Tone in Otomanguean Languages IntoSpan 2014

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October 11, 2014

Otomanguean Tone

Outline

Kingston

• Challenges to typological expectations about tone:

- a Rising without falling tones,
- b Very numerous tone contrasts: Chinantec, Chatino;

Phonology of tone:

- a Tone sandhi in Chatino of San Juan Quiahije,
- b Tone-laryngeal constraints in Triqui languages,
- c Variable influence of *?in sound change

Operation Phonetics of tone:

- Numerous contrasts in Chinanteco of San Antonio Analco and San Juan Quiotepec,
- b Classifying tones automatically;
- ④ Representing numerous tone contrasts phonologically.

Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary



Kingston

• Challenges to typological expectations about tone:

- a Rising without falling tones,
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Phonology of tone:

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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

(日)

Challenges to typological expectations about tone:

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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

Kingston

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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary



Kingston

• Challenges to typological expectations about tone:

- a Rising without falling tones,
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(日)

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Tone Kingston

Otomanguean

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary



Challenges to typological expectations about tone:

- a Rising without falling tones,
- b Very numerous tone contrasts: Chinantec, Chatino;
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Operation of the provide the second secon

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(日)

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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

Kingston

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Kingston

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Otomanguean Tone

Introduction

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Tone

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

Kingston

Challenges to typological expectations about tone:

- a Rising without falling tones,
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Phonology of tone:

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Operation of the second sec

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(日)

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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

• Challenges to typological expectations about tone:

- a Rising without falling tones,
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Operation of the second sec

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- @ Representing numerous tone contrasts phonologically.



Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

Kingston

- a Numerous contrasts in Chinanteco of San Antonio Analco and San Juan Quiotepec,
- b Classifying tones automatically;
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 - a Tone sandhi in Chatino of San Juan Quiahije,
 - b Tone-laryngeal constraints in Triqui languages,
 - c Variable influence of *?in sound change;
- Operation Phonetics of tone:

Outline

Kingston



Otomanguean Tone

Introduction

1 Introduction

2 Typology

- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints

4 Phonetics

Analco

- Quiotepec
- 5 Different approach
 - Principal components
 - Discriminant analysis
 - Phonological representation
 - 7 Summary
 - B Acknowledgments



Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

1 Introduction

2 Typology

3 Phonology

- Chatino tone sandhi
- Tone-laryngeal constraints

4 Phonetics

Analco

- Quiotepec
- 5 Different approach
 - Principal components
 - Discriminant analysis
 - Phonological representation
 - 7 Summary
 - B Acknowledgments



Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints

4 Phonetics

- Analco
- Quiotepec
- 5 Different approach
 - Principal components
 - Discriminant analysis
 - Phonological representation
 - 7 Summary
 - B Acknowledgments



Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints

4 Phonetics

AnalcoQuiotepec

- 5 Different approach
 - Principal components
 - Discriminant analysis
- Phonological representation
- 7 Summary
- B Acknowledgments



Otomanguean Tone

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints

4 Phonetics

- Analco
- Quiotepec
- 5 Different approach
 - Principal components
 - Discriminant analysis
 - Phonological representation
 - Summary
 - B Acknowledgments



Otomanguean Tone

Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints

4 Phonetics

- Analco
- Quiotepec
- 5 Different approach
 - Principal components
 - Discriminant analysis
- 6 Phonological representation
 - Z Summary
 - B Acknowledgments



Otomanguean Tone

Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints

4 Phonetics

- Analco
- Quiotepec
- 5 Different approach
 - Principal components
 - Discriminant analysis
- 6 Phonological representation
 - Z Summary
 - Acknowledgments



Otomanguean Tone

Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints

4 Phonetics

- Analco
- Quiotepec
- 5 Different approach
 - Principal components
 - Discriminant analysis
- 6 Phonological representation
 - Summary
- 8 Acknowledgments



Otomanguean Tone

Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Eastern:

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- b Tlapanecan: 9 (probably reducible to 3 H:M:L),
- c Chinantecan: 12 and counting (and differing between languages);

2 Western:

- a Popolocan: 4 H:HM:LM:L,
- b Mixtecan:
 - Mixtec: 3 H:M:L or H:0:L,
 - Triqui: 8-10+ (later);
- c Zapotecan:
 - i Zapotec: 3 H:L:L-H,
 - ii Chatino: 15 and counting (and differing between languages)

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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Eastern:

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 - ii Chatino: 15 and counting (and differing between languages)

イロト イポト イヨト イヨト



Otomanguean Tone

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Eastern:

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イロト イポト イヨト イヨト



Otomanguean Tone

Kingston

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Eastern:

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- ii Chatino: 15 and counting (and differing between languages)

イロト イポト イヨト イヨト



Otomanguean Tone

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Eastern:

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Otomanguean Tone

Typology

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(日)



Otomanguean Tone

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints

4 Phonetics

- Analco
- Quiotepec
- 5 Different approach
 - Principal components
 - Discriminant analysis
 - Phonological representation
 - 7 Summary
- **B** Acknowledgments



Otomanguean Tone

Typology

Phonology Chatino tone sandhi

Tone-laryngeal

Phonetics

Different approach

Phonological representation

Summary



gloss	isolation	"his/her"* noun	"that"** noun	Otomangue
"tobacco" "grapefruit" "tuber"	kta L stõ M-H kõ L-M	kta L ?ĩ L stõ M-H ?ĩ L kõ L-M ?ĩ L	kta L kã? L-M stõ M-H kã? L-M kõ L-M kã? L-M	Kingston Introduction Typology
"snake" "chepil" "turkey" "nine" "dear"	kna H kta M+ pi M-0 ka M-L tju 0-L	kna H ?ĩ́ M-L kta M+ ?ĩ́ M-L pi M-0 ?ĩ́ M-L ka M-L ?ĩ́ M-L tju 0-L ?ĩ́ M-L	kna H kã? L-M kta M+ kã? L-M pi M-0 kã? L-M ka M-L kã? L-M tju 0-L-0 kã? L-M	Phonology Chatino tone san Tone-laryngeal constraints Phonetics Different approach
"thief"	kna M	kna M ?í H	kna M kã? L-M	Phonological representation
"apple" "tomato" "I run from"	sna H ∫i H-L sna L-0	sna H ?ĩ̃ 0 ∫i H-L ?ĩ̃ 0 sna L ?ĩ̃ 0	sna H-0 kã? L-M ∫i H-L-0 kã? L-M sna L-0 kã? L-M	Summary Acknowledg



gloss	isolation	"his/her"* noun	"that"** noun	Otomanguea Tone
"tobacco" "grapefruit" "tuber"	kta L stõ M-H kõ L-M	kta L ?ĩ́ <mark>L</mark> stõ M-H ?ĩ́ L kõ L-M ?ĩ́ L	kta L kã? L-M stõ M-H kã? L-M kõ L-M kã? L-M	Kingston Introduction Typology
"snake" "chepil" "turkey" "nine" "dear"	kna H kta M+ pi M-0 ka M-L tju 0-L	kna H ?ĩ̃ M-L kta M+ ?ĩ̃ M-L pi M-0 ?ĩ̃ M-L ka M-L ?ĩ̃ M-L tju 0-L ?ĩ̃ M-L	kna H kã? L-M kta M+ kã? L-M pi M-0 kã? L-M ka M-L kã? L-M tju 0-L-0 kã? L-M	Phonology Chatino tone sand Tone-laryngeal constraints Phonetics Different approach
"thief"	kna M	kna M 2ĩ H	kna M kã? L-M	Phonological representatio
"apple" "tomato" "I run from"	sna H ∫i H-L sna L-0	sna H ?ĩ 0 ∫i H-L ?ĩ 0 sna L ?ĩ 0	sna H-0 kã? L-M ∫i H-L-0 kã? L-M sna L-0 kã? L-M	Summary Acknowledgr



gloss	isolation	"his/her"* noun	"that"** noun	Otomanguea Tone
"tobacco" "grapefruit" "tuber"	kta L stõ M-H kõ L-M	kta L ?ĩ́ <mark>L</mark> stõ M-H ?ĩ́ L kõ L-M ?ĩ́ L	kta L kã? L-M stõ M-H kã? L-M kõ L-M kã? L-M	Kingston Introduction Typology
"snake" "chepil" "turkey" "nine" "dear"	kna H kta M+ pi M-0 ka M-L tju 0-L	kna H ?ĩ́ M-L kta M+ ?ĩ́ M-L pi M-0 ?ĩ́ M-L ka M-L ?ĩ́ M-L tju 0-L ?ĩ́ M-L	kna H kã? L-M kta M+ kã? L-M pi M-0 kã? L-M ka M-L kã? L-M tju 0-L-0 kã? L-M	Phonology Chatino tone sand Tone-laryngeal constraints Phonetics Different approach
"thief"	kna M	kna M ?ĩ H	kna M kã? L-M	Phonological representatio
"apple" "tomato" "I run from"	sna H ∫i H-L sna L-0	sna H ?ĩ 0 ∫i H-L ?ĩ 0 sna L ?ĩ 0	sna H-0 kã? L-M ∫i H-L-0 kã? L-M sna L-0 kã? L-M	Summary Acknowledgr



gloss	isolation	"his/her"* noun	"that"** noun	Otomanguea Tone
"tobacco" "grapefruit" "tuber"	kta L stõ M-H kõ L-M	kta L ?ĩ́ <mark>L</mark> stõ M-H ?ĩ́ L kõ L-M ?ĩ́ L	kta L kã? L-M stõ M-H kã? L-M kõ L-M kã? L-M	Kingston Introduction Typology
"snake" "chepil" "turkey" "nine" "dear"	kna H kta M+ pi M-0 ka M-L tju 0-L	kna H ?ĩ́ M-L kta M+ ?ĩ́ M-L pi M-0 ?ĩ́ M-L ka M-L ?ĩ́ M-L tju 0-L ?ĩ́ M-L	kna H kã? L-M kta M+ kã? L-M pi M-0 kã? L-M ka M-L kã? L-M tju 0-L-0 kã? L-M	Phonology chatino tone sand Tone-laynggal constraints Phonetics Different approach
"thief"	kna M	kna M ?í H	kna M kã? L-M	Phonological representatio
"apple" "tomato" "I run from"	sna H ∫i H-L sna L-0	sna H ?ĩ 0 ∫i H-L ?ĩ 0 sna L ?ĩ 0	sna H-0 kã? L-M ∫i H-L-0 kã? L-M sna L-0 kã? L-M	Summary Acknowledgr



gloss	isolation	"his/her"* noun	"that"** noun	Otomanguea Tone
"tobacco" "grapefruit" "tuber"	kta L stõ M-H kõ L-M	kta L ?ĩ́ <mark>L</mark> stõ M-H ?ĩ́ L kõ L-M ?ĩ́ L	kta L kã? L-M stõ M-H kã? L-M kõ L-M kã? L-M	Kingston Introduction Typology
"snake" "chepil" "turkey" "nine" "dear"	kna H kta M+ pi M-0 ka M-L tju 0-L	kna H ?ĩ́ M-L kta M+ ?ĩ́ M-L pi M-0 ?ĩ́ M-L ka M-L ?ĩ́ M-L tju 0-L ?ĩ̈ M-L	kna H kã? L-M kta M+ kã? L-M pi M-0 kã? L-M ka M-L kã? L-M tju 0-L-0 kã? L-M	Phonology Chatino tone sand Tone-layngeal constraints Phonetics Different approach
"thief"	kna M	kna M ?í H	kna M kã? L-M	Phonological representatio
"apple" "tomato" "I run from"	sna H ∫i H-L sna L-0	sna H 2ĩ̃ <mark>0</mark> ∫i H-L 2ĩ̃ 0 sna L 2ĩ̃ 0	sna H-0 kã? L-M ∫i H-L-0 kã? L-M sna L-0 kã? L-M	Summary Acknowledgr



gloss	isolation	"his/her"* noun	"that"** noun	Otomanguea Tone
"tobacco" "grapefruit" "tuber"	kta L stõ M-H kõ L-M	kta L ?ĩ́ <mark>L</mark> stõ M-H ?ĩ́ L kõ L-M ?ĩ́ L	kta L kã? L-M stõ M-H kã? L-M kõ L-M kã? L-M	Kingston Introduction Typology
"snake" "chepil" "turkey" "nine" "dear"	kna H kta M+ pi M-0 ka M-L tju 0-L	kna H ?ĩ́ M-L kta M+ ?ĩ́ M-L pi M-0 ?ĩ́ M-L ka M-L ?ĩ́ M-L tju 0-L ?ĩ̈ M-L	kna H kã? L-M kta M+ kã? L-M pi M-0 kã? L-M ka M-L kã? L-M tju 0-L- <mark>0</mark> kã? L-M	Phonology Chatino tone same Tone-layngeal constraints Phonetics Different approach
"thief"	kna M	kna M ?í H	kna M kã? L-M	Phonological representatio
"apple" "tomato" "I run from"	sna H ∫i H-L sna L-0	sna H 2ĩ̃ <mark>0</mark> ∫i H-L 2ĩ̃ 0 sna L 2ĩ̃ 0	sna H-0 kã? L-M ∫i H-L-0 kã? L-M sna L-0 kã? L-M	Summary Acknowledgr
Tone sandhi in Chatino of San Juan Quiahije: Interim description

Noun's tone	?ḯ's tone
L, M-H, L-M	L
H1, M+, M-0, M-L, 0-L*	M-L
Μ	Н
H2*, H-L*, L-0*	0

* 0-L, H2, H-L, L-0 are followed by 0 before kã? L-M.
 Only some morphemes underdo sandhi: ?ĩ "3s" but not kã? L-M "previously mentioned 3s".



Otomanguean Tone Kingston

Introduction

Fypology

[>]honology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

Tone sandhi in Chatino of San Juan Quiahije: Interim description

Noun's tone	?ḯ's tone
L, M-H, L-M	L
H1, M+, M-0, M-L, 0-L*	M-L
Μ	Н
H2*, H-L*, L-0*	0

● * 0-L, H2, H-L, L-0 are followed by 0 before kã? L-M.

Only some morphemes underdo sandhi: ?ĩ "3s" but not kã? L-M "previously mentioned 3s".



Otomanguean Tone Kingston

Introduction

Typology

Phonology

Chatino tone sandhi Tone-larungeal

_. .

Different

Phonological representation

Summary

Tone sandhi in Chatino of San Juan Quiahije: Interim description

Noun's tone	?ḯ's tone
L, M-H, L-M	L
H1, M+, M-0, M-L, 0-L*	M-L
Μ	Н
H2*, H-L*, L-0*	0

* 0-L, H2, H-L, L-0 are followed by 0 before kã? L-M.
Only some morphemes underdo sandhi: ?ĩ "3s" but not kã? L-M "previously mentioned 3s".



Otomanguean Tone Kingston

Introduction

ypology

[>]honology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary



verb gloss	isolation	"tortilla" jha	"epazote"	Otomangue: Tone
"I picked" "You picked" "he/she picked"	stõ L stõ M-H stõ L-M	stõ L jha L stõ M-H jha L stõ L-M jha L	stõ L whe L stõ M-H whe L stõ L-M whe L	Kingston Introduction Typology
"you ground" "he/she swept" "you will grind"	jo H kwa M+ ko M-0	jo H jha M-L kwa M+ jha M-L ko M-0 jha M-L	jo H whe L kwa M+ whe L ko M-0 whe L	Phonology Chatino tone sam Tone-laryngeal constraints Phonetics
"he/she ground" "he/she will pick"	jo M stõ M	jo M jha H stõ M jha H	jo M whe L stõ M-L whe L	Different approach Phonologica
"making" "I ground" "we will pick"	nja H jo L-0 stõ H-L	nja H jha 0 jo L-0 jha 0 stõ H-L jha 0	nja H-0 whe L jo L-0 whe L stõ ML whe L	Summary Acknowledgr



verb gloss	isolation	"tortilla" jha	"epazote"	Otomanguea Tone
"I picked" "You picked" "he/she picked"	stõ L stõ M-H stõ L-M	stõ L jha <mark>L</mark> stõ M-H jha L stõ L-M jha L	stõ L whe L stõ M-H whe L stõ L-M whe L	Kingston Introduction Typology
"you ground" "he/she swept" "you will grind"	jo H kwa M+ ko M-0	jo H jha M-L kwa M+ jha M-L ko M-0 jha M-L	jo H whe L kwa M+ whe L ko M-0 whe L	Phonology Chatino tone sand Tone-laryngeal constraints Phonetics
"he/she ground" "he/she will pick"	jo M stõ M	jo M jha H stõ M jha H	jo M whe L stõ M-L whe L	Different approach Phonological
"making" "I ground" "we will pick"	nja H jo L-0 stõ H-L	nja H jha 0 jo L-0 jha 0 stõ H-L jha 0	nja H-0 whe L jo L-0 whe L stõ ML whe L	representatio Summary Acknowledgr



verb gloss	isolation	"tortilla" jha	"epazote"	Otomanguea Tone
"I picked" "You picked" "he/she picked"	stõ L stõ M-H stõ L-M	stõ L jha <mark>L</mark> stõ M-H jha L stõ L-M jha L	stõ L whe L stõ M-H whe L stõ L-M whe L	Kingston Introduction Typology
"you ground" "he/she swept" "you will grind"	jo H kwa M+ ko M-0	jo H jha <mark>M-L</mark> kwa M+ jha <mark>M-L</mark> ko M-0 jha <mark>M-L</mark>	jo H whe L kwa M+ whe L ko M-0 whe L	Phonology Chatino tone sand Tone-laryngeal constraints Phonetics
"he/she ground" "he/she will pick"	jo M stõ M	jo M jha H stõ M jha H	jo M whe L stõ M-L whe L	Different approach Phonological
"making" "I ground" "we will pick"	nja H jo L-0 stõ H-L	nja H jha 0 jo L-0 jha 0 stõ H-L jha 0	nja H-0 whe L jo L-0 whe L stõ ML whe L	representatio Summary Acknowledgr



verb gloss	isolation	"tortilla" jha	"epazote"	Otomangue: Tone
"I picked" "You picked" "he/she picked"	stõ L stõ M-H stõ L-M	stõ L jha <mark>L</mark> stõ M-H jha L stõ L-M jha L	stõ L whe <mark>L</mark> stõ M-H whe L stõ L-M whe L	Kingston Introduction Typology
"you ground" "he/she swept" "you will grind"	jo H kwa M+ ko M-0	jo H jha <mark>M-L</mark> kwa M+ jha <mark>M-L</mark> ko M-0 jha <mark>M-L</mark>	jo H whe L kwa M+ whe L ko M-0 whe L	Phonology Chatino tone sam Tone-laryngeal constraints Phonetics
"he/she ground" "he/she will pick"	jo M stõ M	jo M jha <mark>H</mark> stõ M jha H	jo M whe <mark>L</mark> stõ M-L whe <mark>L</mark>	Different approach Phonologica
"making" "I ground" "we will pick"	nja H jo L-0 stõ H-L	nja H jha 0 jo L-0 jha 0 stõ H-L jha 0	nja H-0 whe L jo L-0 whe L stõ ML whe L	representatic Summary Acknowledgr



verb gloss	isolation	"tortilla" jha	"epazote"	Otomanguea Tone
"I picked" "You picked" "he/she picked"	stõ L stõ M-H stõ L-M	stõ L jha <mark>L</mark> stõ M-H jha L stõ L-M jha L	stõ L whe <mark>L</mark> stõ M-H whe L stõ L-M whe L	Kingston Introduction Typology
"you ground" "he/she swept" "you will grind"	jo H kwa M+ ko M-0	jo H jha <mark>M-L</mark> kwa M+ jha <mark>M-L</mark> ko M-0 jha <mark>M-L</mark>	jo H whe L kwa M+ whe L ko M-0 whe L	Phonology Chatino tone sand Tone-laryngeal constraints Phonetics
"he/she ground" "he/she will pick"	jo M stõ M	jo M jha <mark>H</mark> stõ M jha H	jo M whe <mark>L</mark> stõ M-L whe <mark>L</mark>	Different approach Phonological
"making" "I ground" "we will pick"	nja H jo L-0 stõ H-L	nja H jha <mark>0</mark> jo L-0 jha 0 stõ H-L jha 0	nja H-0 whe L jo L-0 whe L stõ ML whe L	représentatio Summary Acknowledgr



verb gloss	isolation	"tortilla" jha	"epazote"	Otomanguea Tone
"I picked" "You picked" "he/she picked"	stõ L stõ M-H stõ L-M	stõ L jha <mark>L</mark> stõ M-H jha L stõ L-M jha L	stõ L whe L stõ M-H whe L stõ L-M whe L	Kingston Introduction Typology
"you ground" "he/she swept" "you will grind"	jo H kwa M+ ko M-0	jo H jha <mark>M-L</mark> kwa M+ jha <mark>M-L</mark> ko M-0 jha <mark>M-L</mark>	jo H whe L kwa M+ whe L ko M-0 whe L	Phonology Chatino tone sand Tone-laryngeal constraints Phonetics
"he/she ground" "he/she will pick"	jo M stõ M	jo M jha <mark>H</mark> stõ M jha H	jo M whe L stõ M-L whe L	Different approach Phonological
"making" "I ground" "we will pick"	nja H jo L-0 stõ H-L	nja H jha <mark>0</mark> jo L-0 jha 0 stõ H-L jha 0	nja H-0 whe L jo L-0 whe L stõ ML whe L	representatio Summary Acknowledgr

jha "tortilla" is toneless, but *whe* "epazote" is L.

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two tortillas" tkwa M-L jha M-L, cf. ka M-L ?i M-L "his nine"

2 "twenty tortillas" kla M-L jha M-H





Otomanguean Tone

Introduction

Typology

Phonology

Chatino tone sandhi

constraints

Phonetics

Different approach

Phonological representation

Summary

- two tortillas" tkwa M-L jha M-L, cf. ka M-L ?i M-L "his nine"
- "twenty tortillas" kla M-L jha M-H





Otomanguean Tone

Kingston

Introduction

Typology

Phonology

Chatino tone sandhi

constraints

Phonetics

Different approach

Phonological representation

Summary

Tone sandhi in Chatino of San Juan Quiahije: Full description

Noun's tone	?ḯ's tone
<mark>0</mark> , L, M-H, L-M	L
H1, M+, M-0, M-L1, 0-L*	M-L
M-L2	M-H
Μ	Н
H2, H-L, L-0	0

Only toneless morphemes underdo sandhi: $2\tilde{i}$ "3s", *jha* "tortilla' but not $k\tilde{a}$? L-M "previously mentioned 3s", *whe* L "epazote".



Otomanguean Tone Kingston

Introduction

Typology

[>]honology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

Tone sandhi in Chatino of San Juan Quiahije: Full description

Noun's tone	?ḯ's tone
<mark>0</mark> , L, M-H, L-M	L
H1, M+, M-0, M-L1, 0-L*	M-L
M-L2	M-H
Μ	Н
H2, H-L, L-0	0

Only toneless morphemes underdo sandhi: ?*i* "3s", *jha* "tortilla' but not *kã*? L-M "previously mentioned 3s", *whe* L "epazote".



Otomanguean Tone Kingston

Introduction

Typology

[>]honology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

Tone sandhi in Chatino of San Juan Quiahije: Full description

Noun's tone	?ḯ's tone
<mark>0</mark> , L, M-H, L-M	L
H1, M+, M-0, M-L1, 0-L*	M-L
M-L2	M-H
Μ	Н
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Only toneless morphemes underdo sandhi: $?\tilde{i}$ "3s", *jha* "tortilla' but not $k\tilde{a}$? L-M "previously mentioned 3s", *whe* L "epazote".



Tone Kingston

Otomanguean

Introduction

ypology

[>]honology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

I Floating tones:

- a Super-Hs = +0: H2 = H+0, H-L = H-L+0, L-0 = L-0+0
- b +H: M = M+H,
- c Associate to following toneless syllables,
- d +0s associate to source if following syllable is specified for tone,
- e +Hs disappear before specified syllables;
- ② Insertions on following toneless syllables:
 - a H1, M+, M-0, M-L1, 0-L insert M-L
 - b Alternatively, the sandhi tone is uniformly L, and in:
 - H. M.-L., M.-L. M-0, M.-L. the apparent M. is supervisional (counting of the count).
 - ii: M-LL M-L, 0-L M-L, the M is epenthetic and demarcative
 - c M-L2 inserts M-H ;
- 3 Toneless syllables default to L otherwise.



Otomanguean Tone Kingston

Introduction

ypology

Phonology Chatino tone sandhi Tone-laryngeal

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

* E > < E >

- I Floating tones:
 - a Super-Hs = +0: H2 = H+0, H-L = H-L+0, L-0 = L-0+0, b +H: M = M+H,
 - c Associate to following toneless syllables,
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 - e +Hs disappear before specified syllables;
- Insertions on following toneless syllables:
 - a H1, M+, M-0, M-L1, 0-L insert M-L
 - b Alternatively, the sandhi tone is uniformly L, and in:
 - H. M.-L., M.-L. M-0, M.-L. the apparent M. is supervisional (counting of the count).
 - ii M-L1 M-L, 0-L M-L, the M is epenthetic and demorcative
 - c M-L2 inserts M-H ;
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Otomanguean Tone

Kingston

Introduction

ypology

Phonology Chatino tone sandhi Tone-laryngeal

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

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- I Floating tones:
 - a Super-Hs = +0: H2 = H+0, H-L = H-L+0, L-0 = L-0+0,
 - b +H: M = M+H,

c Associate to following toneless syllables,

- d +0s associate to source if following syllable is specified for tone,
- e +Hs disappear before specified syllables;
- Insertions on following toneless syllables:
 - a H1, M+, M-0, M-L1, 0-L insert M-L
 - b Alternatively, the sandhi tone is uniformly L, and in:
 - H.M.-L., M.-L., M.-D. M.-L., the apparent M. Istransitional (constitution).
 - ii: M-L1 M-L, 0-L M-L, the M is epenthetic and demarcative

* E > < E >

- c M-L2 inserts M-H ;
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Otomanguean Tone

Introduction

ypology

^Dhonology Chatino tone sandhi Tone-laryngeal

Phonetics

Different approach

Phonological representation

Summary

- I Floating tones:
 - a Super-Hs = +0: H2 = H+0, H-L = H-L+0, L-0 = L-0+0,
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 - d +0s associate to source if following syllable is specified for tone,
 - e +Hs disappear before specified syllables;
- ② Insertions on following toneless syllables:
 - a H1, M+, M-0, M-L1, 0-L insert M-L
 - b Alternatively, the sandhi tone is uniformly L, and in:
 - H.M.L., M.-E. M.-O.M.L. the apparent M. is
 - inalisi dolla () essenti culatori (). El del al del 1000 del tetro del incomentación e
 - c M-L2 inserts M-H ;
- 3 Toneless syllables default to L otherwise.



Otomanguean Tone

Kingston

Introduction

ГуроІоду

>honology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

* E > < E >

- I Floating tones:
 - a Super-Hs = +0: H2 = H+0, H-L = H-L+0, L-0 = L-0+0,
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 - ii M-L1 M-L G-L M-L, the M is epenthetic and demarcative
 - c M-L2 inserts M-H ;
- 3 Toneless syllables default to L otherwise.



Otomanguean Tone

Kingston

Introduction

ГуроІоду

^Dhonology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

* E > < E >

- I Floating tones:
 - a Super-Hs = +0: H2 = H+0, H-L = H-L+0, L-0 = L-0+0,
 - b +H: M = M+H,
 - c Associate to following toneless syllables,
 - d +0s associate to source if following syllable is specified for tone,
 - e +Hs disappear before specified syllables;
- Insertions on following toneless syllables:
 - a H1, M+, M-0, M-L1, 0-L insert M-L,
 - b Alternatively, the sandhi tone is uniformly L, and in:
 - i H M-L, M+ M-L, M-0 M-L, the apparent M is transitional/coarticulatory,
 - ii M-L1 M-L, 0-L M-L, the M is epenthetic and demarcative,

* E > < E >

c M-L2 inserts M-H ;

3 Toneless syllables default to L otherwise.



Otomanguean Tone

Kingston

Introduction

ypology

Phonology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

- I Floating tones:
 - a Super-Hs = +0: H2 = H+0, H-L = H-L+0, L-0 = L-0+0,
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- Insertions on following toneless syllables:
 - a H1, M+, M-0, M-L1, 0-L insert M-L,
 - b Alternatively, the sandhi tone is uniformly L, and in:
 - i H M-L, M+ M-L, M-0 M-L, the apparent M is transitional/coarticulatory.
 - ii M-L1 M-L, 0-L M-L, the M is epenthetic and demarcative,

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c M-L2 inserts M-H ;

3 Toneless syllables default to L otherwise.



Otomanguean Tone

Kingston

Introduction

ypology

Phonology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

- I Floating tones:
 - a Super-Hs = +0: H2 = H+0, H-L = H-L+0, L-0 = L-0+0,
 - b +H: M = M+H,
 - c Associate to following toneless syllables,
 - d +0s associate to source if following syllable is specified for tone,
 - e +Hs disappear before specified syllables;
- Insertions on following toneless syllables:
 - a H1, M+, M-0, M-L1, 0-L insert M-L,
 - b Alternatively, the sandhi tone is uniformly L, and in:
 - i H M-L, M+ M-L, M-0 M-L, the apparent M is transitional/coarticulatory,
 - ii M-L1 M-L, 0-L M-L, the M is epenthetic and demarcative,
 - c M-L2 inserts M-H ;

Toneless syllables default to L otherwise.



Otomanguean Tone

Kingston

Introduction

ypology

Phonology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

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- I Floating tones:
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Otomanguean Tone

.....

Introduction

ypology

Phonology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

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Otomanguean Tone

Kingston

Introduction

ypology

Phonology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

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Otomanguean Tone

.....

Introduction

ypology

Phonology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

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Otomanguean Tone

Kingston

Introduction

ГуроІоду

Phonology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

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Otomanguean Tone

Kingston

Introduction

ГуроІоду

Phonology Chatino tone sandhi

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary





Chatino tonal inventory: 12 tones (incomplete!)

- Float: H+0, H-L+0, L-0+0, M+H,
- Insert: H, M+, M-0, M-L(M-L), 0-L,
- Insert: M-L(M-H)

O Toneless

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Otomanguean Tone

Chatino tone sandhi

oach nological sentation

Summary

Acknowledgme

Kingston

Chatino tonal inventory: 12 tones (incomplete!)

- Float: H+0, H-L+0, L-0+0, M+H,
- Insert: H, M+, M-0, M-L(M-L), 0-L,
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Otomanguean Tone Kingston

6 Toneless

Introduction

Fypology

Phonology Chatino tone sandhi Tone-laryngeal

Phonetics

Different approach

Phonological representation

Summary

Acknowledgme

Otomanguean Tone

Kingston

Outline

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints
- 4 Phonetics

- Analco
- Quiotepec
- 5 Different approach
 - Principal components
 - Discriminant analysis
 - Phonological representation
 - 7 Summary
- 8 Acknowledgments



Otomanguean Tone

Kingston

Introduction

Typology

Phonology

Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

Coda laryngeal constraints on tone distributions in Triqui languages (Di Canio, 2008)

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	VĨ/	
N.II	ERST	1862

Tone	ltun	CV Cop	Chic	ltun	CV? Cop	Chic	ltun	CVh Cop	Chic
5** 4 3 2 1	0* + + + +	+ + + +	+ + + +	0 + + + + +	+ + + +	- + + +	0 + + + +	+ - + + +	- + + +
35** 23 13	- 0 -	0 0 -	0 + +	- 0 -	0 0 +	0 -	+ 0 +	0 0 -	0 + +
43 32 31 21	+ + + 0	0 + 0 0	+ + + +	- - 0	0 0 0	- + + +	- + - 0	0 + 0 0	+ + - +

* 0 = doesn't occur in that languages; ** Itun 35 is cognate with Cop,

Chic 5; Itun(yoso), Cop(ala), Chic(ahuaxtla).

Rising tones:

a Itunyoso (35, 13) and Chicahuaxtla (23, 13) only –h, b Copala (13) only –?;

Palling tones:

- a Itunyoso only 32 –h, 43, 31 only when no –h, – 2 ,
- b Chicahuaxtla 32, 31, 21 –?, 42, 32, 21 –h,
- c Copala 32 only -h;
- Itunyoso: -h permits rising F0, -? blocks any F0 change
- ④ Copala: −? permits rising F0, −h permits falling F0;
- Chicahuaxtla: -h, -? permit rising, falling F0 only one rising (23) and one falling (43) tone are absent -? and only one falling (31) tone -h;
- O Cf. Athabaskan tonogenesis (Krauss, 2005; Kingston, 2005).



Otomanguean Tone Kingston

Introduction

ГуроІоду

Phonology Chatino tone sandh Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

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Otomanguean Tone

Kingston

Introduction

Typology

Phonology Chatino tone sandhi Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

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Otomanguean Tone

Kingston

Introduction

Typology

Phonology Chatino tone sandhi Tone-laryngeal constraints

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

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Otomanguean Tone Kingston

Introduction

ГуроІоду

Phonology Chatino tone sandhi Tone-laryngeal

constraints Phonetics

Different approach

Phonological representation

Summary

Acknowledgmei

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Otomanguean Tone

Introduction

ГуроІоду

Phonology Chatino tone sandhi Tone-laryngeal

constraints Phonetics

Different approach

Phonological representation

Summary

Acknowledgmei

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Otomanguean Tone Kingston

Introduction

Typology

Phonology Chatino tone sandhi Tone-laryngeal

constraints Phonetics

Different approach

Phonological representation

Summary

Acknowledgmei

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Otomanguean Tone

Typology

Phonology Chatino tone sandh Tone-laryngeal

constraints Phonetics

Different approach

Phonological representation

Summary

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Otomanguean Tone

Introduction

ГуроІоду

Phonology Chatino tone sandh Tone-laryngeal

constraints

Different approach

Phonological representation

Summary

Coda laryngeal-tone constraints in Triqui: Generalizations Rising tones:

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O Cf. Athabaskan tonogenesis (Krauss, 2005; Kingston, 2005).



Otomanguean Tone

Introduction

ГуроІоду

Phonology Chatino tone sandhi Tone-laryngeal

constraints Phonetics

Different approach

Phonological representation

Summary



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- Rising tones: a Itunyoso (35, 13) and Chicahuaxtla (23, 13) only -h,
 - b Copala (13) only -2;

I Falling tones:

Generalizations

- a Itunyoso only 32 -h, 43, 31 only when no -h, -2,
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Generalizations

Rising tones:

I Falling tones:

b Copala (13) only -2;

c Copala 32 only -h;



					Otomanguear Tone
Proto-Mixtec	*H-H	*H-H?	*L-L	*L-L?	Kingston Introduction
Molinos S Miguel el Grande	M-M M-M	M-M+(M) M-M+(M)	L-L M-L	M-M+(M) M-L+(M)	Typology Phonology Chatino tone sandh Tone-laryngeal
Silacayoapan Alacatlazala	M-M M-M	H-L M-L	L-L L-L	L-L L-L	Phonetics Different approach
Mixtepec	M-M	M-H / ML-LH	L-L	L-H / L-LH	Phonological representation Summary Acknowledgm



					Otomanguean Tone
Proto-Mixtec	*H-H	*H-H?	* _	*1_1?	Kingston
					Introduction
Molinos	M-M	M-M+(M)	L-L	M-M+(M)	Typology
S Miguel el Grande	M-M	M-M+(M)	M-L	M-L+(M)	Phonology
	Chatino tone sandhi Tone-laryngeal constraints				
Silacayoapan	M-M	H-L	L-L	L-L	Phonetics
Alacatlazala	M-M	M-L	L-L	L-L	Different approach
• •		,			Phonological
Mixtepec	M-M	M-H / ML-LH	L-L	L-H / L-LH	representation
					Summary
					Acknowledgme

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					Otomanguean
Proto-Mixtec	*H-H	*H-H?	*L-L	*L-L?	Tone
					Kingston
Molinos	M-M	M-M+(M)	L-L	M-M+(M)	
S Miguel el Grande	M-M	M-M+(M)	M-L	M-L+(M)	Introduction
*? induced following/floating M					
		0/	0		Phonology
Silacayoapan	M-M	H-L	L-L	L-L	Chatino tone sandhi
Alacatlazala	M-M	M-L	L-L	L-L	constraints
					Phonetics
		,		,	Different
Mixtepec	M-M	M-H / ML-LH	L-L	L-H / L-LH	approach
					Phonological
					c
*? > floating:					Summary
H tone in Chalo	cotongo	,			
L in Penoles (all other tone correspondences inverted).					
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					Otomanguean
Proto-Mixtec	*H-H	*H-H?	*L-L	*L-L?	Tone
					Kingston
Molinos	M-M	M-M+(M)	L-L	M-M+(M)	
S Miguel el Grande	M-M	M-M+(M)	M-L	M-L+(M)	Introduction
*? induced following/floating M					
					Phonology
Silacayoapan	M-M	H-L	L-L	L-L	Chatino tone sandhi Tone-larvngeal
Alacatlazala	M-M	M-L	L-L	L-L	constraints
*? lowered preceding syllable					
Minteres	N / N /				Different
wixtepec	IVI-IVI		L-L	L-H / L-LH	approach
					Phonological representation
*? < floating:					Summary
1 / Hoating.					Acknowledgmer
H tone in Chalo	cotongo	,			
L in Penoles (a	ll other	tone correspon	dences i	nverted).	
			48143		



Proto-Mixtec	*H-H	*H-H?	*L-L	*L-L?	Otomanguean Tone		
Molinos S Miguel el Grande	M-M M-M+(M) L-L M-M+(M) l el Grande M-M M-M+(M) M-L M-L+(M) *? induced following/floating M						
Silacayoapan Alacatlazala	M-M M-M *? low	H-L M-L ered preceding sy	L-L L-L Ilable	L-L L-L	Chatino tone sandhi Tone-laryngeal constraints Phonetics		
Mixtepec	M-M *? rais	M-H / ML-LH sed 2nd σ to H in	L-L CV?V/t	L-H / L-LH to LH in CVCV	Different approach Phonological representation		
*? > floating: H tone in Chalo	cotongo				Summary Acknowledgme		

L in Penoles (all other tone correspondences inverted).

Outline

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints

4 Phonetics

Analco

- Quiotepec
- 5 Different approach
 - Principal components
 - Discriminant analysis
 - Phonological representation
 - 7 Summary
 - B Acknowledgments



Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics Analco

Quiotepe

Different approach

Phonological representation

Summary

Level tones in Chinanteco of San Antonio Analco: 5 (6?)



Otomanguean Tone

Falling tones in Chinanteco of San Antonio Analco: 4 (5?)



Otomanguean

Tone

Analco

Rising tones in Chinanteco of San Antonio Analco: 3



Otomanguean

Tone



Otomanguean Tone

All tones in Chinanteco of San Antonio Analco: 12 (14?)



Otomanguean Tone



(日)

Kingston

Otomanguean Tone

Outline

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints

4 Phonetics

Analco

- Quiotepec
- 5 Different approach
 - Principal components
 - Discriminant analysis
 - Phonological representation
- 7 Summary
- B Acknowledgments



Otomanguean Tone Kingston Introduction

Typology

Phonology

Phonetics

Analco

Quiotepec

Different approach

Phonological representation

Summary

Otomanguean Tone Kingston Introduction Typology

Phonology

Phonetics

Analco Quiotenec

Different approach

Phonological representation

Summary

Acknowledgmei

5+1 level,

- 2 3 or 4 falling,
- 3 or 4 rising,
- ④ 2 concave,
- 5 Total: 13-15.
- O Cf. Castillo (2012), Castellanos (2014): 6 levels, 3 falling 3 rising, plus some number of complex (concave, convex) tones.



Otomanguean Tone Kingston Introduction Typology Phonology

Analco

Quiotepec

Different approach

Phonological representation

Summary

Acknowledgmei

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Otomanguean Tone Kingston Introduction Typology Phonology Phonotics

Analco

Quiotepec

Different approach

Phonological representation

Summary

Acknowledgmei

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- Otomanguean Tone Kingston Introduction Typology Phonology
- Phonetic
- Analco Quiotenec
- Different approach
- Phonological representation
- Summary
- Acknowledgmei

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- Otomanguean Tone Kingston Introduction Typology Phonology
- Phonetics
- Analco
- Quiotepec

Different approach

Phonological representation

Summary

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- - Otomanguean Tone Kingston Introduction Typology Phonology

Phonetic

Quiotepec

Different approach

Phonological representation

Summary

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Following Shosted, Wu, and Goldrich (2104)

- Single male speaker, Chinanteco of San Juan Quiotepec,
- ② 141 lexical items, ≈ 3 repetitions in isolation each, 444 utterances altogether,
- 6 F0 at all 10% points of rime,
- ④ 15 hypothesized tone categories (see above),
- Principal components analysis of unnormalized F0 contours (cf. Shosted, et al., who normalized),
- Discriminant analysis to predict test subset from training subset,
- Principal components analysis of derived measures.



Otomanguean Tone Kingston

ntroduction

Гуроlogy

Phonology

Phonetics

Different approach

Principal components Discriminant analysis

Phonological representation

Summary

Acknowledgmei

Kingston

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Otomanguean Tone Kingston

ntroduction

ГуроІоду

Phonology

Phonetics

Different approach

Principal components Discriminant analysis

Phonological representation

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Otomanguean Tone Kingston

ntroduction

Fypology

Phonology

Phonetics

Different approach

Principal components Discriminant analysis

Phonological representation

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Otomanguean Tone Kingston

ntroduction

Fypology

Phonology

Phonetics

Different approach

Principal components Discriminant analysis

Phonological representation

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Image: A matrix

O Principal components analysis of derived measures.



Otomanguean Tone Kingston

ntroduction

Fypology

Phonology

Phonetics

Different approach

Principal components Discriminant analysis

Phonological representation

Summary

Following Shosted, Wu, and Goldrich (2104)

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(日)

Principal components analysis of derived measures.



Otomanguean Tone Kingston

ntroduction

Typology

Phonology

Phonetics

Different approach

Principal components Discriminant analysis

Phonological representation

Summary

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(日)

Principal components analysis of derived measures.



Otomanguean Tone Kingston

ntroduction

Fypology

Phonology

Phonetics

Different approach

Principal components Discriminant analysis

Phonological representation

Summary

Outline

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints
- 4 Phonetics

AnalcoQuiotepec

5 Different approach

- Principal components
- Discriminant analysis
- Phonological representation
- Summary
- B Acknowledgments



Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach Principal components Discriminant analysis

Phonological representation

Summary

Principal components: Proportion of variance accounted for



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First 3 principal components: All tones





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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach Principal components

Discriminant analysis

Phonological representation

Summary

First 3 principal components: Falling tones



Otomanguean Tone

Level Tones 0 1 2 œ 0 % 0 0 -3 -2 -1 0 2 3 0 PC2 9 10 PC1 00 Scatter Plot Matrix

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Typology

Phonology

Phonetics

Different approach Principal components

Discriminant analysis

Phonological representation

Summary

Acknowledgme

Otomanguean Tone

First 3 principal components: Falling tones



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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach Principal components

Discriminant analysis

Phonological representation

Summary
First 3 principal components: Rising tones



Rising Tones PC3 .2 .1 ഹ 800 æ 00 • 2 PC1 ၟၟၻႍႝ႞ Scatter Plot Matrix

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Otomanguean Tone

Typology

Phonology

Phonetics

Different approach Principal components

Discriminant analysis

Phonological representation

Summary

Acknowledgmei

Otomanguean Tone

First 3 principal components: Concave tones



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Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach Principal components

Discriminant analysis

Phonological representation

Summary

Outline

1 Introduction

- 2 Typology
- 3 Phonology
 - Chatino tone sandhi
 - Tone-laryngeal constraints
- 4 Phonetics

AnalcoQuiotepec

5 Different approach

- Principal components
- Discriminant analysis
- Phonological representation
- Z Summary
- B Acknowledgments



Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach Principal components Discriminant analysis

Phonological representation

Summary

Discriminant analysis = k-means: Number of clusters



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Otomanguean

Discriminant analysis: Correctly classified from PCs by tone



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Discriminant analysis: Predicting test classification from training

 Repeatedly divided data into non-overlapping training and test halves,

- Extracted principal components from training and test halves separately,
- Used them as input to discriminant analysis on training half,
- ④ Used results to predict classification into a priori tones in terms of principal components extracted from the test half,
- Result: Roughly half the test set's tones predicted correctly,
- For 15 *a priori* categories, an extraordinarily successful result by a binomial test.

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Tone Kingston

Otomanguean

ntroduction

Typology

Phonology

Phonetics

Different approach Principal components Discriminant analysis

Phonological representation

Summary

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Discriminant analysis: Predicting test classification from training

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Otomanguean Tone

Discriminant analysis

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Otomanguean Tone



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Otomanguean Tone

Introduction Typology Phonology Phonetics Different

approach Principal components Discriminant analysis

Phonological representation

Summary

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Otomanguean Tone



Otomanguean Tone

> Kingston htroduction ypology

Phonetics

Different approach Principal components Discriminant analysis

Phonological representation

Summary

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Otomanguean

Tone Kingston troduction vpology

Phonology

Phonetics

Different approach Principal components Discriminant analysis

Phonological representation

Summary

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Discriminant analysis



Otomanguean Tone





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Otomanguean Tone



Otomanguean Tone Kingston

Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

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Otomanguean Tone



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Otomanguean Tone Kingston

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

A better answer: What is the best low-dimension physical classification of F0 contours?



Otomanguean Tone Kingston

Phonology

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmer

A better answer: What is the best low-dimension physical classification of F0 contours? Finding one is a work-in-progress.

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A better answer: What is the best low-dimension physical classification of F0 contours? Finding one is a work-in-progress. Requirement: Physical classes must be translatable into phonological features. **Tone** Kingston

Otomanguean

Typology

[>]honology

Phonetics

Different approach

Phonological representation

Summary



Otomanguean Tone

KingstonA better answer: What is the best low-dimension physical
classification of F0 contours?Introduction
Typology
PhonologyFinding one is a work-in-progress.Phonology
Phonological classes must be translatable into
phonological features.Different
approachHope: Proving that Hyman (2010) is wrong to argue that there
are no features for tones.Summary

Kingston

Summary

Otomanguean languages' tone systems are quite varied;

② Typological challenges:

a Rising tone favored over falling,b Too many contrasting tones;

- Tone sandhi is both concrete and arbitrary, is a partial source of multiplying contrasts, but only a partial one;
- Laryngeals interact differently with tone across closely related languages synchronically and diachronically;
- While it's possible to classify tones physically with few dimensions, translation to features is still not obvious.



Otomanguean Tone Kingston Introduction

JI - 65

Phonology

Phonetics

Different approach

Phonological representation

Summary

Summary

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Tone Kingston ntroduction

Otomanguean

rypology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Summarv

Summary

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Otomanguean Tone

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Otomanguean Tone

ntroduction ypology

Phonology

Phonetics

Different approach

Phonological representation

Summary

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Summary



itroduction ypology

Tone

Phonetics

Different approach

Phonological representation

Summary

Summary

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Otomanguean Tone Kingston Introduction

Phonology

Phonetics

Different approach

Phonological representation

Summary



Tone Kingston

Otomanguean

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmen

Acknowledgments

- Chinanteco de San Juan Quiotepec: Miguel Castellanos Cruz and Mario Chavez Peon,
- Chinanteco de San Antonio Analco Tlacoatzintepec: Alicia Gregorio Velasco and her family,
- 3 Chatino: Emiliana Cruz and Anthony Woodbury.



Otomanguean Tone Kingston Introduction

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmen

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ntroduction

Typology

[>]honology

Phonetics

Different approach

Phonological representation

Summary



Otomanguean Tone Kingston

Typology

Phonology

Phonetics

Different approach

Phonological representation

Summary

Acknowledgmen

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