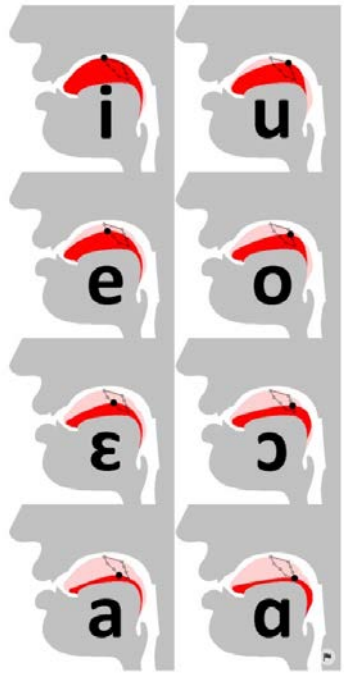




24.901/931, 2026

Introduction to Phonology

Lecture 21

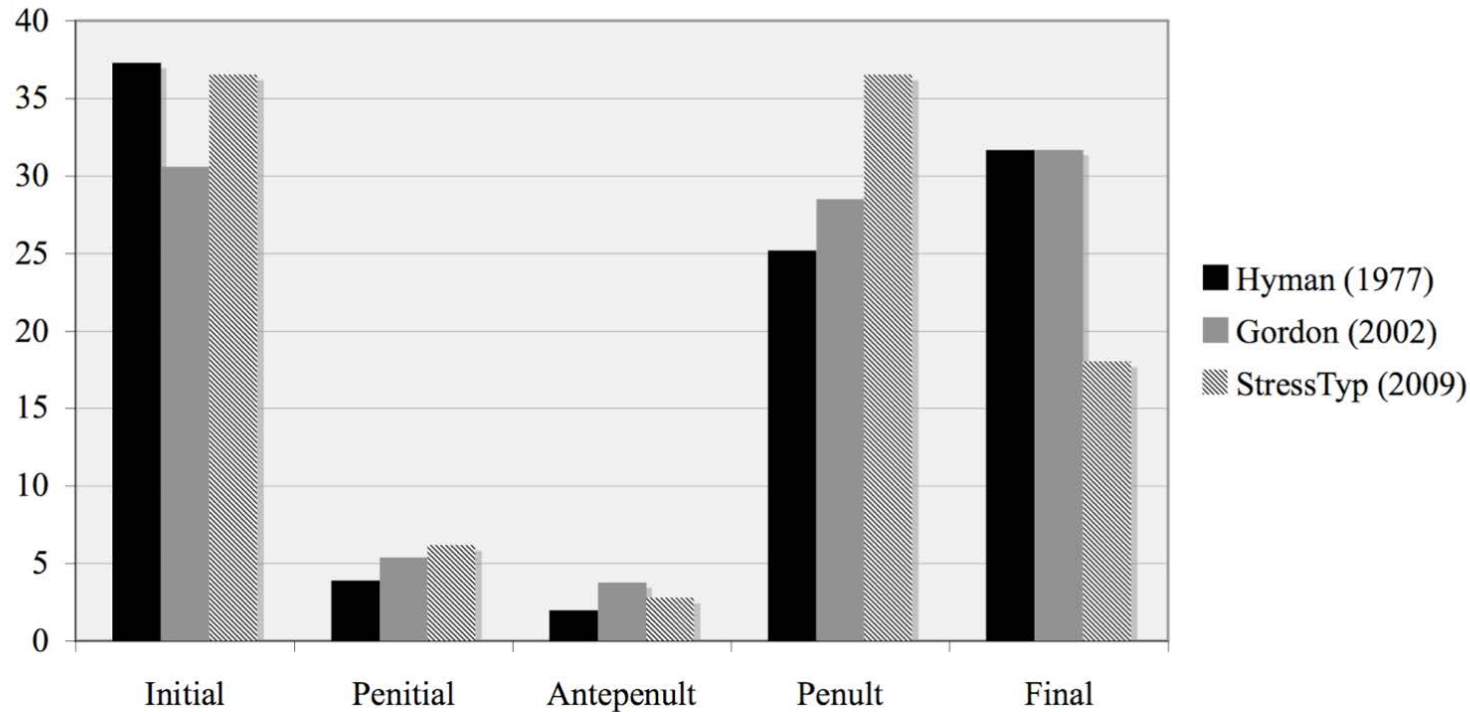
Announcements

- Tuesday May 5: Quiz 2
- 10-15 mins
- Open book
- A stress pattern and its analysis
- Review syllable and stress constraints
- Review the OT Eval and ranking arguments.
- Remember to mark critical violations (*!)

Today

- Stress typology and stress constraints continued

Recall common stress locations in 1-stress systems



Initial: #10*
Peninitial: #010*
Antepenult: 0*100#
Penult: 0*10#
Final: 0*1#
(Postpeninitial: #0010*)

Figure 5.1. Relative frequency (expressed as percentage of the total cases) of different stress locations in three surveys of stress (Gordon 2016). All 3 surveys are for 1-stress systems

Recall 2 ideas about preferred stress locations

- Stress seeks a word edge window, a region of 1-3 syllables at either edge
- Not always the *very* edge: last $\sigma(\sigma)$ and first $\sigma(\sigma)$ can reject stress

Summary + classification of stress constraints

Culminative constraints				
Rhythmic constraints				
Edge Marking constraints				
Edge Avoidance constraints				
Main Stress				

1-stress, 2-stress and n-stress systems

- In 1 stress systems (top-ranked ONESTRESS), the grammar must decide:
 - ⇒ Which end of the word gets the stress?
 - ⇒ How close to that end is the stress placed?
- Comparable questions in 2 stress systems, for *both* word ends
- In n-stress systems: *(EXT)LAPSE >> ONESTRESS. In such systems, the grammar must decide all of the above about edge stresses, plus:
 - ⇒ How closely, or far apart, must stresses be spaced?

Decisions modeled by *(EXT)LAPSE (*00) and *CLASH (*nn).

- Choices in 1-stress and n-stress systems are rankings over a single constraint set. As in all OT analyses, we assume that *all members of this set are present in all stress systems*, but some will be inactive (= unable to decide a winner) if outranked by the right competing constraints.

- Ranking permutations over the set of constraints in Slide 6 generate most *quantity insensitive* stress systems (= syllable weight plays no role), without predicting too many unattested systems, or any that seem unlikely to exist (Gordon 2002).
- = this constraint set doesn't undergenerate and nor severely overgenerate.
- Serious overgeneration problems may come from another source: the interaction of *any* stress constraints with Faithfulness. Next week.

1-stress systems

100000	010000	001000
000001	000010	000100

In these systems, ONESTRESS outranks *either* STRESSR OR STRESSL

In words 3σ or longer, ONESTRESS >> *LAPSE, *EXTLAPSE.

Rankings with off-the-edge constraints must also be considered.

We ignore for now Faithfulness constraints for stress: most stress systems generate fully predictable stress for simple words, meaning that:

All stress constraints >> Ident [$\pm$ stress].

1 stress: STRESS R/L vs. OFF-EDGE constraints

STRESS L: one * for every σ between 1st stress and #_

Hungarian 10*		ONESTRESS	STRESS L	NONINITIAL	STRESS R
	☞1000			*	* * *
	0100		*!		* *
	0010		*!*		*
	1002	*!			
Lakota 010*		ONESTRESS	NONINITIAL	STRESS L	STRESS R
	1000		*!		* * *
	☞0100			*	* *
	0010			* * !	*
	2001	*!			

Ranking argument for STRESSL >> STRESSR in Lakota?

A simpler option for STRESS L? 1 * for each *unstressed* 1st, * #0.
 (vs. present definition: 1 * for each σ separating #_ from 1st stress)

Hungarian		ONESTRESS	STRESS L	NONINITIAL	STRESS R
	☞1000			*	*
	0100		*!		*
Lakota		ONESTRESS	NONINITIAL	STRESS L	STRESS R
	1000		*!		*
	☞0100			*	*

Will the simpler STRESS L constraint correctly exclude other candidates?

More candidates in the Lakota evaluation

Hungarian		ONESTRESS	STRESS L	NONINITIAL	STRESS R
	☞ 1000			*	*
	0001		*!		
Lakota		ONESTRESS	NONINIT	STRESS L	STRESS R
	☹ 0100			*	*
	!☞ 0010			*	*

The system can't decide between 0100 and 0010; favors 0001 over 0100.

We keep the distance-based definition

STRESS L: one * for every σ between 1st stress and #_

Hungarian
10*

	ONESTRESS	STRESS L	NONINITIAL	STRESS R
☞1000			*	* * *
0100		*!		* *
0010		*!*		*
0001		*!*		
	ONESTRESS	NONINITIAL	STRESS L	STRESS R
1000		*!		* * *
☞0100			*	* *
0010			* *!	*
0001			* *!*	

Lakota
010*

EXTENDED NONFINALITY/NONINITIALITY

- (Non-Warsaw) Polish: 1, 10, 010, 0010, 00010
- Macedonian (below): 1, 10, 100, 0100, 00100, 000100

	ONESTRESS	EXTNONFIN	STRESS R	STRESS L
☞000100			* *	* * *
000010		*!	*	* * * *
000001		*!		* * * * *
200100	*!		* *	
100000			* * * ! * *	

e.g. Macedonian *tátkovtsi*, *tatkóvtsite*; *talentírani*, *talentiránite*

EXTNONINITIALITY

Raramuri		ONESTRESS	EXTNONINIT	STRESS L	STRESS R
010, 001 0010 00100 001000 (unstressed roots only)	☞ 00100			* *	* *
	00010			* * * !	
	01000		* !	*	* * *
	10000		* !		* * * *

What ranking argument, from what size words, would show that STRESSL >> STRESSR?

What does the argument above tell us about the extreme rarity of postpenitinal (and antepenultimate) stress systems?

The stress of short words in systems with active (EXT) NONFINALITY:
 e.g. Polish (1, 10, 010, 0*10) or simplified Latin (1, 10, 100, 0100, 0*100)

Polish

0	NFIN	STRESSR
☞ 1	*	
?		
?		

What losing candidates threaten to win?
 What constraints, rankings, will get the
 actual winners to win?

Latin

00	EXTNFIN	STRESSR	STRESSL
☞ 10	*	*	
??			
???			

The stress of short words in systems with active (EXT)NONFINALITY:
 e.g. Polish (1, 10, 010, 0*10) or simplified Latin (1, 10, 100, 0100, 0*100)

Polish

0	DEP V	STRESS	NFIN	STRESSR
☞ 1			*	
0		*!		
10	*!			

Latin

00	DEP V	STRESS	EXTNFIN	STRESSR
☞ 10			*	*
00		*!		
100	*!			

n0000n	n000n0	n00n00
0n000n	0n00n0	0n0n00
00n00n	00n0n0	00nn00

2-stress systems

In these systems, ONESTRESS outranks some competing constraints:

*LAPSE, *EXTLAPSE, **but not** STRESSR, STRESSL

We investigate the other rankings.

A 2-stress system

- Sibuṭu Sama (Austronesian)

a.	bissála	010	‘talk’
b.	bìssalá-han	2010	‘persuading’
c.	bìssala-hán-na	20010	‘he is persuading’
d.	bìssala-han-kámi	200010	‘we are persuading’
e.	bìssala-han-sigé ^{ia}	2000010	‘they are persuading’

- 2 stress max
- final unstressable
- no adjacent stresses: 010, *210
- otherwise, stress both edges

Sibutu

☞ 200010				
000010				
200001				
202010				
☞ 010				
201				
100				
210				

Sibutu

	NFIN	STRESSR	STRESSL	ONESTRESS
☞200010		*		*
000010			*!	
200001	*!			*
202010		*		* *!
000	NFIN	STRESSR	STRESSL	ONESTRESS
☞010		*	*	
201	*!			*
100		* *!		

Sibutu

	NFIN	STRESSR	STRESSL	ONESTRESS
☞200010		*		*
000010			*!	
200001	*!			*
202010		*		* *!
	NFIN	STRESSR	STRESSL	ONESTRESS
☹ 010		*	*!	
201	*!			*
100		* *!		
!☞210		*		*

Sibutu

000000	NFIN	STRESSR	STRESSL	ONESTRESS
☞200010		*		*
000010			*!	
200001	*!			*
202010		*		* * !

000	NFIN	*CLASH	STRESSR	STRESSL	ONESTRESS
☞010			*	*	
201	*!				*
100			* * !		
210		*!	*		*

Binary-rhythm systems (n-stress, n = any number)

In all these systems, *LAPSE >> ONESTRESS

Lapse vs. OneStress: Macedonian vs. English

1 stress: Macedonian		ONESTRESS	*LAPSE
00*100 <i>talentírani</i>	☞00100		* *
	20100	*!	
n stress: English		*LAPSE	ONESTRESS
(20)*100 e.g. <i>sùpercàli....ócious</i>	00100	* *!	
	☞20100	*	*

• Pintupi (Paama-Nyungan: Australian aboriginal):

pá.ŋa	10	‘earth’
tjú.ʈa.ya	100	‘many’
má.ʌ.wà.na	final unstressable	‘through from behind’
pú.ʌŋ.kà.la.tju	10200	‘we (sat) on the hill’
tjá.mu.lìm.pa.tjùŋ.ku	102020	‘our relation’
yú.ma.ʈìŋ.ka.mà.ra.tjù.ʈa.ka	102020200	‘because of mother-in-law’

• Maranun̄ku (W. Daly: Australian aboriginal):

tí.ralk	10	'saliva'
mé.re.pèt	102	'beard'
yán.gar.mà.ta	1020	'the Pleiades'
láŋ.ka.rà.te.tì	10202	'prawn'
wé.le.pè.ne.màn.ta	102020	'kind of duck'

Two similar n-stress systems

Pintupi

100, 1020, 10200,
102020, 1020200

Maranun̄ku

102, 1020, 10202,
102020, 1020202

↖10200					
10202					
10220					
10000					
↖10202					
01020					
10220					

Two similar n-stress systems

Pintupi

100, 1020, 10200,
102020, 1020200

	STRESS L	*CLASH	NONFIN	*LAPSE	ONESTR
☞ 10200		Preliminary!		*	*
10202	*!				* *
10000				* * ! *	
	STRESS L	*CLASH	*LAPSE	NONFIN	ONESTR
10200			*!		*
☞ 10202				*	* *
01020	*!				*
10220		*!			* *

Maranun̄ku

102, 1020, 10202,
102020, 1020202

The fixed-stress edge

- In n-stress languages, rhythm is typically invariant at one edge
e.g. #10..., #01..., or 01#, 10#
- and it's typically variable at other edge, due to word-size differences: e.g.
#10(20)* in *even-parity* words (words with even number of σ)
#10(20)*0 or #10(20)*2 in *odd-parity* words
- typically, the *fixed-stress edge* carries main stress.
as if it's desirable to locate main stress in an invariant way wrt #

Pintupi-Maranungku

- The fixed-stress edge is the left: top ranked STRESS L
- Main stress is on the left: MAINSTRESSL >> MAINSTRESSR
- Even-parity words are rhythmically regular at both edges: 10(20)*
- Odd-parity words have variable rhythm at the opposite edge:
 - Pintupi 10(20)*0, because *CLASH, and NONFINALITY>>*LAPSE
 - Maranungku 10(20)*2: *CLASH, and *LAPSE >> NONFINALITY

Aside on the lapses of Pintupi

10(20)*0 is not uniquely selected by the Pintupi rankings below.

What *other* stress patterns are consistent with these rankings?

σσσσσσσ	STRESSL	NFIN	*CLASH	*LAPSE
☞ 1020200				*

Pintupi:
10, 100, 1020
10200, 102020,
1020200

What is needed to get Pintupi right? Preferably without adding constraints.

Improved Pintupi

Pintupi
10,
100,
1020,
10200,
102020
1020200

σσσσσσσσ	*CLASH	NONFIN	STRESSL	*LAPSE	*EXTNONFIN	STRESSR
☞1020200				*		* *
1020020				*	*!	*
1002020				*	*!	*
σσσσσσσσ	*CLASH	NONFIN	STRESSL	*LAPSE	*EXTNONFIN	STRESS R
☞102020					*	*
100200				*!*		* *

Embellished *LAPSE

A (very) few systems escape analysis in the same terms:

Garawa has $10(20)^*$ but $100(20)^*$

Warsaw Polish: 2003010 , *2030010 .

Perhaps, in these systems, lapse is preferred next to stronger stresses:

$10020 \succ 10200$, $2003010 \succ 2030010$.

Alternatively, an additional constraint against LAPSE before $_ \#$

LAPSE at 1: One * for any 00 sequence not adjacent to 1.

* LAPSE at #: One * for any 00 sequence at $_ \#$.

Garawa

1020, 10020,
102020
1002020

σσσσσσσ	*CLASH	NONFIN	STRESSL	*LAPSE	STRESSR	*EXTNONFIN
☞1002020				*	*	*
1020200				*	* * !	
!☞1020020				*	*	*
σσσσσσσ	*CLASH	NONFIN	STRESSL	*LAPSE	STRESSR	*EXTNONFIN
☞102020					*	*
100200				* ! *	* *	

How to exclude *1020020 without adding a constraint?
Generally assumed: additional constraints on *where* lapse is allowed.

Garawa

1020, 10020,
102020
1002020

σσσσσσσ	LAPSE-AT-1	*LAPSE
☞1002020		*
1020200	*!	*
1020020	*!	*
σσσσσσσ	LAPSE-AT-1	*LAPSE
☞102020		
100200	*!	* *

LAPSE-AT-1: * for any 00 *not adjacent* to main stress

When the fixed-edge is on the right

Nengone (Austronesian): 10, 010, 2010, 02010, 202010, 0202010

σσσσσσσσ	*CLASH	NONFIN	*LAPSE	STRESSR	STRESSL
☞0202010				*	*
2002010			*!	*	
2020100			*!	* *	
2202010	*!			*	
σσσσσσσσ	*CLASH	NONFIN	*LAPSE	STRESSR	STRESSL
☞202010				*	
100200			*!*	* *	

2010,
02010,
202010
0202010

Nengone (Austronesian): 10, 010, 2010, 02010, 202010, 0202010
Malakmalak (Austronesian): 10, 010, 1020, 01020, 102020, 0102020

Note location of main stress is on the fixed edge in Nengone, as in the general case.
Malakmalak is one of the very few systems where main stress is at the variable edge.

Ternary stress

Cayuvava

• 10	éne	tail
• 100	ǰákahe	stomach
• 0100	kihíbere	I ran
• 00100	ariúutǰa	he came already
• 200100	ǰǰìhiraríama	I must do
• 0200100	maràhahaéiki	their blankets
• 00200100	ikitàparerépeha	the water is clean
• 200200100	ǰǰaadiròburúrutǰe	ninety-nine (1 st digit)
• 0200200100	medàrutǰetǰèirohíjpe	fifteen each (2 nd digit)
• 00200200100	ǰǰaadàirobòirohíjpe	ninety-nine (2 nd digit)

Cayuvava

10,
100,
0100
00100
200100
0200100
00200100

σσσσσσσσ	STRESS	*EXTLAPSE	ONESTRESS	EXTNonF	*LAPSE	EXTNonIn
☞0200100			*		* *	*
2020100			* * !			
0000100		* ! *				
0020010				* !	*	

Cayuvava

10,
100,
0100
00100
200100
0200100
00200100

σσσσσσσ						
☞0200100						
2020100						
0000100						
0020010						

Cayuvava

10,
100,
0100
00100
200100
0200100
00200100

σσσσσσσ	STRESS	*EXTLAPSE	ONESTRESS	EXTNonF	*LAPSE	EXTNonIn
☞0200100			*		* *	*
2020100			* * !			
0000100		* ! *				
0020010				* !	*	
σσ						
☞10						

Cayuvava

10,
100,
0100
00100
200100
0200100
00200100

σσσσσσσσ	STRESS	*EXT LAPSE	ONE STRESS	NONFIN	EXTNONF	*LAPSE	EXTNONIN
☞0200100			*			* *	*
2020100			* * !				
0000100		* ! *					
0020010					* !	*	
σσ							
☞10					*		*
00	* !						
01				* !	*		*

How does clash ever arise?

- Araucanian (Mapudungun: Chile, Argentina): rhythm fixed on left edge, no lapse

wu.lé	01	‘tomorrow’
tì.pán.to	010	‘year’
e.lù.mu.jú	0201	‘give us’
e.lù.a.é.new	02010	‘he will give me’
ki.mù.ba.lù.wu.láj	020201	‘he pretended not to know’

- Southern Paiute (Uto-Aztecan: Arizona): rhythm fixed on both edges, no lapse

ʃápi	10	‘belly’
tìβáa	010	‘down west’
ʃínánwə̀ɸi	0120	‘coyote’
pa.íkip	01020	‘hair’
nanʦáka.ìʦiŋwi	010220	‘brothers to each other’
natíjapà.antùkwa	0102020	‘to be between his hoofs’

Araucanian: rhythm is not fixed at the right edge

01, 010, 0201 02010, 020201					
	☞020201				
	020100				
	020210				
	202010				
	☞02010				
	20201				
	00201				

Araucanian

01, 010, 0201 02010, 020201		*CLASH	*LAPSE	NONINIT	STRESSL	NONFIN
	☞020201				*	*
	020100		*!		*	
	020210	*!			*	
	202010			*!		
		*CLASH	*LAPSE	NONINIT	STRESSL	NONFIN
	☞02010				*	
	20201			*!		*
	00201		*!		*	*

S.Paiute: rhythm is fixed at *both* ends (except 2σ words)

S.Paiute 10, 010, 0120, 01020 010220						
	☞010220					
	010200					
	010202					
	102020					

What 10, not *01?

Why 010220, not *012020?

Clash with main stress is worse: *CLASH@1 = *n//1

S.Paiute: rhythm is fixed at *both* ends

S.Paiute
10, 010,
0120,
01020
010220

	*NON FIN	*LAPSE	NON INIT	*CLASH	*CLASH@1
☞010220				*	
010200		*!			
010202	*!				
102020			*!		
012020				*	*!

Another system with clash

- Tauya (Trans New Guinea; Papua New Guinea)

nònó	21	‘child’
ùnetá	201	‘mat’
mòmùnepá	2201	‘X sat and X . . . ’
jàpatijəfó	20201	‘my hand’
...	220201 ..., (probably)	

Tauya

Tauya
21, 201,
2201,
20201
220201

☞220201						
200201						
020201						
202021						

Tauya

Tauya
21, 201,
2201,
20201
220201

	* LAPSE	STRESSL	STRESSR	* CLASH@1	* CLASH
☞ 220201					
200201	* !				
020201		* !			
202010			* !		
202021					

* CLASH@1: One * for each n//1

Foot-based vs. foot-free constraints

Feet: an alternative approach to binary stress systems

- We can view stress as manifesting prominence relations (s//w) *in binary constituents*.
- Then 202010 = (sw)(sw)(sw), **three trochaic feet**. s is 'the foot-head'.
- Foot choices:
 - head position: (ws) or (sw)
 - size: binary (ws/sw); ternary (sww/wws); unary (tolerated or not in diff. systems).
- Foot assignment by rule: RL or LR (+ further option)
 - start at one edge of the word, build one foot; iterate towards the opposite end, building feet on syllables as yet unfooted.
- Foot assignment by constraints:
 - penalize unfooted syllables
 - penalize feet whose edge is not aligned to/farther from L/R edge of word.

Classification of binary/ternary systems in foot terms

	LR	RL
trochees	• (10)(20), (10)(20)(2) • (10)(20), (10)(20)0	• (20)(10), 0(20)(10) • (20)(10)0, 0(20)(10)0
dactyls	• (100)(200), (100)(20)	
iambbs	• (01)(02), (01)(02)0 • (01)00, (01)(02)0	• (02)(01), (2)(02)(01) • (02)(01), 0(02)(01)

Classes of constraints on stress, without feet

- Rhythmic constraints:
how close stresses can be
- Edge-stressing constraints:
which ends of the word require some stress
- Edge-repelling constraints:
which edges are unstressable
- How many stresses/domain
none, at most one, at least one...

Additional classes of constraints, with feet

- Foot size:
how small/big the feet can be (minimally 2σ or maximally 2σ ...)
- Foot head:
Left-headed (10, 100), right-headed (01, 001)?
- Edge-stressing constraints:
which ends of the word require some foot
- Edge-repelling constraints:
which edge σ can't be footed
- How many feet/domain
none, at most one, at least one...
- Are unfooted syllables ok?

For now

- We use a foot-free analysis and constraint set, because:
- It needs fewer constraints
- Many needed constraints are used by foot-people too: *LAPSE, *CLASH
- We avoid structural ambiguity:
 - Polish 00010 could be 00(01)0 or 000(10) or (0001)0 with feet
 - No ambiguity without constituents.
- Foot-free constraint set has a well-studied factorial typology
- The foot-based constraint set probably over-generates more.

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