The development of word-final stops in Hittite

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Introduction

This presentation seeks to answer three interrelated questions about the development and synchronic status of word-final stops in Hittite.

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- Did Hittite have synchronic word-final voicing of stops that has been claimed and widely accepted in the literature?[1]
- How did word-final stops develop in Hittite?

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- Based on Sturtevant's Law (Yates 2019) and the cross-linguistic research on the perception and production of geminates, I will argue that **the length contrast for stops was neutralized in word-final position in pre-Hittite**.

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- Moreover, I will refute the claims of Kloekhorst (2014, p. 653; 2016, p. 222; 2020, pp. 168–172; forthcoming *i.a.*) that Hittite has a length contrast in word-final position.

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- Consequently, I will argue that **all word-final stops in Hittite are underlyingly [-long]**.[2]

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Roadmap

Data

Refuting claims of a word-final length contrast in Hittite

Evaluating word-final voicing in Hittite and beyond

Phrase-final lengthening and perception of geminate contrasts

Conclusions

Appendix

Data

Contextual orthography of Hittite stops

Intervocalic representation of PIE stops

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Word-final representation of PIE stops (Melchert 1994, p. 111)

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/*T/#	<t/d># (^{x}<tt/dd>#)

The Orthographic Constraint: Word-Final Position

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b.i	<mi-li-it>	[milit]	honey-NOM/ACC	*/mélit/
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  - These forms may contain an underlying geminate /t:/ or a singleton /t/.
  - These spellings are ultimately **non-probative**. The orthography forces a singleton spelling regardless of the underlying length of the stop.

Resolving the Ambiguity: “Cost-Free” Environments

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c.i	<ú-uk=a>	[uk=a]	1SG=but	*/hég/
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e.i	<pa-it=aš>	[pait=as]	go-3SG.PST=(s)he	*/póhit=os/

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  - In environments where the script *could* unambiguously capture a geminate, it does not.
  - This suggests the underlying consonant is indeed /**t**/, supporting the face-value reading of the word-final forms in (a.i) and (b.i).

Refuting claims of a word-final length contrast in Hittite

Hittite *takku* and *nekku*

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  kunanzi [k^{w}**u**n-ántsi] 'they kill' < **g^{wh}ən-énti*

Phonologically regular outcome of the oblique cases of *šeppit-* 'grain' and *milit-* 'honey'

The Expectation: Lenition

In oblique cases of Hitt. *šeppit-* (*šeppit-V* < **sép-it*-V) and *milit-* (*milit-V* < **mél-it*-V, we expect lenition between unaccented morae (Eichner 1973; Adiego 2001).

Regular operation

Singleton spellings confirm the rule.
Oblique cases with a singleton dental for both *milit-* and *šeppit-* appear in OS and represent the phonologically regular outcome of **-t-* via lenition.

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Regular operation	**Singleton spellings confirm the rule.** Oblique cases with a singleton dental for both *milit-* and *šeppit-* appear in OS and represent the phonologically regular outcome of **-t-* via lenition.
Problem	**Geminate spellings in oblique cases are also found.** Oblique cases with a geminate dental for both *milit-* and *šeppit-* appear in OS. How do we explain this?

Accounting for geminate spellings: Analogy vs. Restoration

Explanation for problematic spellings like <še-ep-pí-**it-ta**-aš> (KUB 35.126:5+KBo 25.79 iv? 2 [OS])?

View 1: Analogy to 'Honey' (Rieken/Melchert)

- **'Honey':** Geminates in oblique cases of *milit*(*t*)- are restored based on the adjective *m(a)littu-* 'sweet' (Melchert 1994, p. 140).
- **'Grain':** Rieken (1999, p. 158): Geminate spellings in *šeppit*(*t*)- represent interference from the oblique cases of *milit*(*t*)- (same semantic class).

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View 2: Phonological Restoration (Kloekhorst 2014)

- Restoration of long /t/ (i.e., /t:/) from nom./acc. sg. *šeppit* occurred in OH times.
- **Implication:** This would indicate no general lenition of word-final stops and a preserved final length contrast (Kloekhorst 2014, 563, n. 2100–1, 565).

Attestations: Statistical distribution, if anything, favors the singleton

Problem with View 2 (Kloekhorst): If restoration of long /t:/ were the rule, geminates should dominate the Old Script (OS). **They do not.**

The variation suggests free variation rather than analogical restoration (data from Rieken 1999, p. 158, Kloekhorst 2014, p. 565, and *CHD* 2019, s.v. *šep(p)e/it*).

Period	Geminate	Singleton	Total
OS	**3**	**8**	**11**
MS	2	2	4
NS	8	11	19
Total	**13**	**21**	**34**

Attestations of *šeppit*(*t*)- do not attest to a statistically significant difference in proportion of usage across script periods

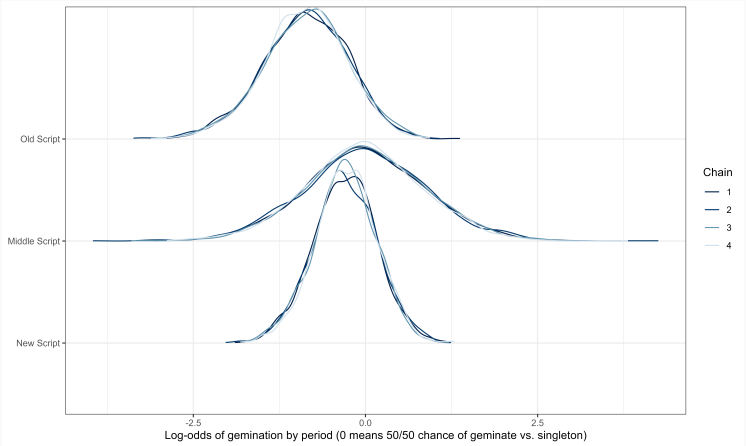

Figure 1: Bayesian logistic regression of geminate probability across periods

Is there really typological support for word-initial and final length contrasts in Hittite?

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  - Moreover, they allow a wide range of word-initial consonant clusters (cf. also other dialects of Arabic with initial geminates).
  - For Tabasaran and the Wixli Dialect of Lak, it is far from clear if the underlying contrast is one of length or along some other phonetic dimension (e.g., intensity; see appendix).

Geminates in Tashelhiyt Berber

Row	Pattern	Example	Gloss
a.	C:	[ʃ:]	‘eat’
b.	C:C:	[gʷ:t:]	‘wash it’
c.	C:C	[t:ħada]	‘be next to’
d.	C:CC	[k:rz]	‘to plough’
e.	CC:	[gn:]	‘they sleep’
f.	CCC:	[kst:]	‘he feeds it on’
g.	VCC:V	[ask:a]	‘tomorrow’
h.	VC:CV	[as:fan]	‘the day before yesterday’
i.	VCC:	[ift:]	‘he gave it’

Table 1: Examples illustrating the distribution of geminate consonants within a word in Tashelhiyt Berber (Ridouane 2007, p. 123); [t:ħada] from Alderete et al. (2015)

Is there really typological support for word-initial and final length contrasts in Hittite?

- Underlying lexical geminates are rare as opposed to the gemination at morpheme boundaries.
- More fatally, Moroccan Arabic also allows word-medial pre-obstruent geminates (Muller 2001, p. 222).

/l-tub/	ttub	‘the cloth’
/l-ḍhur/	ḍḍhur	‘the backs’
/l-neṣṣ/	nneṣṣ	‘the halves’
/l-žmel/	žžmel	‘the camel’

Table 2: Data from Muller (2001, p. 5)[4]

[4]Edge Geminates in Moroccan Arabic may arise by total assimilation between the definite article and the first consonant of some nouns or between the perfect 1st person and the final radical element of some verbs (Noamane 2020, p. 41).

Evaluating word-final voicing in Hittite and beyond

Why have people claimed in the past that Hittite has word-final voicing?

Development of intervocalic stops in Hittite (Yates 2019; Melchert 1994) *contra* Simon (2020), Patri (2009), Kloekhorst (2021), and Kloekhorst (2016)

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Traditional views on the development of word-final stops in Hittite (Melchert 1994, p. 111)

PIE	Hittite	Orthographic Representation
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/*T/#	/D/#	<t/d># (^x<tt/dd>#)[5]

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Voicing contrasts in word-final position

- Word-final voicing should not exist because of an innate bias in phonological grammars against voiced segments (cf. Kiparsky 2006; Myers and Padgett 2014).

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- Word-final voicing is rare because articulatory, aerodynamic, perceptual, and acquisition factors favor word-final de-voicing (Blevins 2004, pp. 104, 112; Blevins 2006, p. 136).
- The development should not be *a priori* ruled out for Hittite, but the structural factors that might lead to word-final voicing should be ruled out for Hittite.

Possible pathways to the development of word-final voicing (Blevins 2006)

Mechanism 1: Final de-gemination followed by the transposition of a geminate/singleton opposition into a voiceless/voiced one.

Stage	Output Patterns
A	*VTTV, *VTT#
B	*VTTV, *VT#
C	VTV, VD#

Key: V = vowel; T = voiceless stop; D = voiced stop; # = word boundary.

Possible pathways to the development of word-final voicing (Blevins 2006)

Mechanism 2: Intervocalic Voicing followed by apocope

Intervocalic obstruent voicing followed by final vowel loss:

$$\text{*VTV} \quad > \quad \text{*VDV} \quad > \quad \text{VD}$$

Lack of structural conditions for the emergence of word-final voicing in Hittite

- Hittite does not meet the structural conditions discussed by Blevins that might lead to word-final voicing.

[6] Surface geminates are found in nursery words like PIE **atta-* 'father'.

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- In Hittite, a geminate/singleton contrast is not phonologized as a voiced vs. voiceless contrast since PIE rarely has surface geminates and regular degemination across morpheme boundaries (cf. Byrd 2015, 23, 43 *i.a.* Yates 2019, p. 286).[6]

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- Rather, Hittite shows the opposite trajectory and develops a durational contrast from an original voicing contrast.

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Lack of intervocalic voicing followed by apocope

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- What then explains the singleton spellings of PIE voiceless stops in word-final position?

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Proposal: Hittite neutralized voicing in [+cons, -son] segments in word-final position through word-level generalization of a phrase-final neutralization process. Under this analysis, we have to explain the lack of geminates in word-final position rather than positing word-final voicing.

Phrase-final lengthening and perception of geminate contrasts

The Link Between Lengthening and Devoicing (1)

1. The Phonetic Reality: Phrase-Final Lengthening

Phrase-final or pre-pausal segments can be **up to 2–3x longer** than their phrase-medial counterparts (Blevins 2004, p. 104).[7]

2. The Perceptual Ambiguity

The Conflict: Duration is a primary cue for voicing.

Because *everything* is long in final position, listeners find it difficult to consistently classify a segment as [± long] (and thus Voiced vs. Voiceless).

[7] See Klatt (1975), Wightman et al. (1992), Fougeron and Keating (1997), and Paschen, Fuchs, and Seifart (2022) for classical and recent studies.

The Link Between Lengthening and Devoicing (2)

2. Recalled: The Perceptual Ambiguity

The Conflict: Duration is a primary cue for voicing.

Because *everything* is long in final position, listeners find it difficult to consistently classify a segment as [± long] (and thus Voiced vs. Voiceless).

3. The Outcome

Phrase-final lengthening acts as a phonetic source for **word-final devoicing** of stops and fricatives (cf. Blevins 2004, p. 105).

Word-final devoicing before Pre-Hittite

- **Chronology:** Word-final voicing neutralization occurred **before** the trans-phonologization of the durational contrast.

Word-final devoicing before Pre-Hittite

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The Mechanism: Overgeneralization

Phrase-Final Neutralization

↓

(Gradient Change)

↓

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Why Overgeneralize? Evidence from Infant Acquisition:

- **Dominance effects** of single-word utterances (Blevins 2006, p. 138).
- Edges act as **"anchors of reliability"** for learners (Johnson, Seidl, and Tyler 2014; Sundara, Demuth, and Kuhl 2011).

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Phrase-final lengthening in Hittite as a verb-final language (cf. Lyutikova and Sideltsev 2021)

me-na-ah-ha-an-da	*ú-et*	*s=a-an*	*LUGAL-us*	*hu-ul-le-et*
afterwards	come-3SG.PST	CONN=3SG.ACC	king-NOM.SG.M	fight-3SG.PST

"Afterwards, he came, and the King fought him."

s=a-as	*sa-ra-a*	*URU-ya*	*pa-it*	*ú-uk=wa*	*LUGAL-us=s-mi-is*
CONN=3SG.NOM	up	city-ALL.SG	go-3SG.PST	1SG=quot	king-NOM.SG=3PL.DAT

ki-is-ha

become-3SG.MID.PRS

"And he went up to the city (and said), 'I am y'all's King.'"

- The final consonants of phrase- and clause-final verbs would regularly be the locus of phrase-final lengthening and led to word-final neutralization of voicing.

Phrase-final lengthening in verbs

The lengthening would not be unique to phrase-final verbs, but also to phrase-final nouns as well.

But why did word-final devoiced [+cons, –son] segments not phonologize as [+long] just like their intervocalic counterparts?

Changes via Sturtevant's Law in intervocalic position

Pre-Hittite	*[p]	*[t]	*[k, k^w]	*[χ, $χ^w$]	*[b]	*[d]	*[g, g^w]	*[ʁ, $ʁ^w$]
	|	|	|	|	|	|	|	|
Hittite	[p:]	[t:]	[k:, k^w:]	[χ:, $χ^w$:]	[p]	[t]	[k, k^w]	[χ, $χ^w$]

Dmitrieva's findings on the perception of geminate contrasts in Russian, Italian, and English (2012, p. 137)

Finding	Experiment
Lower steepness of the curve	English, Italian*, overall*
Singleton bias	Russian*, English, Italian

Evidence for lower distinctiveness in preconsonantal environment.

Finding	Experiment
Lower steepness of the curve	Russian, English, Italian*, overall*
Singleton bias	Russian*, English, Italian

Evidence for lower distinctiveness in word-final position.

- Hierarchy of contrast distinctiveness: VV > WI > VC > WF (Dmitrieva 2012, p. 153).
- Since pre-Hittite neutralizes the contrast in pre-obstruent position, Dmitrieva's hierarchy implies that the contrast should also be neutralized in word-final position.

The development of Hittite word-final stops

Changes via Sturtevant's Law in pre-obstruent position								
Pre-Hittite	*[p]	*[t]	*[k, k^w]	*[χ, $χ^w$]	*[b]	*[d]	*[g, g^w]	*[ʁ, $ʁ^w$]
	|	|	|	|	|	|	|	|
Hittite	[p]	[t]	[k, k^w]	[χ, $χ^w$]	[p]	[t]	[k, k^w]	[χ, $χ^w$]

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Changes via Sturtevant's Law in pre-obstruent position								
Pre-Hittite	*[p]	*[t]	*[k, k^w]	*[χ, $χ^w$]	*[b]	*[d]	*[g, g^w]	*[ʁ, $ʁ^w$]
	|	|	|	|	|	|	|	|
Hittite	[p]	[t]	[k, k^w]	[χ, $χ^w$]	[p]	[t]	[k, k^w]	[χ, $χ^w$]

Examples from Yates (2019, p. 264):

a. PIE *(we/o)-tk^w- > Hitt. ⟨*wa-at-ku-zi*⟩, ⟨*wa-at-ku-ut-ta*⟩ 'leaps/leapt'
b. PIE *$h_2ŕ̥tko$- > Hitt. ⟨*ḫar-tág-ga-aš*⟩, ^{LÚ}⟨*ḫar-ta-ak-ki*⟩ 'bear(-man)'

a. ^{x}⟨*wa-at-tu-uk-zi*⟩, ^{x}⟨*wa-at-tu-uk-ta*⟩
b. ^{x}⟨*ḫar-at-tág-ga-aš*⟩, ^{x}⟨*ḫar-at-ta-ak-ki*⟩

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Changes via Sturtevant's Law in pre-obstruent position								
Pre-Hittite	*[p]	*[t]	*[k, k^w]	*[χ, $χ^w$]	*[b]	*[d]	*[g, g^w]	*[ʁ, $ʁ^w$]
	|	|	|	|	|	|	|	|
Hittite	[p]	[t]	[k, k^w]	[χ, $χ^w$]	[p]	[t]	[k, k^w]	[χ, $χ^w$]

Stage	PIE $^*\mathbf{C}_{\text{[-voi, +cons, -son]}}$	PIE $^*\mathbf{C}_{\text{[+voi, +cons, -son]}}$
PIE	$^*C_{\text{[-voi]}}]_\omega]_\phi$	$^*C_{\text{[+voi]}}]_\omega]_\phi$
Pre-Hittite	$^*C_{\text{[-voi, -long]}}]_\omega]_\phi$	$^*C_{\text{[-voi, -long]}}]_\omega]_\phi$
Pre-Hittite	$^*C_{\text{[-voi, -long]}}]_\omega$	$^*C_{\text{[-voi, -long]}}]_\omega$
Hittite	$C_{\text{[-voi, -long]}}]_\omega$	$C_{\text{[-voi, -long]}}]_\omega$

Table 3: Diachronic development of word-final stops from PIE to Hittite

Conclusions

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Conclusions

- I have argued that Hittite does not have word-final voicing and word-final stops are all [-long].
- Hittite word-final stops, just like their pre-consonantal counterparts, resist word-final phonologization of a [+long] duration owing to singleton bias in production and perception.
- Along with Kiparsky's refutation of the Latin evidence for word-final voicing (see appendix), there is absolutely no reason to reconstruct word-final voicing for PIE.

Thank you![8]

[8] I am indebted to Bruce Hayes, Jonah Katz, and the members of the PIES Graduate Seminar and the UCLA Phonology Seminar for their help and support. Special thanks to Craig Melchert for his discussion of the many issues presented here. None of this would have come to fruition without the constant feedback and encouragement of Tony Yates.

Appendix

Luwian 3rd personal pronouns

	CLuwian	HLuwian
NomSgAnim	-aš	/-as/
AccSgAnim	-an	/-an/
N-ASgNeut	-ata	/-ada/
DatSg	-tu	/-du/
NomPlAnim	-ata	/-ada/
AccPlAnim	-aš	/-ada/
N-APlNeut	-ata	/-ada/
DatPl	-mmaš	/-mants/

PIE -*t > Proto-Italic -*d

- Duenos Inscription from the 1st half of the 6th cent. BCE (Vine 1999), (Harðarson 2011)
  1. IOVESA T :DEIVOS:QOI:ME D :MITA T :NEI:TE D :ENDO:COSMIS:VIRCO:SIE D
  2. AS:TE D :NOISI:OPETOI T :ESIAI:PACA:RIVOIS
  3. DVENOS:ME D :FECE D :EN:MANO:MEINOM:DVENOI:NE:ME D :MALO:STATO D

- One could argue that Proto-Italic developed word-final voicing but then this was lost as a synchronic process in all of the Italic languages (O. <au t i>, and <av t >, <au t > 'or').

- With Kiparsky (2006, pp. 10–11), I analyze the word-final <d>-spellings as reflecting spirantization or a lack of release burst (cf. Davidson 2011 for English) before word-final stops were lost after long vowels in Latin.

- This type of lenition can be compared with e.g.,t > t̄ > ? >∅ (Middle Chinese to modern Mandarin; Chen 1976).[9]

[9] Along with Harris, Urua, and Tang (2023, p. 38), I see spirantization and the lack of word-final burst release both as lenition processes and adopt their modulation carrier approach of unifying both as lenition processes that lead to glottalization (and eventually deletion).

Welsh word-final voicing

	/b d g/ vs. /p t k/ in Welsh		(Blevins 2006, p. 146)
	Short vowel + fortis		Long vowel + lenis
(1a)	[map] /map/‘map’	(1b)	[maːb] /mab/‘son’
(2a)	[brat] /brat/‘apron; rag’	(2b)	[braːd] /brad/‘treason’
(3a)	[dɔt] /dot/‘dot; vertigo’	(3b)	[doːd] /dod/‘to come’

	/pʰ, tʰ, kʰ/ vs. /b, d, g/ in Welsh		(Kiparsky 2006, p. 8)
	Short vowel + fortis		Long vowel + lenis
(1a)	[map] /map/‘map’	(1b)	[maːb] /mab/‘son’
(2a)	[brat] /brat/‘apron; rag’	(2b)	[braːd] /brad/‘treason’
(3a)	[dɔt] /dot/‘dot; vertigo’	(3b)	[doːd] /dod/‘to come’

Somali final voicing

Underlying distinction between /t, k/ and /b, d, g/ (Blevins 2006, pp. 147–148)

Input	/ʔilkó/	/ʔílik/	/ʔedgó/	/ʔédeg/
Final Voicing	–	ʔílig	–	–
Aspiration (V)	ʔilkʰó	–	–	–
Final Neutralization	–	ʔilik̚	–	ʔeðek̚
Lenition	[ʔilkʰó]	[ʔílik̚]	[ʔedgó]	[ʔéðek̚]

Underlying distinction between /tʰ, kʰ/ and /b, d, g/ (Kiparsky 2006, pp. 6–7)

Input	/ʔilkʰó/	/ʔílikʰ/	/ʔedgó/	/ʔedeg/
Final Neutralization	–	ʔilik̚	–	ʔéðek̚
Lenition	[ʔilkʰó]	[ʔílik̚]	[ʔedgó]	[ʔéðek̚]

The spellings of <pait=aš>

Kloekhorst (2008, p. 24 *i.a.*) has claimed that <pait=aš> cannot be evidence for word-final voicing (in my updated framework, a [-long] stop) because <paitt=aš> would have been liable to an analysis <pait=(y)a=aš> 'and (s)he went'.

This claim is conceptually incoherent:

- Homophony otherwise not avoided in Hittite (cf. *dāi* 'places' or 'takes', *uwanzi* 'they come' or 'they see'; *aranza* 'standing' or 'arrived', *tianzi* 'they step' or 'they place')
- Readings with the conjunction =(y)a would presumably be clear from the context.

Attestations of oblique forms of šep(p)it(t)-

Script	Single	Geminate
Old Script (OS)	še-ep-pí-da-aš (StBoT 25.54 iv 5 (OS)), [še]-ep-pí-da-as (StBoT 25.56 iv 14 (OS)), gen. še-ep-pí-da-aš KBo 17.36 iv 5 (OS), KBo 25.56 iv 14 (OS), KBo 27' 36+ IV 5 (OH/OS), KBo 27 33+ IV 14' (OH/OS), KUB 35 133 I 25 (OH/OS), KUB 42.89 obv. 16	še-ep-pí-it-ta-aš KUB 35.126:5 + KBo 25.79 iv? 2 (OS), KBo 25.79 iv (1) (OS)
Middle Script (MS)	še-ep-pí-da-aš KUB 34.88:4 (MS), KUB 42.89 obv. 16	še-ep-pí-it-ta-aš KUB 34.89 obv. 2, 8 (MS)
New Script (NS)	še-pí-tàš KUB 58.58 i 18 (LNS), Bo 9550:5 (NS), še-pí-it-ta-aš KUB 45.58 iv 8 (NS), še-ep-pí-ta-aš KUB 35.133 i 25 (NS), KUB 60.99 i 2, 3 (NS), KBo 45.199 i 6 (NS), še-ep-pí-ta-aš (KUB 38.32 obv. 11, rev. 22 (NS; cult inventory of Mt. Ziwana), VSNF 12.56 obv. 8, 14 (fr.) (OH?/NS)), KUB 34 88:4' (MH/NS)	še-ep-pí-it-ta-aš KBo 10.34 i 9 (MH/NS), KBo 2.4 ii 18, iii 22, iv 30, 33 (NS), KUB 9.2 i 14 (NS), še-ep-pí-id-da-aš KUB 20.66 iv 6 (NS), še-ep-pít-tàš KBo 16.81 i 6 (NS)

Is there really typological support for word-initial and final length contrasts in Hittite?

- Tabasaran has created word-initial and final geminates through general apocope of word-initial/final unstressed vowels (specifically pre-tonic high vowels in word-initial position [Babaliyeva 2011, p. 5]).
- The contrast between transcribed geminates and singletons is one of intensity (Babaliyeva 2011, p. 5) and not duration.

Is there really typological support for word-initial and final length contrasts in Hittite?

- Three words from a dialect of Lak should give us pause if that is the only relevant comparandum for Hittite.
- Moreover, it is far from clear (see Beguš 2021, p. 711 for references) whether what is transcribed by Anderson (1997, p. 989) as geminate stops are actually geminate, intensive, fortis, or unaspirated.

lit.	*Wixli*	gloss
maq	*maqq*	'word'
kkunuk	*kkunukk*	'egg'
šša$^{\text{ʃ}}$rult	*šša$^{\text{ʃ}}$rultt*	'sparrows'

Table 4: Wixli words from Anderson (1997, p. 989)

Constraint Set

Constraint	Description
ID(ENT)-T-[long]	Corresponding input and output obstruents must have the same specification for [long].
***GEM-T #**[10]	A [+long] obstruent is not allowed to surface in the word-final position. (cf. Yates 2019, 276[58]) Dmitrieva (2012, p. 86); Arabic dialects: Cowell (1964, pp. 23–24), Erwin (1963, p. 30); modern Mandaic (Malone 1997, p. 146)
DEP-V	An output vowel must have an input correspondent.[11] Wolof (Bell 2003), Hungarian (Ringen and Vago 2011)

[10] This constraint is contextually equivalent to the *GEM/1VA constraint of Pająk (2009, p. 270).

[11] Dmitrieva (2012, p. 166) reports that word-initial geminates are usually supported by epenthesis but word-final geminates are neutralized.

Word-final degemination

- By the constraints above, we can generate word-final degemination :

/VTT/#	*GEM-T #	DEP-V	ID(ENT)-T-[LONG]
a. [VTT]#	∗!		
☞ b. [VT]#			∗
c. [V.TəT]#		∗!	
d. [VT.Tə]#		∗!	

/VTTV/	*GEM-T #	DEP-V	ID(ENT)-T-[LONG]
a. [VTV]			∗!
☞ b. [VTTV]			
c. [V.Tə.TV]		∗!	
d. [VT.TəV]		∗!	

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