Positionally Licensed Extended Lapses

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1 Introduction

In a large portion of natural languages, stress is rhythmic. Stress falls on alternating syllables, and lapses of any kind are marked. This defines most binary systems. However, some languages (such as Cayuvava, Estonian, Winnebago, and Yupik) exhibit *ternary* stress; ternary stress is characterized by having stressed syllables separated by two unstressed syllables, such as ('σσ)σ('σσ)σ. Within standard phonological frameworks, stress is based on binary feet; ternary stress has presented a puzzle

Lapses are defined as sequences of two consecutive unstressed syllables, which are penalized by the constraint *LAPSE, defined in (1).

(1) *LAPSE *σσ
Assign one violation mark for every sequence of two consecutive unstressed syllables.

For example, in a word like *pa.tá.ki.ma.ti*, *LAPSE will assign two violations: *ki.ma* and *ma.ti*. Lapses are generally allowed in ternary stress languages; between every stress, there is a lapse of two unstressed syllables

Kager (2001) suggests splitting the *LAPSE constraints into a family of lapse constraints which more accurately predict attested typology, as well as gaps in the typology. Instead of penalizing all lapses equally, Kager's lapse constraints license lapses word-finally and adjacent to the main stress of the word. These constraints are defined in (2).

(2) *Kager's Positional Lapse Constraints*
a. LAPSE-AT-PEAK *σσ *except* _'σ, 'σ_
Assign one violation mark for every lapse that is not adjacent to the word peak.
b. LAPSE-AT-END *σσ *except* _#
Assign one violation mark for every lapse that is not word-final.

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In the word *pa.tá.ki.ma.ti*, both of these positional lapse constraints would assign a single violation; however, the violation would be incurred by a different string in each. LAPSE-AT-PEAK assigns one violation for *ma.ti*, while LAPSE-AT-END assigns a violation for *ki.ma*.[1]

In addition to these positionally licensed lapse constraints, *EXTENDED-LAPSE (also called *LONG-LAPSE) is another more specific type of lapse constraint. *EXTENDED-LAPSE (Nespor and Vogel 1989, Elenbaas and Kager 1999, Kager 2001) prohibits sequences of three consecutive unstressed syllables; this captures the generalization that two overlapping lapses are more marked than two separate lapses.

(3) *Extended lapses*
*EXTENDED-LAPSE *σσσ
Assign one violation mark for every unstressed syllable that is both preceded and followed by another unstressed syllable.

I propose a synthesis of positionally licensed lapse constraints with the regular extended lapse constraint; specifically, I propose that there are positionally licensed extended lapse constraints. In addition to *EXTENDED-LAPSE, there are constraints licensing longer lapses adjacent to the main stress or word-finally. These constraints are defined in (4).

(4) *Positional Extended Lapse Constraints*
a. EXTENDED-LAPSE-AT-PEAK *σσσ *except* _'σ, 'σ_
Assign one violation mark for every extended lapse non-adjacent to the word peak.
b. EXTENDED-LAPSE-AT-END *σσσ *except* _#
Assign one violation mark for every non-final extended lapse.

Evidence for this family of extended lapse constraints will come from the Tripura dialect of Bangla[2] (henceforth Tripura Bangla or TB). Tripura Bangla prohibits extended lapses generally, yet allows them word finally. This pattern cannot be predicted by *EXTENDED-LAPSE; EXTENDED-LAPSE-AT-END is crucial for a successful analysis of TB. Section 2 contains an

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[1]Kager (2001) also proposes *INITIAL-LAPSE as part of the family of lapse constraints. *INITIAL-LAPSE assigns one violation mark for every lapse that is word-initial. For discussion of this constraint, see Houghton (2006).

[2]Bangla is a language used by about 211,000,000 first- and second-language speakers in Bangladesh, India, Nepal, Saudi Arabia, and Malawi, among other countries. The Tripura Bangla dialect is spoken in Tripura, a region of India.

analysis of TB, and section 3 explores why EXTENDED-LAPSE-AT-END is essential.

In this analysis of Tripura Bangla, foot alignment constraints act as constraints on foot economy in the analysis of ternary stress systems (see Elenbaas and Kager 1999). Only independently motivated constraints are used, accompanied by EXTENDED-LAPSE-AT-END. An essential feature of this analysis is that it uses no constraints which are particular to ternary stress; EXTENDED-LAPSE-AT-END is not ternary stress specific, and could be extended to analyses of the phenomenon referred to as foot extrametricality. Foot extrametricality and other predictions made by the family of positionally licensed extended lapse constraints are discussed in section 4.

2 Tripura Bangla

Das (2001) surveys the stress pattern of TB extensively, and is the source of all data and descriptive generalizations found here. In Tripura Bangla, main stress is on the first syllable; secondary stress falls on every third syllable thereafter, unless it would create a word-final stress. Tripura Bangla is a quantity sensitive language. All heavy syllables in TB are stressed, except where it would create a clash or a word-final stress. Stressed heavy syllables obscure the usual generalizations about stress in TB, and are ignored here. (For details of the analysis with heavy syllables, see Houghton 2006.)

Data from Tripura Bangla words containing only light syllables is provided in (5).

(5) *TB words with only light syllables*

a. 3n syllables (word-final lapse)		Pattern	# of σ
i. á.to.ri	‘intestine’	Xxx	3
ii. ó.no.kɔ.rò.ni.yɔ	‘imitable’	XxxXxx	6
b. 3n+1 syllables (word-final extended lapse)			
i. á.ra.sa.li	‘trouble making’	Xxxx	4
ii. ɔ́.no.nu.dà.ßo.ni.yɔ	‘unintelligible’	XxxXxxx	7
c. 3n+2 syllables (word-final foot)			
i. bá.ri	‘home’	Xx	2
ii. ɔ́.nɔ.mo.nì.yɔ	‘rigid’	XxxXx	5
iii. ɔ́.no.nu.kɔ̀.ro.ni.yɔ̀.ta	‘inimitability’	XxxXxxXx	8

Words with 3n syllables can be characterized as ending with a sequence of two unstressed syllables, while words with 3n+1 syllables end with a sequence of three unstressed syllables. Words with 3n+2 syllables have a foot aligned word-finally.

I will be assuming the use of categorical alignment constraints, as defined in (6) (McCarthy and Prince 1993, McCarthy 2003).

(6) *Alignment constraints*

a. ALIGN-R/L (HD,WD)
Assign one violation mark for every foot containing main stress that is not aligned with the right/left edge of the word.

b. ALIGN-R/L (FT,WD)
Assign one violation mark for every foot that is separated from the right/left edge of the word by at least one syllable.

Word-initial stress in TB signals the use of trochaic feet. Due to trochaic feet in TB, stress cannot be word-final in a word containing only light syllables. This can be observed in a two-syllable word as in (7).

(7) TROCHEE >> IAMB
(e.g. bá.ri)

2σ /xx/	TROCHEE	IAMB
(Xx) ~ (xX)	**W** 0 ~ 1	**L** 1 ~ 0

Main stress is always initial in TB; this indicates that ALIGN-L (HD, WD) must outrank ALIGN-R (HD, WD), as shown below in (8). The five-syllable word in (8) contains two feet, both of which are possible positions for main stress to be realized. However, the winner in (8) is the candidate with stress on the first foot, rather than the right-aligned foot.

(8) ALIGN-L(HD, WD) >> ALIGN-R(HD, WD)
(e.g. ɔ́.nɔ.mo.nì.yɔ)

5σ /xxxxx/	ALIGN-L (HD, WD)	ALIGN-R (HD, WD)
(**X**x)x(Xx) ~ (Xx)x(**X**x)	**W** 0 ~ 1	**L** 1 ~ 0

There are generalizations which can be made about the number of feet per word in TB. Words up to four syllables in length have only a single left-aligned foot. A four-syllable word like (X**x)xx** is grammatical, but forms like *(Xx)(Xx) which add an extra foot are prohibited. A second foot can only emerge if the word is at least five syllables, such as (Xx)x(Xx). At this point, it is no longer possible to have a single left-aligned foot, as in *(X**x)xxx**. A third foot requires a word of at least eight syllables, schematized as (Xx)x(Xx)x(Xx). Eight-syllable words with only two feet, like *(Xx)x(X**x)xxx**, are ungrammatical in TB.

These generalizations indicate that TB uses the minimum possible number of feet in each word. This preference for foot economy is due to the domination of a left-alignment constraint over the relevant lapse constraints. The tableau in (9) demonstrates that ALIGN-L(FT, WD) dominates both *LAPSE and LAPSE-AT-PEAK.

(9) ALIGN-L(FT, WD) >> *LAPSE, LAPSE-AT-PEAK
(e.g. á.ra.sa.li)

4σ /xxxx/	ALIGN-L(FT, WD)	*LAPSE	LAPSE-AT-PEAK
(X**x)xx** ~ (Xx)(Xx)	**W** 0 ~ 1	**L** 2 ~ 0	**L** 1 ~ 0

*LAPSE, along with the other constraints in the lapse family, prefers maximal footing. On the other hand, alignment constraints act as foot antagonists. Because an alignment constraint outranks the relevant lapse constraints, footing is minimal in TB.

Notice that the winner in (9) contains an extended lapse. Crucially, this extended lapse is word-final. TB permits extended lapses only in final position, but they are banned elsewhere.

In five-syllable words it is impossible to avoid non-final extended lapses with a single foot, while still obeying the undominated ALIGN-L(HD, WD). EXTENDED-LAPSE-AT-END is violated when there is only a single foot per word, while ALIGN-L(FT, WD) is perfectly satisfied by a single foot. Because five-syllable words in TB require two feet, EXTENDED-LAPSE-AT-END must dominate ALIGN-L (FT, WD). This is shown in (10).

(10) EXTENDED-LAPSE-AT-END >> ALIGN-L (FT, WD)
(e.g. ɔ́.nɔ.mo.nì.yɔ)

5σ /xxxxx/	EXTENDED-LAPSE-AT-END	ALIGN-L (FT, WD)
(Xx)x(Xx) ~ (X**x)xxx**	**W** 0 ~ 1	**L** 1 ~ 0

As shown above, extended lapses are not allowed everywhere in the word. Extended lapses are only permitted word-finally; word peaks do not license extended lapses.

(11) Align-L (Ft, Wd) >> Extended-Lapse-at-Peak
(e.g. ɔ́.no.nu.dà.ßo.ni.yɔ)

7σ /xxxxxxx/	Align-L (Ft, Wd)	Extended-Lapse-at-Peak
(Xx)x(X**x)xx** ~ (Xx)x(Xx)(Xx)	**W** 1 ~ 2	**L** 1 ~ 0

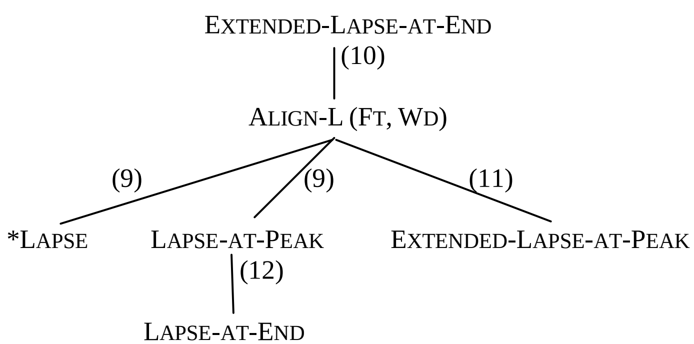
When no higher ranked constraint can distinguish between two candidates, lapses are preferred at the word peak. For instance, the five-syllable candidates in (12) both have a single lapse; the only difference is where that lapse is positioned. In the winner, the lapse is at the main stress of the word, while the loser has a word-final lapse.

(12) Lapse-at-Peak >> Lapse-at-End
(e.g. ɔ́.nɔ.mo.nì.yɔ)

5σ /xxxxx/	Lapse-at-Peak	Lapse-at-End
(Xx)x(Xx) ~ (Xx)(Xx)x	**W** 0 ~ 1	**L** 1 ~ 0

A summary of the rankings that have been established thus far is provided in (13). These rankings are necessary and sufficient for words containing only light syllables in TB. To recap, Extended-Lapse-at-End must be undominated, and Align-L (Ft, Wd) must dominate the lapse constraints. Lapse-at-Peak makes crucial decisions about *where* lapses fall.

(13) Ranking summary



In summary: Extended-Lapse-at-End >> Align-L (Ft, Wd) >> *Lapse (and the other lapse constraints).

3 Justification for Extended-Lapse-at-End

There are restrictions on extended lapses, predicted by the family of extended lapse constraints posited in (4). EXTENDED-LAPSE-AT-END and EXTENDED-LAPSE-AT-PEAK are in a stringency relationship with *EXTENDED-LAPSE; this means that languages with more than one stress will avoid extended lapses (no quaternary languages), and that if an extended lapse must occur, it will be either word-final (as in TB) or next to the main stress (as described in section 4).

Tripura Bangla exemplifies this generalization: extended lapses are prohibited generally, but allowed in a word-final position. The crucial ranking hierarchy for TB is EXTENDED-LAPSE-AT-END >> ALIGN-L (FT, WD) >> *LAPSE. Without EXTENDED-LAPSE-AT-END, it is not possible to correctly predict the stress pattern of TB.

What about *EXTENDED-LAPSE? *EXTENDED-LAPSE is not sufficient in the place of EXTENDED-LAPSE-AT-END, which can be seen in words with 3n+1 syllables. If *EXTENDED-LAPSE simply replaces EXTENDED-LAPSE-AT-END, the wrong winner is predicted. This is shown in (14).

(14) **EXTENDED-LAPSE for 3n+1 Syllables*

7σ /xxxxxxx/	ALIGN-L	*LAPSE	*EXTENDED-LAPSE
a (Xx)x(X**x)xx** ~ (Xx)(Xx)(Xx)x	**W** 1 ~ 2	**L** 3 ~ 1	**L** 1 ~ 0
b (Xx)x(X**x)xx** ~ (X**x)xxxxx**	**L** 1 ~ 0	**W** 3 ~ 5	**W** 1 ~ 4
fused row a◦b	**L**	**L**	**L**

This tableau highlights a ranking paradox, schematized in (15). In order to prevent more than two feet from being formed in the seven-syllable word, ALIGN-L must dominate both *EXTENDED-LAPSE and *LAPSE. However, to force a second foot instead of having only a single foot in the word, either *EXTENDED-LAPSE or *LAPSE must dominate the foot economy constraint ALIGN-L.

(15) Ranking paradox
- a) two feet vs. more feet:
  ALIGN-L must dominate *EXTENDED-LAPSE *and* *LAPSE
  (ALIGN-L >> *EXTENDED-LAPSE, *LAPSE)
- b) two feet vs. less feet:
  *EXTENDED-LAPSE or *LAPSE must dominate ALIGN-L
  (*EXTENDED-LAPSE *or* *LAPSE >> ALIGN-L)

However, with the addition of EXTENDED-LAPSE-AT-END, this paradox is resolved. This can be observed in (16).

(16) *With EXTENDED-LAPSE-AT-END*

7σ /xxxxxxx/	EXTENDED-LAPSE-AT-END	ALIGN-L	*LAPSE	*EXTENDED-LAPSE
a (Xx)x(X**x)xx** ~ (Xx)(Xx)(Xx)x	**e** 0 ~ 0	**W** 1 ~ 2	**L** 2 ~ 0	**L** 1 ~ 0
b (Xx)x(X**x)xx** ~ (X**x)xxxxx**	**W** 0 ~ 3	**L** 1 ~ 0	**W** 2 ~ 4	**W** 1 ~ 4
fused row a◦b	**W**	**L**	**L**	**L**

EXTENDED-LAPSE-AT-END is crucial for a successful analysis of TB; in fact, the desired winning candidate is harmonically bounded if *EXTENDED-LAPSE is the only extended lapse constraint. Regardless of ranking, candidate (a) in (17) can never be the winner with this set of constraints.

(17) *Winner is Harmonically Bounded*

7σ /xxxxxxx/	*EXTENDED-LAPSE	ALIGN-L	*LAPSE	LAPSE-AT-PEAK	LAPSE-AT-END
a → *(Xx)x(X**x)xx***	*1*	*1*	*3*	*2*	*2*
b (Xx)(Xx)(Xx)x	0 (**L**)	2 (**W**)	1 (**L**)	1 (**L**)	0 (**L**)
c (X**x)xxxxx**	4 (**W**)	0 (**L**)	5 (**W**)	4 (**W**)	4 (**W**)
fused row b◦c	**L**	**L**	**L**	**L**	**L**

The addition of EXTENDED-LAPSE-AT-END to the constraint set breaks the reciprocity. As can be observed in (18), there is now a possible ranking of constraints such that the observed winner is optimal.

(18) *Winner is Not Harmonically Bounded*

7σ /xxxxxxx/	*EXT-LAPSE	ALIGN-L	*LAPSE	LAPSE @PK	LAPSE @END	EXT-LAPSE @END
a →*(Xx)x(X**x)xx***	*1*	*1*	*3*	*2*	*2*	*0*
b (Xx)(Xx)(Xx)x	0 (**L**)	2 (**W**)	1 (**L**)	1 (**L**)	0 (**L**)	0 (**e**)
c (X**x)xxxxx**	4 (**W**)	0 (**L**)	5 (**W**)	4 (**W**)	4 (**W**)	3 (**W**)
fused row b◦c	**L**	**L**	**L**	**L**	**L**	**W**

Without EXTENDED-LAPSE-AT-END, the observed winners in words with 3n+1 syllables will be harmonically bounded in TB. As is always the case in situations of harmonic bounding, we must ask if some other constraint could be breaking the reciprocity instead. If we do not introduce EXTENDED-LAPSE-AT-END, the constraint which breaks the harmonic bounding must account for the fact that there are no extended lapses in general (the role of *EXTENDED-LAPSE) but that extended lapses are allowed word-finally (constraint against word-final feet?).

NONFINALITY(FT) seems like a reasonable possibility to take the place of EXTENDED-LAPSE-AT-END, as it is a constraint which bans feet in word-final position. NONFINALITY(FT) is defined in (19).

(19) NONFINALITY(FT)
Assign one violation mark for every foot that is word-final.

However, it becomes clear that NONFINALITY(FT) cannot save the day for TB. Although the observed forms in words with 3n+1 syllables avoid a word-final foot, candidate (a) in (18) will still lose to (18b) or (18c), which also lack a word-final foot. Additionally, TB has word-final feet in *all* words with 3n+2 syllables; for example, (Xx)x(Xx) and (Xx)x(Xx)x(Xx) are both valid outputs in TB.

If NONFINALITY(FT) is at work in TB, it must be outranked by another constraint which allows word-final feet in words with 3n+2 syllables and prefers the desired optimum. Possible constraints which could outrank NONFINALITY(FT), such as LAPSE-AT-PEAK, must be ranked below *EXTENDED-LAPSE to produce the rhythm observed elsewhere in TB. No consistent ranking can be reached with NONFINALITY(FT) that will account for all observed patterns in TB.

Even the combined forces of *EXTENDED-LAPSE and NONFINALITY(FT) are unable to replace EXTENDED-LAPSE-AT-END. The answer cannot be the addition of another constraint outranking *EXTENDED-LAPSE. Instead, there must be another constraint used in its place with the following features: a) the constraint prohibits long lapses, generally and b) the constraint allows long lapses where they occur in TB (word-finally).

EXTENDED-LAPSE-AT-END is the only constraint which can satisfy both of these needs and, therefore, predict all of the attested winners in TB.

4 Additional Predictions

With the addition of this family of extended lapse constraints to the grammar, there are two important questions that arise. What other predictions are made by EXTENDED-LAPSE-AT-END? What languages would be predicted by the presence of a constraint EXTENDED-LAPSE-AT-PEAK?

First, let us consider the predictions made by EXTENDED-LAPSE-AT-END. EXTENDED-LAPSE-AT-END predicts languages where long lapses are permitted only at the right edges of words. This is a plausible explanation for the attested phenomenon generally referred to as foot extrametricality. Foot extrametricality is when an entire foot is considered to be extrametrical, and stress can fall up to four syllables away from the edge of the word.

In Classical Palestinian Arabic, words ending in a sequence of light syllables can have stress either three or four syllables from the end of the word (Hayes 1995). In words consisting of three or five light syllables, stress falls on the antepenultimate syllable. However, in a word with four syllables, stress falls on the preantepenultimate syllable. Data from Classical Palestinian Arabic is provided in (20).

(20) Words with light syllables in Classical Palestinian Arabic

a)	(ká.ta).bu	‘they wrote’
b)	(šá.dža).ra.tun	‘a tree’
c)	ša.dža.(rá.tu).hu	‘his tree’

According to Hayes, the data in (20) can be described by the formation of a word-final extrametrical foot, although it is ignored by stress. However, EXTENDED-LAPSE-AT-END is a likely candidate for explaining why, when other factors in the language are keeping stress from occurring on the last two syllables, stress never goes any further than the fourth syllable from the end—any further away from the edge of the word would cause a violation of EXTENDED-LAPSE-AT-END.

We should also consider the predictions made by EXTENDED-LAPSE-AT-PEAK. EXTENDED-LAPSE-AT-PEAK would predict the existence of a ternary stress language similar to TB, except that extended lapses would only be licensed next to the main stress of the word.

LAPSE-AT-PEAK, as shown in Kager (2001), describes a binary language with a bidirectional stress pattern; EXTENDED-LAPSE-AT-PEAK would represent a bidirectional *ternary* stress pattern. Bidirectionality and ternarity are both relatively uncommon stress patterns, so it is not unexpected that there are no known cases where these two phenomena coincide.

Although there is no attested language with this pattern, it is similar to the pattern observed in Sentani (Elenbaas 1999). However, there are no words in Sentani long enough to tell whether or not the pattern predicted by EXTENDED-LAPSE-AT-PEAK is consistent with Sentani data. A word of nine-syllables is required to detect this pattern, such as (σ́σ)σσ(σ̀σ)σ(σ̀σ).

5 Conclusions

A positionally licensed extended lapse constraint is crucial for the analysis of Tripura Bangla. The constraints proposed are simply a synthesis of existing constraints: the positionally licensed lapse constraints (LAPSE-AT-END and LAPSE-AT-PEAK) and *EXTENDED-LAPSE. LAPSE-AT-END and LAPSE-AT-PEAK are simply extensions of *LAPSE; extending the same positional licensing to extended lapse constraints seems to be a natural step.

Additionally, EXTENDED-LAPSE-AT-END predicts the attested phenomenon of foot extrametricality, which is a topic for further investigation.

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