

Simulated Segment Evolution using the TKF91 Model

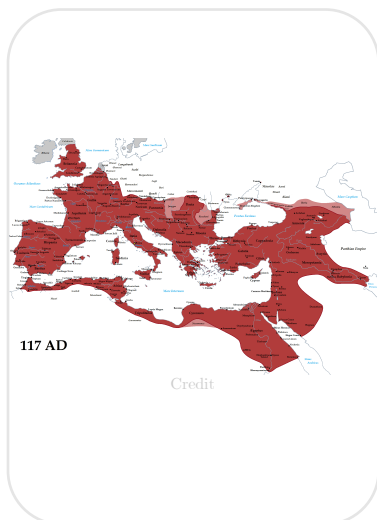
David Goldstein

Introduction

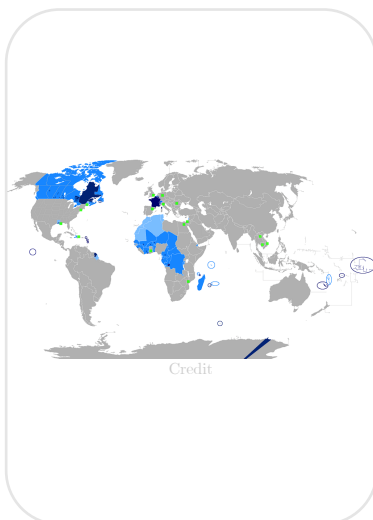
In this paper, we attempt to do the impossible!

Languages

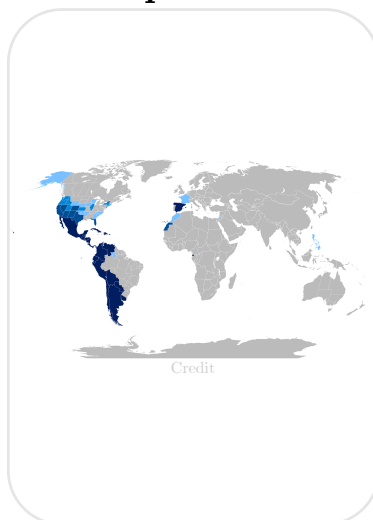
Latin



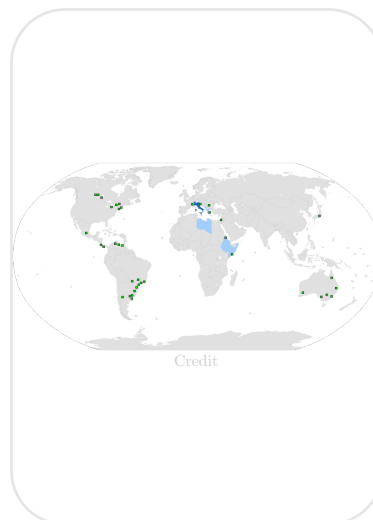
French



Spanish



Italian



Brazilian Portuguese



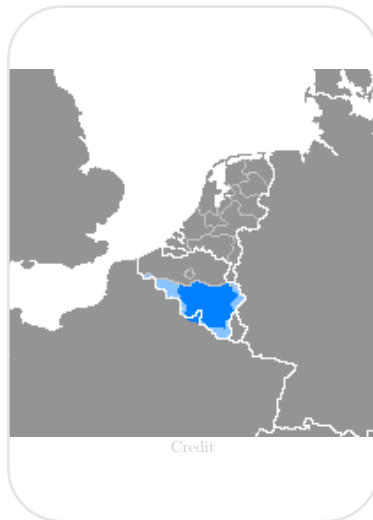
Portuguese



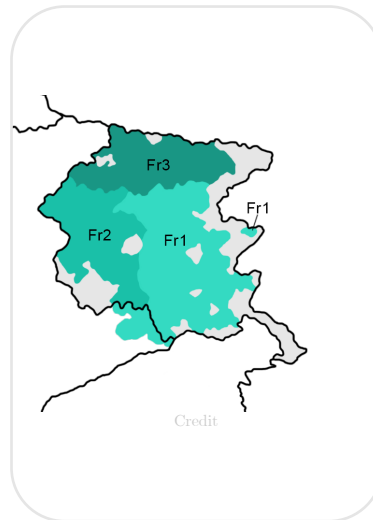
Catalan



Walloon



Friulian



Romanian



Concepts Used

	I	We	YouPlural	Here	There	There-Ibi
Latin	- e g o:	n o: - s	w o: - s	- e k k u m h i: k	i l l a: k	i b i:
French	- ʒ - ə	n u - -	v u - -	i - - s - - i -	- - l a -	
Spanish	- j - o	n o - s	b o - s	- a - k - - i -	a - j a -	
Italian	- i - o	n o: i -	v o: i -	- - - k w - - i -	- - l a -	- v i
Brazilian	- e - w	n ɔ j - s	v ɔ j s	- a - k - - i -	- - l a -	
Portuguese						
Portuguese	- e - w	n ɔ - f	v o - f	- ɐ - k - - i -	- - l a -	
Catalan	- ʒ - ɔ		b u - s	- a - k - - i -	ə - ʎ a -	
Walloon	- ɖʒ - ɪ	n o - -	v o - s		- - l a -	
Friulian	- j - o	n o: - -	v o: - -	- a - k - - i -		
Romanian	j e - w	n oj -	v oj -		- - l a -	
	There-Adlbi	Who-Qui	Who-Quem	What	When-Quando	How-Quomodo
Latin		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		k - i -		k w a -	k - ā - - -	k ɔ m - - -
Spanish	a i		k j e n -	k - e -	k w a n d o	k o m o - -
Italian		k - i -		k - e -	k w a n d o	k o m e - -
Brazilian	a i		k - ẽj - -	k - i -	k w ẽ - d u	k o m u - -
Portuguese						
Portuguese	ɐ i		k - ẽj - -	k - i -	k w ẽ - d u	k o m u - -
Catalan		k - i -		k - ɛ -	k w a n	k ɔ m - - -
Walloon		k - i: -		k w ɛ: -	k w a n d	k ɔ m ẽ - -
Friulian		k w i -		ʦj - e -	k w a n t	ʦj e m u: t -
Romanian			ʦj - i n e	ʦj - 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 ẽ - 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 -	ʦj i ŋ k w e
Brazilian	ũ - - -	d - oj s		d u ɐ s	t r - e s	s ĩ - k - u
Portuguese						
Portuguese	ũ - - -	d - oj f		d u ɐ f	t r - e f	s ĩ - k - u
Catalan	u n - -	d - o s			t r - ɛ s	s i ŋ k - -
Walloon	ô - - -	d - ø: -			t r - ø: -	s ẽ - k - -
Friulian	u ŋ - -	d - oj -			t r - e: -	ʦj i ŋ k - -
Romanian	u n u -	d - oj -	d o w ə		t r - ej -	ʦj i n ʦj - -

	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 - ñ o -	g r a n d e -		l o - n g o -	l a r y o -	l a t o -
Italian	m a ñ ñ o -	g r a n d e -		l u - n g o -	l a r g o -	l a t o -
Brazilian		g r ẽ - dʒ i -		l õ - g u -	l a ʁ g u -	l a t u -
Portuguese						
Portuguese		g r ẽ - 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 õ		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 ɐ r u -
Portuguese						
Portuguese	ẽ - ʃ - u -	p ɐ j ʃ - i -		a v i -		p a - s ɐ r u -
Catalan	a m p l ə -	p e ʃ - - -		a w - -	- - u - - s - e - ʎ - -	
Walloon			p - ε h õ		- - 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 ā - 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 o 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 γ a - -	
Walloon	b - - - ø: ʁ -		m a ɲ - - - i: - -			s y s i: - -
Friulian	b e v i - -		m a ɲ ʃ - - a - -			
Romanian	b - - - ɣa - -		m i n - - k a - -		m u r s e k a - -	s u dʒ e - -

	To Spit	To Spit-Exconspuere	To Spit-Sputare	To Know	To Know-Sapere	To Know-Cognoscere
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	k o g n o: s k e r e
French	k ɔ̃ - s p y e - -				s a v w a ʁ -	k ɔ̃ - n ɛ - t ʁ -
Spanish		e s k u - p i r	e s p u t a r -		s a b - e r -	k o - n o θ e r -
Italian			- s p u t a: r e		s a p - e: r e	k o - n o ʃ ʃ e r e
Brazilian	k u - s p i ʁ -				s a b - e ʁ -	k o - ɲ e s - e ʁ -
Portuguese						
Portuguese	k u - ʃ p i r -				s ɐ b - e r -	k u - ɲ i s - e r -
Catalan		ə s k u - p i - -			s ə β - ɛ - -	k u - n ɛ ʃ - ə - -
Walloon					s a v - ø: ʁ -	k i - n ɔ h - - - -
Friulian					s a v - e: - -	k o - ɲ o s - i - -
Romanian		- s k u j p a		ʃ t i - -		k u - n ɣ a ʃ t e - -
	To Think	To Think-Pensare	To Fear	To Fear-Tremere	To Sleep	To Live
Latin	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	w i: w e r e
French	k ʁ - - i d e - -	p ɑ̃ - s e - -		k ʁ ẽ - d - ʁ -	d - ɔ ʁ m i ʁ -	v i v - ʁ -
Spanish	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 -	b i b i r -
Italian	k - o ʎ 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	v i: v e r e
Brazilian	k - u ʒ i t a ʁ -	p ẽ - s a ʁ -	t e m e ʁ -	t r e m - e ʁ -	d - o ʁ m i ʁ -	v i v e ʁ -
Portuguese						
Portuguese	k - u ʒ i t a r -	p ẽ - s a r -	t i m e r -	t r i m - e r -	d - u r m i r -	v i v e r -
Catalan	k - u - j d a - -	p ə n s a - -	t e m ə - -		d - u r m i - -	b i w - r ə
Walloon		p ẽ - s e - -			d w a ʁ m i - -	
Friulian		p e ɲ s a: - -	t e m i - -	t r i m - a: - -	d - u r m i: - -	v i v i - -
Romanian	k - u ʎ e t a - -	p ə - s a - -	t e m e - -		d - o r m i - -	v i - a - -
	To Die	To Swim	To Swim-Navigare	To Fly	To Fly-Exvolare	To Come
Latin	m o r i: - -	n - a t a: r e	n a v i g a: r e	w o l a: r e		w e n i: r e
French	m u ʁ i ʁ -		n a - - ʒ e - -	v o l e - -		v ə n i ʁ -
Spanish	m o r i r -	n - a d a r -	n a b e g a r -	b o l a r -		b e n i r -
Italian	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	v e n i: r e
Brazilian	m o ʁ e ʁ -	n - a d a ʁ -	n a v i ɣ a ʁ -	v o - a ʁ -		v - - i ʁ -
Portuguese						
Portuguese	m u ʁ e r -	n - ɐ ð a r -	n ɐ v i ɣ a r -	v w - a r -		v - - i r -
Catalan	m u r i - -	n - ə d a - -	n ə b ə g a - -	b u l a - -		b ə n i - -
Walloon	m ɔ r i - -		n ɛ - - ʎ i: - -	v ɔ l e - -		v i n i - -
Friulian	m u r i: - -	n - a d a - -	n a v i g a - -	- - - - - -	z v o l a - -	v i ɲ i: -
Romanian	m u r i - -		n a v i g a - -	- - - - - -	z b u r a - -	v e n i - -

	ToFall	ToFall-Tumbare	ToSing-AncestralClass	ToPlay-Ludere	ToPlay-Jiocare	ToFreeze
Latin	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	g e l a : r e
French	ʃ w a - - ɣ -	t ô - b e -	ʃ ã - t e - -		ʒ - w - e - -	ʒ ə l e - -
Spanish	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 -	- e l a r -
Italian	k - a d e : r e		k a n t a : r e		ɕ o - k a : r e	ɕ e l a r e
Brazilian	k - ɐ - i r -	t ô - b a ɣ	k ẽ - t a r -		ʒ o - g a ɣ -	ʒ i l a r -
Portuguese						
Portuguese	k - ɐ - i r -	t ô - b a r	k ẽ - t a r -		ʒ u - ɣ a r -	ʒ i l a r -
Catalan	k - a w - r ə	t u m b a -	k ə n t a - -		ʒ u - g a - -	ʒ ə l a - -
Walloon	ʃ - ɛ : - - ɣ -	t u m - e -	ʃ ã - t e - -		ɕ u w - e - -	ɕ a l e - -
Friulian	ʃ j a d e - -		c a n t a : - -		ɕ u j - a - -	
Romanian	k ə d ɛ a - -	t u m b a -	k i n t a - -		ʒ u - k a - -	
	ToFreeze-Glaciare	ToFreeze-Inglaciare	Sun	Sun-Soliculus	Moon	Star
Latin	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	- s t - e : l l a
French	g l a - s - e - -			s ɔ l ɛ j - - -	l y n -	e - t w a - l -
Spanish			s o l - -		l u n a	e s t r e - j a
Italian	g j a t ʃ j a r e		s o l e -		l u n a	- s t - e l l a
Brazilian			s ɔ w - -		l u - ɐ	i s t r e - l ɐ
Portuguese						
Portuguese			s ɔ ʔ - -		l u - ɐ	i ʃ t r e - l ɐ
Catalan	g l ə - s - a - -		s ɔ l - -		ʎ u n ə	ə s t - ɛ - l -
Walloon			s ɔ l ɔ -		l ø n -	- s t - ø : - l -
Friulian	g l a - ʃ - a - -			s o r e - - l i -	l u n e	- s t - ɛ - l e
Romanian		i n g - e ʦ - a - -	s ɔ a r e -		l u n ə	- s t - ɛ a - -
	Water	Rain	Lake	Sea	Salt	Earth
Latin	a - k ^w - a	p l u - w i a	l a k u m	m a r e	s a : l e m	t - e r r a
French	o - - -	p l ɥ - - i -	l a k - -	m ɛ ɣ -	s ɛ l - -	t - e - ɣ -
Spanish	a - ɣ w a	j - u - b j a	l a g o -	m a r -	s a l - -	t j e - r a
Italian	a k k w a	p j o d ɕ - a	l a g o -	m a r e	s a l e -	t - ɛ r r a
Brazilian	a - g w ɐ	ʃ - u - v - ɐ	l a g u -	m a ɣ -	s a w - -	t - e - ɣ ɐ
Portuguese						
Portuguese	a - g w ɐ	ʃ - u - v - ɐ	l a ɣ u -	m a r -	s a l - -	t - ɛ - ɣ ɐ
Catalan	aj - ɣ w ə	p l u - ʒ - ə	ʎ a k - -	m a r -	s a l - -	t - ɛ - r ə
Walloon	ɛ : - - w -	p l u : - ɣ - -	l a k - -	m e ɣ -	s e - - -	t - ɛ : - ɣ -
Friulian	a - g - e	p l o - - j e	l a : t - -	m a : r -	s a : l - -	t j ɛ - r e
Romanian	a - p - ə	p l ɔ a - - j e	l a k - -	m a r e	s a r e -	ʦ - a - r ə

	Sky	Wind	Fire-Focus	Green	Year	Name-Nomen
Latin	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	n o : m e n
French	s j ε l - -	v - ã - - -	f - ø - - -	v e ʁ - - -	ã - - -	n ð - - -
Spanish	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	ʃ - ε l o -	v - ε n t o -	f w ɔ k o -	v e r - d e -	a n n o -	n o : m e -
Brazilian	s - ε w - -	v - ã - t u -	f - o g u -	v e r - d i -	e - n u -	n o m i -
Portuguese						
Portuguese	s - ε w - -	v - ã - t u -	f - o ɣ u -	v e r - d i -	e - n u -	n o m i -
Catalan	s - ε l - -	b - e n - - -	f - ɔ k - -	v ε r - t - -	a - ɲ - -	n ɔ m - -
Walloon	s - i : ʁ - -	v - ã - - - -	f - ø : - - -	v ε ʁ - - - -	ã - - - -	n ð - - -
Friulian	ʃ - i : l - -	v - i n t - -	f - u : k - -	v ε r - t - -	a - ɲ - -	n ɔ ɲ - -
Romanian	ʃ - e r - -	v - i n t - -	f - o k - -	v e r - d e -	a n - - -	n u m e -
	Name-Nominem	Tongue				
Latin	n o : m i n - e m	l i n g ^w - a				
French		l ã - g - -				
Spanish	n o m - b r e -	l e ɲ g w a				
Italian		l i n g w a				
Brazilian		l ī - g w e				
Portuguese						
Portuguese		l ī - g w e				
Catalan						
Walloon		l ě ɣ - - - -				
Friulian		l ε n g - ε				
Romanian		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	n	14	s
15	u	16	ʃ	17	oj	18	v	19	b	20	k	21	m	22	h	23	i:	24	a	25	ɐ	26	l	27	a:				
28	ʌ	29	k ^w	30	ẽj	31	ẽj̃	32	ʈʃ	33	d	34	ɪ	35	ɛ	36	ɛ:	37	ʈʃ	38	ã	39	ẽ	40	t				
41	ẽ	42	u:	43	œ̃	44	ũ	45	õ	46	ŋ	47	ø	48	ø:	49	aj	50	r	51	e:	52	ɣ	53	ɑ				
54	ɾ	55	ej	56	ẽ	57	θ	58	ĩ	59	g	60	ɲ	61	õ	62	ɣ	63	p	64	ã	65	ɐj	66	z	67	x		
68	β	69	ɛ̣a	70	ʃ	71	ð	72	y	73	ɾ	74	ɔ̣a	75	ɥ	76	c	77	ts	78	ɫ	79	ɛj	80	f				
81	g ^w	82	ẽũ																										

Partition Assignments

David's basic rules

1 Nasal Vowel

ẽ ĩ ã ẽ ẽ œ ù õ ẽ ĩ ã ã

2 Vowel

e o: ə o i ɔ ɪ u oɪ i: a ɐ a: i ε ε: u: ø ø: aɪ e: ɑ ej vj ɛa y ɔa ej ẽu

3 Nasal Consonant

n m ŋ ɲ

4 Non Sylabic Sonorants

w j l r

5 Consonants

g ʒ j ɟ s ʃ v b k h ʌ kʷ ʈ d ʈ t ɸ ɾ θ g ɣ p z x β ʄ ð ɾ ɥ c ts ɭ f gʷ

Maximum Clade Credibility

0

Changes per Branch

Questions

