Linguistics 251 B. Hayes

Vowel Harmony Spring 2019

Class 4 (4/11/19): Wolof, Factorial typology, Translucency

# Readings

* Hayes, Bruce, and Zsuzsa Cziráky Londe. 2006. Stochastic phonological knowledge: the case of Hungarian vowel harmony. *Phonology* 23:59–104.
* On course web site for Week 2.

# Plan for today

* Analytic exercise will be Wolof, the classic example of transparency and opacity in the same language.
* Cover the Kaun article
* phonetic naturalness
* factorial typology
* relationship to the parasitic harmony principle
* need for ganging?
* Translucency

Wolof exercise: both transparent and opaque vowels

# Sources

* Ka, Omar. "Wolof phonology and morphology: A non-linear approach." Illinois dissertation (1989)
* Sy, Mariame I. "Vowel harmony in Wolof loanwords." Studies in African Linguistics 35 (2006): 203-220.
* Pulleyblank, Douglas. "Neutral vowels in Optimality Theory: A comparison of Yoruba and Wolof." Canadian Journal of Linguistics/Revue canadienne de linguistique 41.4 (1996): 295-347.

# Trying to get the facts right

# Vowel inventory with pairs that alternate in suffixes

i u iː uː high [+ATR]

e ə o eː oː mid [+ATR]

| | | | |

ɛ ʌ| ɛ ɛ: ɔː mid [−ATR]

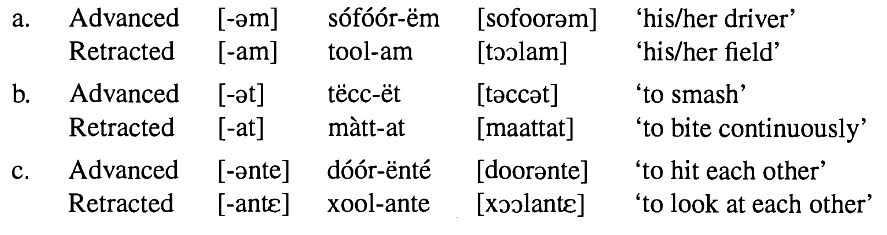
aː low [−ATR]

* This follows Sy, permitting us to say harmonic vowels = mid vowels.
* Ka and Pulleyblank use [a] for Sy’s [ʌ], making it harder.

# Stems

* Hard to get really solid data. I think:
* High vowels like to cooccur with [+ATR] in stems, but there are exceptions in loanwords.
* [biyɛːr] ‘beer’ (Fr. *bière* [bjɛʁ])
* [aː] likes to occur with [−ATR] in stems, but there are exceptions in loanwords.
* [dʌraːpoː] ‘flag’ (Fr. *drapeau* [dʁapo])
* The exceptions tend to involve *long*  harmony vowels, something we will not try to get, at least yet.
* As far as I can tell, the true harmonic vowels must agree within stems, even in loanwords.

# Alternations in suffixes (Pulleyblank, uses [a] for [ʌ])



# [-kat]: the -Iyor of Wolof

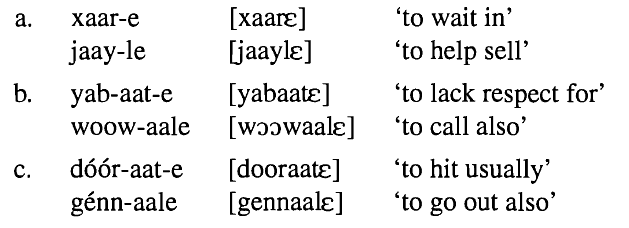
* [-kʌt] ‘agentive’ is always [−ATR] even when attached to a [+ATR] stem:

[foːt-kʌt] ‘laundry person’

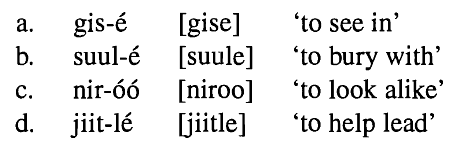
* I couldn’t get this in an analysis but we could return to it later.

# Long [aː] is opaque (and takes [–ATR] suffixes)

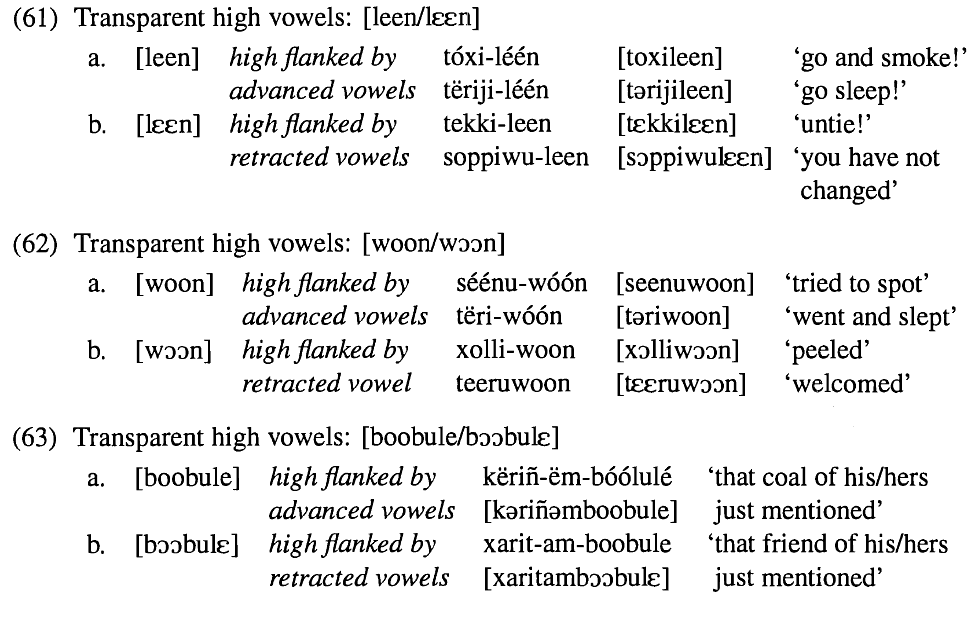
Long vowels generally behave like their short counterparts, but [aː] is the exception.



# High vowels when alone behave like [+ATR]



# Otherwise high vowels are transparent



* Note in particular [tərijileen], [sɔppiwulɛɛn], with two transparent vowels in a row.

# Transparent vowels in Humble Phonology

* We are allowed to use any feature matrices, plus the variable X.
* So we can try “distal agree”, with two matrices and an intervening X.
* work out at board

# Moving to the spreadsheet

comments on kaun paper

# Factorial typology

* This is a canonical, early-OT factorial typology of a limited empirical domain.
* Kaun is interested in phonetically-based phonology.

# Kaun is autosegmentalist

* … perhaps more for concreteness than any other reason
* Hence the “driver” for spreading is Align(round, right); rightward alignment of an autosegment with respect to the end of a word
* penalize one for every vowel intervening between end of a span and word edge
* Hence Faithfulness is Dep(link)

# “Spread bad vowel”

* Vowels that are not phonetically distinct from neighbors tend to trigger harmony.
* lower round vowels
* front round vowels
* For Kaun, these get special, often stronger, versions of Align(round, right)

# General markedness

* \*RoLo, \*RoFro
* These govern possible *recipients* of spreading; better if they are high, or back.

# Why does rounding harmony tend to be across equal-height sequences?

* Gestural Uniformity
* It’s best for a rounding span to have a uniform labial posture.

# An alternative to Gestural Uniformity that has arisen in subsequent years

* Parasitic harmony: like assimilates to like.
* Here, we could implement this with Agree constraints that include a like-height condition. (do this at board)
* … or, later on, with the more elaborate Agreement by Correspondence system

# Replicating Kaun’s factorial typology

* This assumes a Turkish-like inventory.
* This assumes inviolable Backness harmony

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Align | Align low | Align front | Dep | RoLo | RoFro | GestUni |
|  |  |  | Align | Align low | Align front | Dep | RoLo | RoFro | GestUni |
| uI | R | 1 |  |  |  | 1 |  |  |  |
|  | U |  | 1 |  |  |  |  |  |  |
| uA | R | 1 |  |  |  | 1 | 1 |  | 1 |
|  | U |  | 1 |  |  |  |  |  |  |
| oI | R | 1 |  |  |  | 1 |  |  | 1 |
|  | U |  | 1 | 1 |  |  |  |  |  |
| oA | R | 1 |  |  |  | 1 | 1 |  |  |
|  | U |  | 1 | 1 |  |  |  |  |  |
| yI | R | 1 |  |  |  | 1 |  | 1 |  |
|  | U |  | 1 |  | 1 |  |  |  |  |
| yA | R | 1 |  |  |  | 1 | 1 | 1 | 1 |
|  | U |  | 1 |  | 1 |  |  |  |  |
| øI | R | 1 |  |  |  | 1 |  | 1 | 1 |
|  | U |  | 1 | 1 | 1 |  |  |  |  |
| øA | R | 1 |  |  |  | 1 | 1 | 1 |  |
|  | U |  | 1 | 1 | 1 |  |  |  |  |

# Results, with empirically-attested cases

/uI/ /uA/ /oI/ /oA/ /yI/ /yA/ /øI/ /øA/ Kaun type

R R R R R R R R 1 across-the-board, Kirghiz

R R R R U U R R

R R R R U U U U

R U R R R R R R 7 like 6 but front only

R U R R R U R R 6 height-agree or mid trigger

R U R R U U R R

R U R R U U U U 12 Sibe roots, like Turkish but back only

R U R U R R R R 8 high target only in back, across the board in front

R U R U R U R U 5 high target only

R U R U U U R U

R U R U U U U U

R U U R R R R R

R U U R R U U R 2 height-agreeing harmony

R U U R U U U R

R U U R U U U U

R U U U R R R R 9 high-trigger height-agreeing in back, across the board in front

R U U U R U R U

R U U U R U U R

R U U U R U U U 3 height-agreeing, high-target only

R U U U U U U U

U U R R R R R R

U U R R R U R R

U U R R U U R R

U U R R U U U U

U U R U R R R R

U U R U R U R U

U U R U U U R U

U U R U U U U U

U U U R R R R R

U U U R R U U R

U U U R U U U R 4 height-agreeing, mid-trigger only

U U U R U U U U 10 height-agreeing, mid-trigger, back vowels only

U U U U R R R R

U U U U R U R U 13 high target only in front vowels

U U U U R U U R

U U U U R U U U

U U U U U U U U

# What if we moved to a parasitism explanation for the same-height tendency?

* This is parasitic harmony, the principle “like becomes more like”.
* We could formalize it here as “Agree if height same”

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Agree if height same | GestUni |
| uI | R |  |  |
|  | U | 1 |  |
| uA | R |  | 1 |
|  | U |  |  |
| oI | R |  | 1 |
|  | U |  |  |
| oA | R |  |  |
|  | U | 1 |  |
| yI | R |  |  |
|  | U | 1 |  |
| yA | R |  | 1 |
|  | U |  |  |
| øI | R |  | 1 |
|  | U |  |  |
| øA | R |  |  |
|  | U | 1 |  |

# Comparing the two factorial typologies

Gestural uniformity Parasitic harmony

/uI/ /uA/ /oI/ /oA/ /yI/ /yA/ /øI/ /øA/ /uI/ /uA/ /oI/ /oA/ /yI/ /yA/ /øI/ /øA/ Kaun type

R R R R R R R R R R R R R R R R 1

R R R R R U R R

R R R R R U U R

R R R R U U R R R R R R U U R R

R R R R U U U U R R R R U U U U

R U R R R R R R R U R R R R R R 7

R U R R R U R R R U R R R U R R 6

R U R R R U U R

R U R R U U R R R U R R U U R R

R U R R U U U U R U R R U U U U 12

R U R U R R R R R U R U R R R R 8

R U R U R U R U R U R U R U R U 5

R U R U R U U U

R U R U U U R U R U R U U U R U

R U R U U U U U R U R U U U U U

R U U R R R R R R U U R R R R R

R U U R R U R R

R U U R R U U R R U U R R U U R 2

R U U R U U U R

R U U R U U U U R U U R U U U U

R U U U R R R R R U U U R R R R 9

R U U U R U R U R U U U R U R U

R U U U R U U R

R U U U R U U U R U U U R U U U 3

R U U U U U U U R U U U U U U U

U U R R R R R R U U R R R R R R

U U R R R U R R U U R R R U R R

U U R R U U R R U U R R U U R R

U U R R U U U U U U R R U U U U

U U R U R R R R U U R U R R R R

U U R U R U R U U U R U R U R U

U U R U U U R U U U R U U U R U

U U R U U U U U U U R U U U U U

U U U R R R R R

U U U R R U U R

U U U R U U U R \*\*\* 4

U U U R U U U U \*\*\* 10

U U U U R R R R U U U U R R R R

U U U U R U R U U U U U R U R U 13

U U U U R U U R

U U U U R U U U

U U U U U U U U U U U U U U U U

* Slightly fewer outcomes predicted.
* But can’t get 4 and 10.

# Looking at the failure

* UUUR: spread the bad (non-high) vowel, and avoid height-shift.
* Type 10 is just 4, but turning off harmony in the front series, so we can ignore it.
* Kaun: Spread Bad Vowel causes only mids to be triggers, Gestural Uniformity causes them to only spread to mids.
* Socrates: why is it a problem if we have Parasitic Harmony instead? And what is the solution?
* You may flip the page as soon as you have figured this out.

# Weights for the Harmonic Grammar solution to UUUR

25.079 25.079 Dep

16.726 16.726 Align low

16.726 16.726 Align if high same

0.000 0.000 RoFro

0.000 0.000 Align front

0.000 0.000 Align

0.000 0.000 RoLo

# Factorial typology in Harmonic Grammar

* For some efforts along this lines, see
* Anttila, A., & Magri, G. (2018, February). Does MaxEnt Overgenerate? Implicational Universals in Maximum Entropy Grammar. In *Proceedings of the Annual Meetings on Phonology* (Vol. 5).

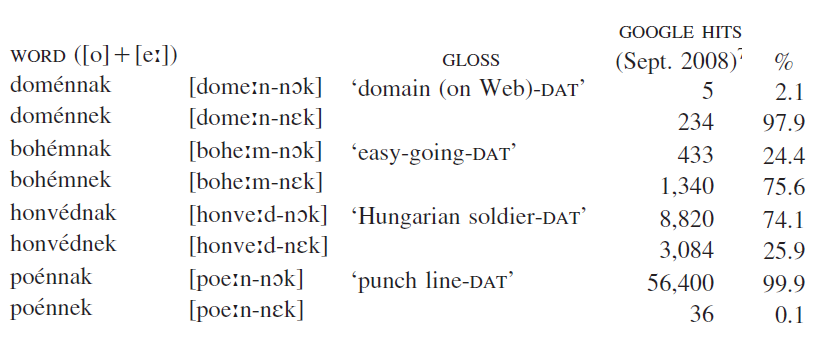
translucency

# Translucency

* Hungarian: vowels that depending on lexical item, are either transparent or opaque.
* [i] is almost always transparent.
* [ɛ] is almost always opaque.
* [eː] is somewhere in between, leading to (I think) fruitless debates as to whether it is transparent or not.

# Corpus data: some representative cases of stems with noninitial [eː]

* This is a mixture of type variation and token variation, with all possible mixes internal to a lexical item apparently occurring.
* Data below from Hayes/Zuraw/Siptár/Londe, *Language* 2009, using Google hits.



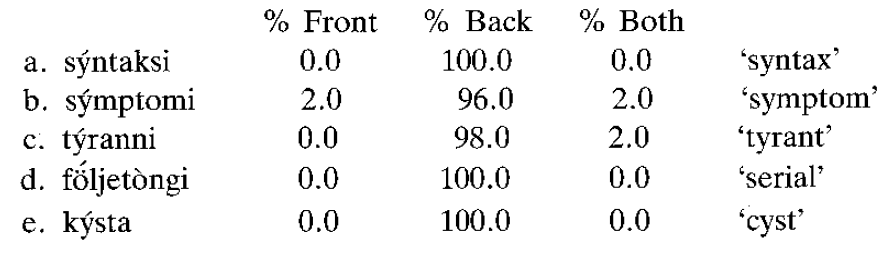
* Finnish: there seems to be some tendency for the initial, stressed vowel of a stem to influence harmony, despite intervening harmonic vowels.

# Finnish translucency

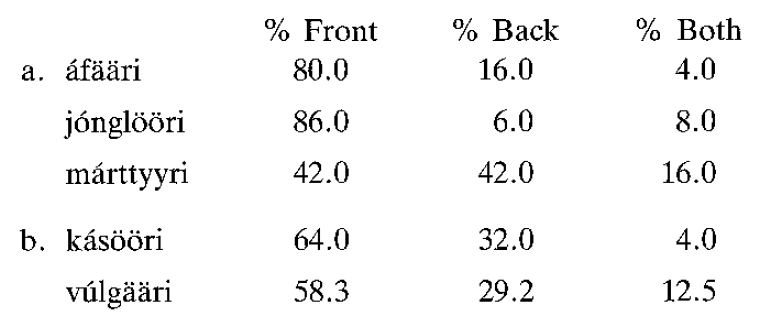
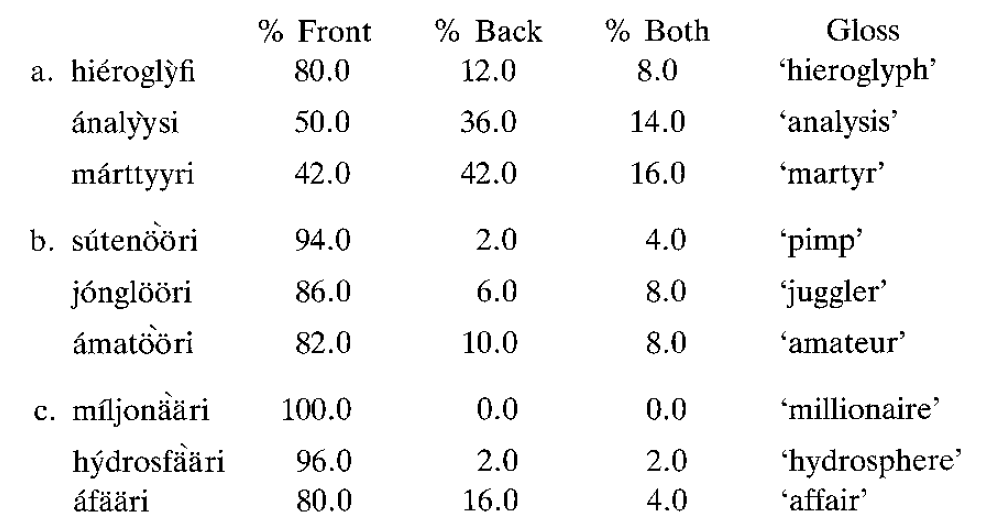
* Source:
* Ringen, Catherine and Orvokki Heinämäki (1999). Variation in Finnish vowel harmony: an OT account. *Natural Language and Linguistic Theory* 17. 303-337.
* There seems to be some tendency for the initial, stressed vowel of a stem to influence harmony, despite intervening harmonic vowels.

# Some Finnish data

* A distal stressed front vowel virtually never beats out a local back vowel:



* But a stressed distal back vowel sometimes beats out a local front vowel:



# Translucency is understudied

* It tends to not appear in grammars and field descriptions since it requires extensive corpus data and perhaps even experimental study to pin down.

to come

# Typological topics not yet treated

* Optional vowel harmony (Diola-Fogny, briefly)
* Unnatural vowel harmony, from diachronic change (e.g. Korean, Mongolian)
* “Trojans”:[[1]](#footnote-1) vowels that trigger the opposite harmony from their phonetic value.
* Hungarian, Nez Perce

# We tour the Framework Bazaar

* Domain theories, Harmonic Serialism, Targeted Constraints, credit theories, directional theories
* Pathologies that test the frameworks: majority rules, myopia

**stop here**

Optional vowel harmony

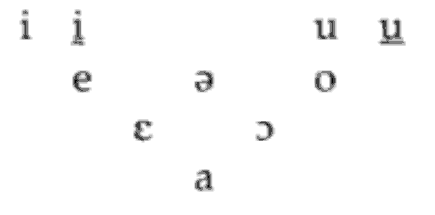
# Kujamaat Joóla: language name and references

* Looking more closely, I found that Kujamaat Joóla is the same as Diola Fogny (the first African instance I’ve seen of the widespread phenomenon of linguists replacing the xenonym with the autonym.)
* Diola-Fogny is famous, and endlessly reanalyzed, for its cluster simplification phenomena—grammar of David Sapir (1965).
* My initial source for optionality: Mark Aronoff and Kristin Fudemann (2004) *What is morphology*? Oxford: Blackwell.
* They rely on: Sapir, J. David, 1975. Big and thin : Two Diola-Fogny metalinguistic terms. *Language in Society* 4(1).

# The language

* Spoken in Senegal
* West Atlantic (Niger-Congo)
* 80,000 speakers as of 1975.

# Vowels

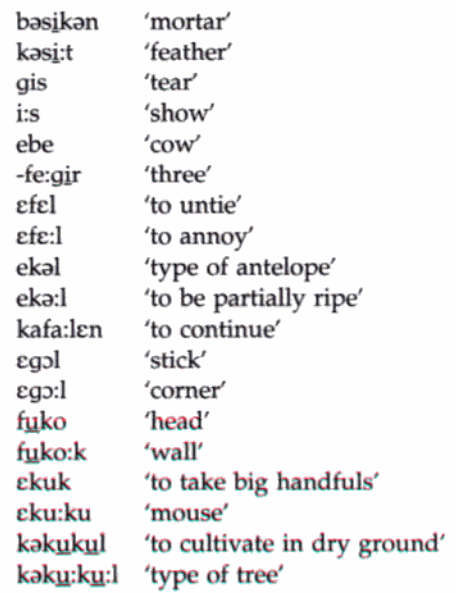


where underlined [i] and [u] are the [+ATR] versions of [i], [u]

ə is the [+ATR] version of [a]

long vowels also exist, matching the short inventory in quality

# Stems are harmonic



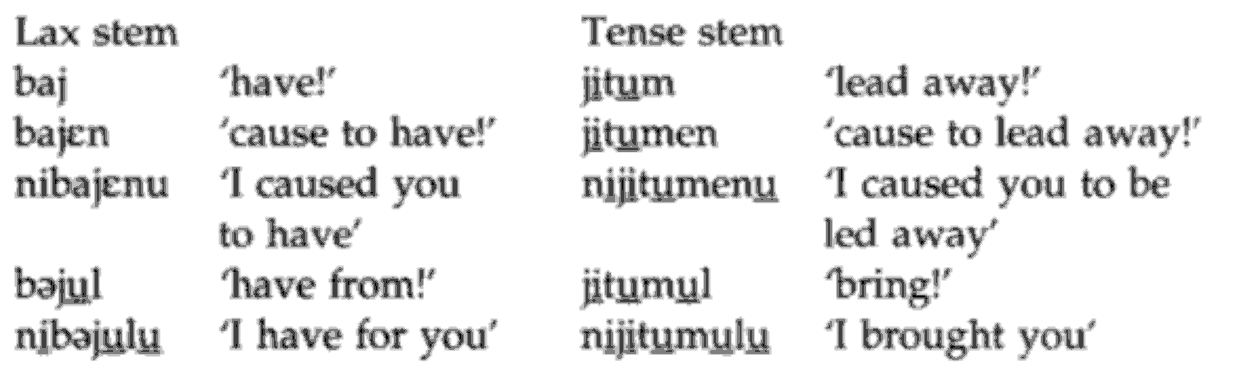
# Harmony pattern

exceptionless (?)

no opaque or transparent vowels

[+ATR] dominant

# Alternations



# “Big” vs. “Thin” speakers

* “Big” = uses vowel harmony a lot
* “Thin” = opposite of “big”
* People self-assess as big or thin, not necessarily accurately (i.e. they self assess as being like locally important individuals).

# A case of optional harmony

pa - na - kan - do ‘he will put it within’

[pənəkəndo] full harmony

[panakəndo] partial harmony—one syllables

[] Sapir’s transcription of partial harmony (semi assimilation) across the word.



# Phonetic harmony

“Likewise, vowels affected by vowel harmony ‘may only partially tense, that is, they may become tainted with tenseness, not completely tense.” (Aronoff/Fudeman, quoting Sapir 1975).

# Other ways to be big and thin

* Particular lexical items (both affixes and stems) have [+ATR] entries for big speakers,

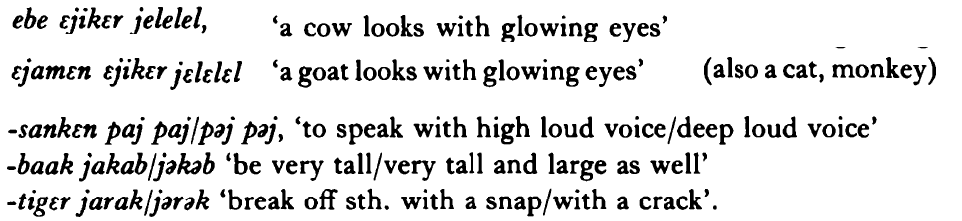
[–ATR] entries for thin ones.

# Not optional everywhere

* This is ill-investigated, but in certain contexts, e.g. derivational morphology, harmony is obligatory for all speakers.

# Why “big” and “thin”?

Because [ATR] is used for sound symbolism: [+ATR] thing are bigger.[[2]](#footnote-2)



# Kujamaat Joóla and the origin of harmony

* It shows that an innovating harmony can be neutralizing — “thin” speech is more informative!
* Gradient harmony would be worth studying phonetically, since a common-currency belief of historical phonology is that vowel harmony originates in vowel-to-vowel coarticulation.

Exercise 2: Shona

# The facts as summarized by Hayes and Wilson (2008, *LI*)

*Shona vowel distribution*

a. *a* is freely distributed.

b. *e*, *o* may occur as follows:

i. in initial syllables, as in *beka* ‘belch’, *gondwa* ‘become replete with water’.

ii. *e* may occur noninitially if the preceding vowel is *e* or *o*, as in *cherenga* ‘scratch’, *fovedza* ‘dent’.

iii. *o* may occur noninitially only if the preceding vowel is *o*, as in *dokonya* ‘be very talkative’.

c. *i*, *u* may occur as follows.

i. in initial syllables, as in *gwisha* ‘take away’, *huna* ‘search intently’.

ii. *i* may occur noninitially unless the preceding vowel is *e* or *o*, as in *kabida* ‘lap (liquid)’, *bhigidza* ‘hit with thrown object’, *churidza* ‘plunge, dip’.

iii. *u* may occur noninitially unless the preceding vowel is *o*, as in *baduka* ‘split’, *bikura* ‘snatch and carry away’, *chevhura* ‘cut deeply with sharp instrument’, *dhuguka* ‘cook for a long time’.

* “In dynamic terms, this implies a kind of asymmetrical harmony for [high]: the mid vowels *e*, *o* require a following high *i* to be lowered to *e*, and the mid vowel *o* requires a following *u* to be lowered to *o*. In fact, Shona suffixes alternate in height in order to remain in conformity with these requirements (Fortune 1955:26, Beckman 1997:10-11), though our focus is on harmony as a phonotactic pattern.”
* Chart:

*Shona vowel distribution: corpus data*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Vowel sequence* | *Count* | *Ad hoc O/E* | *Status* | *Comment* |
| a a | 1443 | 1.03 | ✓ |  |
| **a e** | **3** | **0.02** | \* | Noninitial *e* without harmony trigger |
| **a o** | **0** | **0.00** | \* | Noninitial *o* without harmony trigger |
| a i | 500 | 1.69 | ✓ |  |
| a u | 568 | 1.24 | ✓ |  |
| e a | 639 | 0.77 | ✓ |  |
| e e | 587 | 5.30 | ✓ |  |
| **e o** | **0** | **0.00** | \* | *\**Noninitial *o* without harmony trigger |
| **e i** | **2** | **0.01** | \* | *\*i* not lowered after *e* |
| e u | 260 | 0.96 | ✓ | *e* not a lowering trigger for back vowels |
| o a | 638 | 0.75 | ✓ |  |
| o e | 153 | 1.35 | ✓ |  |
| o o | 694 | 6.56 | ✓ |  |
| **o i** | **23** | **0.13** | ? | *i* not lowered after *o* (weak trigger) |
| **o u** | **20** | **0.07** | ? | *u* not lowered after *o* (weak trigger) |
| i a | 1130 | 1.14 | ✓ |  |
| **i e** | **0** | **0.00** | \* | *\**Noninitial *e* without harmony trigger |
| **i o** | **0** | **0.00** | \* | *\**Noninitial *o* without harmony trigger |
| i i | 478 | 2.29 | ✓ |  |
| i u | 175 | 0.54 | ✓ |  |
| u a | 1737 | 1.14 | ✓ |  |
| **u e** | **4** | **0.02** | \* | Noninitial *e* without harmony trigger |
| **u o** | **1** | **0.005** | \* | Noninitial *o* without harmony trigger |
| u i | 175 | 0.55 | ✓ |  |
| u u | 811 | 1.63 | ✓ |  |

* Socrates: Make a grammar that produces the following changes to rich-base forms, guaranteeing the observations above.

/a e/  [a i]

/a o/  [a u]

/e o/  [e u]

/e i /  [e e]

/o i /  [o e]

/o u /  [o o]

/i e/  [i i]

/i o/  [i u]

/u e/  [u i]

/u o/  [u u]

all others faithful

1. I conjecture that this term comes from Martin Krämer, and that it is a malapropism for “Trojan horse”. (The Trojans were the victims, not the perpetrators.) [↑](#footnote-ref-1)
2. Sapir notes that the cross-linguistic pattern “high F1 = big” is also present. So [+high, –ATR] [ɪ,ʊ] are the smallest vowels, [+low, +ATR] [ə] is the biggest.

   [pɛkɛs] ‘breaking of a small pot’

   [pakas] ‘breaking of a larger pot’

   [təkəs] ‘breaking of really large pot’ [↑](#footnote-ref-2)