Simulated Segment Evolution using the TKF91 Model

John Huelsenbeck
johnh@berkeley.edu

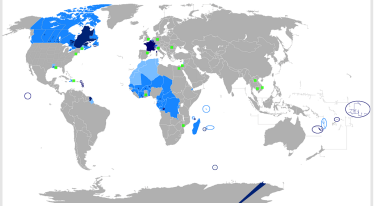
Introduction

In this paper, we attempt to do the impossible!

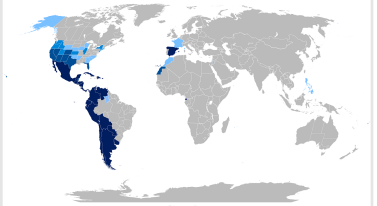
Languages

Latin

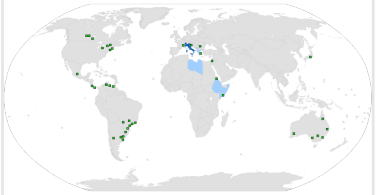
French



Spanish



Italian



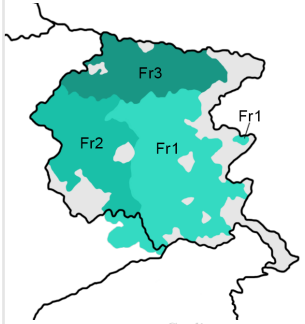
Brazilian Portuguese

Portuguese

Catalan

Walloon

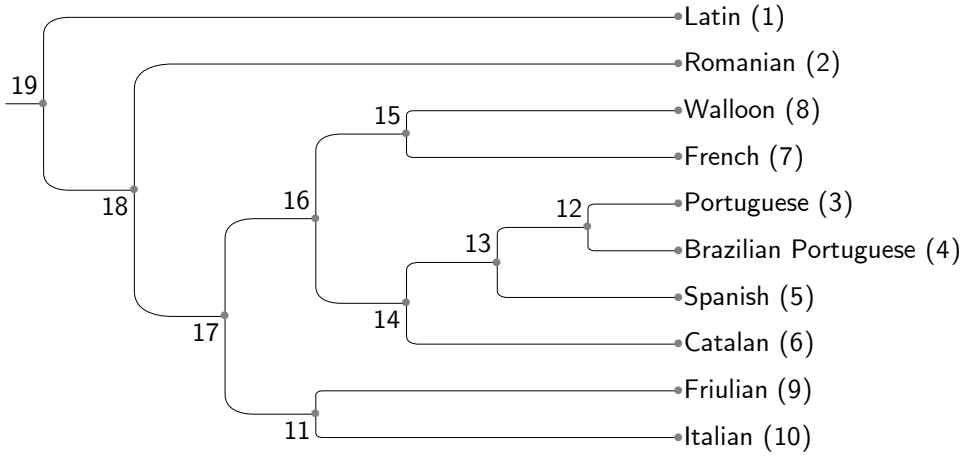
Friulian



Romanian

Example Tree

An example tree showing the relationships of $N = 10$ languages.



Alignment

Alignments (**A**) are formed from the observed segments (**S**) and a homology map (**H**).

S

Latin	s t eː l l a
French	e t w a l
Spanish	e s t ɾ e j a
Italian	s t e l l a
Brazilian Portuguese	i s t ɾ e l ɐ
Portuguese	i̥ ʃ t ɾ e l ɐ
Catalan	ə s t ɛ l
Walloon	s t øː l
Friulian	s t ɛ l e
Romanian	s t e̯a

H$_1$

Latin	00111110
French	10001111
Spanish	10001110
Italian	01101111
Brazilian Portuguese	10101010
Portuguese	10101110
Catalan	10001111
Walloon	00001110
Friulian	10001110
Romanian	10011111

H$_2$

Latin	111110000
French	000111100
Spanish	000111111
Italian	000111111
Brazilian Portuguese	101010100
Portuguese	000101111
Catalan	000101111
Walloon	000111000
Friulian	111100000
Romanian	000111111

A$_1$

Latin	-	-	s	t	eː	l	l	-
French	e	-	-	-	t	w	a	l
Spanish	e	-	-	-	s	t	ɾ	-
Italian	-	s	t	-	e	l	l	a
Brazilian Portuguese	i	-	s	-	t	-	ɾ	-
Portuguese	i̥	-	ʃ	-	t	ɾ	e	-
Catalan	ə	-	-	-	s	t	ɛ	l
Walloon	-	-	-	-	s	t	øː	-
Friulian	s	-	-	-	t	ɛ	l	-
Romanian	s	-	-	t	e̯a	-	-	-

A$_2$

Latin	s	t	eː	l	l	-	-	-
French	-	-	-	e	t	w	a	-
Spanish	-	-	-	e	s	t	ɾ	e
Italian	-	-	-	s	t	e	l	l
Brazilian Portuguese	i	-	s	-	t	-	ɾ	-
Portuguese	-	-	-	i̥	-	ʃ	t	ɾ
Catalan	-	-	-	ə	-	s	t	ɛ
Walloon	-	-	-	s	t	øː	-	-
Friulian	s	t	ɛ	l	-	-	-	-
Romanian	-	-	-	s	t	e̯a	-	-

Character Assignments

Each segment gets a different number

0	e	1	g	2	oː	3	ʒ	4	ə	5	ɟ	6	o	7	i	8	w	9	ɔ	10	ʤ	11	ɪ	12	j	13	t	14	uː
15	y	16	u	17	s	18	d	19	v	20	n	21	ʃ	22	oj	23	b	24	k	25	m	26	h	27	iː				
28	a	29	ɐ	30	l	31	aː	32	ʎ	33	k^w	34	ẽj̃	35	ɐ̃j̃	36	ʧ	37	ɨ	38	ɛ	39	ɛː	40	ʧ				
41	ã	42	ɐ̃	43	ɛ̃	44	ɔ̃	45	w̃	46	ẽ	47	eː	48	ɲ	49	ð	50	ũ	51	j̃	52	c	53	œ̃	54	g		
55	ɬ	56	p	57	au̯	58	ø	59	õ	60	r	61	ʁ	62	ɾ	63	ŋ	64	øː	65	aj	66	ɑ	67	ej				
68	θ	69	ĩ	70	ɣ	71	ɑ̃	72	ʦ	73	ɐj	74	z	75	x	76	f	77	œ	78	o̯a	79	β	80	e̯a				
81	ɟ	82	ʁ	83	ɥ	84	ɔː	85	ɛj	86	g^w	87	ẽu̯																

Partition Assignments

David's basic rules

1 Nasal Vowel

ẽj̃ ɐ̃j̃ ã ɐ̃ ɛ̃ ɔ̃ ẽ ũ œ̃ õ ĩ ɑ̃

2 Vowel

e oː ə o i ɔ ɪ uː y u oj iː a ɐ aː ɨ ɛ ɛː eː au̯ ø øː aj ɑ ej ɐj œ o̯a e̯a ɔː ɛj ẽu̯

3 Nasal Consonant

n m w̃ ɲ j̃ ŋ

4 Non Sylabic Sonorants

w j l r

5 Consonants

ɡ ʒ ɟ ʤ t s d v ʃ b k h ʎ kʷ ʧ ʧ ð c g ɬ p ʁ ɾ θ ɣ ʦ z x f β ɟ ʁ ɥ gʷ

Results

Questions