingual dictionary English-Chukchansi; Chukchansi-English*. 2023 edition. <https://fresnostatecah.files.wordpress.com/2023/10/2023dictionary-chuk_eng-cover-merged.pdf> [last accessed 25.03.2024]

Alber, Birgit. 2020. Word Stress in Germanic. In Putnam, Michael T. & Page, Richard (eds.). *The Cambridge Handbook of Germanic Linguistics*, 73-96. Cambridge: Cambridge University Press.

Alber, Birgit & Arndt-Lappe, Sabine. 2022. Anchoring in Truncation: A typological analysis. *Natural Language & Linguistic Theory* 41: 1-50. <https://doi.org/10.1007/s11049-021-09534-x>

Anderson, Stephen R. 1988. *Amorphous Morphology.* Cambridge: Cambridge University Press.

Anttila, Arto. 2007. Variation and Optionality. In De Lacy, Paul (ed.). *The Cambridge Handbook of Phonology*, 519-536. Cambridge: Cambridge University Press.

Archangeli, Diana. 1991. Syllabification and prosodic templates in Yawelmani. *Natural Language & Linguistic Theory* 9(2): 231-283.

Archangeli, Diana. 2003. Lexical irregularity in OT: DOT vs. variable constraint ranking. In Carnie, Andrew, Harley, Heidi & Willie, MaryAnn (eds.). *Formal Approaches to Function in Grammar: In honor of Eloise Jelinek*, 227-244. Amsterdam: John Benjamins.

Bachmann, Christian & Basier, Luc. 1984. Le verlan: argot d'école ou langue des Keums? *Mots* 8: 169-187.

Bagemihl, Bruce. 1988. *Alternate Phonologies and Morphologies*. PhD dissertation, University of British Columbia.

Bagemihl, Bruce. 1995. Language Games and Related Areas. In Goldsmith, John (ed.). *The Handbook of Phonological Theory*, 697-713. Oxford: Blackwell.

Beckman, Jill N. 1998. *Positional faithfulness*. PhD dissertation, University of Massachussetts, Amherst.

Benua, Laura. 1995. Identity Effects in Morphological Truncation. In Beckman, Jill, Walsh Dickey, Laura & Urbanczyk, Suzanne (eds.). *University of Massachusetts Occasional Papers in Linguistics 18: Papers in Optimality Theory*, 177-136. GLSA: Amherst, Massachusetts.

Bertinetto, Pier Marco. 1987. Lingue segrete, e segreti delle lingue. Alcuni problemi di fonologia italiana studiati attraverso un gioco linguistico. *Annali della Scuola Normale Superiore di Pisa, Classe di Lettere e Filosofia, serie III, Vol. 17, No. 3*: 889-920. <https://www.jstor.org/stable/24307401> [last accessed 25.03.2024]

Blake, Barry J. 2010. *Secret Language. Codes, Tricks, Spies, Thieves, and Symbols*. Oxford: Oxford University Press.

Borowsky, Toni. 2012. Language Disguise in OT. Reversing and Truncating. Indigenous Language and Social Identity. *Pacific Linguistics* 626: 367-385.

Botne, Robert & Davis, Stuart. 2000. Language games, segment imposition, and the syllable. *Studies in Language* 24(2): 319-344.

Buckley, Eugene. 2011. Metathesis. In van Oostendorp, Marc, Ewen, Colin J., Hume, Elizabeth & Rice, Keren (eds.). *The Blackwell Companion to Phonology*, 1380-1470. Malden, Massachusetts: Wiley-Blackwell.

Cabré, Teresa, Torres-Tamarit, Francesc & del Mar Vanrell, Maria. 2021. Hypocoristic truncation in Sardinian. *Linguistics* 59: 683-714.

Charette, Monique. 2008. The vital role of the trochaic foot in explaining Turkish word endings. *Lingua* 118: 46-65.

Clements, George N. 1990. The role of the sonority cycle in core syllabification. In Kingston, John & Beckman, Mary E. (eds.). *Papers in Laboratory Phonology* I, 283-333. Cambridge: Cambridge University Press.

Collord, Thomas Lee. 1968. *Yokuts Grammar: Chukchansi*. PhD dissertation, University of California Berkeley.

Davis, Stuart. 1993. Language Games. In: Asher, Ronald E. (ed.). *The Encyclopedia of Language and Linguistics*, 1980-1985. Pergamon Press: Oxford and New York.

Dell, François & Elmedlaoui, Mohamed. 2002. *Syllables in Tashlhiyt Berber and in Moroccan Arabic*. Dordrecht: Kluwer Academic.

Downing, Laura. 2006. *Canonical Forms in Prosodic Morphology*. Oxford: Oxford University Press.

Downing, Laura. 2018. Optimality Theory and Prosodic Morphology. In Audring, Jenny & Masini, Francesca (eds.). *The Oxford Handbook of Morphological Theory*. Oxford Handbooks Online, Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199668984.013.14>

Dressler, Wolfgang U. 1976. Phono-morphological dissimilation. In Dressler, Wolfgang U. & Pfeiffer, Oskar E. (eds.). *Phonologica 1976*: 41-48. Innsbruck: Institut für Sprachwissenschaft.

Dyga, Jagoda. 2023. Prominence and anchoring in truncation in Polish child language. Slides to talk presented at *FiNo – Phonology in the Nordic Countries*, Kaunas, Lithuania, 20 January 2023.

Frazier, Melissa & Saba-Kirchner, Jesse. 2011. *Correspondence and Reduplication in Language Play: Evidence from Tigrinya and Ludling Typology*. Manuscript. <http://www.melfraz.com/ling/TigLudMs.pdf> [last accessed 10.04.2024]

Gamble, Geoffrey. 1978. *Wikchamni Grammar.* PhD dissertation, University of California Press.

Geiger, Jeffrey. 2015. The role of rhythm in iterative-infixing ludlings. <https://www.jeffreypgeiger.com/pdfs/Geiger_ABC_Poster.pdf> [last accessed 26.03.2024]

Golston, Chris. 1996. Direct Optimality Theory: representation as pure markedness. *Language* 72(4): 713-748.

Golston, Chris. 2021. No stress system requires recursive feet. *Catalan Journal of Linguistics* 20: 9-35.
<https://doi.org/10.5565/rev/catjl.333>

Golston, Chris & Krämer, Martin. 2018. Yokuts templates are not emergent. Poster presented at *Annual Meeting on Phonology*, San Diego, CA, 05-07 October 2018.

Golston, Chris & Krämer, Martin. In prep. *The Emergence of The *ed in Yokuts*. Ms. CSU Fresno and UiT The Arctic University of Norway.

Golston, Chris & Riad, Tomas. 2000. The phonology of Classical Greek meter. *Linguistics* 38: 1-69.

Golston, Chris & Thurgood, Elzbieta. 2003. Reduplication as echo: evidence from Bontok and Chumash. In Ritva, Laury, McMenamin, Gerald, Okamoto, Shigeko, Samiian, Vida & Subbarao, Karumuri V. (eds.). *Perspectives in Linguistics: Papers in Honor of P. J. Mistry*, 81-105. New Delhi: Indian Institute of Language Studies. <https://chrisgolston.weebly.com/uploads/1/1/7/0/117070916/bontok_chumash.pdf> [last accessed 26.03.2024]

Gotowski, Megan. 2019. La règle du jeu: Verlan as an example of anti-faithfulness. *Linguistica Atlantica* 37(2): 1-18.

Guekguezian, Peter Ara. 2017. Templates as the interaction of recursive word structure and prosodic well-formedness. *Phonology* 34: 81-120.

Hale, Ken & Nash, David. 1997. Damin and Lardil phonotactics. In Tryon, Darrell & Walsh, Michael (eds.). *Boundary rider: essays in honour of Geoffrey O'Grady*, 247-259. Canberra: Pacific Linguistics, C-136.

Hayes, Bruce. 1995. *Metrical Stress Theory: Principles and Case Studies*. Chicago: University of Chicago.

Kiparsky, Paul. 2003. Syllables and moras in Arabic. In Féry, Caroline & van de Vijver, Ruben (eds.). *The Syllable in Optimality Theory*, 147-182. Cambridge: Cambridge University Press.

Kitaoka, Daiho & Mackenzie, Sara. 2021. Moraic reversal and realisation: analysis of a Japanese language game. *Phonology* 38: 41-79.

Klein, Thomas B. 2000. *Umlaut in Optimality Theory: a comparative analysis of German and Chamorro*. Tübingen: Niemeyer.

Krämer, Martin. 2009. *The phonology of Italian*. Oxford: Oxford University Press.

Krämer, Martin. 2018. The perfect word in Italian. Or fruit salad matters. In Bennett, Ryan, Angeles, Andrew, Brasoveanu, Adrian, Buckley, Dhyana, Kalivoda, Nick, Kawahara, Shigeto, McGuire, Grant & Padgett, Jaye (eds.). *Hana-Bana (花々). A Festschrift for Junko Itô and Armin Mester*, 1-21. Santa Cruz, CA: University of California.

Krämer, Martin & Vogt, Barbara. 2018. Alignment and locality in the typology of affixing language games. *The Linguistic Review* 35: 83-120.

Krämer, Martin & Vogt, Barbara. Forthcoming. Language games. In *Wiley Blackwell Companion to Phonology*, 2nd ed.

Laycock, Don. 1972. Towards a typology of ludlings or play languages. *Linguistic Communications* 6: 61-113.

Llamzon, Teodoro A. 1966. Tagalog Phonology. *Anthropological Linguistics* 8(1): 30-39.

Marantz, Alec. 1982. Re reduplication. *Linguistic Inquiry* 13: 483-545.

Martínez-Paricio, Violeta & Torres-Tamarit, Francesc. 2019. Trisyllabic hypocoristics in Spanish and layered feet. *Natural Language & Linguistic Theory* 37(2): 659-691.

McCarthy, John & Prince, Alan. 1990. Foot and Word in Prosodic Morphology: The Arabic Broken Plurals. *Natural Language & Linguistic Theory* 8: 209-282.

McCarthy, John & Prince, Alan. 1994. The emergence of the unmarked: Optimality in prosodic morphology. In Gonzàlez, Mercè (ed.). *Proceedings of the North East Linguistic Society* 24, 333-379. Amherst, MA: Graduate Linguistic Student Association.

McCarthy, John & Prince, Alan. 1995. Faithfulness and Reduplicative Identity. In Beckman, Jill, Walsh Dickey, Laura & Urbanczyk, Suzanne (eds.). *Papers in Optimality Theory*. *University of Massachusetts Occasional Papers* 18, 249-384. Amherst, MA: Graduate Linguistic Student Association. [ROA 60]

McCarthy, John & Prince, Alan. 1999. Faithfulness and Identity in Prosodic Morphology. In Kager, René, van der Hulst, Harry & Zonneveld, Wim (eds.). *The Prosody-Morphology Interface*, 218-309. Cambridge: Cambridge University Press.

Menn, Lise & McWhinney, Brian. 1984. The Repeated Morph Constraint: toward an Explanation. *Language* 60: 519-541.

Nagaya, Naonori & Uchihara, Hiroto. 2021. Ludlings and Phonology in Tagalog. *Asian and African Languages and Linguistics* 15: 9-20.

Nespor, Marina. 1993. *Fonologia*. Bologna: il Mulino.

Newman, Paul. 1997. Hausa Phonology. In Kaye, Alan S. & Daniels, Peter T. (eds.). *Phonologies of Asia and Africa*, 537-552. Winona Lake: Eisenbrauns.

Newman, Stanley S. 1944. *The Yokuts language of California*. The Viking Fund Publications in Anthropology 2. New York: The Viking Fund.

Niceforo, Alfredo. 1897. *Il gergo nei normali, nei degenerati e nei criminali*. Torino: Fratelli Bocca.

Özçelik, Öner. 2014. Prosodic faithfulness to foot edges: the case of Turkish stress. *Phonology* 31: 229-269.

Plénat, Marc. 1995. Une approche prosodique de la morphologie du verlan. *Lingua* 95: 97-129.

Poser, William J. 1990. Evidence for foot structure in Japanese. *Language* 66(1): 78-105.

Prince, Alan & Smolensky, Paul. 1993/2004. *Optimality Theory: Constraint Interaction in Generative Grammar.* Malden, MA: Wiley Blackwell.

Riad, Tomas. 2022a. The secret morphology of Tashlhiyt Berber. *Brill's Journal of AfroAsiatic Languages* 14: 273-307.

Riad, Tomas. 2022b. How linguistic is verse meter? In Akamine S. (ed.). *Proceedings of WECOL* 27, 118-133. CSU Fresno: Department of Linguistics, California State University.

Şahin, Erdal. 2008. Kuş dili. In Naskali, Emine Gürsoy & Şahin, Erdal (eds.). *Kültür Tarihimizde Gizli Diller ve Şifreler*, 11-34. Istanbul: Ka Kitap.

Sherzer, Joel. 1982. Play languages. With a note on ritual languages. In Obler, Loraine K. & Menn, Lise (eds.). *Exceptional language and Linguistics*, 175-199. New York: Academic Press.

Smith, Wikaliler Daniel. 2014. *A Grammar of Guna: A Community-Centered Approach*. PhD dissertation, University of Texas at Austin.

Steriade, Donca. 2018. Quantitative rhythm and Saussure's tribrach law. In Goldstein, David M., Jamison, Stephanie W. & Vine, Brent (eds.). *Proceedings of the 28th Annual UCLA Indo-European Conference*, 231-265. Bremen: Hempen.

Suzuki, Yui. 2021. Prosody of Iterative Infixal Ludlings in Turkish. *Asian and African Languages and Linguistics* 15: 31-46.

Thurgood, Elzbieta. 1997. Bontok reduplication and prosodic templates. *Oceanic Linguistics* 36(1): 135-148.

Ussishkin, Adam. 2000. Root-and-Pattern Morphology Without Roots or Patterns. In Hirotani, Masako, Coetzee, Andries, Hall, Nancy & Kim, Ji-yung (eds.). *Proceedings of the Northeastern Linguistics Society* [NELS] 30: 655-670.

Ussishkin, Adam. 2003. Templatic Effects as Fixed Prosody: The Verbal System in Semitic. In Lecarme, Jacqueline (ed.). *Research in Afroasiatic Grammar* 2, 511-530. Amsterdam: John Benjamins.

Vaux, Bert. 2011. Language Games. In Goldsmith, John, Riggle, Jason & Yu, Alan C. L. (eds.). *The Handbook of Phonological Theory*, 2nd edition, 722-750. Oxford, UK: Wiley-Blackwell.

Vogt, Barbara. 2013. Consequences of rhythmic secondary stress in German: stress patterns in language games and past participle formation. *Linguistische Berichte* 234: 171-191.

Watson, Janet C. E. 2002. *The Phonology and Morphology of Arabic*. Oxford: Oxford University Press.

Yannuar, Nurenzia, Hoogervorst, Tom & Klamer, Marian. 2022. Examining Javanese Phonology through Word Reversal Practices. *Oceanic Linguistics* 61(1): 560-588. <https://doi.org/10.1353/ol.2021.0029>

Yip, Moira. 1982. Reduplication and C-V skeleta in Chinese secret languages. *Linguistic Inquiry* 13: 637-661.

Yip, Moira. 1993. *The interaction of ALIGN, PARSE-Place and *ECHO in Reduplication*. Paper presented at the Rutgers Optimality Workshop.

Yip, Moira. 1998. Identity avoidance in phonology and morphology. In Lapointe, Steven G., Brentari, Diane K. & Farrell, Patrick M. (eds.). *Morphology and its relation to phonology and syntax*, 216-246. CSLI: Stanford.

Yu, Alan C. L. 2007. *A Natural History of Infixation*. Oxford: Oxford University Press.

Yu, Alan C. L. 2008. On iterative infixation. In Chang, Charles B. & Haynie, Hannah J. (eds.). *Proceedings of West Coast Conference on Formal Linguistics* 26, 516-524. Ithaca NY: Cascadilla Press.

Zepeda, Ofelia. 1983. *A Tohono O'odham Grammar*. Tucson: University of Arizona Press.

Zoll, Cheryl. 1998. *Parsing below the segment in a constraint-based framework*. CSLI: Stanford, CA.

Zukoff, Sam 2012. *The phonology of verbal reduplication in Ancient Greek: an Optimality Theory approach*. Master's thesis, University of Georgia.