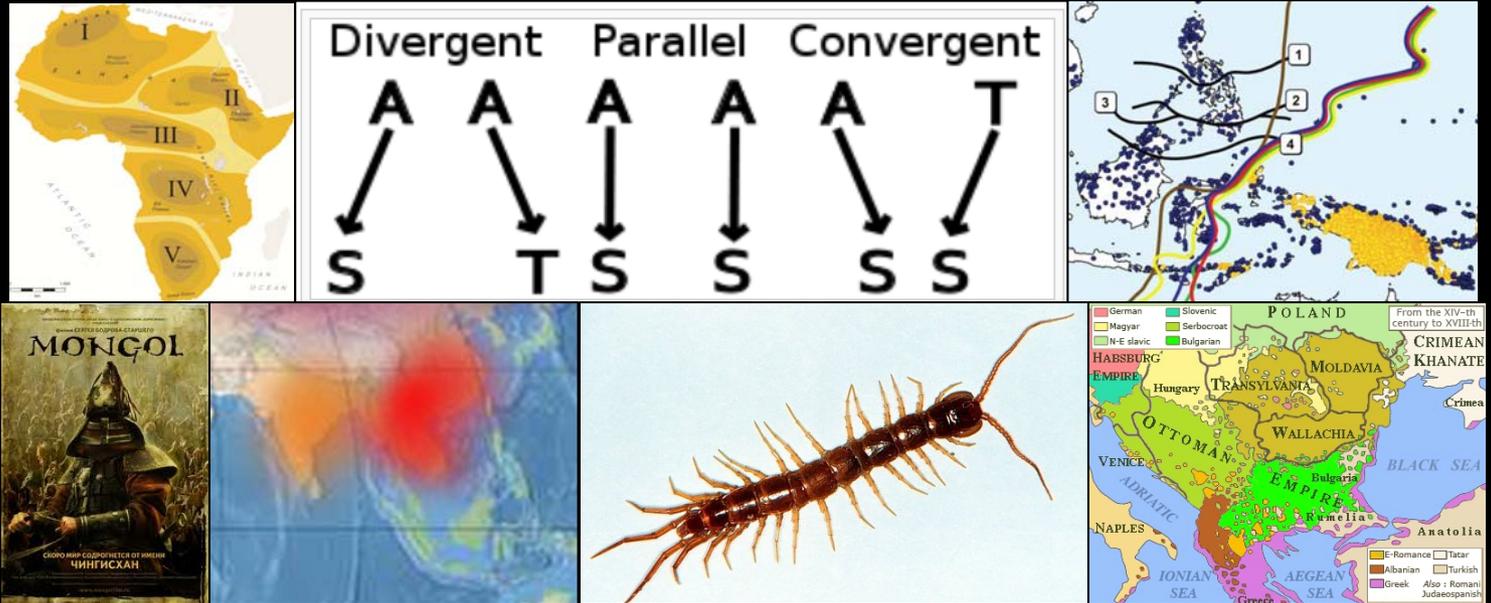


QUALITATIVE AND QUANTITATIVE APPROACHES TO LANGUAGE DIVERSITY

What they can, can't, and *may* be able to tell us about human (pre)history



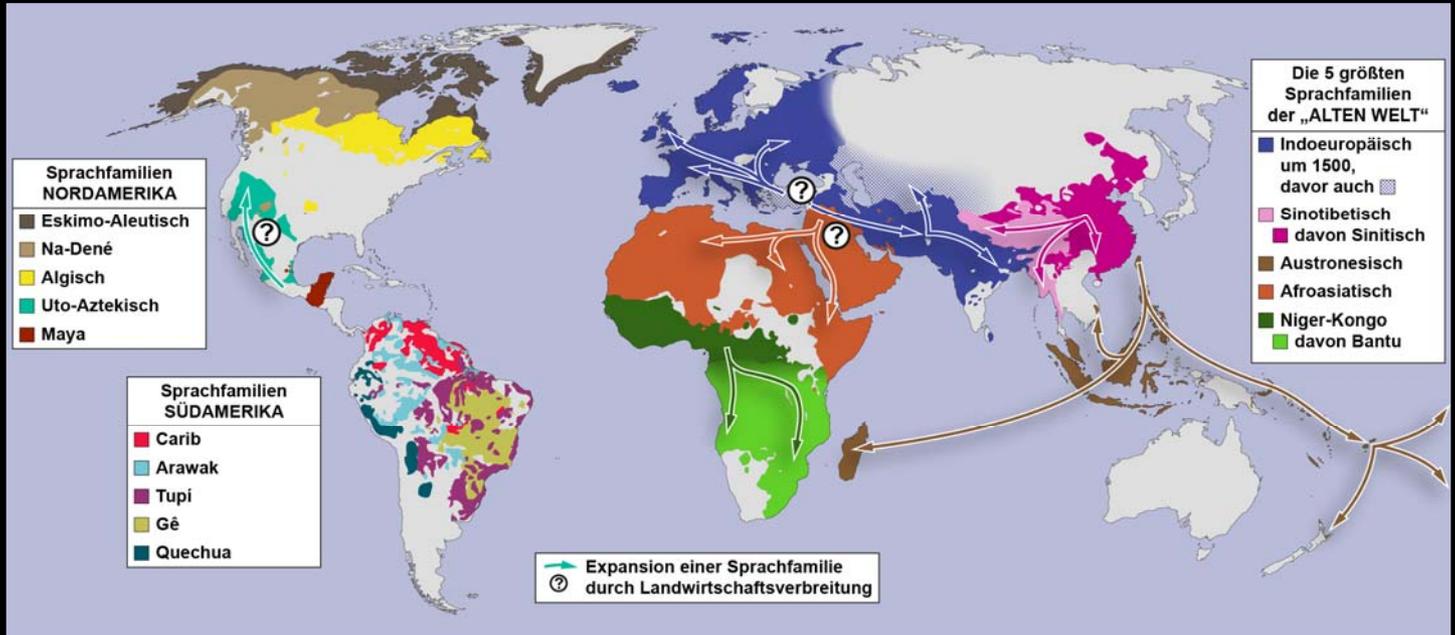
Paul Heggarty

Linguistics, Max Planck Institute for Evolutionary Anthropology, Leipzig

Paul.Heggarty@gmail.com — <http://eva-mpg.academia.edu/PaulHeggarty>

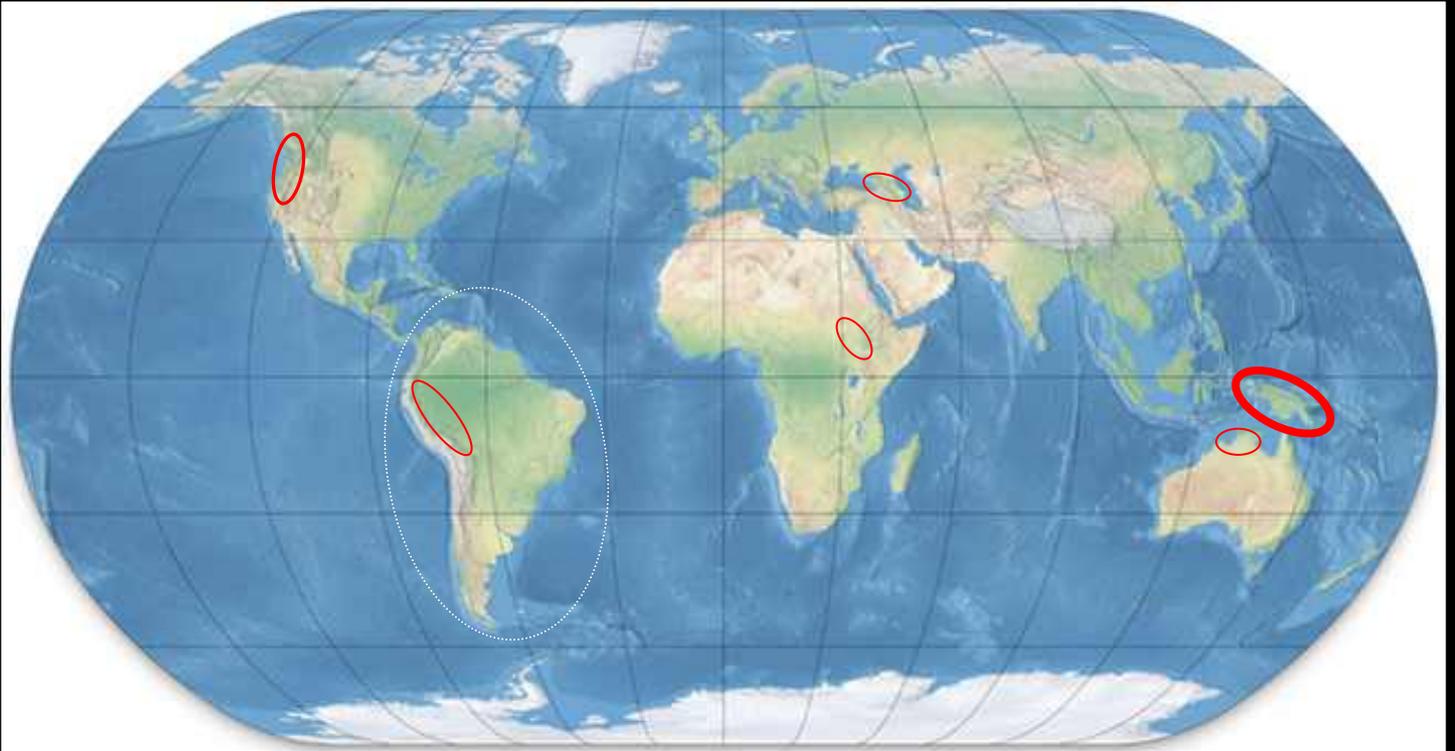
LINGUISTIC DIVERSITY: WHAT DO WE MEAN?

ONE VIEW OF THE LINGUISTIC WORLD: MAJOR FAMILIES



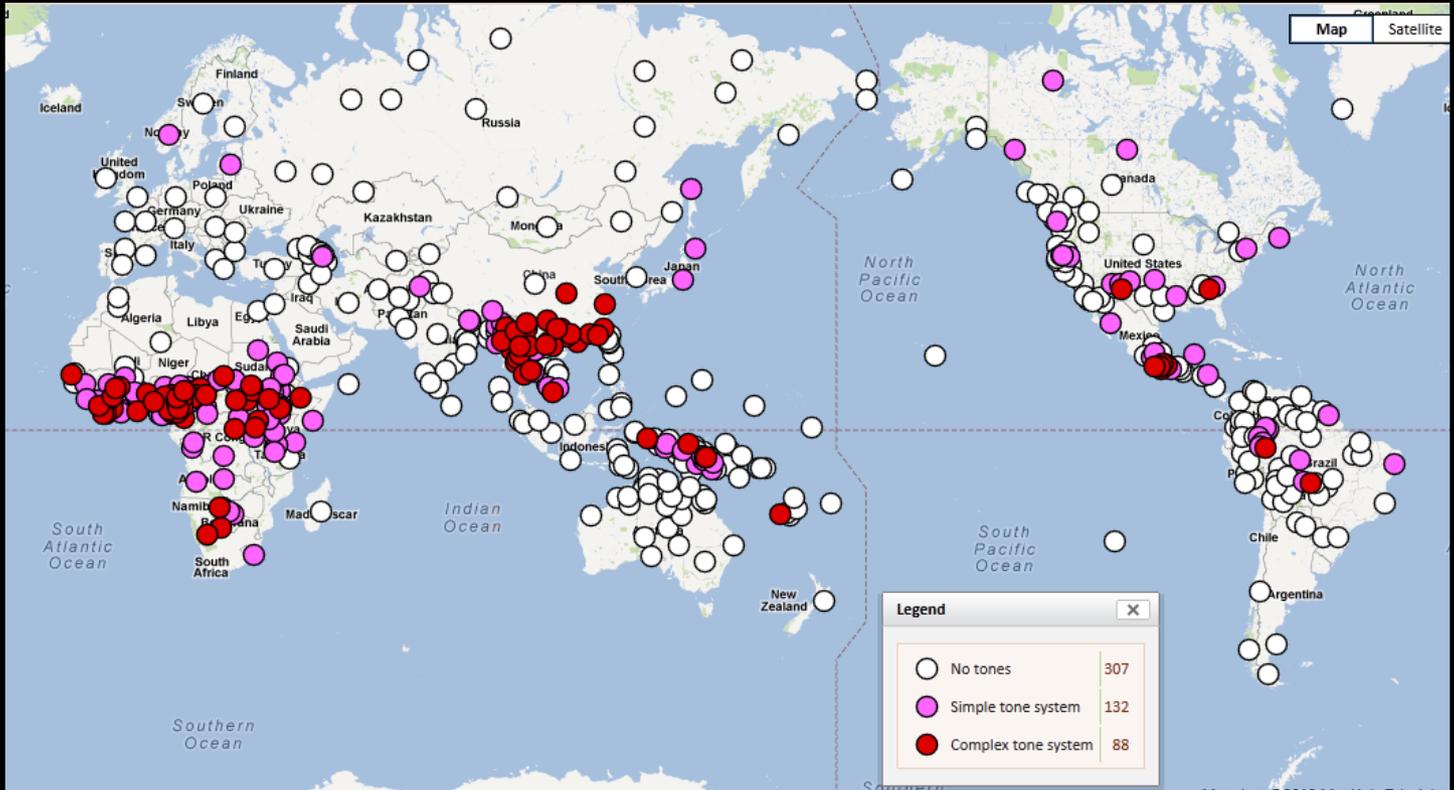
→ = Expansions as proposed by the farming/language dispersal hypothesis.

OR ANOTHER DIMENSION: LINEAGE DIVERSITY HOTSPOTS



Linguistic record of human past is not only about families and relatedness!

OR: DIVERSITY/PATTERNS IN LANGUAGE STRUCTURES — E.G. TONE



Not random — but not necessarily because of relatedness: e.g. tonogenesis.

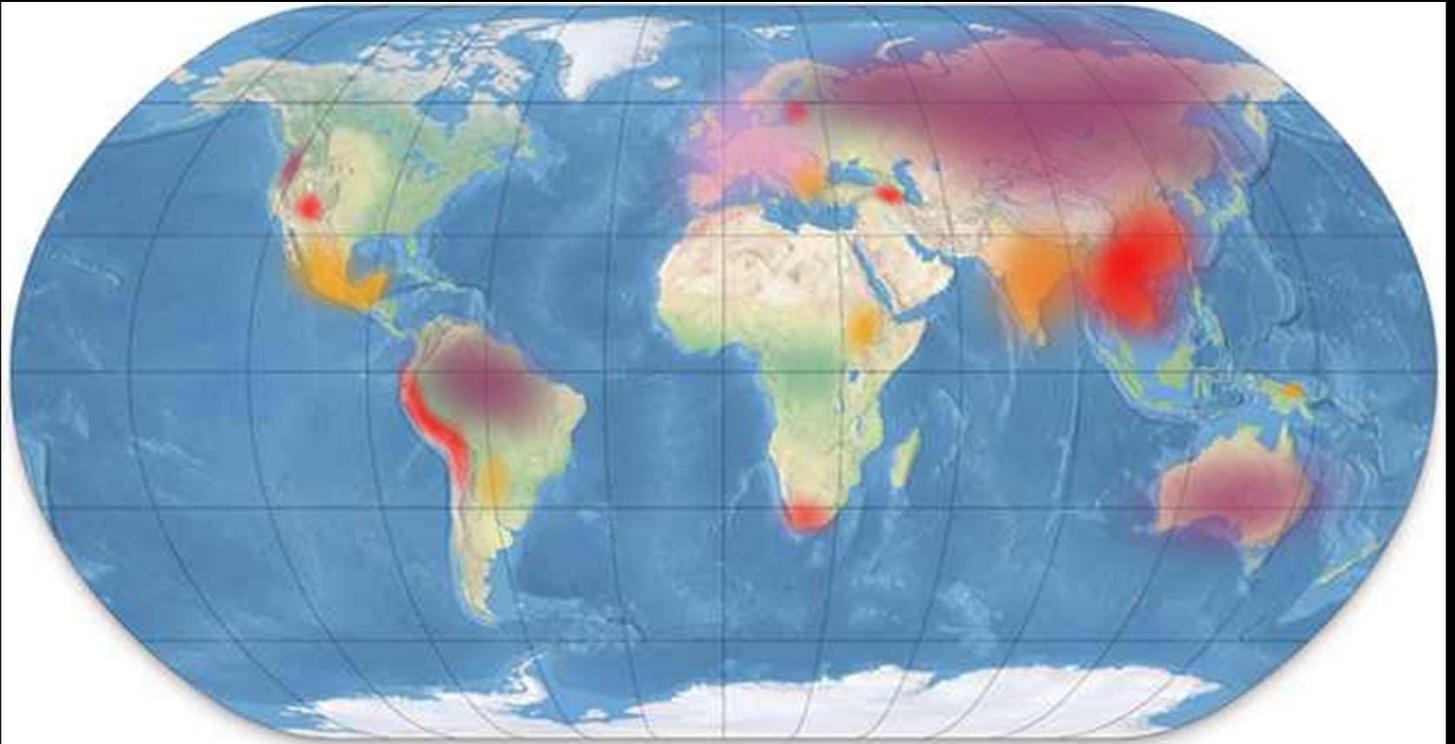
Haspelmath *et al.* (2008) — <http://wals.info/feature/13A>

OR: DIVERSITY/PATTERNS FROM A GENERATIVIST PERSPECTIVE?



Pino and friends, audience: you tell me...

LINGUISTIC AREAS: CONVERGENCE OUT OF LINEAGE DIVERSITY



Not rare — just *some* examples.

DIVERSITY WITHIN MAJOR FAMILIES: TREELIKE OR CONTINUOUS?



Indic, Arabic, 'Chinese', Bantu, Mayan, Quechua, Algonquian, Italy, Scandinavia, Switzerland (formerly much more of Europe).

'DIVERSITY LINGUISTICS'

Conference

Diversity Linguistics: Retrospect and Prospect

Тавтай морилно

歡迎

Bienvenidos

We

Haere mai! Haere mai! Haere mai!

DIVERSITY LINGUISTICS: RETROSPECT AND PROSPECT

1-3 May 2015 (Leipzig, Germany)

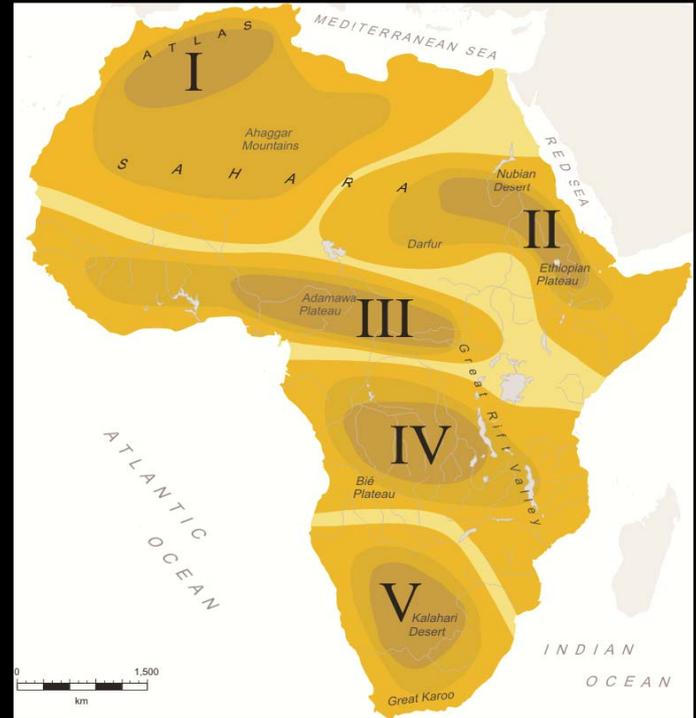
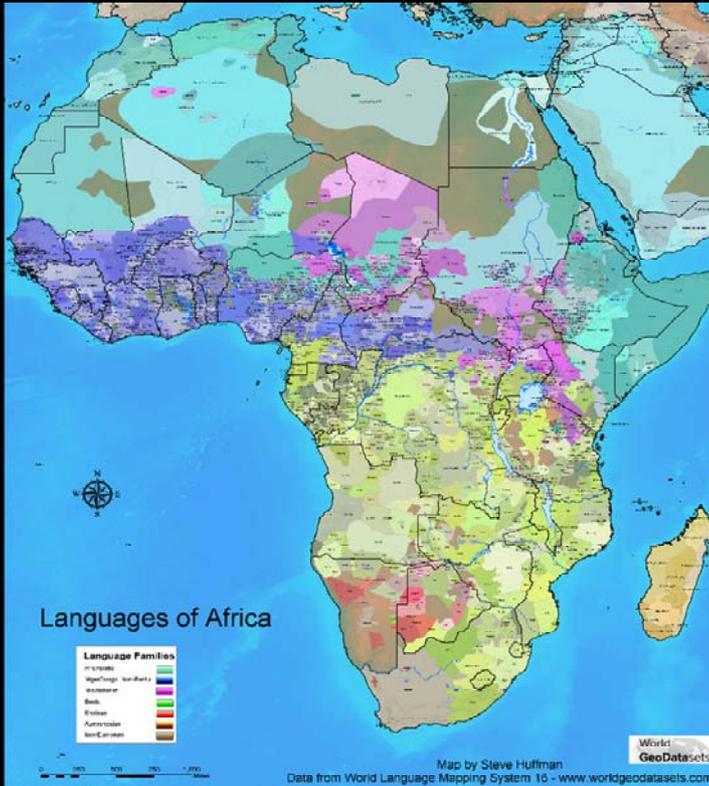
Closing conference of the Department of Linguistics at the Max Planck Institute for Evolutionary Anthropology

This conference is the final event taking place at MPI EVA's Department of Linguistics, which will close at the end of May 2015 with Bernard Comrie's retirement. To celebrate eighteen years of research on the diversity of human languages, we invited all present and former members and guests of the department to submit an abstract.

The conference thus reflects current activities **within the broad area of "diversity linguistics": research on little-studied languages, language typology and universals, comparative/historical linguistics, and evolutionary linguistics.** It will provide a representative overview of past achievements and future prospects of research within the various subfields of diversity linguistics.

PATTERNS ON DIFFERENT DIMENSIONS: OVERLAPS & CONTRASTS

DIVERGENT LANGUAGE FAMILIES ... LANGUAGE CONVERGENCE AREAS



↑ Güldemann (2010):

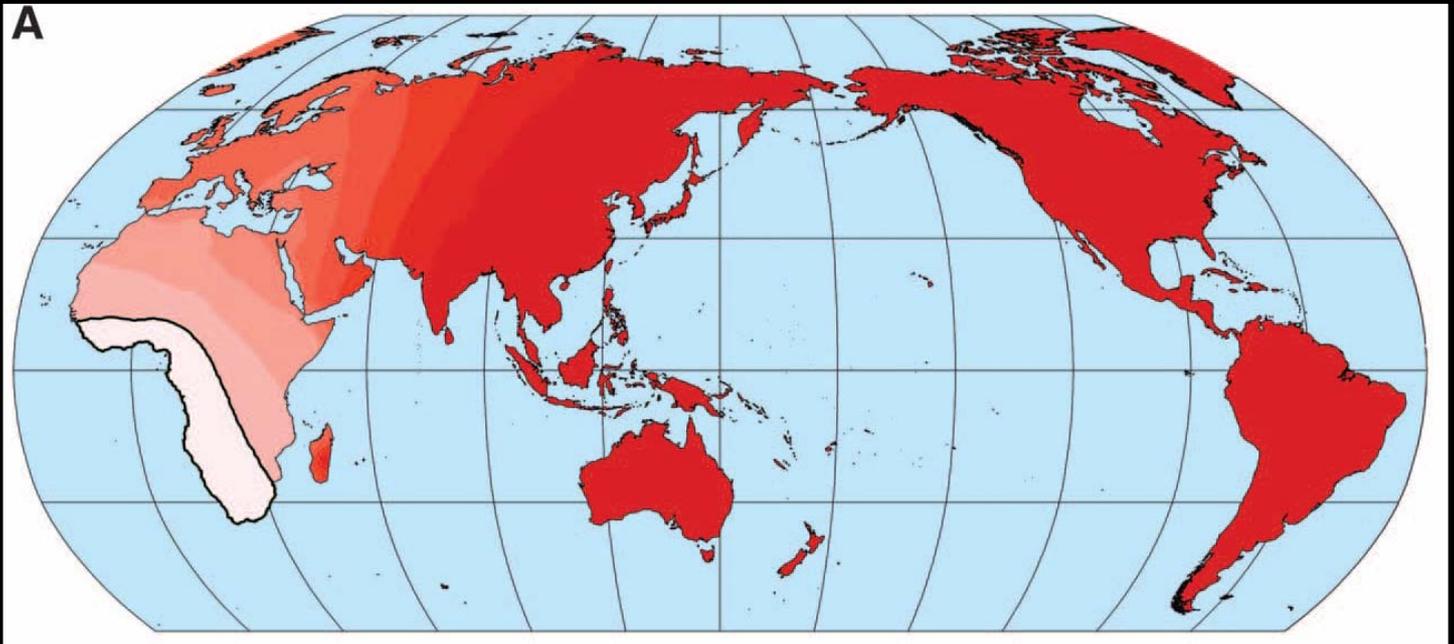
“Sprachraum” and geography: linguistic macro-areas in Africa

WHEN DIVERSITY IS NOT DIVERSITY

— EXAMPLE PROBLEMS

PHONEMIC 'DIVERSITY'?

OUT OF AFRICA ...



- Atkinson (2011): *Phonemic diversity supports a serial founder effect model of language expansion from Africa.*

STRUCTURE AND RATE OF CHANGE

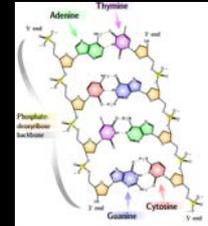
- Phoneme inventories and how fast they change: e.g. over 2000 years.

	VOWELS	CONSONANTS	TOTAL
Latin	10*	17	27
Romanian	7	20	27
Italian	7	23	30
French	16	21	37
Catalan	8	25	33
Spanish	5	19	24
Portuguese: Portugal	14	23	37
Portuguese: Brazil	16	23	39

- Counts fall or — mostly — rise.
- Founder effects model not applicable. (Not 'diversity' but counts.)

MISAPPLYING FOUNDER EFFECT LOGIC

- The phonemes of a language are not a ‘phoneme pool’.
- Counts are not “diversity” = limb ‘diversity’, ‘limb pool’?



THE ‘FOUNDING’ OF AMERICAN ENGLISH?

DNA

We hold these truths to be self-evident,
that all men are created equal ...

ACGT



founder effect

founder
effect

founder effect

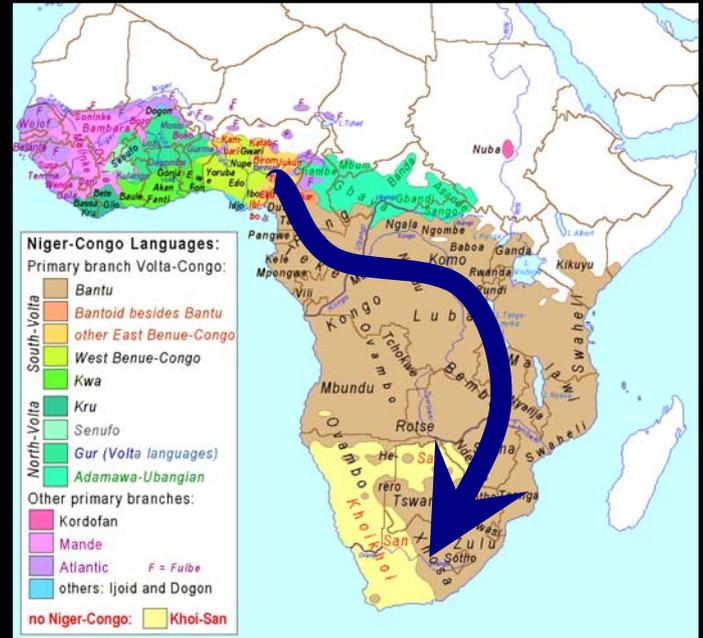
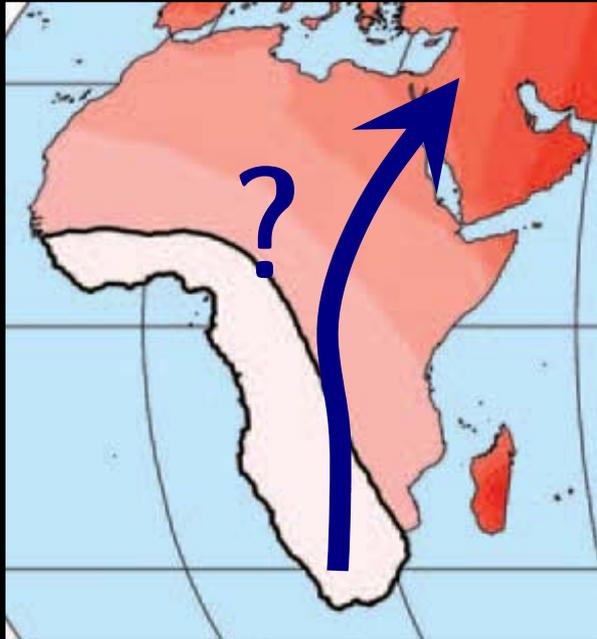


Wi huld fisi drufs tu bi silf-ividind,
vat all min ari criadid igual ...

A-G-

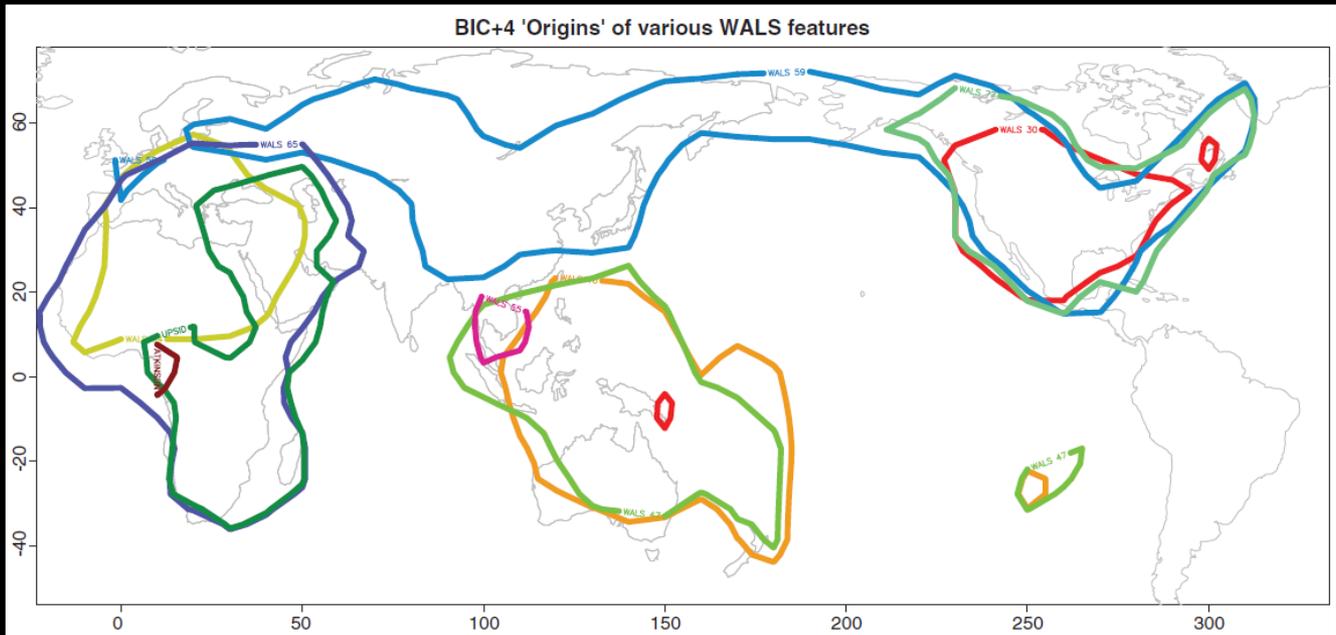


STRUCTURAL PATTERNS: CORRELATION VS. CAUSATION



- Known histories: language here almost all replaced in last 4000 years.
- Pattern is in reverse:
 - Bantu picks up *more* phonemes by contact as wave of advance spreads.

OUT OF AFRICA ... OR OUT OF EASTER ISLAND?



- Cysouw *et al.* (2012) on results in Atkinson (2011):
an artefact of ... suboptimal data, biased methodology, unjustified assumptions.

ANYONE FOR FISHING?

Everett (2013): *Evidence for direct geographic influences on linguistic sounds: the case of ejectives*

57 of 92 (62%) languages with ejectives are located in high elevation 'zones', which are defined here as major regions greater than 1500 m in altitude, plus land within 200 km of such a region of high altitude.

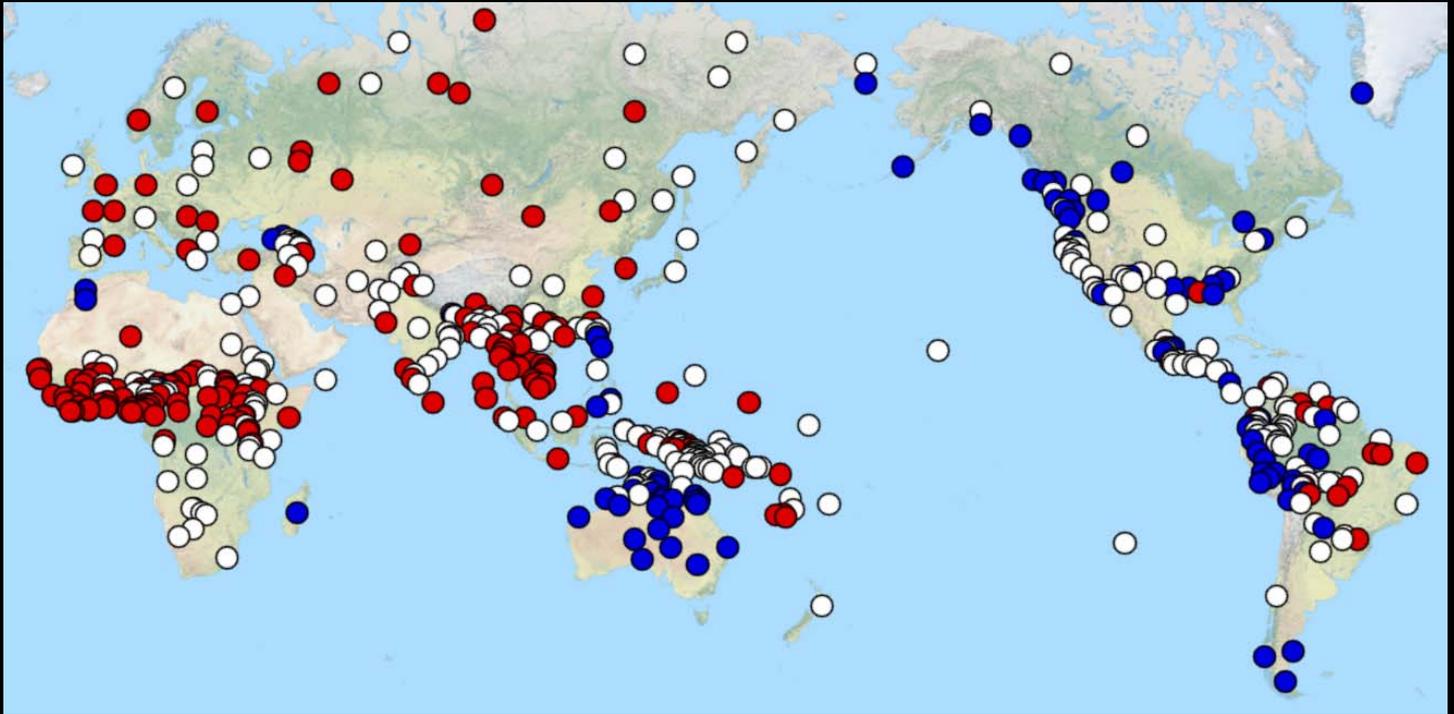
Creanza *et al.* (2015): *A comparison of worldwide phonemic and genetic variation*

Everett *et al.* (2015): *Climate, vocal folds, and tonal languages: connecting the physiological and geographic dots*

**LANGUAGE DIVERSITY DATABASES:
QUALITATIVE VS. QUANTITATIVE?**

PUTTING MEANINGFUL NUMBERS ON LANGUAGE?

World Atlas of Language Structures — WALS — <http://wals.info>



Maddieson (2013: WALS 2a): Vowel Quality Inventories

QUANTIFICATION, RULE 1: DO NOT 'BIN' CONTINUOUS DATA

“Due to uncertainty in ascertaining exact inventory counts across languages, the *WALS* data are binned into ranges for:

- Vowel: small [2-4] medium [5-6] large [7-14]
- Consonant: small [6-14] mod. small [15-18] average [19-25]
 mod. large [26-33] large [34+]
- Tone: no tone simple tone complex tone ...

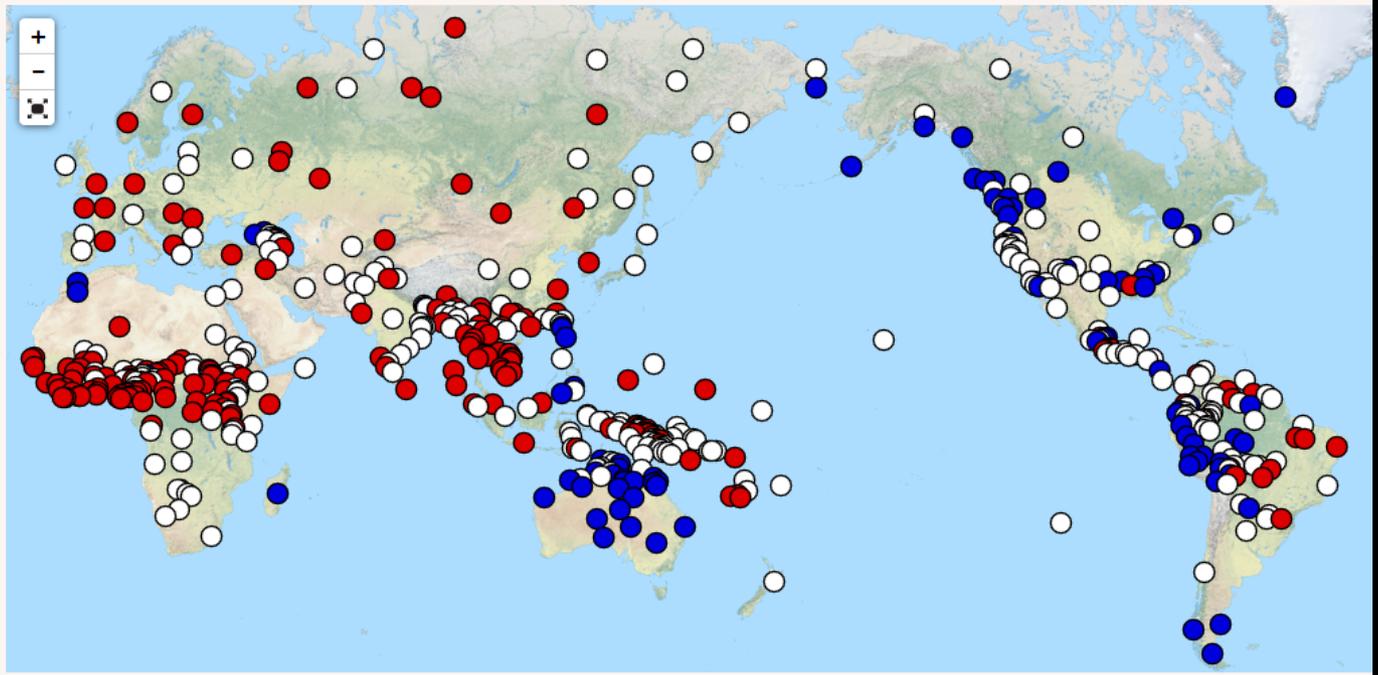
... diversity.”

Atkinson (2011 : si 2)

Feature 2A: Vowel Quality Inventories

Values

●	Small (2-4)	93
○	Average (5-6)	287
●	Large (7-14)	184



Maddieson (2013: WALS 2a): Vowel Quality Inventories

WHEN A PHONEME INVENTORY IS NOT A PHONEME INVENTORY...

- Vowel quality — not phoneme — inventories.

2. Establishing the values

When vowel qualities are counted in this way in the sample of languages surveyed for this chapter, the average number of vowels in a language is just fractionally below 6. The smallest vowel quality inventory recorded is 2 and the largest 14.

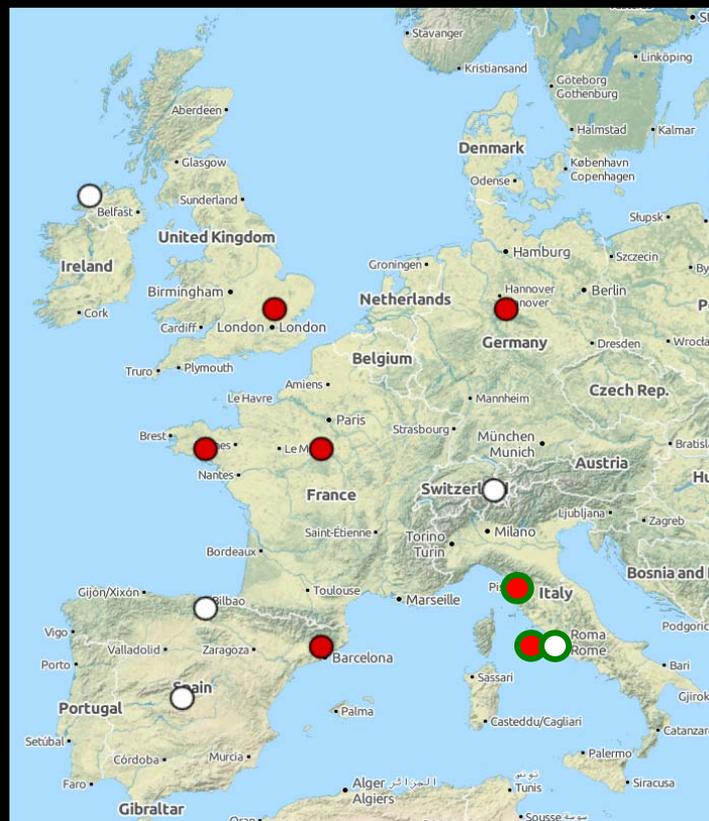
Only one language in the sample, German, uses 14 vowel qualities and only 2 make use of 13, namely the variety of British English included here and Bété

- Long and short variants of the same vowel are always counted once
- Nasalized vowels do not add to the inventory as long as a non-nasalized counterpart occurs, and so on.

Maddieson (2013: WAL5 2a)

WHEN 7 = 13, BUT NOT 5

- Spanish: 5 = white
- Latin: 5 = white
(5 long + 5 short)
- Italian: 7 = red
(5 basic, + 2 /ε/ /ɔ/ if stressed)
- English: 13 = red
- German: 14 = red
- [red] = [red] i.e. 7 = 13 = 14
- [red] ≠ [white] i.e. 7 ≠ 5

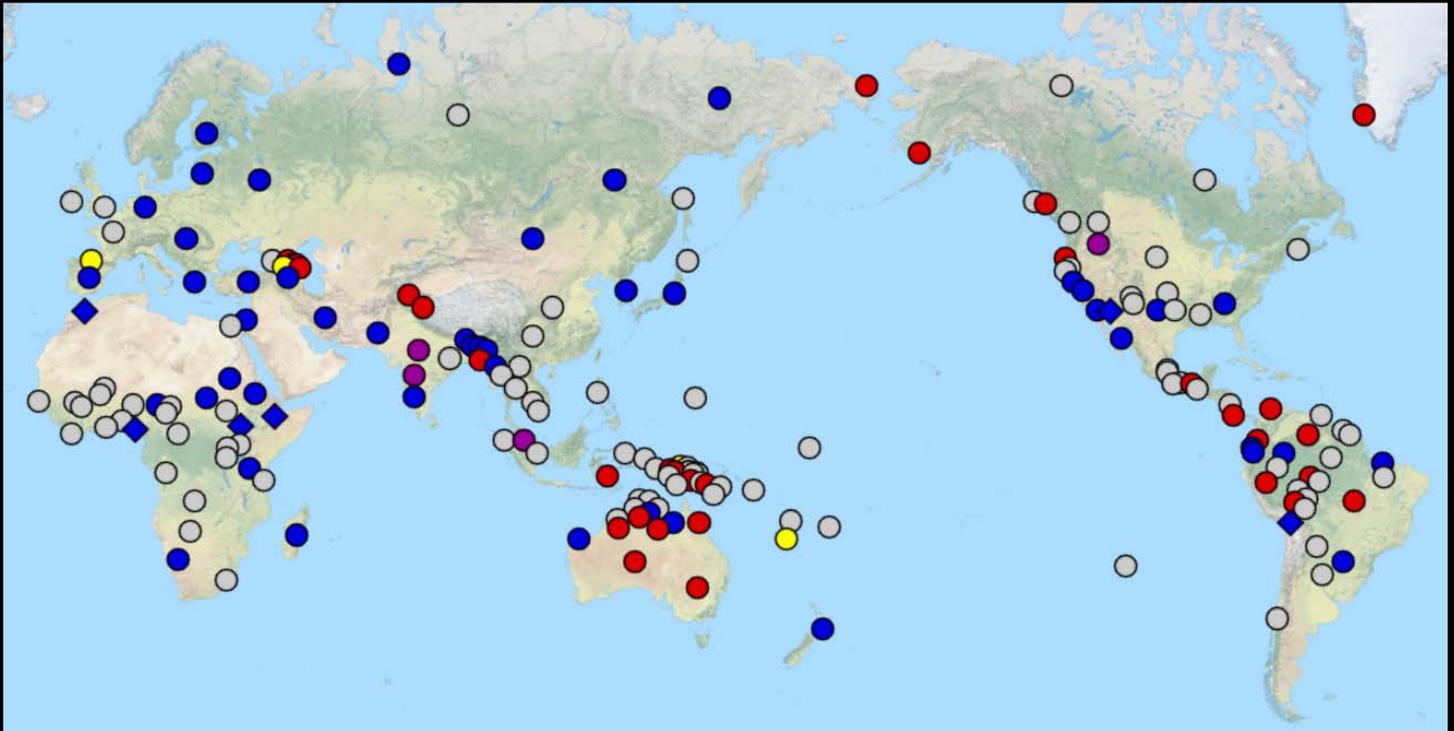


So in vowel quality inventory, Italian is ...

- Identical to English, German, the most extreme of all languages in sample.
- Completely different to Spanish, Latin, just on either side of mean (6).

QUALITATIVE OR QUANTITATIVE?

World Atlas of Language Structures — WALS — <http://wals.info>



Comrie (2013: WALS 98a): Alignment of Case Marking of Full Noun Phrases

PUTTING MEANINGFUL ‘NUMBERS’ ON LANGUAGE

But the main recurrent difficulty is that in many languages, different kinds of full noun phrases partake of different case marking patterns. For instance, in **Spanish** the accusative marker, the preposition *a*, is found (roughly) only with specific, animate noun phrases, so that strictly speaking a noun phrase like the male proper name *Juan* has a nominative–accusative case marking system, while the inanimate noun phrase *el libro* ‘the book’ has a neutral case marking system, as illustrated partially in (7).

(7) Spanish

a. *María vio a Juan.*

Mary see.AOR.3SG ACC John

‘Mary saw John.’

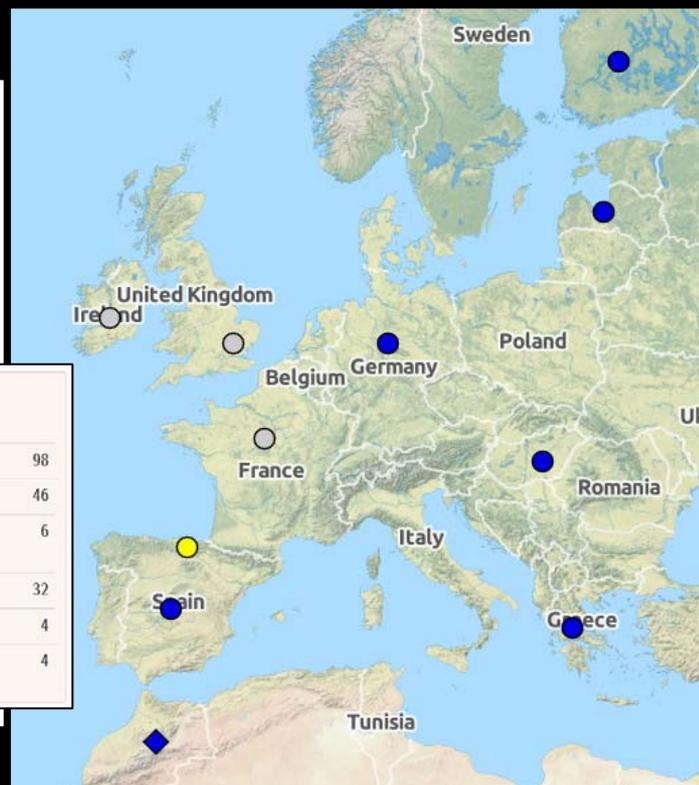
b. *María vio el libro.*

Mary see.AOR.3SG the book

‘Mary saw the book.’

Values

○ Neutral	98
● Nominative - accusative (standard)	46
◆ Nominative - accusative (marked nominative)	6
● Ergative - absolutive	32
● Tripartite	4
● Active-inactive	4



‘Qualitative’ justification ↑...

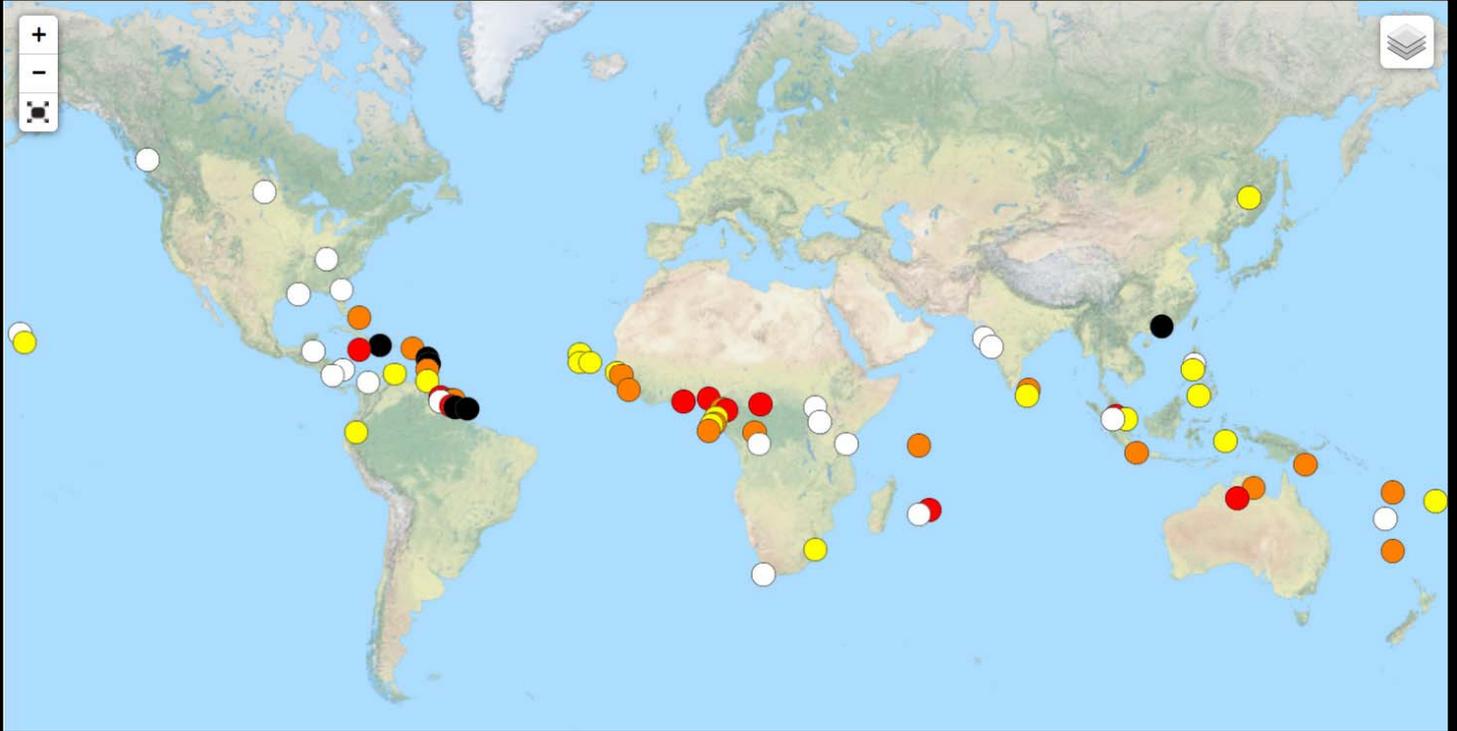
Comrie (2013: WALS 98a): Alignment of Case Marking of Full Noun Phrases

... but quantitative chaos:

A. The policy that has been followed in assigning such languages to types has been to maximize the occurrence of overt case marking. Thus, if a language has an optional accusative case marker, or one that occurs only under certain specified circumstances, then this has been given priority and taken as critical. This policy decision needs to be taken into account consistently in interpreting the maps. (For details on how decisions were taken for individual languages, reference should be made to the electronic version of this atlas.) Thus, Spanish and Burmese come out as accusative, Araona and Gooniyandi as ergative, and Hindi as tripartite.

- “Maximise ... priority ... critical.” Any = All. 1% = 100% 0.01 = 1.
– 0.01 is closer to 1 than to 0. 0.01 is 1.
- A meaningful representation of language data in numbers?
- An atlas for display purposes ... not a database for quantitative purposes.

QUALITATIVE OR QUANTITATIVE?



Atlas of Pidgin and Creole Language Structures — APiCS
www.apics-online.info — Haspelmath *et al.* (2013: APiCS 19)



THE ATLAS OF PIDGIN AND CREOLE LANGUAGE STRUCTURES ONLINE

Values

<input type="radio"/>	All simple words	22
<input checked="" type="radio"/>	One compound expression	18
<input checked="" type="radio"/>	Two compound expressions	17
<input checked="" type="radio"/>	Three compound expressions	10
<input checked="" type="radio"/>	Four compound expressions	7

Representation: 74

19 Interrogative pronouns

Here we look at the four interrogative pronouns 'who', 'where', 'when', and 'how' and ask whether they are expressed as simple, monomorphemic words as in the European lexifiers, or as compound expressions consisting of a generic noun and an adnominal interrogative word.

Compound interrogatives translate literally as 'which person', 'what place', 'what hour', 'what manner' or similar. From the first through the last value, languages show an increasing amount of compound expressions, and thus an increasing degree of distance from the European lexifiers.

Two languages A and B, entirely opposite values on all four data points:

• Language A: who where [what time] [what way] =

• Language B: [what person] [what place] when how =

→ Languages A and B = 'two compound expressions' = **orange**, identical.

QUALITATIVE OR QUANTITATIVE?

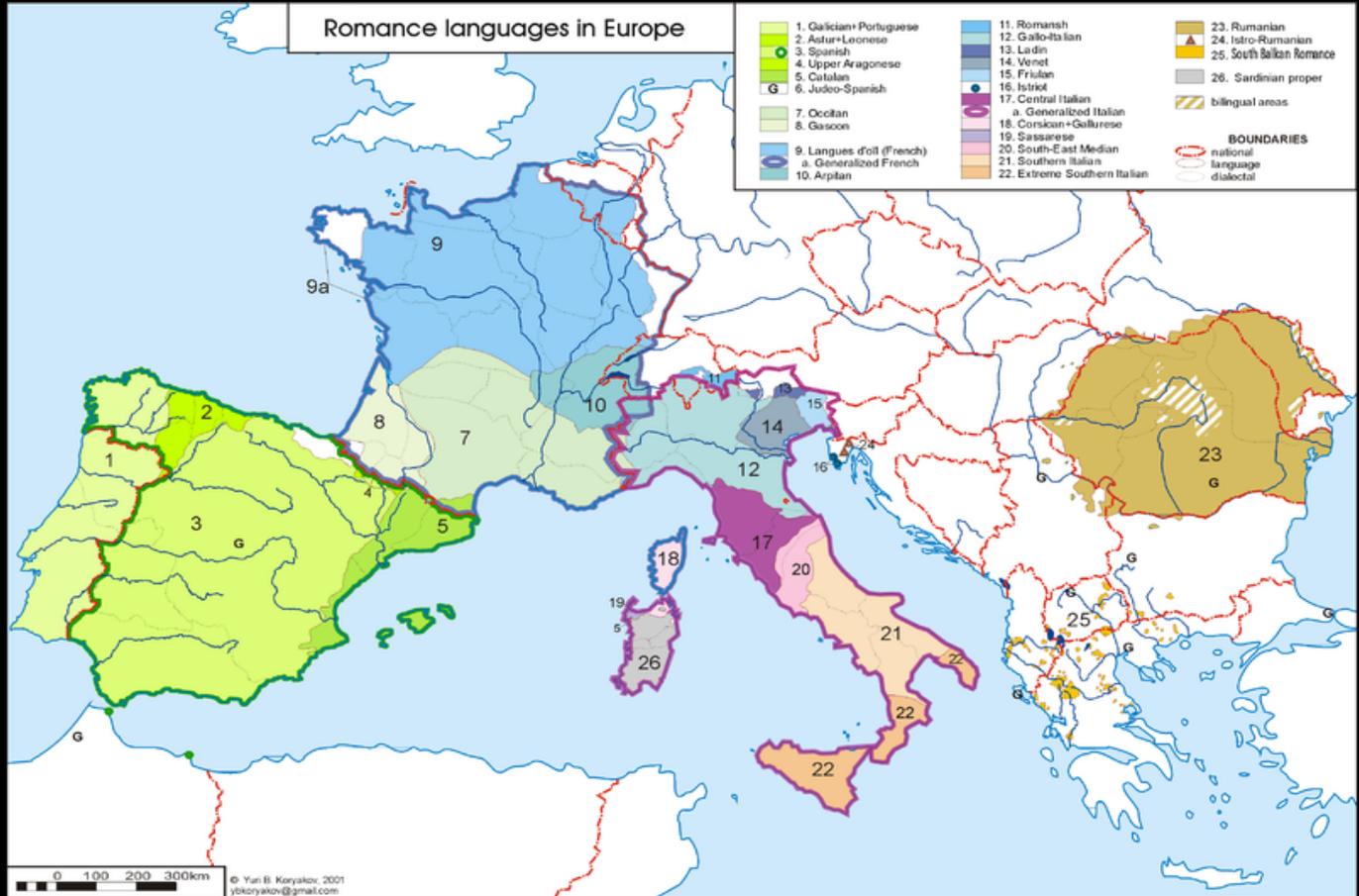
Other problems with WALS for reference, quantitative purposes ...

- **Classification into WALS 'families':**
 - e.g. *Khoisan, *Altaic, *Australian, *Nilo-Saharan, etc...
 - Very controversial, non-entities, faces in the fire?
- **Coverage:**
 - **Sparse:** on average, c. 200 languages per feature = under 3%.
 - **Inconsistent:** languages covered varies widely from feature to feature.

WHY LINGUISTIC DIVERSITY?

WHAT SHAPED LINGUISTIC PATTERNS?

DADDY, WHERE DO LANGUAGE FAMILIES COME FROM?



HOW TO START A FAMILY? A BIT OF ROMANCE ...

Time

SOUND CHANGES IN VARIOUS REGIONS

Geographical Space

(in approximate order)

← Bucharest Florence Lisbon Madrid Barcelona Paris →

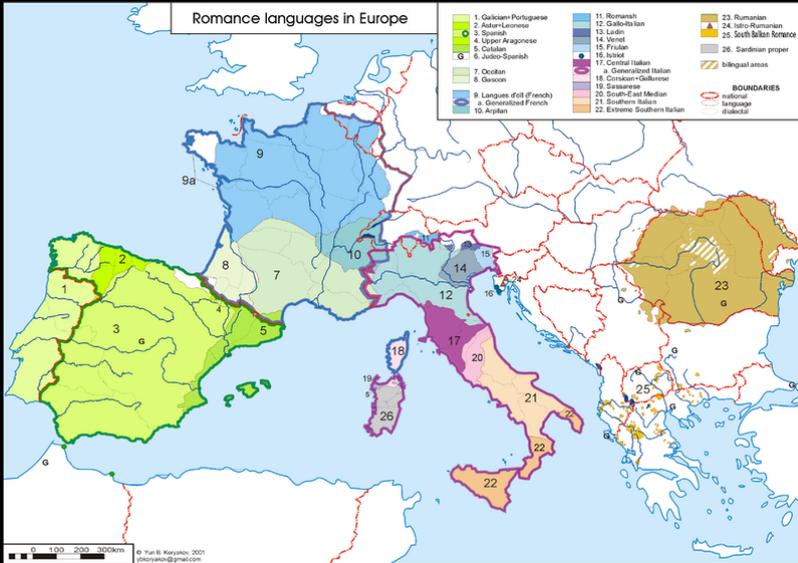
INPUT: The *same* original form in all regions

[sɛptɛm] [sɛptɛm] [sɛptɛm] [sɛptɛm] [sɛptɛm] [sɛptɛm]

1	final [m] is lost completely (via a nasal vowel [sɛptɛ̃])	[sɛptɛ]	[sɛptɛ]	[sɛptɛ]	[sɛptɛ]	[sɛptɛ]	[sɛptɛ]
2	final [ɛ] changes to [e] (knock-on adjustment at end of syll.)	[sɛpte]	[sɛpte]	[sɛpte]	[sɛpte]	[sɛpte]	[sɛpte]
3	[p] → [t] before following [t] (assimilation)	–	[sɛtte]	[sɛtte]	[sɛtte]	[sɛtte]	[sɛtte]
4	[tt] changes to [t] (simplification of geminate)	–	–	[sɛte]	[sɛte]	[sɛte]	[sɛte]
5	first [e] changes to [ɛ] (knock-on adjustment at end of syll.)	–	–	–	[sɛte]	–	–
6	first [ɛ] becomes [jɛ] (diphthongisation)	–	–	–	[sjɛte]	–	–
7	[s] changes to [ʃ] (anticipating the high front vowel [ɛ]?)	[ʃɛpte]	–	–	–	–	–
8	first [ɛ] becomes [a] (vowel lowering)	[ʃapte]	–	–	–	–	–
9	final [ɛ] → [ə] ('relaxed' in unstressed position)	[ʃaptə]	–	[sɛtə]	–	[sɛtə]	[sɛtə]
10	final [ɛ] is devoiced ('whispered')	–	–	[sɛt̚]	–	[sɛt̚]	[sɛt̚]
11	final [ɛ] is lost completely	–	–	–	–	[sɛt]	[sɛt]
	OUTPUT: <i>different</i> descendant forms from one region to	[ʃaptə]	[sɛtte]	[sɛt̚]	[sjɛte]	[sɛt]	[sɛt]

WHAT DO LANGUAGE FAMILIES MEAN?

TODAY



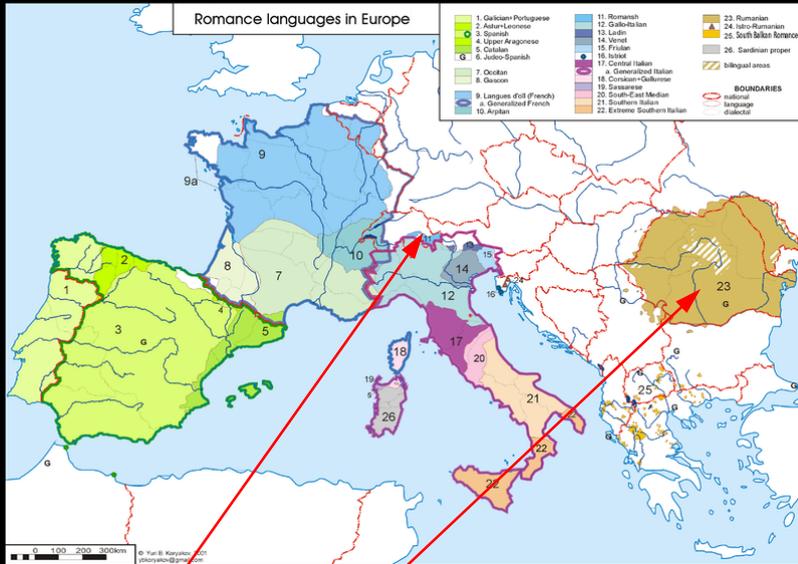
IRON AGE



But why me?

Language families do not happen by chance, for no reason.

TALKING 'IN ROMAN': ROMAN(I)CĒ ...

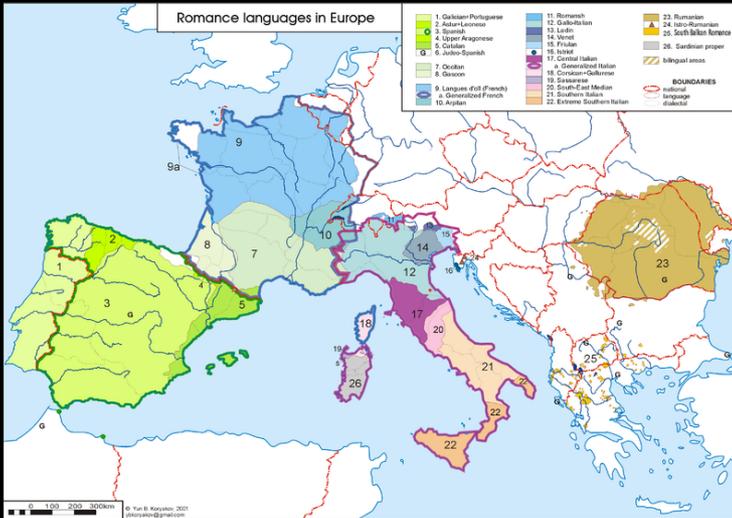


- Romansch, Romanian, 'Romance' languages ... = 'Neo-Latin'.

(N.B. All Roman ... but not all Romance: language clues to the past.)

PRINCIPLE: LINGUISTIC EFFECTS ← REAL-WORLD CAUSES

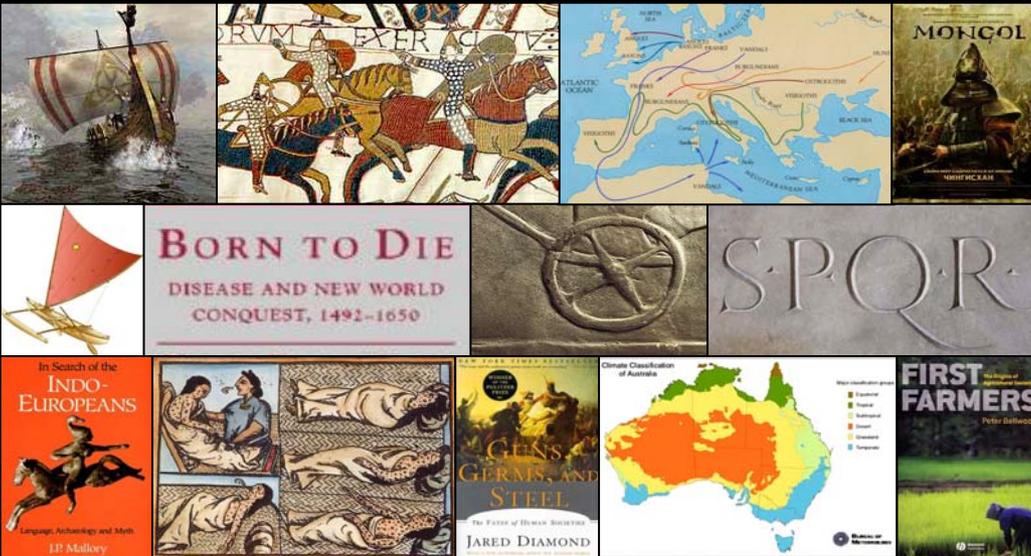
Heggarty & Renfrew (2014: 19-21)



Language families only exist because of powerful expansive processes.

[= Linguistic evidence of past processes impacting on populations and cultures.]

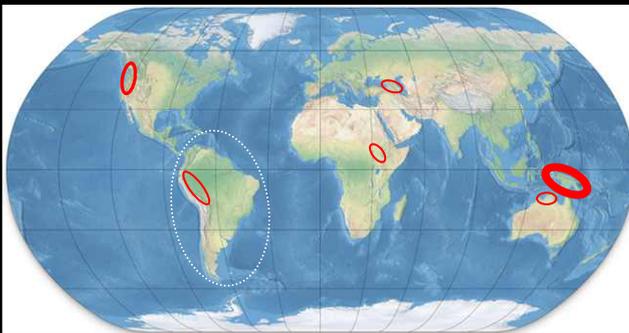
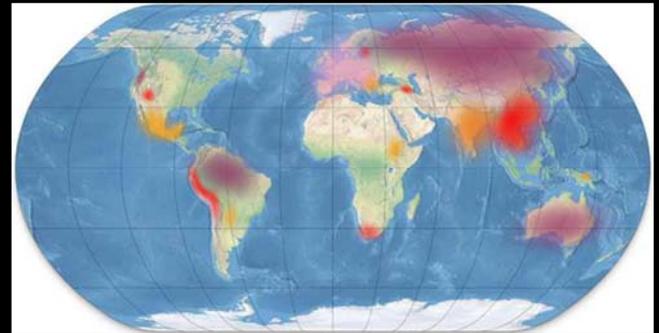
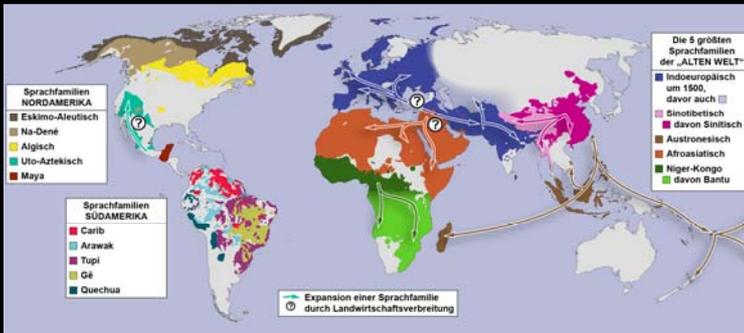
EXPANSIVE PROCESSES: BUT WHICH?



Demographic. Subsistence. Economic. Technological. Political. Socio-cultural.

NOT JUST FAMILIES ...

Traditional 'family preference', but ...



.... linguistics has far more to say on human origins and interactions.

On all other 'diversity dimensions' of linguistic panorama.

DIFFERENT EFFECTS ← DIFFERENT CAUSES

General principle, applies to patterns in all dimensions of linguistic panorama.

Heggarty & Renfrew (2014: 21-24); Heggarty (2014)

LANGUAGE FAMILIES

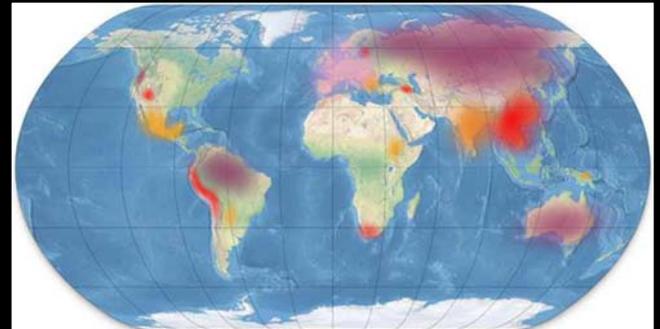
← expansive, divergent processes



Clear-cut: Member of family, yes or no?

LANGUAGE AREAS

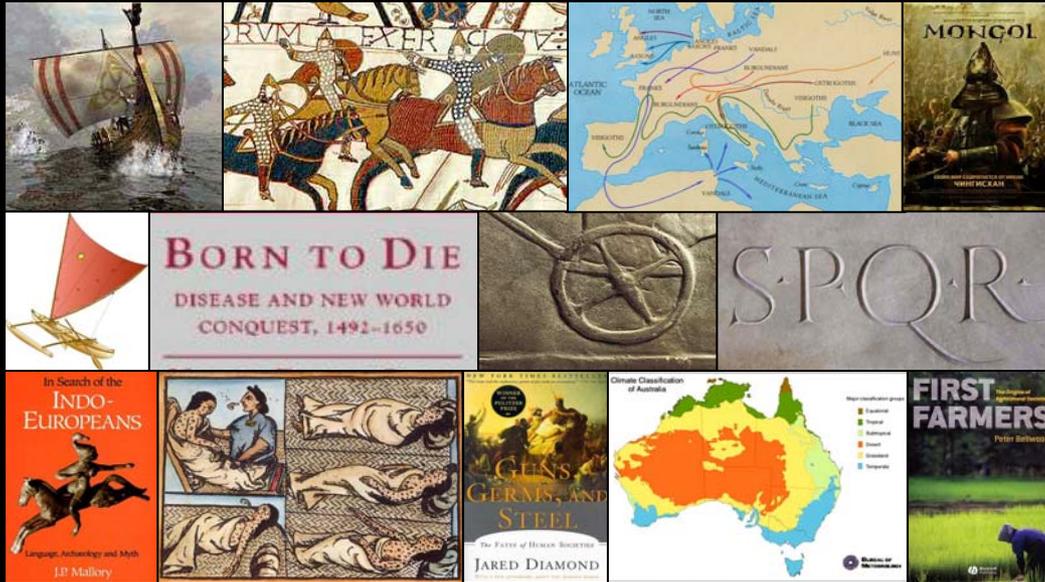
← convergent processes.



Diffuse: core vs. peripheral members.

WHICH PROCESSES — WHICH LINGUISTIC EFFECTS?

'Family preference': all processes explain only families, divergence?

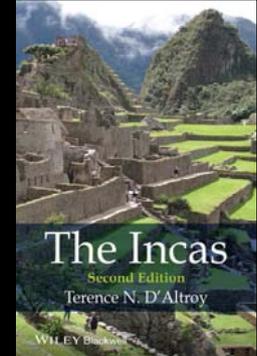


No prehistory of linguistic convergence areas, of diversity hotspots.

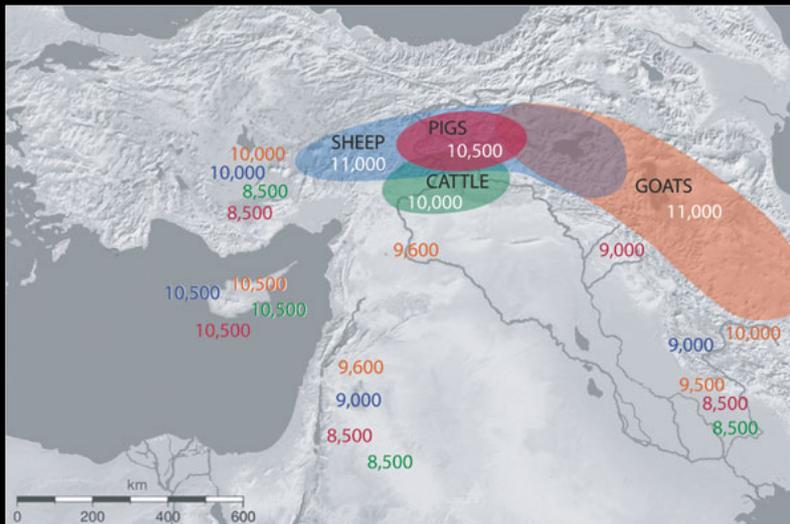
Some processes / contexts invoked for (divergent) families
are in fact a more natural explanation for convergent areas instead...

ARCHAEOLOGICAL PATTERNS: CORE VS. PERIPHERY

- D'Altroy (2014: 9) *The Incas* — on theories of empires:
Over the last few decades, the most widely used approach in anthropology and history divides empires into their core and periphery.



NEOLITHIC ANIMAL DOMESTICATES



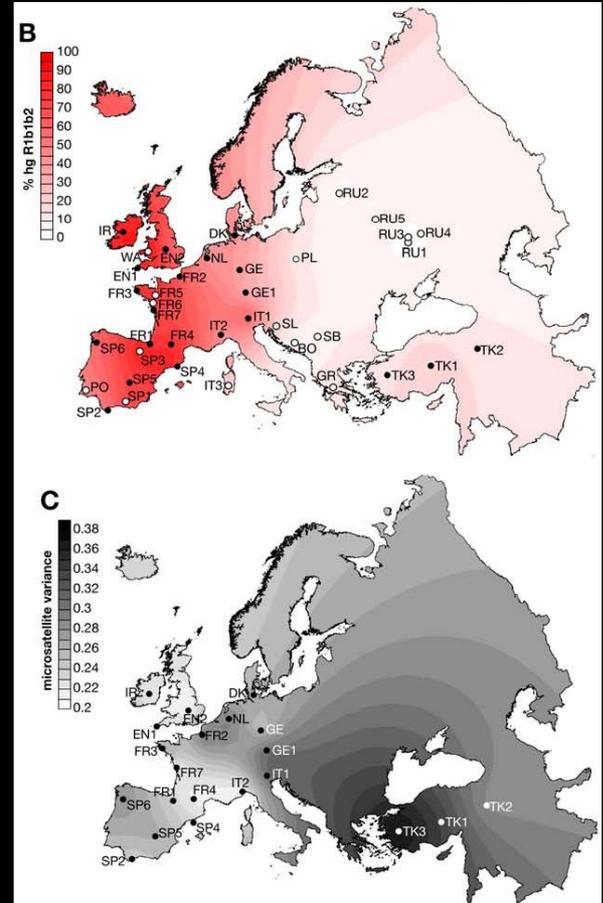
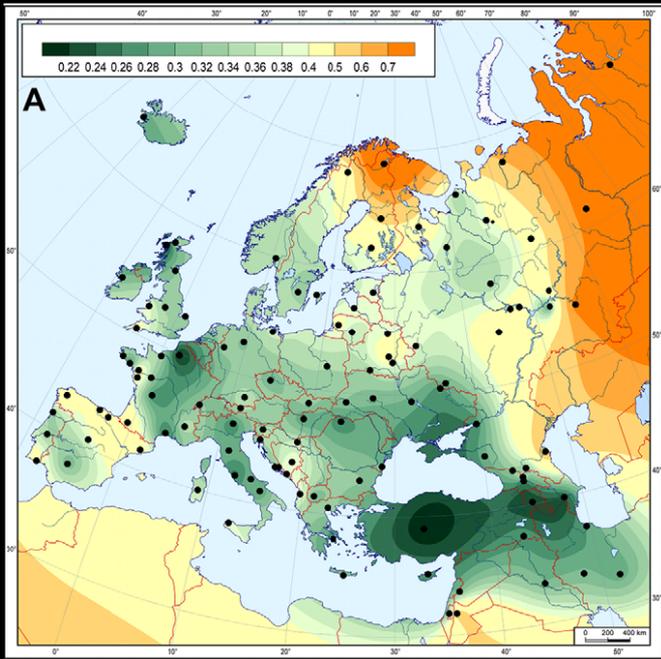
GOthic ARCHITECTURE!



GENETIC PATTERNS: CLINES AND DIFFUSION

Balaresque *et al.* (2010)

[Paternal lineage — modern DNA] →



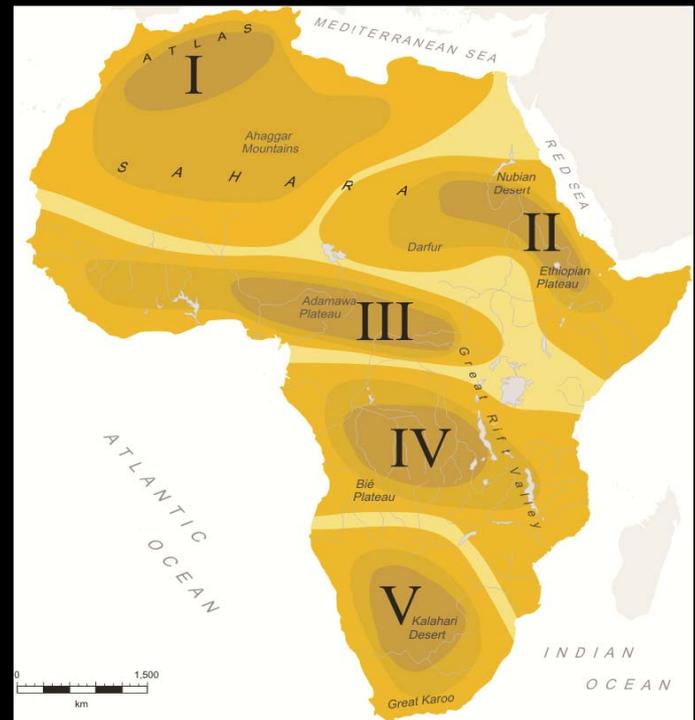
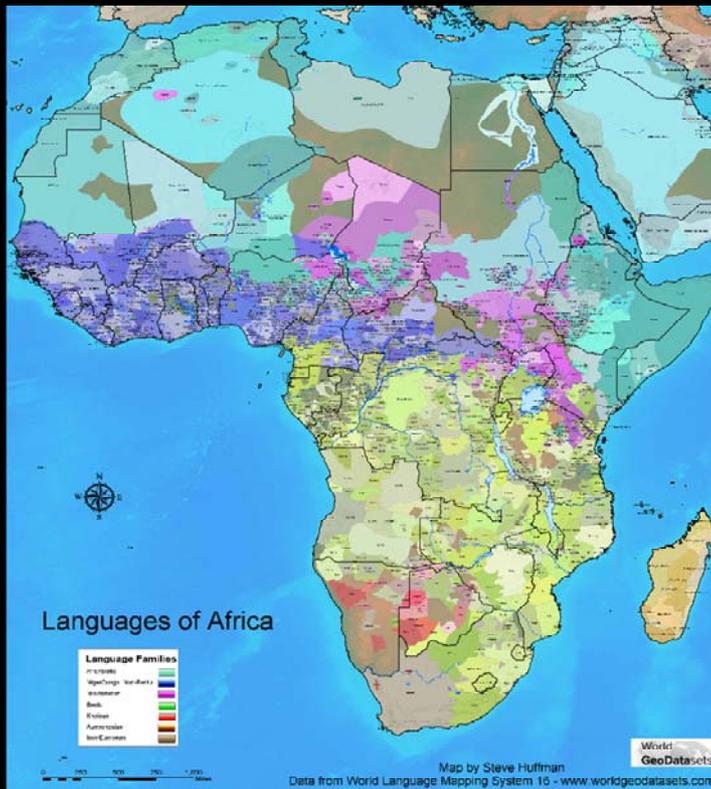
↑ Haak *et al.* (2010) [Maternal lineage — ancient vs. modern DNA]

HOW THE PATTERNS RELATE...

FAMILIES AND 'ANTI-FAMILIES'?

PATTERNS ON DIFFERENT DIMENSIONS: OVERLAPS & CONTRASTS

DIVERGENT LANGUAGE FAMILIES ... LANGUAGE CONVERGENCE AREAS

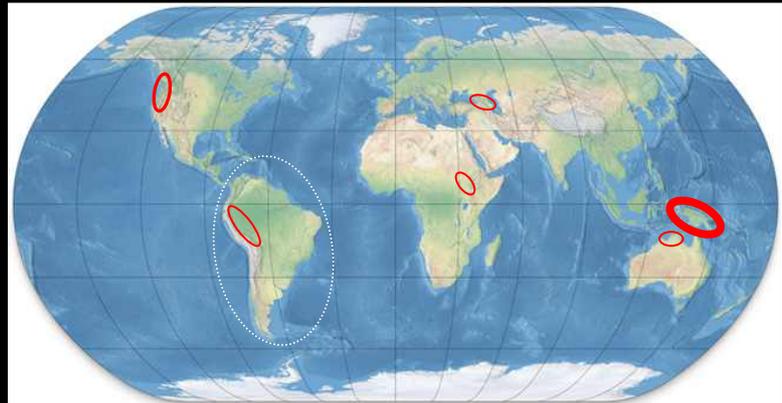
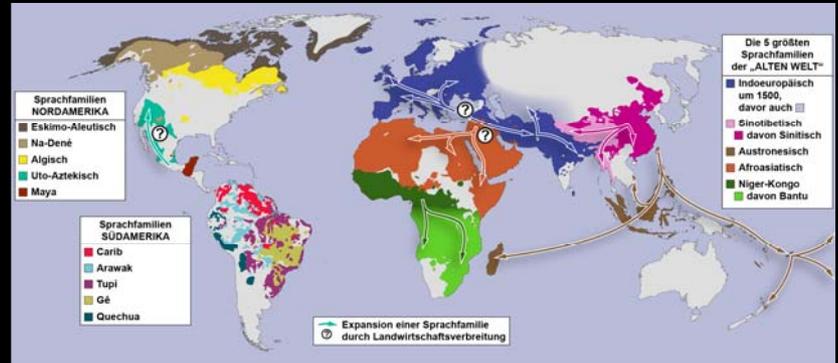


↑ Güldemann (2010):

“Sprachraum” and geography: linguistic macro-areas in Africa

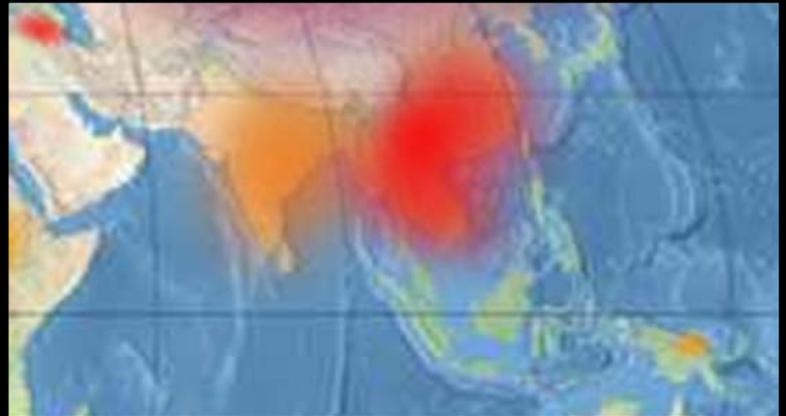
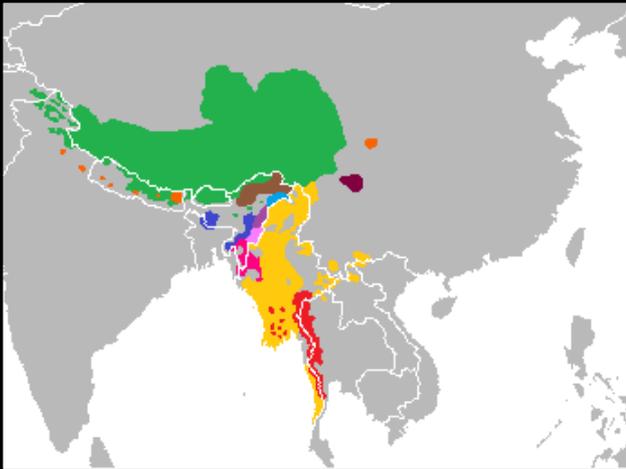
COMPLEMENTARY DISTRIBUTION: FAMILIES VS. DIVERSITY HOTSPOTS

- Old World vs. New?
- Background diversity arisen since first settlement.
- ‘Neolithic Revolution’:
→ Farming/language dispersals?
- Diversity hotspots?
= Where the great families just didn't reach?
- (But many complexities ...)



ONE FAMILY, MORE THAN ONE AREA: TIBETO-BURMAN

- One family, straddled over two contrasting convergence areas:
 - Matisoff's (1990: 113) "Sinosphere" vs. "Indosphere".



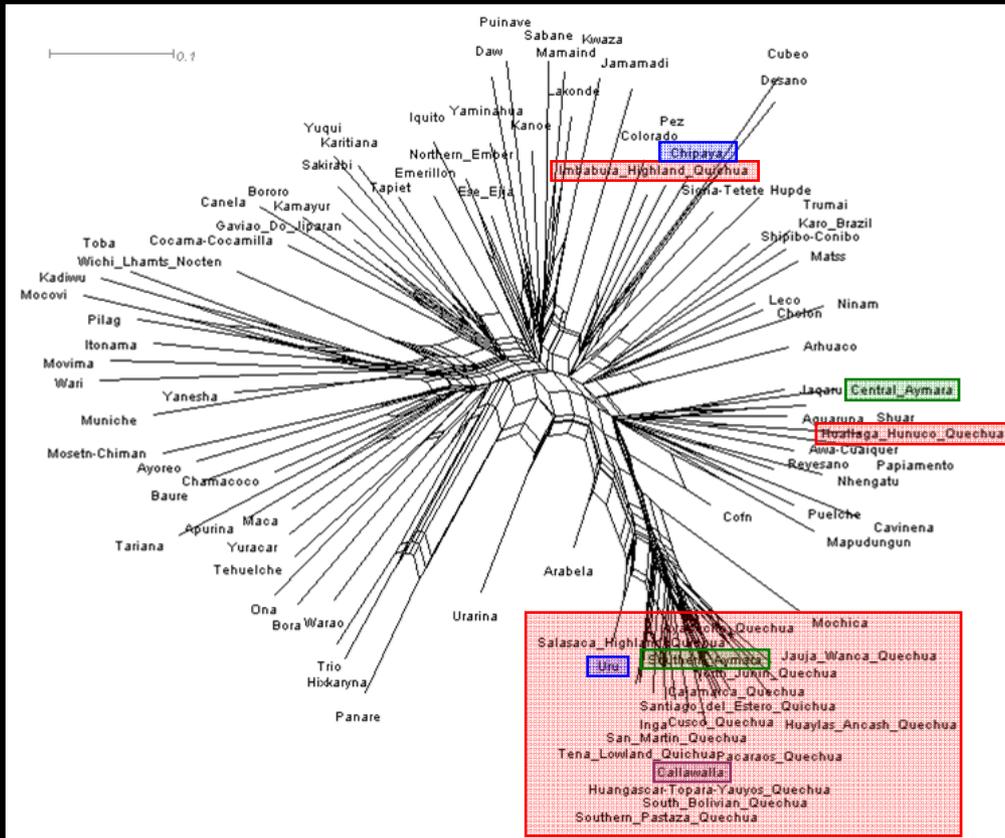
- Tibeto-Burman languages diverge:
 - Some to Sinosphere ... others to Indosphere characteristics.

ONE AREA, MORE THAN ONE FAMILY: 'BALKANISATION'



Change towards the characteristics of the area
= change away from related languages not in the area.

HOW AREAL CONVERGENCE CREATES FAMILY DIVERGENCE



Muysken *et al.* "Traces of Contact" Project

Structural features: subordination, argument marking, noun phrase, TAME

FAMILY VS. CONVERGENCE? A CASE-STUDY

- Some isolates + several small families, widely (but thinly) spread:
 - Uralic, Turkic, Mongolic, Tungusic.



‘Altaic’: divergent macro-family — or convergence area?

PATTERNS AND CAUSATION

- CORE VS. PERIPHERY
Altai vs. Uralic, Korean, Japanese.
= Typical of convergence areas.
- ‘Mobility’, nomadism, very low population density ...
→ Family expansions, divergence, ‘spread zone’?
Or → Intense long-range contact → convergence (Steppe ‘confederations’).



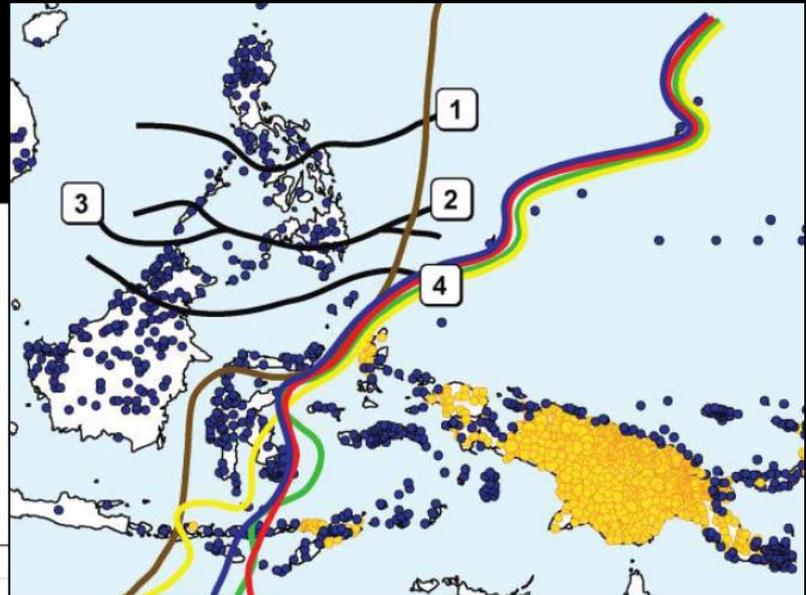
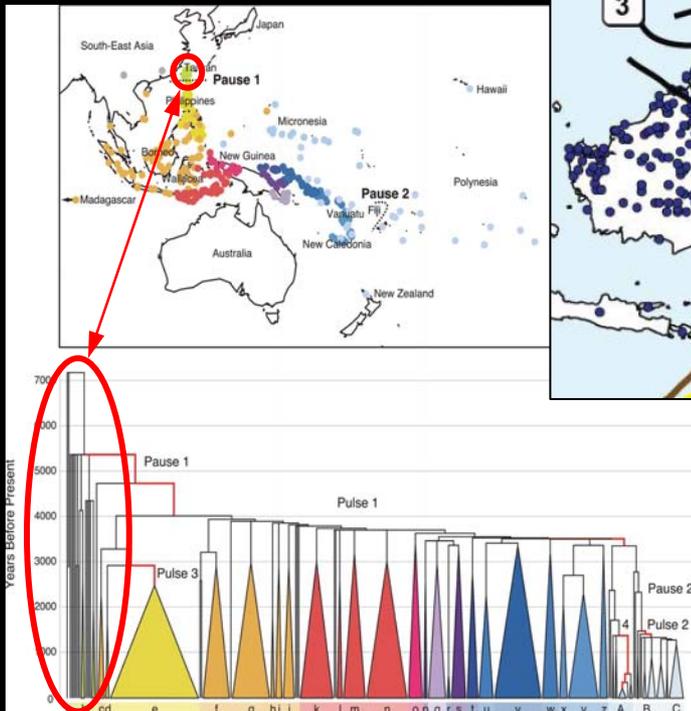
☒ A diverging ‘Altaic’ family.

☑ A North Eurasian convergence area.

LANGUAGE STRUCTURES AND THE HOLY GRAIL

- 'Ultra-stable' structures / parameters → reveal deepest families, prehistory?

↓ Phylogeny of Austronesian
Gray *et al.* (2009) ↓



↑ Structural isoglosses
within Austronesian
Donohue & Denham (2010)

MASS LANGUAGE SHIFT: STRUCTURES MORE STABLE THAN FAMILIES

- The same deep structural features:
 - Resistant to internal change:
 - genealogically **most stable** — but only if transmission is vertical!
 - Resistant even through language shift, carried over into new language:
 - genealogically **least stable** in mass language shift.
- = ‘Stable’ in speaker population, even when they switch lineage.
- Features so structurally stable ... they are ‘genealogically unstable’!
 - **Less diagnostic** of deep genealogy than ‘Austronesian’ lexis!

HOW TO WORK IT ALL OUT?

QUALITATIVE + QUANTITATIVE: 'GLOTTOBANK'?

New databases: world-scale, and specifically for quantitative applications...

- Grambank Harald Hammarström
 - Lexibank Simon Greenhill & Russell Gray
 - Phonobank Mattis List
 - IElex and URAlex Michael Dunn
 - Paradigms and deep signal Nick Evans
-
- New models: constantly refined to get closer to how languages really work.
 - New co-operation: with ancient DNA, archaeological science...

WHAT PLACE FOR LINGUISTICS IN THE 'SCIENCE OF HUMAN HISTORY'?



MAX PLANCK INSTITUTE FOR
THE SCIENCE OF HUMAN HISTORY

NEWS | ARCHAEOGENETICS | LINGUISTIC AND CULTURAL EVOLUTION | SERVICE

Some papers on these themes:

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