How to linearize weight?

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Major Theories of Affix Linearization

Phonological Dislocation theories

Horwood (2002): Affixes are prefixes or suffixes to the base, but may infix under the pressure of phonological constraints

Morphological pivot affixation

Yu (2007): Affixes are prefixes or suffixes to specific (possibly internal) base positions ('pivots') and cannot be dislocated by phonological processes

Tagalog *um*-Infixation

(1)

BASE	ACTOR FOCUS	
abot	**um**abot	'reach for, pf.'
tawag	t**um**aawag	'call, pf.'

Infixation as Affixation+Phonological Dislocation (Horwood 2002)

(2) um $\leftrightarrow$ ___ $_{\text{Base}}[$

(3) *V-initial Base*

um-abot	NoCoda	Lin-μ
☞ a. **u.m**a.bot	*	
b. a.**um**.bot	**!	*
c. a.b**u.m**ot	*	*!*

(4) *C-initial Base*

um-tawag	NoCoda	Lin-μ
a. **um**.ta.wag	**!	
☞ b. t**u.m**a.wag	*	*
c. ta.**um**.wag	**!	**

Infixation as Pivot Affixation (Yu 2007)

(5) um $\leftrightarrow$ $_{\text{Base}}[\ \ldots \underline{\hspace{2em}}\ \mathrm{V}$

Possible pivots for affixation (Yu 2007)

(6)

a. **Initial pivot**
   - (i) First consonant/onset
   - (ii) First vowel/nucleus
   - (iii) First syllable

b. **Final pivot**
   - (i) Final vowel/nucleus
   - (ii) Final syllable

c. **Prominence pivot**
   - (i) Stressed syllable
   - (ii) Stressed vowel/nucleus

Mora affixation

(7) *Emphatic adjectives in Shizuoka Japanese* (Davis&Ueda 2006)

	ADJECTIVE	EMPHATIC FORM				
a.	katai	kattai	'hard'			
	osoi	ossoi	'slow'	CV.C̥…	⇒	CV.C̥ː…
	takai	takkai	'high'			
b.	hade	hande	'showy'			
	ozoi	onzoi	'terrible'	CV.C̬…	⇒	CV**N**.C̬…
	nagai	naŋgai	'long'			
c.	zonzai	zoːnzai	'impolite'			
	suppai	suːppai	'sour'	CVC.C…	⇒	CVːC.C…
	okkanai	oːkkanai	'scary'			

Central Question of this Talk

How are μ-affixes linearized?

Our claim

➢ **μ-affixation is pivot affixation**

A typology of mora affixation

Morphological μ's

I. A μ as morpheme

(8) *Gidabal* (Geytenbeek&Geytenbeek 1971, Kenstowicz&Kisseberth 1977)

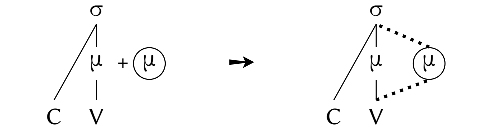
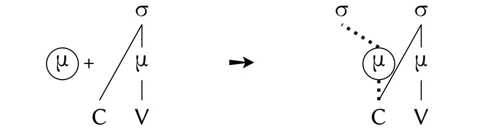
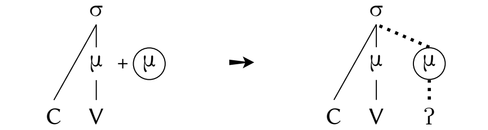
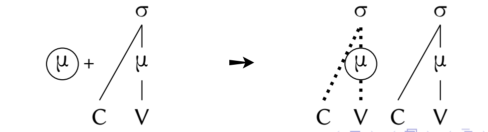
Base		Imperative
gida	'to tell'	gid**aː**
ma	'to put'	m**aː**

II. A μ is part of a morpheme

(9) *Plural suffix /–weʔ/ in Zuni* (Newman 1965, Saba Kirchner 2007)

Base		Plural
lupa	'box of ashes'	lup**aː**weʔ
homata	'juniper tree'	homat**aː**weʔ

Realization of a μ-affix

Vowel lengthening:	
Gemination:	
(Epenthesis:)	
(Reduplication:)	

Empirical study: loci of μ-realization

- 25 cases of μ-affixation in 21 languages

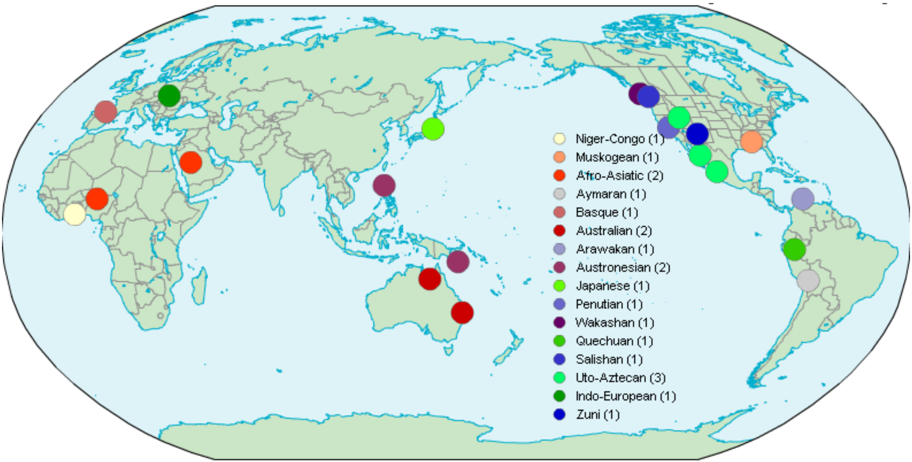
Empirical study: loci of μ-realization

- 25 cases of μ-affixation in 21 languages
- excludes:
  - cases of vowel-lengthening for monosyllabic bases (e.g. Western Nilotic)
  - patterns of templatic morphology
  - patterns where reduplication/epenthesis is the only exponent of a morpheme
  - the same μ-affixation pattern in languages of the same language family

Language	(classification according to AUTOTYP) Stock	Area	Continent
Saanich	Salishan	Alaska-Oregon	WN America
Southern Sierra Miwok	Yokuts-Utian	California	WN America
Nootka	Wakashan	Alaska-Oregon	WN America
Aymara	Jaqui	Andean	S America
Quechua	Quechuan	Andean	S America
Guajiro	Arawakan	NE South America	S America
Hiaki	Uto-Aztecan	Mesoamerica	C America
Shoshone	Uto-Aztecan	Mesoamerica	C America
Tepecano	Uto-Aztecan	Mesoamerican	C America
Alabama	Muskogean	E North America	EN America
Zuni	Zuni	Basin and Plains	EN America
Hausa	Chadic	African Savannah	Africa
Asante Twi (Akan)	Kwa	African Savannah	Africa
Classical Arabic	Semitic	N Africa	Africa
Arbizu Basque	Basque	Europe	W and SW Eurasia
Slovak	Slavic	Europe	W and SW Eurasia
Keley-i	Austronesian	Oceania	S/SE Asia
Shizuoka Japanese	Japanese	N Coast Asia	N-C Asia
Tawala	Austronesian	Oceania	NG and Oceania
Lardil	Tangkic	N Australia	Australia
Gidabal	Pama-Nyungan	S Australia	Australia

Mora affixation: Distribution of Languages

language families, WALS



Where (in their base) are morphological μ's realized?

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➙ **on the final vowel.**

(10) *Gidabal* (Geytenbeek&Geytenbeek 1971, Kenstowicz&Kisseberth 1977)

Base		Imperative
gida	'to tell'	gid**aː**
ma	'to put'	m**aː**
jaga	'to fix'	jag**aː**
gaːda-li-wa	'keep on chasing'	gaːdaliw**aː**

Where (in their base) are morphological μ's realized?

➙ **on the first vowel.**

(11) *Shizuoka Japanese* (Davis&Ueda 2006)

BASE		EMPHATIC
zonzai	'impolite'	z**oː**nzai
supːai	'sour'	s**uː**pːai
onzukutai	'ugly'	**oː**nzukutai
kandarui	'languid'	k**aː**ndarui
okːanai	'scary'	**oː**kːanai

Where (in their base) are morphological μ's realized?

→ **on the consonant following the first vowel.**

(12) *Shoshone* (Crum&Dayley 1993, Haugen 2008, McLaughlin 2012)

Base		Durative
katɨ	'sit'	ka**tː**ɨ
jɨtsɨ	'get up, fly'	jɨ**tː**sɨ
jakai	'cry'	ja**kː**ai
nemi	'travel'	ne**mː**i
maka	'feed'	ma**kː**a
taikwa	'speak'	tai**kː**wa

Where (in their base) are morphological μ's realized?

➙ **after the first vowel: epenthesis.**

(13) *Tepecano* (Mason 1916, Haugen 2008)

BASE		PLURAL
gogoc	'dog'	goʔgoc
imai	'squash'	iʔmai
duduːr	'jaguar'	duʔduːr
asaːk	'net'	aʔsaːk

Language		#(C)		V		C	…	C	V	(C)#	
Saanich	■		■								
Tawala	■			■							
Keley-i (I)		■									
Hiaki (I)				■							
Cl. Arabic (BIII)				■							
Shizuoka Japanese				■	■	■					
Tepecano					■	■					
Keley-i (II)						■					
Hiaki (II)						■					
Shoshone						■					
Cl. Arabic (BII)						■					
Alabama								■	■		
Arbizu Basque									■		
Gidabal									■		
Zuni									■		
Hausa									■		
Diegeño									■		
Slovak									■		
Nootka									■		
Asante Twi									■	■	
Guajiro									■		■
Quechua									■		■
Lardil									■		■
S. Sierra Miwok									■		■
Aymara									■		■

μ-affixation as Pivot Affixation

Pivots for μ-affixation

- first/last μ
- first/last σ

➙ they describe all and only the possible landing sites for μ-affixes

Against phonological μ-dislocation

Arguments against Phonological μ-Dislocation

- **Lack of non-local infixation**
- **Coexistence of μ-affixes**
- **Lack of Variable Infixation**
- **Cases of Fixed Infixation**

The general logic of μ-dislocation approaches

(14) *Long vowels in Gidabal*

μ + gida		*Cː	Lin-μ	*Vː
☞ a.	gi$_{μ}$da [giːda]			*
b.	gid$_{μ}$a [gidːa]	*!	*	

The general logic of μ-dislocation approaches

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$_\mu$ + gida	*Cː	Lin-μ	*Vː
☞ a. gi$_\mu$da [giːda]			*
b. gid$_\mu$a [gidːa]	*!	*	

(15) *Geminates in Shoshone*

$_\mu$ + maka	*Vː	Lin-μ	*Cː
a. ma$_\mu$ka [maːka]	*!		
☞ b. mak$_\mu$a [makːa]		*	*

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Lack of non-local infixation

- the pivots first/last μ/first/last σ are sufficient to predict all attested cases of μ-affixation

Lack of non-local infixation

- the pivots first/last μ/first/last σ are sufficient to predict all attested cases of μ-affixation
- phonological disfixation accounts inherently predict non-local infixation

(16) *Non-local gemination in unattested Shoshone'*

Base	μ-affixed form
gadali	ga**d:**ali
pukalimbu	puka**l:**imbu
sandagumkil	sanda**g:**umkil

Serious misprediction: non-local infixation

(17) *Shoshone'*

gadali + μ			*Vː	$\text{FAITH}_{\sigma]}$	LIN-μ
a.	gadali_{μ}	[gadaliː]	*!	*	
b.	$\text{gadal}_{\mu}\text{i}$	[gadalːi]		*!	*
c.	$\text{gada}_{\mu}\text{li}$	[gadaːli]	*!		**
☞ d.	$\text{gad}_{\mu}\text{ali}$	[gadːali]			***

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Moraic Distinctiveness

- different µ-affixes in the same language result in different outputs
(Guerssel&Lowenstamm 1990, Lowenstamm 2003)

(18) *Binyanim in Classical Arabic* (McCarthy 1979, McCarthy&Prince 1990)

	‘write’	‘do’
Binyan I	katab	faʔal
Binyan II	katːab	faʔːal
Binyan III	kaːtab	faːʔal

Problem for the Dislocation Approach

If both Binyanim are μ-prefixes

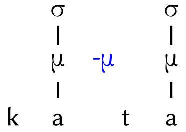
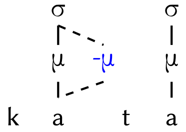
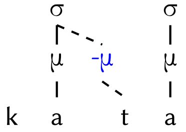
they should infix in exactly the same way

Classical Arabic under pivot-affixation

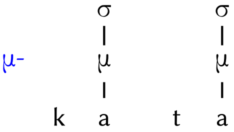
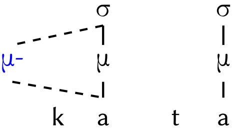
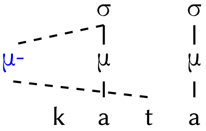
(19) *Two μ-affixes in Classical Arabic*

Binyan II	$\leftrightarrow$	μ / [μ__	(Gemination)
Binyan III	$\leftrightarrow$	μ / [__ μ	(Vowel lengthening)

(20) *Binyan II: Gemination*

Input: = a.	$*\times$	$\sigma \uparrow \mu$	$\mu \downarrow \bullet$	$*V\!:$
a. 		*!	*	
b. 				*!
☞ c. 				

(21) *Binyan III: Vowel Lengthening*

Input: = a.	$*\times$	$\sigma \uparrow \mu$	$\mu \downarrow \bullet$	$*V\!:$
a. 		*!	*	
☞ b. 				*
c. 	*!			

Arguments against Phonological μ-Dislocation

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- **Lack of Variable Infixation**
- **Cases of Fixed Infixation**

A serious misprediction: Shoshone”

- only CV, CVC- syllables are licit
- the rightmost C that can be geminated (not followed by another C), is lengthened

(22) *Shoshone”*

BASE	μ-AFFIXED FORM
mataku	mata**kː**u
makantu	ma**kː**antu
matalkufti	ma**tː**alkufti

A serious misprediction: Shoshone'

(23) *Shoshone'*

$]_{Base}$ + μ			*V:	LIN-μ	*C:
a.	ma.ta.ku$_{\mu}$	(mataku:)	*!		
☞ b.	ma.tak$_{\mu}$u	(matak:u)		*	*
c.	ma.ta$_{\mu}$.ku	(mata:ku)	*!	*	

A serious misprediction: Shoshone'

(23) *Shoshone'*

$]_{\text{Base}}$ + μ			*V:	Lin-μ	*C:
	a. ma.ta.ku$_{μ}$	(mataku:)	*!		
☞	b. ma.tak$_{μ}$u	(matak:u)		*	*
	c. ma.ta$_{μ}$.ku	(mata:ku)	*!	*	
	a. ma.kan.tu$_{μ}$	(makantu:)	*!		
☞	b. mak$_{μ}$an.tu	(mak:antu)		***	*

A serious misprediction: Shoshone'

(23) *Shoshone'*

$]_{\text{Base}}$ + μ			*V:	LIN-μ	*C:
a.	ma.ta.ku$_{\mu}$	(mataku:)	*!		
☞ b.	ma.tak$_{\mu}$u	(matak:u)		*	*
c.	ma.ta$_{\mu}$.ku	(mata:ku)	*!	*	
a.	ma.kan.tu$_{\mu}$	(makantu:)	*!		
☞ b.	mak$_{\mu}$an.tu	(mak:antu)		***	*
a.	ma.tal.kuf.ti$_{\mu}$	(matalkufti:)	*!		
☞ b.	mat$_{\mu}$al.kuf.ti	(mat:alkufi)		*****	*

→ **Variable μ-affixation:** infixation of morphological μ is unstoppable

…but isn't Keley-i such a language?

Samek-Lodovici (1992):

'Gemination is caused by random affixation of a moraic morpheme. A very simple set of independently motivated constraints determines its eventual location and what segment is involved.' (p.8)

Gemination in Keley-i

Hohulin (1971), Hohulin&Kenstowicz (1979), Archangeli (1987), Lombardi&McCarthy (1991)

- three tenses (Prs, Pst, Fut) and five foci

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  gemination of the leftmost consonant that can be geminated in the Prs+Fut (=non-perfect)

(24) *Non-perfect gemination* (Hohulin&Kenstowicz 1979)

Access.Focus	Ben.Foc
ʔi-**p**ː ili	ʔi-**p**ːili-ʔan
ʔi-**d**ːuyag	ʔi-**d**ːuyag-an

Subj.Focus	Obj.Focus	Ref.Foc
um-pi**l**ːi	pi**l**ːi-ʔen	pi**l**ːi-ʔan
um-du**y**ːag	du**y**ːag-en	du**y**ːag-an

Analysis for Keley-i in Samek-Lodovici (1992)

- left-edge proximity for the affix
- syllabic wellformedness: only CV/CVC are licit

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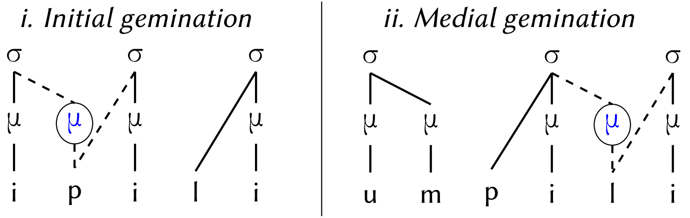

Gemination in Keley-i I

(25) *Non-perfect root-initial gemination* (Hohulin&Kenstowicz 1979)

	ACCESS.FOCUS	BEN.FOC	
FUT	ʔi-**p:**ili	ʔi-**p:**ili-ʔan	
PAST	ʔim-pili	ʔim-pili-ʔan	'to chose'
PRES	ke-ʔi-**p:**ili	ke-ʔi-**p:**ili-ʔi	
FUT	ʔi-**d:**uyag	ʔi-**d:**uyag-an	
PAST	ʔin-duyag	ʔin-duyag-an	'to pour'
PRES	ke-ʔi-**d:**uyag	ke-ʔi-**d:**uyag-i	

Gemination in Keley-i II

(26) *Non-perfect root-medial gemination* (Hohulin&Kenstowicz 1979)

	SUBJ.FOCUS	OBJ.FOCUS	REF.FOC	
FUT	um-pi**l**ː i	pi**l**ː i-ʔen	pi**l**ː i-ʔan	
PAST	p-imː-ili	p-in-ili	p-in-ili-ʔan	'to chose'
PRES	ka-ʔum-pi**l**ː i	ke-pi**l**ː i-ʔa	ke-pi**l**ː i-ʔi	
FUT	um-du**y**ː ag	du**y**ː ag-en	du**y**ː ag-an	
PAST	d-imː-uyag	d-in-uyag	d-in-uyag-an	'to pour'
PRES	ka-ʔum-du**y**ː ag	ka-du**y**ː ag	ka-du**y**ː ag-i	

Morphological analysis for Keley-i

	Focus				
	Access.	**Ben.**	**Sbj.**	**Obj.**	**Ref.**
Pst					
Prs	ʔi–	ʔi–	ʔum–	ke–	ke–
Fut	ʔi–	ʔi–	ʔum–		

initial G.	medial G.

➙ partially complementary distribution of initial/medial μ-affixation

Morphological analysis for Keley-i

	Focus					
	Access.	**Ben.**	**Sbj.**	**Obj.**	**Ref.**	stative
Pst						ʔi–
Prs	ʔi–	ʔi–	ʔum–	ke–	ke–	ʔi–
Fut	ʔi–	ʔi–	ʔum–			ʔi–

initial G.	medial G.

➙ partially complementary distribution of initial/medial μ-affixation

➙ **but:** both gemination patterns cooccur in the stative paradigm

Morphological analysis for Keley-i

	Focus					
	Access.	Ben.	Sbj.	Obj.	Ref.	stative
Pst						ʔi–
Prs	ʔi–	ʔi–	ʔum–	ke–	ke–	ʔi–
Fut	ʔi–	ʔi–	ʔum–			ʔi–

initial G.	medial G.

➙ partially complementary distribution of initial/medial μ-affixation
➙ **but:** both gemination patterns cooccur in the stative paradigm

(27) *Initial and medial gemination in Keley-i* (Hohulin&Kenstowicz 1979)

		Pst	**Prs**	**Fut**
bitu	'to put'	ne-ʔi-bitw-an	ke-ʔi-bːitːu-ʔan	me-ʔi-bːitːu-ʔan

Morphological analysis for Keley-i

There are two μ-affixes!

Morphological analysis for Keley-i

There are two μ-affixes!

I. μ / [__μ $\leftrightarrow$ [−pst, Access $\vee$ Ben $\vee$ Stat]

II. μ / [σ__ $\leftrightarrow$ [−pst, Sbj $\vee$ Obj $\vee$ Ref $\vee$ Stat]

Arguments against Phonological μ-Dislocation

- **Lack of non-local infixation**
- **Coexistence of μ-affixes**
- **Lack of Variable Infixation**
- **Cases of Fixed Infixation**

(28) *Emphatic adjectives in Shizuoka Japanese* (Davis&Ueda 2006)

	Adjective	Emphatic Form				
a.	katai	kattai	'hard'			
	osoi	ossoi	'slow'	CV.C̥. . .	⇒	CV.C̥ː. . .
	takai	takkai	'high'			
b.	hade	hande	'showy'			
	ozoi	onzoi	'terrible'	CV.C̮. . .	⇒	CV**N**.C̮. . .
	nagai	naŋgai	'long'			
c.	zonzai	zoːnzai	'impolite'			
	suppai	suːppai	'sour'	CVC.C. . .	⇒	CVːC.C. . .
	okkanai	oːkkanai	'scary'			

Shizuoka Japanese in Davis & Ueda (2006)

(29) *CVO̥V*

μ-katai		σ-Cond	*V:	Dep n	*C:
☞ a. kat$_{\mu}$ai	(kat:ai)				*
b. ka n$_{\mu}$ tai	(kantai)			*!	
c. ka$_{\mu}$tai	(ka:tai)		*!		

(30) *CVO̯V*

μ-hade		σ-Cond	*V:	Dep n	*C:
a. had$_{\mu}$e	(had:e)	*C̯:	*		*
☞ b. ha n$_{\mu}$ de	(hande)			*	
c. ha$_{\mu}$de	(ha:de)		*!		

Shizuoka Japanese in Davis & Ueda (2006)

(31) *CVN.OV*

μ-zonzai			σ-COND	*V:	DEP n	*C:
	a. $\text{zonz}_{\mu}\text{ai}$	(zon.z:ai)	$^*{}_{\sigma}[C_{\mu}$!	*		*
	b. $\text{zon n}_{\mu}\text{zai}$	(zonn.zai)	$^*CC]_{\sigma}$!		*	
☞	c. $\text{zo}_{\mu}\text{nzai}$	(zo:n.zai)		*		

Sh. Japanese Linearization by Pivot Affixation

(32) $\mu \leftrightarrow {}_{\text{Base}}[\ \mu$ ___

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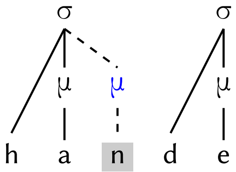
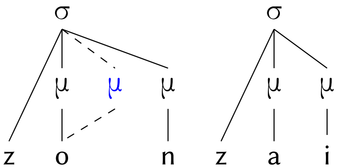
(32) $\mu \quad \leftrightarrow \quad {}_{\text{Base}}[\ \mu$ ___

(33)

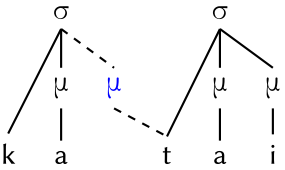
a.



b.



c.



Shizuoka Japanese as a Problem for Dislocation

LIN-μ must be ranked below *Vː to allow μ-metathesis in n-epenthesis

(34) *CVO̯V*

μ-hade			σ-COND	LIN$_\mu$	*Vː	DEP n	*Cː
	a. had$_\mu$e	(hadːe)	*C̯ː	**	*		*
☞	b. ha n$_\mu$ de	(hande)		*!		*	
☛	c. ha$_\mu$de	(haːde)			*		

(35) *CVO̯V*

μ-hade			σ-COND	*Vː	LIN$_\mu$	DEP n	*Cː
	a. had$_\mu$e	(hadːe)	*C̯ː	*	**		*
☞	b. ha n$_\mu$ de	(hande)			*	*	
	c. ha$_\mu$de	(haːde)		*!			

Shizuoka Japanese as a Problem for Dislocation

LIN-μ must be ranked above *Vː to block gemination beyond the first σ

(36) *CVN.OV*

μ-kata			σ-COND	*Vː	LIN$_\mu$	DEP n	*Cː
	a. onz$_\mu$okutai	(on.zːokutai)	*$_\sigma$[C$_\mu$!		**		*
☛	a'. onzok$_\mu$utai	(on.zokːutai)			***		*
	b. on n$_\mu$ zai	(onn.zokutai)	*CC]$_\sigma$!		*	*	
☞	c. o$_\mu$nzokutai	(oːn.zokutai)		*			

(37) *CVN.OV*

μ-kata			σ-COND	LIN$_\mu$	*Vː	DEP n	*Cː
	a. onz$_\mu$okutai	(on.zːokutai)	*$_\sigma$[C$_\mu$!	**	*		*
	a'. onzok$_\mu$utai	(on.zokːutai)		*!**			*
	b. on n$_\mu$ zai	(onn.zokutai)	*CC]$_\sigma$!			*	
☞	c. o$_\mu$nzokutai	(oːn.zokutai)			*		

μ-Alignment in Davis & Ueda (2006:4)

(38) ALIGN-L(μ_e,Wd)
Align the emphatic mora with the beginning (left edge) of the word.

"In our analysis, the evaluation of the alignment constraint in (5) is with respect to the syllable so that if the emphatic mora (μ_e) is realized in the first syllable of the word then the constraint is satisfied; it is violated if it is realized beyond the first syllable."

Conclusion

- μ-affixation is pivot-affixation

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Conclusion

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- the alternative of phonological dislocation
  - predicts unattested instances of non-local infixation
  - fails to predict instances of Fixed Infixation without additional (stipulated) machinery
  - fails to predict the coexistence of different μ-affixation patterns in one language
  - predicts unattested instances of variable μ-infixation

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