Seto vowel harmony and neutral vowels

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A positive vowel harmony imperative generates real phenomena other approaches don't.

Seto's (Finno-Ugric, Estonia) harmonically paired neutral vowels break most approaches to harmony. I show that, with some additions, Kimper's new framework for harmony captures the language cleanly using non-local feature spreading combined with the notion of trigger strength.

Seto vowel harmony

- Kiparsky and Pajusalu (2001): Seto (Finno-Ugric, Estonia) has **progressive front–back harmony**.
- **Stress:** word initial.
- **No prefixes**.
- These harmonic alternations:
  /ü/–/u/ /ö/–/o/ /ä/–/a/ /e/–/ə/ /e/–/õ/$_{\text{wd-init}}$
- Three **neutral vowels**:
  - **/i/:** transparent to harmony in all contexts, but paired with /ɨ/ word initially.
  - **/e/:** transparent to harmony word initially, paired with /õ/ word initially and /ə/ elsewhere.
  - **/o/:** blocks harmony all contexts and triggers back harmony, paired with /ö/ word initially.
- Sample front–back alternations:

nal'a-tta-nuq 'joked' (Pp.)	–	*nälü-ttä-nüq* 'starved' (Pp.)
tütt:re-kkene 'daughter' (dim.)	–	*maama-kkənə* 'mom' (dim)
klɨbisə-ma 'to rattle'	–	*libise-mä* 'to flutter'
nõsə-sə 'they rise'	–	*elä-se* 'they live'

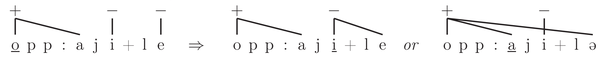
- Stems containing only transparent vowels always select front suffixes.
- Both common approaches to transparent vowels fail for Seto:
  - Unpaired transparent vowels are underspecified for the harmonic feature and **underspecified segments** are immune to harmony (Clements, 1976; Kiparsky, 1981; Archangeli and Pulleyblank, 1994; Ringen and Vago, 1998).
  - Harmony creates back-harmonic tokens of front transparent vowels but later **neutralization processes** revert them to their original front value (Bach, 1968; Clements, 1976; Walker, 1998; Bakovic and Wilson, 2000).
- **Neither works:** The three neutral vowels must all contrast for [Back].
- The model should not require paired neutral vowels: Related languages Votic and Veps have **similar systems with unpaired neutral vowels**.

Parameter	Value
distance (k)	0.4
linked trigger (k_{link})	1
direction	Right
Vowel qualities	
x[i]	0.2
x[é]	1
(x[k_{init}])	6.7
$x_{default}$	5

A set of parameters for Spread that capture Seto harmony.

Trigger Competition and Spread

- Trigger Competition (Kimper, 2011) is a new framework for vowel harmony.
- **Autosegmental representation** which permits crossing lines:



- The **trigger** (marked with an underline) of a particular instance of spreading is the segment which provides the impetus for spreading.

  Spread[f]: For a feature *f*, assign +1 for each segment linked to *f* as a dependent.
- Uses **Serial Harmonic Grammar** (Pater et al., 2008, Pater, 2010, Mullin, 2011): Constraints are weighted, and derivations proceed one step at a time.
- **Multiplier parameters** affect the reward assigned by Spread:
  - The **distance multiplier** *k* is applied once for each unit of distance between trigger and target.
  - The **trigger quality multipliers** *x[...]* are applied to triggers with a particular vowel quality.
- Segment that cannot harmonize due to some basic markedness or faithfulness constraint, and are not strong enough to trigger harmony, are skipped and are **transparent.**
- Those that cannot harmonize, but are strong enough to trigger harmony, are **opaque.**

Seto in Trigger Competition

- **Markedness constraints** ban non-initial /ö/ and /ɨ/ prevent neutral vowels from alternating. Word-initial segments have no incentive to alternate.
- **Long-distance spreading** allows backness to spread past transparent vowels.
- Assigning **a low trigger strength to the transparent vowels** prevents them from spreading frontness (above right).
- A **high trigger strength** allows opaque /o/ to spread backness (below).

/lähko+1e/	*{õ, i} -20	StID[Bk] -1	Spr[±Bk] +.75	$\mathcal{H}$
a. lähko+1e	0	0	0	0
b. lähkö+1e	1	1	5	-17.25
☞ c. lähkǫ+1ə	0	0	5	3.75
d. lähko+1e	0	0	$5 \times .5 = 2.5$	1.875

/lähko+1ə/	*{õ, i} -20	StID[Bk] -1	Spr[±Bk] +.75	$\mathcal{H}$
a. lähko+1ə	0	0	0	0
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☞ c. lähkǫ+1ə	0	0	5	3.75
d. lähko+1e	0	0	$5 \times .5 = 2.5$	1.875

The derivation for [lähkolə] *'near+ALL' converges after one step.*

/opp:a+ji/	*{õ, i} -20	StID[Bk] -1	Spr[±Bk] +.75	$\mathcal{H}$
a. opp:a+ji	0	0	0	0
☞ b. opp:a+ji	0	0	$5 \times .4^2 = 8$	0.6
c. opp:a+ji	1	0	$5 \times .4^0 = 5$	-16.25

/opp:aji+le/	*{õ, i} -20	StID[Bk] -1	Spr[±Bk] +.75	$\mathcal{H}$
a. opp:aji+le	0	0	$5 \times .4^2 = 0.8$	0.6
b. opp:aji+le	0	0	$5 \times .4^2 + .1 = 0.9$	0.675
☞ c. opp:aji+lə	0	0	$5 \times .4^2 + 5 \times .4 = 2.8$	2.1
d. opp:aji+le	1	1	$5 \times .4^2 + 5 = 5.8$	-16.65

The /ö/two steps of the derivation for [opp:ajɪlə] *'teacher+PL+ALL.'*

What can be a harmony trigger?

- **Kimper:** For any given target, **only the nearest segment** linked to each feature value can be a trigger.
  - Wrongly predicts that all transparent vowels are icy targets: Once a front vowel is linked to a transparent vowel, **front harmony cannot spread further** as in (a).
- **My proposal:** The grammar can optionally allow for triggers that are already inside harmonic domains, as in (c).

/bäbiba/	StID[Bk] -1	Spr[±Bk] +.75	$\mathcal{H}$
☞ a. bäbiba	0	5	3.75
b. bäbibä	1	$5 + 0.2$	2.9
☺ c. (bäbibä)	1	$5 + 5 \times 0.4 = 7$	4.25

Front vowels can't spread past transparent vowels if the grammar only permits domain-final triggers as in (b). [nonce word.]

How is directionality enforced?

- **Kimper:** Directionality is an open issue.
- **My proposal** has two pieces:
  - New **direction parameter** limits spreading from a trigger that is to the right (or left) of its target.
  - New **constraint** prevents harmony from starting anywhere but the start of the word—as in (a)—unless neutral vowels interfere:

    HarmonizeFrom[Left/Right][*f*]: Assigns one mark for each consecutive non-harmonized node on the *f* tier to the immediate [left/right] of the [right/left] edge of any harmony domain.

/bubübü/	StID[Bk] -1	Spr[±Bk] +.75	$\mathcal{H}$
☞ a. bubübü	0	5	3.75
☺ b. bububü	1	5	2.75
c. bubübü	0	0	0

Left-to-right spreading can fail even if right-to-left spreading is banned. The derivation here converges on candidate (a) without the initial syllable participating in harmony. [nonce word.]

Conclusions and future work

The addition of new mechanisms for directionality and a new source of harmony triggers enables Trigger Competition to capture this difficult case neatly, and shows promise for variable-harmony cases like Hungarian vacillation.

Acknowledgements

I am indebted to Paul Kiparsky and Karl Pajusalu for providing these data, to Paul Kiparsky and Arto Anttila for their ample advice on this project, and to and to Meghan Sumner and the participants in Stanford's P-Interest workshop for their comments.

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