58 The Emergence of the Unmarked

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1 Introduction

The term "The Emergence of the Unmarked" (TETU), originally coined by McCarthy and Prince (1994), refers to situations where some marked structure is generally allowed in a language, but banned in particular contexts; the complementary unmarked structure thus "emerges." In Nuu-chah-nulth (Wakashan, referred to by McCarthy and Prince by its former name, Nootka), for example, syllables can generally have codas; reduplicants, however, are exceptional in that codas are banned. This results in words like [ʧi-ʧim.s'iːɬ] 'hunting bear' and [waː-waːs.ʧiɬ] 'naming where', in which unmarked (codaless) syllables emerge in reduplicants despite the presence of marked codas in bases.

TETU effects came to prominence in phonological theory with the advent of Optimality Theory (OT; Prince and Smolensky 1993). In OT terms, these effects typically follow from rankings like (1), where a markedness constraint M is dominated by a faithfulness constraint F1, which blocks M's activity in some, though crucially not all, contexts. M is free to become active in contexts where F1 isn't relevant; here, M can motivate violation of still lower-ranked faithfulness constraints (F2).

(1) F1 >> M >> F2

The Nuu-chah-nulth pattern described above results from a ranking of this type, as shown in (2) and (3). The markedness constraint NoCoda is dominated by the anti-deletion constraint IO-Max; this ranking protects underlying codas from deletion, eliminating the unmarked, codaless candidate (2b). Since reduplicants are assumed not to stand in correspondence with inputs, however (chapter 100: reduplication), high-ranking IO-Max is irrelevant in their evaluation.[1] Because NoCoda dominates BR-Max, the emergence of unmarked CV syllables is permitted

[1] Correspondence between input and output candidates is evaluated by input–output (IO) faithfulness constraints. Reduplicants stand in correspondence relationships with the output forms of their bases, and are evaluated by base–reduplicant (BR) faithfulness constraints (McCarthy and Prince 1999). Faithfulness constraints in this chapter assess IO correspondence, unless otherwise noted.

in reduplicants. Concretely, candidates (3a) and (3b) are identical, except that the reduplicant in (3b) contains a copy of the coda of the root-initial syllable, while the reduplicant in (3a) doesn't. Because NoCoda dominates BR-Max, the additional NoCoda violation in (3b) rules out this candidate in favor of the less marked (3a).

(2)

/ʧims-ʼiːħ/	IO-Max	NoCoda	BR-Max
☞ a. ʧim.sʼiːħ		**	
b. ʧi.sʼiː	**!		

(3)

/red-ʧims-ʼiːħ/	IO-Max	NoCoda	BR-Max
☞ a. ʧi.ʧim.sʼiːħ		**	****
b. ʧim.ʧim.sʼiːħ		***!	***

Increasing attention to TETU effects was a natural result of inquiry into Optimality Theory. As McCarthy and Prince note, TETU is a direct result of two fundamental properties of OT. First, OT is a theory of ranked, violable constraints. Constraints are frequently active in a language even if they are not always satisfied; this is at the heart of TETU effects, which occur when a markedness constraint is dominated but still active. They observe that this "sharply differentiates OT from approaches to linguistic structure and interlinguistic variation based on parameters, rules, or other devices that see linguistic principles in globally all-or-nothing terms" (1994: 363–364).[2]

Second, distinctions between marked and unmarked structures are fundamental to OT, allowing the existence and emergence of unmarkedness to be formally defined. As McCarthy and Prince explain, "OT (Prince and Smolensky 1993) offers an approach to linguistic theory that aims to combine an empirically adequate theory of markedness with a precise formal sense of what it means to be 'unmarked' " (1994: 333). At the heart of OT are two basic constraint types: those demanding identity, typically between inputs and outputs (faithfulness), and those penalizing particular output structures (markedness) (CHAPTER 63: MARKEDNESS AND FAITHFULNESS CONSTRAINTS; see also CHAPTER 4: MARKEDNESS). Marked structures are defined as exactly those structures which violate a markedness constraint.[3] "Emergence" can be defined with similar precision, again by reference to basic properties of OT: an unmarked structure can be said to emerge in a language if the markedness constraint violated by that structure is dominated by some (typically faithfulness) constraint which blocks its activity in some, but not all, contexts in that language.

§2 elaborates on this basic understanding of TETU as "activity despite domination," surveying three types of cases in which a dominating constraint is inactive in a particular evaluation, allowing a lower-ranked markedness constraint

[2] This view is elaborated in McCarthy (2002: 129–134), where it is noted that theories with ordered rules can mimic some TETU effects with the application of default rules.

[3] More precisely, structures which violate some markedness constraint M1 are marked with respect to M1; if these structures do not violate some other markedness constraint M2, no conflict arises in saying that they are also unmarked with respect to M2. In OT, markedness is multidimensional, assessed by each markedness constraint individually.

to emerge. §3 then describes gradient TETU effects found in languages where the emergent markedness constraint is never categorically active. Finally, §4 compares true TETU effects with situations where faithfulness, rather than markedness, constraints are active despite domination and thus emergent.

2 TETU typology

The typical TETU ranking is F1 >> M >> F2, with M emerging in evaluations where F1 is not decisive. This section will discuss three subclasses of TETU rankings, following from three different contexts in which high-ranking F1 may be rendered inactive. §2.1 looks at output segments and structures which have no input correspondents and so are invisible to IO-faithfulness constraints; these include reduplicants, epenthetic segments, and syllable boundaries. §2.2 considers evaluations in which multiple candidates tie on a particular high-ranking constraint, and §2.3 surveys faithfulness constraints which evaluate only some positions or aspects of outputs while ignoring others. In each of these situations, a high-ranking constraint is inactive and a dominated markedness constraint becomes active, choosing the winning output.

2.1 Output segments and structures without input correspondents

TETU is commonly observed in output structures which lack input correspondents and thus cannot be evaluated by IO-faithfulness. Recall the Nuu-chah-nulth ranking in (2) and (3), of the form IO-F >> M >> BR-F. Because reduplicants have no input correspondents in this theory, they cannot be evaluated by IO-faithfulness, allowing the effects of M (NoCoda in Nuu-chah-nulth) to emerge. This section describes similar TETU patterns found in two other structures which are present in outputs but not inputs: epenthetic segments and syllable boundaries.

2.1.1 Epenthesis

Kager (1999) observes that markedness constraints which are generally freely violated in a language often determine the quality of epenthetic segments (CHAPTER 67: VOWEL EPENTHESIS). These segments are typically featurally unmarked; epenthetic vowels like [i], [ɨ], and [ə], and consonants like [ʔ], [h], and glides, are cross-linguistically common, while marked segments like [f] and [æ] are rarely epenthesized.[4] This is due to TETU rankings like IO-Ident >> M, where M is a featural markedness constraint. When a constraint demanding identity between input and output features outranks markedness (here, IO-Ident >> M), the latter has little power to ban marked features in the language as a whole. While the presence of an epenthetic segment violates the anti-epenthesis constraint Dep, its lack of an input correspondent means that it is invisible to high-ranked IO-Ident; thus, epenthetic segments are subject to markedness constraints which require them to have unmarked feature values.

[4] See Vaux (2002, 2008) for a survey of epenthetic segments and a diachronic perspective. See also Steriade (2001, 2009) for the view that epenthetic segments are chosen by faithfulness constraints minimizing the perceptual distance between representations with and without the epenthetic segment.

2.1.2 Syllable structure

Not every aspect of linguistic outputs is evaluated by faithfulness constraints; some output properties, like prosodic structure above the mora level, are generally taken to be governed by markedness constraints only (CHAPTER 33: SYLLABLE-INTERNAL STRUCTURE). In a language like Timugon Murut (Austronesian), where DEP >> ONSET as in (4) and (5) (McCarthy and Prince 1994), the dominated markedness constraint ONSET emerges to make decisions in cases where DEP cannot distinguish between candidates. DEP's high ranking results in a language where epenthesis never occurs in order to avoid onsetless syllables, thus allowing words like [ambi'luo] 'soul' in (4). DEP (and similarly MAX, IDENT, etc.) cannot, however, distinguish between the candidates in (5), which differ only in syllabification. Because faithfulness constraints cannot see these differences, the decision is handed down to the emergent markedness constraint ONSET.

(4)

/ambi'luo/	DEP	ONSET
☞ a. am.bi.'lu.o		**
b. ʔam.bi.'lu.ʔo	**!	

(5)

/ambi'luo/	DEP	ONSET
☞ a. am.bi.'lu.o		**
b. am.bil.'u.o		***!

Cross-linguistically, the markedness constraint ONSET commonly triggers epenthesis, deletion, and other changes to prevent onsetless syllables. But its effects can also emerge even in languages like Timugon Murut, where ONSET is crucially dominated and so cannot require all syllables to have onsets; here, ONSET nonetheless requires syllabification of available consonants as onsets rather than codas. This contrasts with a parameter-based view of phonology, where onsetless syllables are present only when the ONSET parameter is "off," and thus cannot affect syllabification in any way.

2.2 Output candidates not distinguished by dominating constraints

Unmarkedness can also emerge when multiple output candidates are evaluated identically by all constraints dominating the emergent markedness constraint. This section discusses allomorph selection, which has been traditionally analyzed as a TETU effect of this sort within OT, as well as a similar example from the syntax–phonology interface.

2.2.1 Allomorphy

Mascaró (2004) observes that when a morpheme has multiple underlying forms, Gen supplies candidates that vary in the forms they correspond to (CHAPTER 99: PHONOLOGICALLY CONDITIONED ALLOMORPH SELECTION). In cases like English *a/an*, where the indefinite article has two lexically listed allomorphs, some members of the candidate set stand in correspondence with underlying *a*, while others stand

in correspondence with underlying *an*. For this reason, the two output candidates shown in (6), *a wug* and **an wug*, tie on all high-ranked IO-faithfulness constraints. While the ranking of faithfulness constraints (here, simply FAITH) above NOCODA generally permits codas throughout English, NOCODA nevertheless emerges as decisive here, ruling out **an wug* in this unique case where multiple possible outputs are equally faithful to their respective inputs.[5]

(6)

{*a*, *an*} /wʌg/	FAITH	NOCODA
☞ a. ə.wʌg		*
b. ən.wʌg		**!

A more complex TETU analysis of lexically specific allomorph selection is offered in Becker's (2009) discussion of the Turkish aorist (Lees 1961; Napikoğlu and Ketrez 2006). The aorist suffix has two allomorphs: /-Ir/, with a high vowel, is used after all polysyllabic roots; /-Er/, with a non-high vowel, is used after all monosyllabic obstruent-final roots (the backness and height of these vowels are determined by vowel harmony; CHAPTER 118: TURKISH VOWEL HARMONY). Monosyllabic sonorant-final roots allow lexical exceptions: some take /-Ir/, while others take /-Er/.

(7)

shape of stem	*affix*				
polysyllabic	-Ir	[gere'k-ir]	'need'	[ʧɑlɨ'ʃ-ɨr]	'work'
obstruent-final monosyllabic	-Er	[sɑ't-ɑr]	'sell'	[œ'p-er]	'kiss'
{r l n}-final monosyllabic	-Ir	[kɑ'l-ɨr]	'stay'	[gœ'r-yr]	'see'
	-Er	[dɑ'l-ɑr]	'dive'	[œ'r-er]	'knit'

Turkish vowels are typically faithful to their underlying height specification, both in roots and in affixes; for example, the affix /-E/ (DATIVE) (e.g. [je're] 'to the place') contrasts with the affix /-I/ (3SG POSS) (e.g. [je'ri] 'his/her place'). This indicates that IDENT[high] outranks both of the markedness constraints in (8). When two allomorphs are available to choose from, however, as in these aorist examples, IDENT[high] is satisfied regardless of the choice of allomorph; the markedness constraints can thus emerge as decisive. (9) illustrates how *'σ/high consistently selects the /-Er/ allomorph in monosyllabic obstruent-final roots.

(8) a. *'σ/high
No stressed high vowels.
b. *RER
No non-high vowels between sonorants.

(9)

/sɑt-{-Er, -Ir}/	IDENT[high]	*'σ/high	*RER
☞ a. sɑ't-ɑr			
b. sɑ't-ɨr		*!	

[5] The ranking FAITH >> ONSET similarly chooses [ən.ʌg] over *[ə.ʌg].

The situation is more complex in the monosyllabic sonorant-final roots, which don't behave uniformly. Some of these occur with /-Er/, violating *RER, as shown in (10), while others occur with /-Ir/, violating *'σ/high, as in (11). Becker argues that sonorant-final monosyllabic roots are linked to lexically specified constraint rankings: for /-Er/-selecting roots like /dɑl/, *'σ/high >> *RER, while the opposite ranking holds for /-Ir/-selecting roots like /kɑl/. The overall pattern is one where each markedness constraint is emergent for a particular class of roots. See Becker (2009) for further details of the analysis, including the treatment of polysyllables and mechanisms for learning both affix URs and lexically specific rankings.

(10)

/dɑl-{-Er, -Ir}/	IDENT[high]	*'σ/high	*RER
☞ a. dɑ'l-ɑr			*
b. dɑ'l-ɨr		*!	

(11)

/kɑl-{-Er, -Ir}/	IDENT[high]	*RER	*'σ/high
a. kɑ'l-ɑr		*!	
☞ b. kɑ'l-ɨr			*

This TETU analysis of the Turkish aorist accounts for the fact that the lexically specific distribution of this affix is limited to sonorant-final roots. Since *RER is ranked below IDENT[high], its effect can only be observed when a root contributes one sonorant and one of two lexically listed allomorphs (here, of the aorist affix) contributes the other. This contrasts with a diacritic-based approach to exceptionality; since such an approach isn't based on markedness constraints, it runs the risk of missing phonological restrictions on the distribution of exceptions. See Gouskova (2010) for further arguments in favor of a grammar-based approach to exceptionality (also CHAPTER 106: EXCEPTIONALITY).

Rankings in each of these allomorphy examples take the form F >> M, where F cannot distinguish between candidates containing different allomorphs. Because multiple candidates are equally faithful, satisfying M does not require violating a lower-ranked F2, as is required in the prototypical TETU cases discussed in §1. The Turkish example shows that satisfying an emergent markedness constraint can also require violating a lower-ranked markedness constraint, in a ranking like F >> M1 >> M2. This occurs because markedness constraints can conflict with each other, as well as with faithfulness constraints. The following discussion of phonological phrasing and the syntax–phonology interface carries this observation further, demonstrating that markedness constraints can also emerge in contexts where a higher-ranked, conflicting markedness constraint is inactive.

2.2.2 Phonological phrasing

Because faithfulness constraints do not evaluate prosodic structure, analyses of phonological phrasing are generally based on rankings of conflicting markedness constraints. While most familiar TETU rankings involve domination by a conflicting faithfulness constraint, the dominating constraint may also be a second markedness constraint. That is, dominated M2 may also emerge in a ranking like (12).

(12) M1 >> M2

Truckenbrodt (1999) proposes an analysis of phonological phrasing based only on markedness constraints; in contexts where high-ranking markedness constraints are rendered inactive, lower-ranking markedness constraints emerge. In Chewa (Bantu, referred to by Truckenbrodt as Chichewa), a complex VP like $[\text{V NP NP}]_{\text{VP}}$ is produced as single phonological phrase, $(\text{V NP NP})_{\text{PhP}}$, rather than $*(\text{V NP})_{\text{PhP}}$ $(\text{NP})_{\text{PhP}}$, as in (13). The large phrase satisfies WRAP-XP, a constraint that penalizes any syntactic phrase whose elements are parsed into smaller phonological phrases. Other dominated markedness constraints express conflicting preferences for smaller phonological phrases: ALIGN-XP demands alignment of the right edge of each syntactic phrase with the right edge of a corresponding phonological phrase. The winner in (13) incurs a violation due to the first NP, which has no phrase break at its right edge.

The ranking WRAP-XP >> ALIGN-XP generally thwarts ALIGN-XP's desire for additional phonological phrases. ALIGN-XP's effects emerge, however, under focus. ALIGN-FOC requires focused verbs to fall at the end of phonological phrases; the ranking ALIGN-FOC >> WRAP-XP rules out candidate (14a). Candidates (14b) and (14c) both satisfy ALIGN-FOC, and both violate WRAP-XP, rendering WRAP-XP inactive as well in selecting the optimal output. Because these candidates tie on high-ranking constraints, we again see a TETU effect: ALIGN-XP emerges, selecting the unmarked candidate, (14c).

(13)

$/[\text{V NP NP}]_{\text{VP}}/$	ALIGN-FOC	WRAP-XP	ALIGN-XP
☞ a. $(\text{V NP NP})_{\text{PhP}}$			*
b. $(\text{V NP})_{\text{PhP}}$ $(\text{NP})_{\text{PhP}}$		*!	

(14)

$/[\text{V}_{\text{FOC}}\text{ NP NP}]_{\text{VP}}/$	ALIGN-FOC	WRAP-XP	ALIGN-XP
a. $(\text{V}_{\text{FOC}}\text{ NP NP})_{\text{PhP}}$	*!		*
b. $(\text{V}_{\text{FOC}})_{\text{PhP}}$ $(\text{NP NP})_{\text{PhP}}$		*	*!
☞ c. $(\text{V}_{\text{FOC}})_{\text{PhP}}$ $(\text{NP})_{\text{PhP}}$ $(\text{NP})_{\text{PhP}}$		*	

Truckenbrodt notes that this analysis of Chewa is particularly interesting, due to the non-local nature of the TETU effect: the appearance of an (unmarked) prosodic break after the focused verb causes another break to appear after a subsequent non-focused noun phrase.

2.3 *Output segments not evaluated by specific faithfulness*

This final subsection discusses situations where general IO-faithfulness is low-ranked, and the emerging markedness constraint is instead dominated by a different type of faithfulness constraint. In other words, these are TETU rankings of the type Special-F >> M >> General-F. We discuss three kinds of faithfulness that can outrank general IO-faithfulness: positional faithfulness, which protects strong positions inside a candidate; output–output faithfulness, which protects the base in a morphologically complex form; and USELISTED, which protects correspondents of existing forms in a speaker's lexicon.

2.3.1 Positional faithfulness

Beckman (1999) examines patterns where contrasts are licensed only in strong positions like initial syllables, stressed syllables, and onsets. She analyzes these using positional faithfulness constraints, which assess correspondence only for segments in particular output positions (here, onsets).

Catalan (Romance) allows contrastive voicing in onsets, but bans voiced obstruents in codas (CHAPTER 69: FINAL DEVOICING AND FINAL LARYNGEAL NEUTRALIZATION). Beckman accounts for this with the ranking shown in (15)–(17). Underlyingly voiced coda obstruents are devoiced in surface forms, due to the ranking *VoiObs >> Ident[voice], as in (15). In onsets, however, underlying voicing surfaces faithfully, due to the high-ranking positional faithfulness constraint Ident[voice]/Onset, as in (16)–(17). Here the markedness constraint *VoiObs is dominated, yet active in non-onset contexts, making this a TETU effect.

(15)

/griz/ 'gray (masc)'	Ident[voice]/Onset	*VoiObs	Ident[voice]
a. 'griz		**!	
☞ b. 'gris		*	*

(16)

/gos-a/ 'dog (fem)'	Ident[voice]/Onset	*VoiObs	Ident[voice]
a. 'go.zə	*!	**	*
☞ b. 'go.sə		*	

(17)

/griz-a/ 'gray (fem)'	Ident[voice]/Onset	*VoiObs	Ident[voice]
☞ a. 'gri.zə		**	
b. 'gri.sə	*!	*	*

In addition to protecting phonologically strong positions (initial syllable, stressed syllables, onsets), positional faithfulness may also protect morphologically strong contexts such as roots (McCarthy and Prince 1995) and nouns (Smith 1999, 2001; see also CHAPTER 102: CATEGORY-SPECIFIC EFFECTS). Smith notes that in Spanish, stress is lexically marked in nouns but predictable in verbs. She analyzes a range of such patterns using noun-specific faithfulness constraints (F/Noun) in the ranking schema F/Noun >> M >> F. Here, nouns may be faithful to lexically specified stress thanks to high-ranking F/Noun; in verbs, however, stress is instead governed by emergent markedness constraints.

The activity of markedness constraints in all of these rankings, despite their domination by a conflicting (here position-specific) faithfulness constraint, identifies these as TETU effects. There is a significant difference, however, between many positional faithfulness patterns and most other TETU patterns. In the TETU ranking schemata discussed in previous sections, general IO-faithfulness constraints dominate emergent markedness constraints. Here, though, markedness dominates (general, though not position-specific) IO-faithfulness. This results in different surface distributions of the emergent unmarked structures.

Typically, when IO-F >> M, marked structures are licensed in most contexts throughout the language; unmarkedness emerges in specific, less frequent contexts like reduplicants, epenthetic segments, or allomorphs. When TETU results

from high-ranking positional faithfulness, however, the reversed ranking M >> IO-F can result in a language which is largely *unmarked*; in these languages, marked structures are restricted to the specific set of contexts protected by the positional faithfulness constraint. When this set of markedness licensing contexts is small, as for FAITH/σ1 or FAITH/'σ (faithfulness to word-initial and stressed syllables, respectively), unmarked structures are required in the majority of contexts: the set of positions in which markedness may occur is atypically smaller than those where unmarkedness is required.[6] This distributional pattern will be discussed further in §4.

2.3.2 *Output–output faithfulness*

Another family of constraints which evaluates only some outputs and so gives rise to TETU effects is output–output (OO) faithfulness (Benua 1997). OO-faithfulness constraints evaluate correspondence between the base of a morphologically complex word and that base's stand-alone surface form. Harris (1990) discusses examples of Aitken's Law in dialects of the Central Scottish Lowlands. Here, stressed vowels in roots have predictable length: when followed by any consonant other than /r v ð z/, vowels are short; otherwise, they are long. /ɪ ʌ/ are exceptions, remaining short in all positions. (See also CHAPTER 20: THE REPRESENTATION OF VOWEL LENGTH.) For example, stop-final *feed* has a short vowel, while the open syllable *key* has a long vowel. The past tense *keyed*, however, keeps the long vowel which is present in its base *key*, despite its final stop coda. This can be attributed to protection from high-ranking OO-FAITH, as described below (Benua 1997; McCarthy 2002).

Because OO-faithfulness constraints target only a subset of a language's output forms – those which are morphologically complex – they can give rise to TETU effects. A ranking like OO-F >> M >> IO-F operates much like the positional faithfulness TETU ranking discussed above. The markedness constraint *V:C] ("no long vowels in syllables closed by any consonant other than /r v ð z/") dominates IO-faithfulness; tableau (18) shows that this results in a language which is typically unmarked: long vowels are absent from closed syllables. Long vowels appear in open syllables, as in (19); because OO-IDENT(length) >> *V:C], long vowels also appear in closed syllables in morphologically complex forms derived from roots with long vowels, as in *keyed* [ki:d] (cf. *key* [ki:]) in (20).

(18)

/fi:d/	OO-ID(length)	V:C]	IO-ID(length)
☞ a. fid			*
b. fi:d		*!	

(19)

/ki:/	OO-ID(length)	V:C]	IO-ID(length)
a. ki			*!
☞ b. ki:			

[6] Positional faithfulness TETU rankings can also result in languages where, as is more typical of TETU, unmarkedness is the less frequent pattern; this occurs when the positional faithfulness constraint targets a broad set of positions, e.g. FAITH/Root.

(20)

/kiː-d/	OO-Iᴅ(length)	V:C]	IO-Iᴅ(length)
a. kid	*!		*
☞ b. kiːd		*	

Here, again, a markedness constraint is active in the language despite its domination by (here, OO) faithfulness. Similar TETU effects are possible in other theories that use faithfulness relations between members of a paradigm, such as McCarthy's (2005) Optimal Paradigms.

2.3.3 UseListed

Zuraw (2000) proposes an additional novel kind of faithfulness constraint, UseListed, which protects items that are listed in a speaker's lexicon. Listed items include all roots and all morphologically complex forms that a particular speaker has heard, with more frequent items assumed to be more strongly listed.

In producing a previously heard, morphologically complex form, the speaker has two options: they could use either the lexically listed forms of the root and affixes as inputs to the grammar, or they could instead use the single lexically listed complex form (again, as input to the grammar). Zuraw proposes that these two possible input structures compete in a single evaluation, with UseListed penalizing outputs derived from productive combinations of morphemes.

For novel roots and novel complex forms (i.e. novel combinations of roots and affixes, even if a speaker is familiar with each morpheme in other contexts), however, no lexical listing is available. Thus outputs based on any of these forms will violate UseListed equally. Markedness constraints ranked below UseListed can therefore emerge in evaluations of unfamiliar items, as in Hayes and Londe's (2006) analysis of Hungarian vowel harmony.

The Hungarian dative appears with a back vowel when the root's final syllable has a back vowel ([glykoːz-nɔk] 'glucose-ᴅat'), and it appears with a front vowel when the root's final syllable has a front rounded vowel ([ʃoføːr-nɛk] 'chauffeur-ᴅat') (chapter 123: hungarian vowel harmony). When the root's final syllable has a front unrounded vowel, some items take a front suffix ([tsiːm-nɛk] 'address-ᴅat') and others take a back suffix ([hiːd-nɔk] 'bridge-ᴅat'). Taking a back suffix is especially likely when the final front unrounded vowel is preceded by a back vowel ([aːtseːl-nɔk] 'steel-ᴅat'). Here, the relevant markedness constraints will be Local[eː], which penalizes back vowels in the syllable immediately following an [eː], and Distal[back], which penalizes front vowels in any syllable following a back vowel.

Hungarian speakers agree on the dative forms of familiar (lexically listed) items such as [aːtseːl-nɔk]. UseListed is decisive in these cases, preferring the listed form over productive combinations of the root and the suffix, and thus rendering lower-ranked markedness constraints on vowel harmony inactive. The two candidates (21a) and (21b) are generated from the listed form [aːtseːl-nɔk], and thus satisfy UseListed (despite the unfaithful surface form of this input in (21b)). The second two candidates are generated productively by combining the root /aːtseːl/ with the dative suffix, and are thus ruled out by UseListed.

(21)

/aːtseːl-{nɛk, nɔk}/, *listed*: [aːtseːl-nɔk]	Use Listed	Ident [back]	Local [eː]	Distal [back]
☞ a. /aːtseːl-nɔk/ → aːtseːl-nɔk			*	*
b. /aːtseːl-nɔk/ → aːtseːl-nɛk		*!		**
c. /aːtseːl-{nɛk, nɔk}/ → aːtseːl-nɔk	*!		*	*
d. /aːtseːl-{nɛk, nɔk}/ → aːtseːl-nɛk	*!			**

But when Hungarian speakers hear a novel root containing a back vowel followed by a front unrounded vowel, e.g. [haːdeːl], the suffix vowel in the dative forms can agree with either root vowel: some speakers prefer [haːdeːl-nɔk], as in (22a), while others prefer [haːdeːl-nɛk], as in (22b). Both candidates in (22) violate UseListed, since no lexical listing exists for this novel item, and thus the dative form must be derived productively by combining the root /haːdeːl/ with the dative suffix.

(22)

/haːdeːl-{nɛk, nɔk}/, *listed*: [ ]	Use Listed	Ident [back]	Local [eː]	Distal [back]
☞ a. /haːdeːl-{nɛk, nɔk}/ → haːdeːl-nɔk	*		*	*
☞ b. /haːdeːl-{nɛk, nɔk}/ → haːdeːl-nɛk	*			**

Hayes and Londe argue that a particular speaker's actual output depends on a stochastic ranking between the two competing markedness constraints on vowel harmony, Local[eː] and Distal[back]. Crucially, as in the Turkish example in §2.2.1, one of these two low-ranked markedness constraints emerges; here, this occurs when dominating UseListed cannot distinguish between candidate outputs for a novel input.

3 Gradient TETU

The previous sections have surveyed various ways in which high-ranking constraints can be rendered irrelevant in particular evaluations, allowing lower-ranked markedness constraints to emerge. Of course, not all markedness constraints which are dominated in a particular language emerge; many are ranked too low to ever be active in choosing a winning surface form. Recent work suggests, however, that subtle TETU effects can be identified even for markedness constraints which never distinguish between grammatical and ungrammatical forms.

Consonants in Arabic roots are subject to various co-occurrence restrictions (chapter 86: morpheme structure constraints). Among grammatical consonant combinations, preferences for particular combinations are found: some are much more frequent than others in the lexicon, and novel words conforming to the more frequent patterns are judged as more well-formed in rating tasks (chapter 90: frequency effects). Coetzee and Pater's (2008) analysis of these preferences among grammatical forms casts them as gradient TETU effects, where markedness constraints which are never categorically obeyed nevertheless exert subtle preferences for unmarked forms (chapter 89: gradience and categoricality in

PHONOLOGICAL THEORY). Rankings giving rise to these gradient effects are illustrated in (23) and (24). Roots including both coronal stops and fricatives (e.g. /dasar/ 'to push', represented here as TS) and those containing coronal stops and sonorants (e.g. /dalaq/ 'to spill', represented here as TL) both surface faithfully in Arabic, although these combinations are underrepresented, i.e. they are attested less often than expected, given the overall frequency of each type of consonant. In the lexicon, however, TS roots are more severely underrepresented than TL roots, suggesting that TL roots are in some sense more easily tolerated. Coetzee and Pater argue that both combinations violate a constraint against roots with two coronals (*TT), while only the dispreferred TS roots violate an additional constraint against roots with two coronals of similar sonority (*TT[son]).

(23)

/TS/	IDENT(place)	*TT[son]	*TT
☞ a. TS		*	*
b. PS	*!		

(24)

/TL/	IDENT(place)	*TT[son]	*TT
☞ a. TL			*
b. PL	*!		

Here, no markedness constraint is ranked highly enough to ban TS or TL outputs. These consonant combinations are protected by faithfulness, and are thus attested and grammatical, but they are not judged by speakers to be quite as well formed as roots that lack OCP violations. TS's additional violation of *TT[son] contributes to its decreased acceptability relative to TL, as observed in the results of word-likeness tasks and similar psycholinguistic experiments. In other words, the markedness constraint *TT[son] is active in Arabic even though it is crucially dominated by IDENT(place). This activity is evidenced by the underattestation of actual TS roots and the decreased acceptability of novel TS roots, even though it doesn't force unfaithful mappings.

The incorporation of gradient generalizations into the grammar can also be used to identify relative rankings of undominated markedness constraints, i.e. the opposite of gradient TETU. If neither of two markedness constraints is ever crucially dominated by a conflicting constraint in some language, the relative ranking of these constraints cannot be determined from either categorical phonotactics or paradigmatic information. This approach, however, allows evidence for their relative ranking to come from gradient phonotactics and psycholinguistic data. Coetzee (2009) compares the grammaticality of English homorganic stops after [s], noting that coronals are attested, as in *state*, but labials and dorsals are not, as in **skake* or **spape* (see also Davis 1984, 1991; Frisch 1996; Frisch *et al.* 2004).

Coetzee's psycholinguistic experiments show that speakers rate **spape* as less acceptable than **skake*, and both are less acceptable than *state*. He uses this result to propose that while *SPVP and *SKVK are both undominated in English, the constraint penalizing *SPVP is more highly ranked than the constraint penalizing *SKVK. This view is also supported by the existence of words that come close to

violating *sKVk, such as *skag*, *skulk*, or *squeak*, compared with the non-existence of **spab*, **spulp*, or **spweep*.

4 The emergence of the faithful

As mentioned in §2.3.1, there is an important distinction between the formal definition of TETU and the most intuitive surface-oriented descriptions of these patterns. McCarthy and Prince (1994: 334) define TETU as follows:

> Even in languages where [some markedness constraint] C is crucially dominated and therefore violated, the effects of C can still be observed under conditions where the dominating constraint is not relevant. . . . this [is] "emergence of the unmarked."

The same passage describes the typical surface pattern that results from constraint activity despite domination:

> in the language as a whole, C may be roundly violated, but in a particular domain it is obeyed exactly. In that particular domain, the structure unmarked with respect to C emerges.

Patterns where high-ranking positional faithfulness constraints allow unmarkedness to emerge (e.g. Ident[voice]/Onset >> *VoiObs >> Ident[voice]) demonstrate that activity-despite-domination rankings can also give rise to a converse pattern: a markedness constraint may in fact be obeyed in the language as a whole, but violated in a particular domain. In these cases, the structure unmarked with respect to the markedness constraint emerges in the language as a whole, despite its ungrammaticality in a particular domain.

The lack of a necessary connection between a markedness constraint's activity despite domination and the relative rarity of the resulting unmarkedness is also illustrated in patterns following from the activity of positional markedness constraints. Like positional faithfulness constraints, these are versions of regularly attested markedness constraints which evaluate only structures in particular output positions, e.g. Onset/σ1, a constraint that penalizes onsetlessness in the initial syllable only (chapter 55: onsets).

An example of this pattern comes from Arapaho (Algonquian, Smith 2002: 127, from Salzman 1956: 53–54). In this language, onsetless syllables occur in non-initial syllables (e.g. the onsetless third syllable in [wo.ˈʔo.uːˑ.soː] 'kitten'), as shown in (25). Word-initial vowels are, however, banned (e.g. *[o.toʔ]), as shown in (26). These patterns follow from the ranking Onset/σ1 >> Dep >> Onset, and are identical in character to the typical TETU surface pattern: marked structures are licensed in most of the language, but a small pocket of enforced unmarkedness is found in initial syllables. Many other languages of this type are discussed by Smith (2002) and Flack (2009).

(25)

/woˈʔouːˑsoː/	Onset/σ1	Dep	Onset
☞ a. woˈʔo.uːˑ.soː			*
b. woˈʔo.ʔuːˑ.soː		*!	

(26)

/oto?/	Onset/σ1	Dep	Onset
☞ a. ho.to?		*	
b. o.to?	*!		*

Despite the surface similarities between positional markedness patterns and classic TETU patterns, the formal structure of these rankings distinguishes them from TETU rankings. These follow the schematic form M1 >> F >> M2, rather than the TETU form F1 >> M >> F2. These patterns thus might be dubbed "The Emergence of the Faithful": F emerges (i.e. is active despite domination) in cases where dominating Onset/σ1 is inactive.

Albright (2004) discusses patterns of this sort, using the term "The Emergence of the Marked" to describe their surface pattern. In Lakota (Siouan), codas are banned in roots but licensed elsewhere (e.g. affixes, reduplicants, function words). This pattern results from the positional markedness ranking NoCoda-root >> F >> NoCoda; as Albright explains, this pattern is a "mirror image of the TETU configuration: here, greater faithfulness emerges outside roots, when a higher-ranked markedness constraint (NoCoda-root) is inapplicable" (2004: 7). Here, markedness "emerges" in distributionally rare root-external contexts. To be clear, the distributional sense of "emerge" used here is different from the formal sense used by McCarthy and Prince: formally, effects of the constraint which is dominated yet active emerges; distributionally, whichever pattern is not generally permitted (markedness *vs.* unmarkedness) "emerges" in specific, restricted contexts.

5 Conclusion

TETU is a property of theories with violable constraints, and sets these theories apart from those with parameters or inviolable constraints. In TETU rankings, a markedness constraint is shown to be dominated in a language, yet active in situations where the dominating constraints are irrelevant. Three types of such situations are surveyed in §2. Active-yet-dominated markedness constraints have also been used in the analysis of gradient patterns, as discussed in §3. Finally, patterns mirroring TETU which result from active-yet-dominated faithfulness constraints are discussed in §4.

TETU effects, which demonstrate the violability of OT constraints, set OT apart from theories with inviolable constraints, also known as parameters in Principles and Parameters Theory (Chomsky 1981, 1986). In Principles and Parameters Theory, the learner starts with parameters set to their default, or unmarked, position; parameters can be switched off given evidence from the ambient language. The NoCoda parameter, for instance, will remain on for a speaker of Hawaiian, as this language doesn't allow codas. However, speakers of English or Nuu-chah-nulth will switch the NoCoda parameter off, as codas are generally allowed in these languages. Once off, however, the NoCoda parameter can no longer be used to account for the contexts in which these two languages prefer codaless syllables (see §1 and §2.2.1 above), causing a loss of generality in the analysis of these languages (McCarthy 2002: 131–132).

Interest in TETU effects initially brought attention to a variety of cases where constraints were shown to be active even in languages where they were roundly

violated, e.g. NoCoda in English. This lent support to the view that there is a single, universal constraint set for all languages, which in turn led to fruitful research on how language-specific rankings of these universal constraints could be learned (see e.g. Tesar 1995; Tesar and Smolensky 1998; and much work since).

Early work in OT typically assumed that this universal constraint set was innate; assumptions of both innateness and constraint universality have begun to lose favor in recent years with the advent of proposals that some or all constraints are induced by learners (Flack 2007; Hayes and Wilson 2008; Moreton 2010).

TETU effects were a major focus of interest in the early days of Optimality Theory, when the concept of violable constraints was new to the linguistic community. With the increased acceptance of violable constraints in theoretical work, cases of TETU no longer attract special attention, even as interest turns to other theories that incorporate violable constraints, including OT-CC (McCarthy 2007), Harmonic Grammar (Legendre *et al.* 1990; Pater 2009), and MaxEnt (Goldwater and Johnson 2003; Hayes and Wilson 2008).

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