

Simulated Segment Evolution using the TKF91 Model

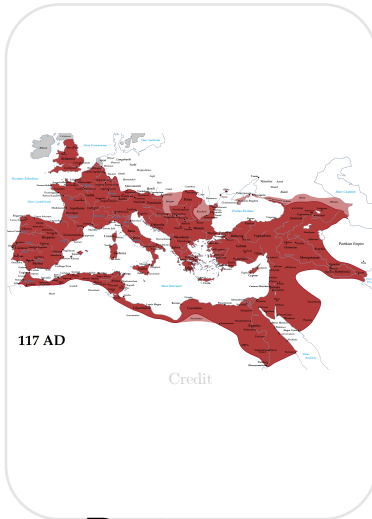
David Goldstein

Introduction

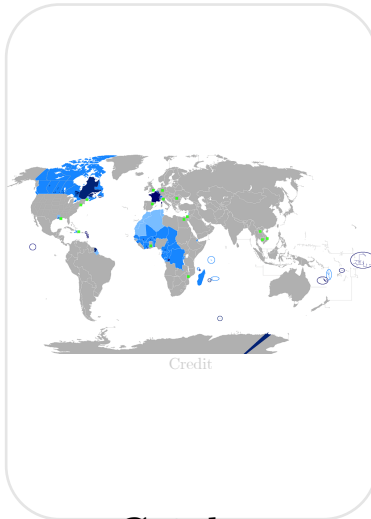
In this paper, we attempt to do the impossible!

Languages

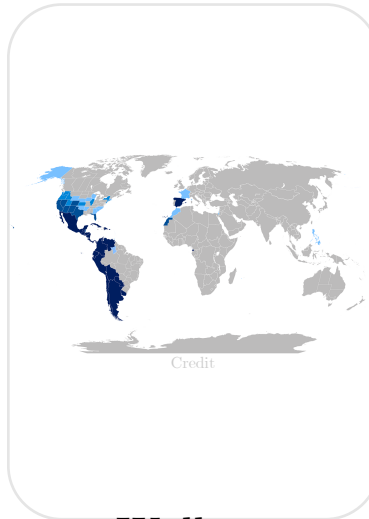
Latin



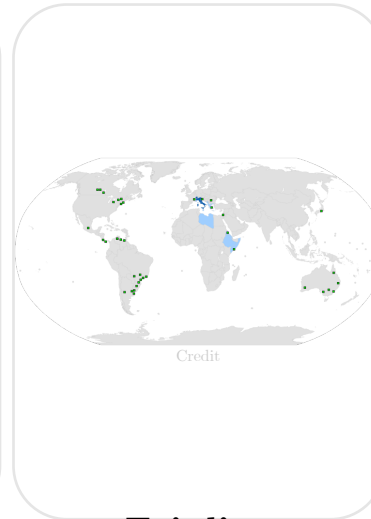
French



Spanish



Italian



Brazilian Portuguese



Portuguese



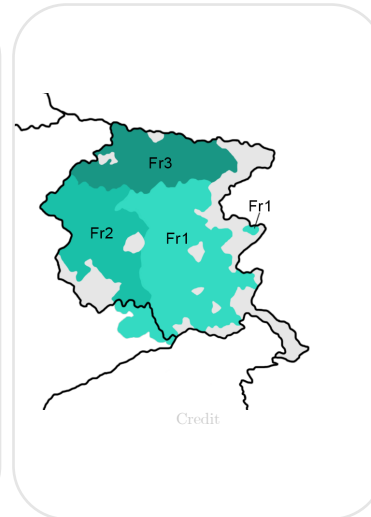
Catalan



Walloon



Friulian



Romanian



Concepts Used

	I	Who-Qui	Who-Quem	What	When-Quando	How-Quomodo
Latin	- e g o:	k ^w - i s	k ^w - e m -	k ^w - i d	k ^w - a n d o:	k ^w o: m o d o
French	- ʒ - ə	k - i -		k w a -	k - ã - -	k ɔ m - -
Spanish	- j - o		k j e n -	k - e -	k w a n d o	k o m o - -
Italian	- i - o	k - i -		k - e -	k w a n d o	k o m e - -
Brazilian	- e - w		k - ĕj - -	k - i -	k w ĕ - d u	k o m u - -
Portuguese						
Portuguese	- e - w		k - ĕj - -	k - i -	k w ĕ - d u	k o m u - -
Catalan	- ʒ - ɔ	k - i -		k - ε -	k w a n	k ɔ m - -
Walloon	- dʒ - ɪ	k - i: -		k w ε: -	k w a n d	k ɔ m ĕ - -
Friulian	- j - o	k w i -		tʃ - e -	k w a n t	tʃ e m u: t -
Romanian	j e - w		tʃ - i n e	tʃ - e -	k - i n d	k u m - - -
	One	Two-Duos	Two-Duae	Two-Duas	Three	Five
Latin	u: n u m	d u o: s	d u - aj	d u a s	t r - e: s	k ^w i: n k ^w - e
French	œ - - -	d - ø -			t ʁ w a -	s ĕ - k - -
Spanish	u n o -	d - o s			t r - e s	θ i n k - o
Italian	u n o -		d u - e		t r - e -	tʃ i ŋ k w e
Brazilian	ũ - - -	d - o j s		d u e s	t r - e s	s ĩ - k - u
Portuguese						
Portuguese	ũ - - -	d - o j f		d u e f	t r - e f	s ĩ - k - u
Catalan	u n - -	d - o s			t r - ε s	s i ŋ k - -
Walloon	õ - - -	d - ø: -			t r - ø: -	s ĕ - k - -
Friulian	u ŋ - -	d - o j -			t r - e: -	tʃ i ŋ k - -
Romanian	u n u -	d - o j -	d o w ə		t r - e j -	tʃ i n tʃ - -
	Big	Big-Grandem	Big-Majjorem	Long-Longum	Long-Largum	Wide
Latin	m a g n u m	g r a n d e m	m a j j o r e m	l o - n g u m	l a r g u m	l a: t u m
French		g ʁ ā - - -		l ɔ̃ - - - -	l a ʁ ʒ - -	l e - - -
Spanish	m a - ɲ o -	g r a n d e -		l o - n g o -	l a r y o -	l a t o -
Italian	m a ɲ ɲ o -	g r a n d e -		l u - n g o -	l a r g o -	l a t o -
Brazilian		g r ĕ - dʒ i -		l õ - g u -	l a ʁ g u -	l a t u -
Portuguese						
Portuguese		g r ĕ - d i -		l õ - g u -	l a r g u -	l a t u -
Catalan		g r a n - - -		ʎ o - ŋ - - -	ʎ a r k - -	
Walloon		g ʁ ā - - -		l õ - - - -		
Friulian		g r a n t - - -		l u n k - -	l a r k - -	
Romanian			m a - - - r e -	l u n g - -	l a r g - -	l a t - -

	Wide-Amplum	Fish-Piskem	Fish-Pescion	Bird-Avem	Bird-Avicellum	Bird-Passerem
Latin	a m p l u m	p i s k e m		a w e m	- a w i - k - e l l u m	p a s s e r e m
French	ã - p l - -		p w a s ò		w a - - - z - o - - - -	
Spanish	a n ʃ - o -	p e θ - - -		a b e -		p a - x a r o -
Italian	a m p j o -	p e ʃ ʃ e -			- - u - t ʃ - ε l l o -	p a s s e r o -
Brazilian	ẽ - ʃ - u -	p e j ʃ - i -		a v i -		p a - s e r u -
Portuguese						
Portuguese	ẽ - ʃ - u -	p ɐ j ʃ - i -		a v i -		p a - s e r u -
Catalan	a m p l ə -	p e ʃ - - -		a w - -	- - u - - s - e - ʎ - -	
Walloon			p - ε h ò		- - u: - - h - ε: - - - -	
Friulian		p ε s - - -			- - u - - ʃ j ε - l - -	
Romanian		p e ʃ t e -				p a - s ə r e -
	ToDrink	ToEat	ToEat-Manducare	ToBite	ToBite-Morsicare	ToSuck
Latin	b i b - e r e	k o m e d e r e	m a n d u k a: r e	m o r d e: r e	m o r s i k a: r e	s u: g e r e
French	b - - w a ʁ -		m ã - ʒ - - e - -	m o ʁ d - ʁ -		s y s e - -
Spanish	b e b - e r -	k o m e - - - r -	m a n d u k a r -	m o r ð e r -	m o - s - k a r -	
Italian	b e - - - r e		m a n dʒ - - a: r e	m ɔ r d e r e	m o r s i k a r e	
Brazilian	b e b - e ʁ -	k o m e - - -	m ẽ - ʒ - - a ʁ -	m o ʁ d e ʁ -	m u - s ə g a - -	s u g a ʁ -
Portuguese						
Portuguese	b i β - e r -	k u m - - e r -	m ẽ - ʒ - - a r -	m u r ð e r -	m u - s ə g a r -	s u g a r -
Catalan	b ε w - - r ə		m ə ɲ ʒ - - a - -		m u - s ə ɣ a - -	
Walloon	b - - - ø: ʁ -		m a ɲ - - - i: - -			s y s i: - -
Friulian	b e v i - -		m a ɲ j - - a - -			
Romanian	b - - - ɛa - -		m i n - - k a - -		m u r s e k a - -	s u dʒ e - -
	ToSpit	ToSpit-Exconspuere	ToSpit-Sputare	ToSpit-Cracher	ToKnow	ToKnow-Sapere
Latin	k o n s p u e r e		- s p u t e r e		s k i: r e	s a p - e r e
French	k ɔ̃ - s p y e - -			k ʁ a ʃ e		s a v w a ʁ -
Spanish		e s k u - p i r	e s p u t a r -			s a b - e r -
Italian			- s p u t a: r e			s a p - e: r e
Brazilian	k u - s p i ʁ -					s a b - e ʁ -
Portuguese						
Portuguese	k u - ʃ p i r -					s e b - e r -
Catalan		ə s k u - p i - -				s ə β - ε - -
Walloon						s a v - ø: ʀ -
Friulian						s a v - e: - -
Romanian		- s k u j p a			ʃ t i - -	

	ToKnow-Cognoscere	ToThink	ToThink-Pensare	ToFear	ToFear-Tremere	ToSleep
Latin	k o g n o : s k e r e	k - o : g i t a : r e	p e : n s a : r e	t i m e : r e	t r e m - e r e	d - o r m i : r e
French	k ɔ - n ɛ - t ʁ -	k ʁ - - i d e - -	p ã - s e - -		k ʁ ě - d - ʁ -	d - ɔ ʁ m i ʁ -
Spanish	k o - n o θ e r -	k w - - i d a r -	p e n s a r -	t e m e r -	t r e m - e r -	d - o r m i r -
Italian	k o - n o f f e r e	k - o dʒ i t a : r e	p e n s a : r e	t e m e : r e	t r e m - a : r e	d - o r m i : r e
Brazilian	k o - ɲ e s - e ʁ -	k - u ʒ i t a ʁ -	p ě - s a ʁ -	t e m e ʁ -	t r e m - e ʁ -	d - o ʁ m i ʁ -
Portuguese						
Portuguese	k u - ɲ i s - e r -	k - u ʒ i t a r -	p ě - s a r -	t i m e r -	t r i m - e r -	d - u r m i r -
Catalan	k u - n ɛ f - ə - -	k - u - j d a - -	p ə n s a - -	t e m ə - -		d - u r m i - -
Walloon	k i - n ɔ h - - - -		p ě - s e - -			d w a ʁ m i - -
Friulian	k o - ɲ o s - i - -		p e ŋ s a : - -	t e m i - -	t r i m - a : - -	d - u r m i : - -
Romanian	k u - n ɣ a f t e - -	k - u dʒ e t a - -	p ə - s a - -	t e m e - -		d - o r m i - -
	ToLive	ToDie	ToSwim	ToSwim-Navigare	ToFly	ToFly-Exvolare
Latin	w i : w e r e	m o r i : - -	n - a t a : r e	n a v i g a : r e	w o l a : r e	
French	v i v - ʁ -	m u ʁ i ʁ -		n a - - ʒ e - -	v o l e - -	
Spanish	b i b i r -	m o r i r -	n - a d a r -	n a b e g a r -	b o l a r -	
Italian	v i : v e r e	m o r i : r e	n w o t a : r e	n a v i g a r e	v o l a : r e	z v o l a : r e
Brazilian	v i v e ʁ -	m o ʁ e ʁ -	n - a d a ʁ -	n a v i γ a ʁ -	v o - a ʁ -	
Portuguese						
Portuguese	v i v e r -	m u ʁ e r -	n - ɐ ð a r -	n ɐ v i γ a r -	v w - a r -	
Catalan	b i w - r ə	m u r i - -	n - ə d a - -	n ə b ə g a - -	b u l a - -	
Walloon		m ɔ r i - -		n ɛ - - dʒ i : - -	v ɔ l e - -	
Friulian	v i v i - -	m u r i : - -	n - a d a - -	n a v i g a - -	- - - - -	z v o l a - -
Romanian	v i - a - -	m u r i - -		n a v i g a - -	- - - - -	z b u r a - -
	ToCome	ToFall	ToFall-Tumbare	ToSing-AncestralClass	ToPlay-Ludere	ToPlay-Jucare
Latin	w e n i : r e	k - a d e r e		k a n t a : r e	l u : d e r e	j o - k a : r e
French	v ə n i ʁ -	f w a - - ʁ -	t ð - b e -	f ã - t e - -		ʒ - w - e - -
Spanish	b e n i r -	k - a - e r -	t u m b a r	k a n t a r -	l u d i r -	x u - g a r -
Italian	v e n i : r e	k - a d e : r e		k a n t a : r e		dʒ o - k a : r e
Brazilian	v - - i ʁ -	k - ɐ - i r -	t ð - b a ʁ	k ě - t a r -		ʒ o - g a ʁ -
Portuguese						
Portuguese	v - - i r -	k - ɐ - i r -	t ð - b a r	k ě - t a r -		ʒ u - γ a r -
Catalan	b ə n i - -	k - a w - r ə	t u m b a -	k ə n t a - -		ʒ u - g a - -
Walloon	v i n i - -	f f - ɛ : - - ʁ -	t u m - e -	f f ã - t e - -		dʒ u w - e - -
Friulian	v i ɲ i : -	f f j a d e - -		c a n t a : - -		dʒ u j - a - -
Romanian	v e n i - -	k ə d ɣ a - -	t u m b a -	k i n t a - -		ʒ u - k a - -

	ToFreeze	ToFreeze-Glaciare	ToFreeze-Inglaciare	Sun	Sun-Soliculus	Moon
Latin	g e l a: r e	g l a - k i a: r e	i n g l a k i a: r e	s o: l e m	s o l i c u l u s	l u: n a
French	ʒ ə l e - -	g l a - s - e - -			s ɔ l ɛ j - - -	l y n -
Spanish	- e l a r - -			s o l - -		l u n a
Italian	ɖ e l a r e	g j a t ʃ j a r e		s o l e -		l u n a
Brazilian	ʒ i l a r -			s ɔ w - -		l u - e
Portuguese						
Portuguese	ʒ i l a r -			s ɔ ʔ - -		l u - e
Catalan	ʒ ə l a - -	g l ə - s - a - -		s ɔ l - -		ʎ u n ə
Walloon	ɖ a l e - -			s ɔ l ɔ -		l ø n -
Friulian		g l a - ʃ - a - -			s o r e - - l i -	l u n e
Romanian			i n g - e t s - a - -	s ɔ a r e -		l u n ə
	Star	Water	Rain	Lake	Sea	Salt
Latin	- s t - e: l l a	a - k ^w - a	p l u - w i a	l a k u m	m a r e	s a: l e m
French	e - t w a - l -	o - - -	p l ɥ - - i -	l a k - -	m ɛ ʁ -	s ɛ l - -
Spanish	e s t r e - j a	a - ɣ w a	j - u - b j a	l a g o -	m a r -	s a l - -
Italian	- s t - e l l a	a k k w a	p j o d ɖ - a	l a g o -	m a r e	s a l e -
Brazilian	i s t r e - l e	a - g w e	ʃ - u - v - e	l a g u -	m a ʁ -	s a w - -
Portuguese						
Portuguese	i ʃ t r e - l e	a - g w e	ʃ - u - v - e	l a ɣ u -	m a r -	s a l - -
Catalan	ə s t - ɛ - l -	aj - ɣ w ə	p l u - ʒ - ə	ʎ a k - -	m a r -	s a l - -
Walloon	- s t - ø: - l -	ɛ: - - w -	p l u: - ʁ - -	l a k - -	m e ʁ -	s e - - -
Friulian	- s t - ɛ - l e	a - g - e	p l o - - j e	l a: t - -	ma: r -	s a: l - -
Romanian	- s t - ɛ a - - -	a - p - ə	p l ɔ a - - j e	l a k - -	m a r e	s a r e -
	Earth	Sky	Wind	Fire-Focus	Green	Year
Latin	t - e r r a	k - a j l u m	w - e n t u m	f - o k u m	w i r i d e m	a n n u m
French	t - e - ʁ -	s j ɛ l - -	v - ã - - -	f - ø - - -	v e ʁ - - -	ã - - -
Spanish	t j e - r a	θ j e l o	b j e n t o -	f w e g o -	b e r - d e -	a - ɲ o -
Italian	t - ɛ r r a	ʃ - ɛ l o -	v - ɛ n t o -	f w ɔ k o -	v e r - d e -	a n n o -
Brazilian	t - e - ʁ e	s - ɛ w - -	v - ã - t u -	f - o g u -	v e r - d i -	e - n u -
Portuguese						
Portuguese	t - ɛ - ʁ e	s - ɛ w - -	v - ã - t u -	f - o ɣ u -	v e r - d i -	e - n u -
Catalan	t - ɛ - r ə	s - ɛ l - -	b - e n - - -	f - ɔ k - -	v ɛ r - t - -	a - ɲ - -
Walloon	t - ɛ: - ʁ -	s - i: ʁ - -	v - ẽ - - - -	f - ø: - - -	v ɛ ʁ - - -	ã - - - -
Friulian	t j ɛ - r e	ʃ - i: l - -	v - i n t - -	f - u: k - -	v ɛ r - t - -	a - ɲ - -
Romanian	ts - a - r ə	ʃ - e r - -	v - i n t - -	f - o k - -	v e r - d e -	a n - - -

	Name-Nomen	Name-Nominem	Tongue
Latin	n oː m e n	n oː m i n - e m	l i n g ^w - a
French	n ɔ̃ - - -		l ã - g - -
Spanish		n o m - b r e -	l e ŋ g w a
Italian	n oː m e -		l i n g w a
Brazilian	n o m i -		l ĩ - g w ɐ
Portuguese			
Portuguese	n o m i -		l ĩ - g w ɐ
Catalan	n ɔ̌ m - -		
Walloon	n ô - - -		l ẽ ʏ - - -
Friulian	n ɔ̌ ŋ - -		l ɛ̃ n g - ɛ̃
Romanian	n u m e -		l i m b - ə

Character Assignments

Each segment gets a different number

0	e	1	g	2	o:	3	ʒ	4	ə	5	j	6	o	7	i	8	w	9	ɔ	10	dʒ	11	ɪ	12	j	13	k ^w	14	s
15	k	16	i:	17	m	18	n	19	ẽj	20	ẽj	21	ɸj	22	d	23	a	24	ɪ	25	ɛ	26	ɛ:	27	ɸj				
28	ã	29	ẽ	30	u	31	t	32	ẽ	33	u:	34	œ	35	ũ	36	õ	37	ɳ	38	ø	39	oj	40	ɸ				
41	ø:	42	aj	43	ɐ	44	r	45	e:	46	ɾ	47	ɑ	48	ɹ	49	ej	50	ẽ	51	θ	52	ĩ	53	g	54	ɳ		
55	l	56	õ	57	ʎ	58	ɣ	59	a:	60	p	61	ã	62	ɐj	63	h	64	b	65	v	66	z	67	x				
68	β	69	ɐa	70	ɸ	71	ð	72	y	73	ɾ	74	ɔa	75	ɸ	76	c	77	ts	78	ɸ	79	ɐj	80	f				
81	g ^w	82	ẽɸ																										

Partition Assignments

David's basic rules

1 Nasal Vowel

ã ẽ ĩ œ ù õ ẽ ĩ ã ã

2 Vowel

e o: ə o i ɔ ɪ i: ě ě a i ε ε: u u: ø oɹ ø: aɹ ɐ e: a eɹ a: ɐa y ɔa ɛ ě

3 Consonant Group 1

w j m n r l

4 Consonants

g ʒ ʝ ɟ k^w s k ʈ ɖ d ʈ t ɳ ʃ ʂ ɾ θ g ɲ ʎ ɣ p h b v z x β ʝ ɖ ɾ ɰ c ts ʈ f g^w

Maximum Clade Credibility

0

Changes per Branch

Questions

