Articles are inversely correlated with case in Indo-European

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Introduction

“The typological revolution” in IE (Hewson and Bubeník 2006)

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- Rich morphology → analytic structure
- Case-marking → adpositions and syntax

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- Others have denied the relationship by pointing out counterexamples and questioning its motivation (Wood 2003, p. 74; Barðdal 2009, p. 131; Börjars et al. 2016, e31)

Two distinct questions

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- Causal relationship

  Does the reduction in case inventory **cause** the grammaticalization of definite articles?

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- Nepali (Indic) has neither case nor articles
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- Not clear from these observations alone if it's probabilistic

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- **Methodological mismatch**

  Estimating probabilistic relationships requires statistical methods (Evans and Levinson 2009, p. 439; Ladd et al. 2015, p. 223)

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2. Does the evidence support a statistical association between case inventory and the presence of an indefinite article in Indo-European?
3. Is there are also a statistical association between definite and indefinite articles?
4. If there is a statistical association between case inventory and articles, is it a causal relationship?

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2. The association is **not** between articles and absence of case: as cases are lost, the probability of articles increases
3. The correlation between definite and indefinite articles is upheld even when controlling for case inventory
4. The question of causation has not been properly understood and remains open

Roadmap

1. Case and articles in Indo-European

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Case and articles in Indo-European

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- Case inventories generally decrease over time
- There are exceptions to this general trend (e.g., Old Lithuanian; Kulikov 2012, pp. 295–296; Kim 2012, p. 125)

Article inventories in Indo-European

(3) Russian

krasivyj novyj derevjannyj **dom**
beautiful.NOM.SG new.NOM.SG wooden.NOM.SG house.NOM.SG

'**a**/**the** beautiful new wood **house**' (Bailyn 2012, p. 45)

(4) Old Irish

a. **in** macc
DEF boy
'**the** boy'

b. macc
boy
'**a** boy'

(5) Persian

a. ketab
book
'The book'

b. ketab-**i**
book-INDEF
'**A** book'

(6) English

a. **the** farmer

b. **a** farmer

The history of articles in Indo-European (Goldstein 2022)

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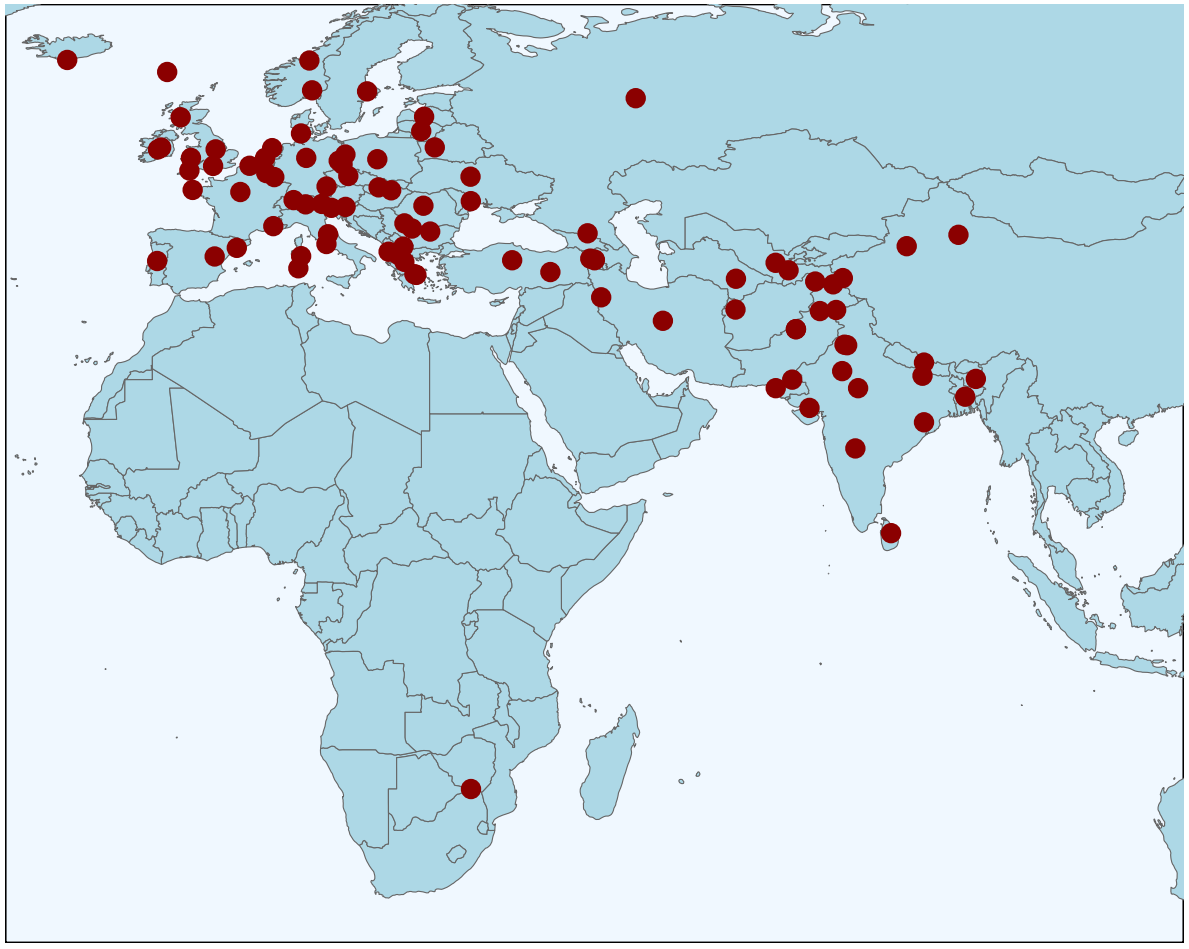
- They are thus a relatively recent trait and not reconstructed to Proto-Indo-European
- In languages with both definite and indefinite articles, definite articles emerge first where we have evidence (e.g., Greek, Armenian, Germanic)
- No evidence for loss of articles in my study group

Data

Geographic distribution of sampled languages ($N = 94$)



Measurement criteria for case

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4. Vocatives excluded
5. Variation in case exponence is ignored

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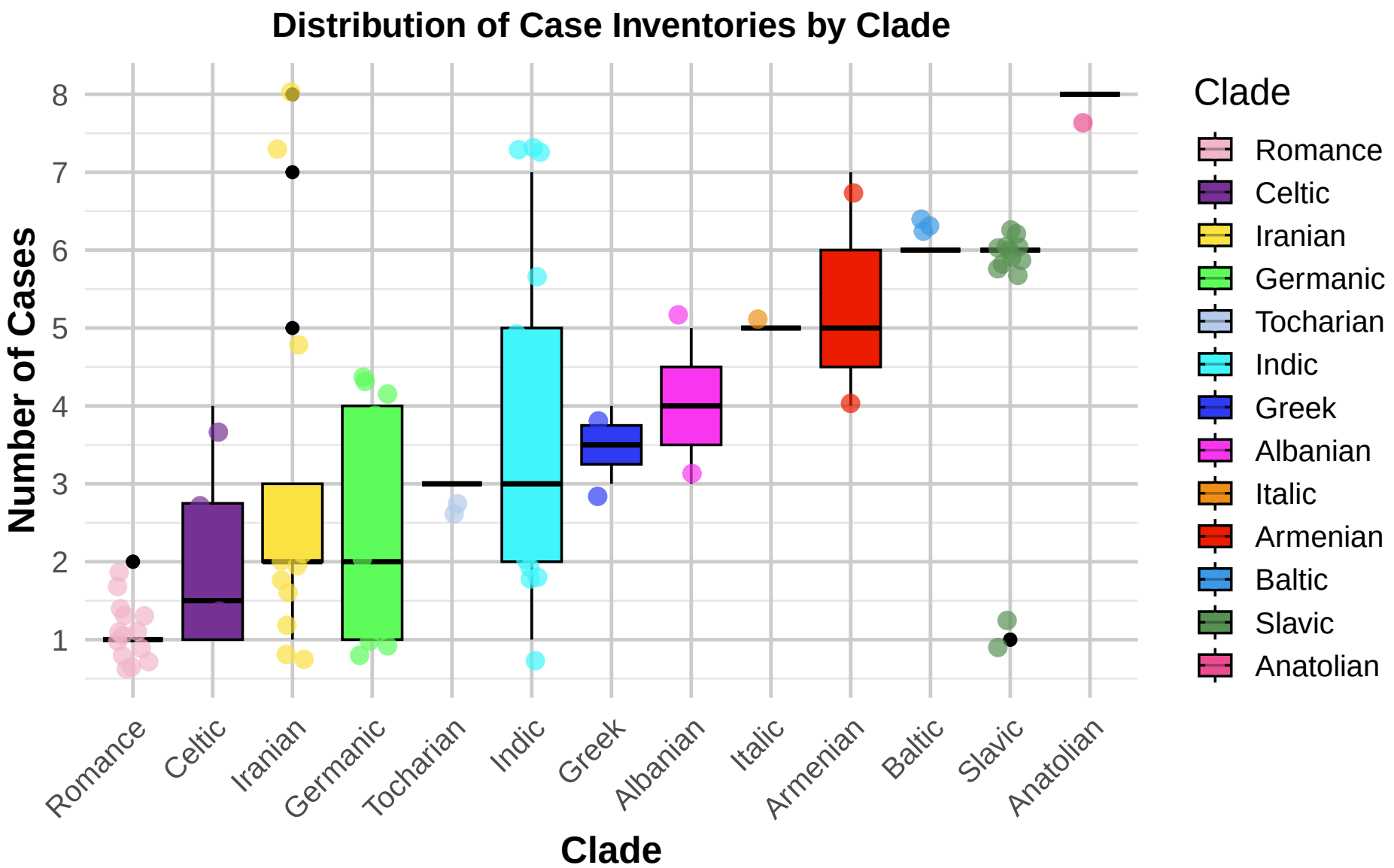
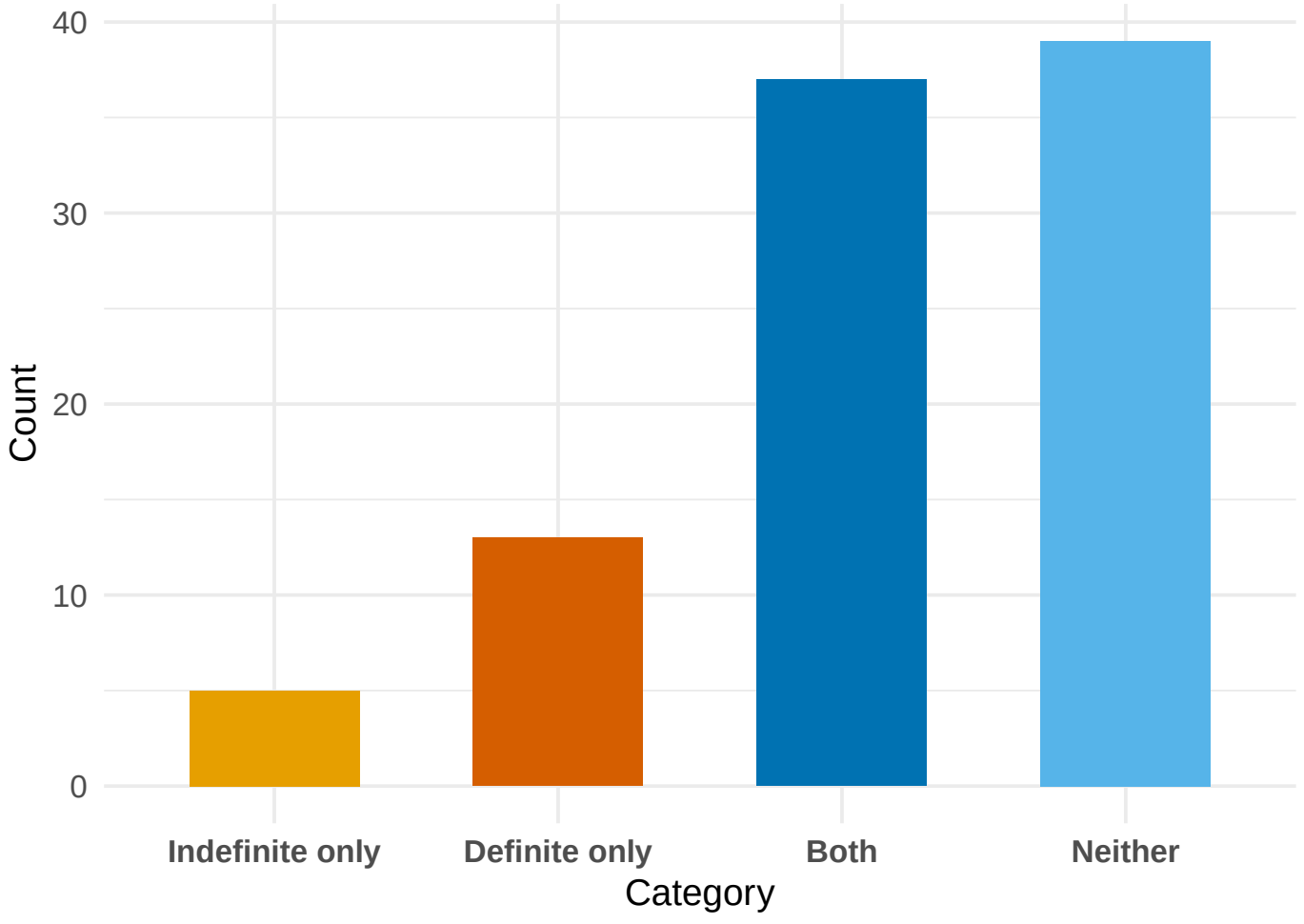
- This approach to measuring case inventories essentially counts the number of rows in nominal paradigms
- The lower bound for case inventories is therefore 1—not 0
- Counting this away avoids the discontinuity 0, 2, 3, ...

Phylogenetic distribution of case inventories



Frequency distribution of article inventories



Methods

Description of model

- Two Bayesian logistic regression submodels with Gaussian processes for spatial and phylogenetic autocorrelation (Guzmán Naranjo and Becker 2021; Guzmán Naranjo and Mertner 2022)

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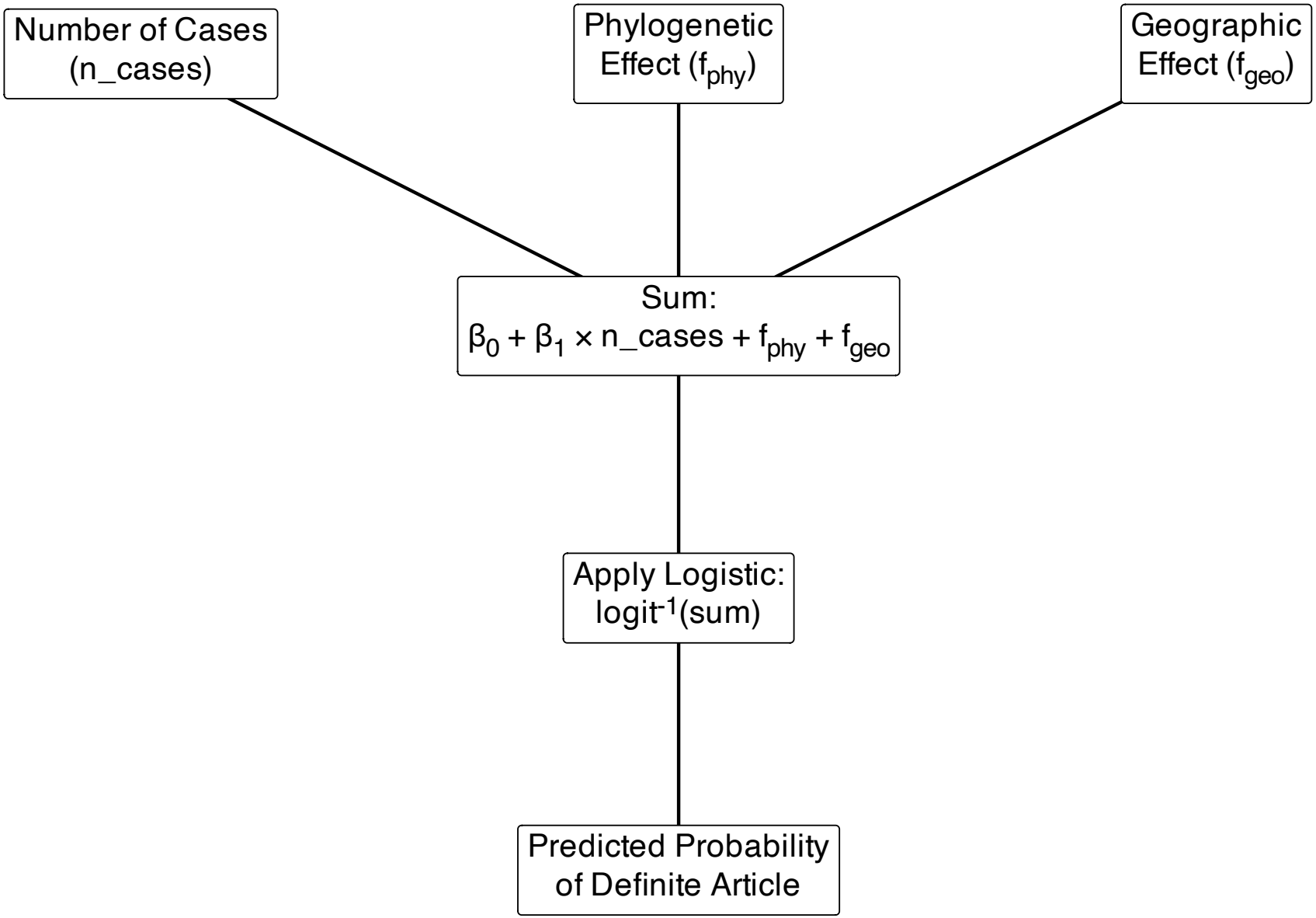
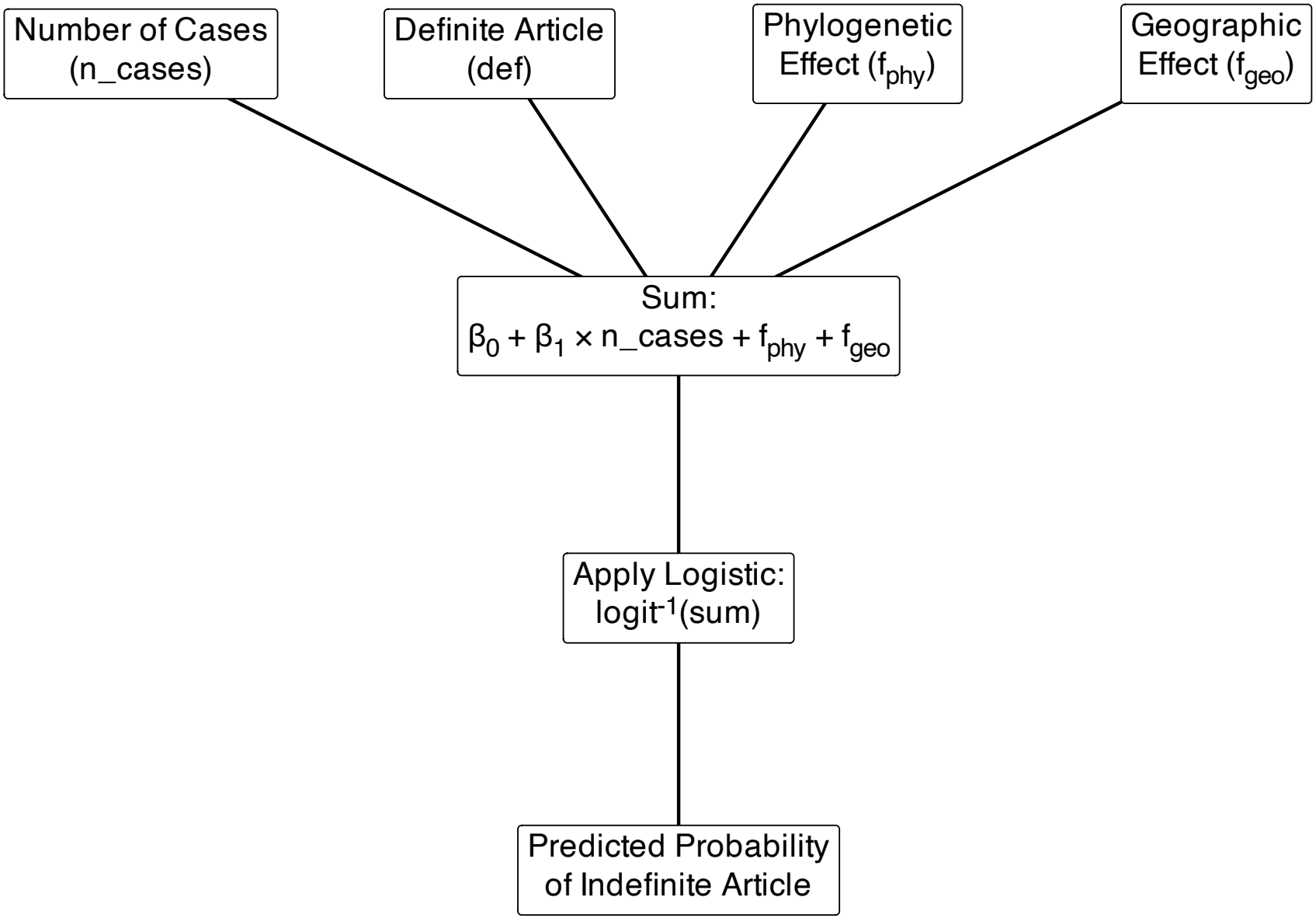
- Stan and `cmdstanr`

Definite submodel

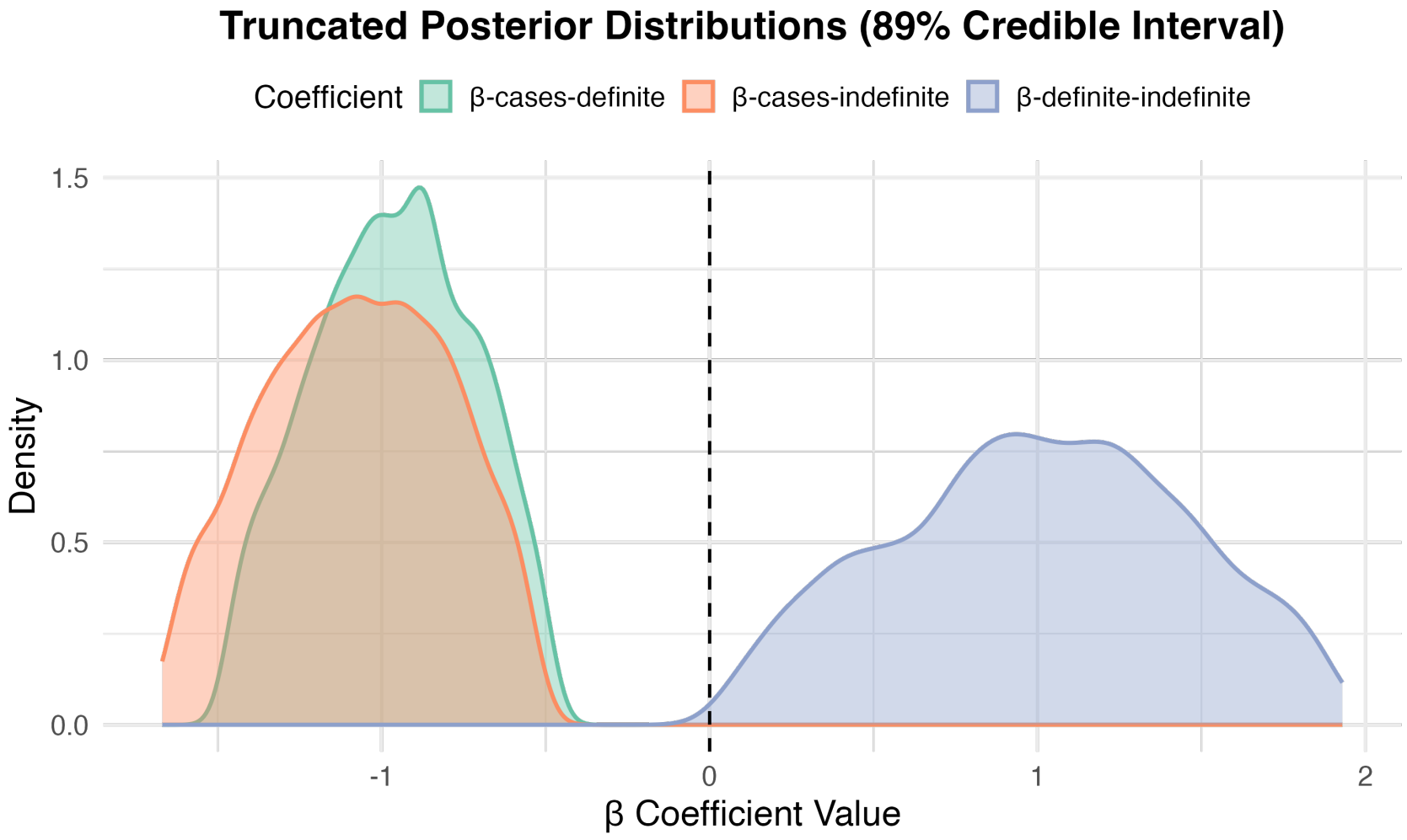


Indefinite submodel

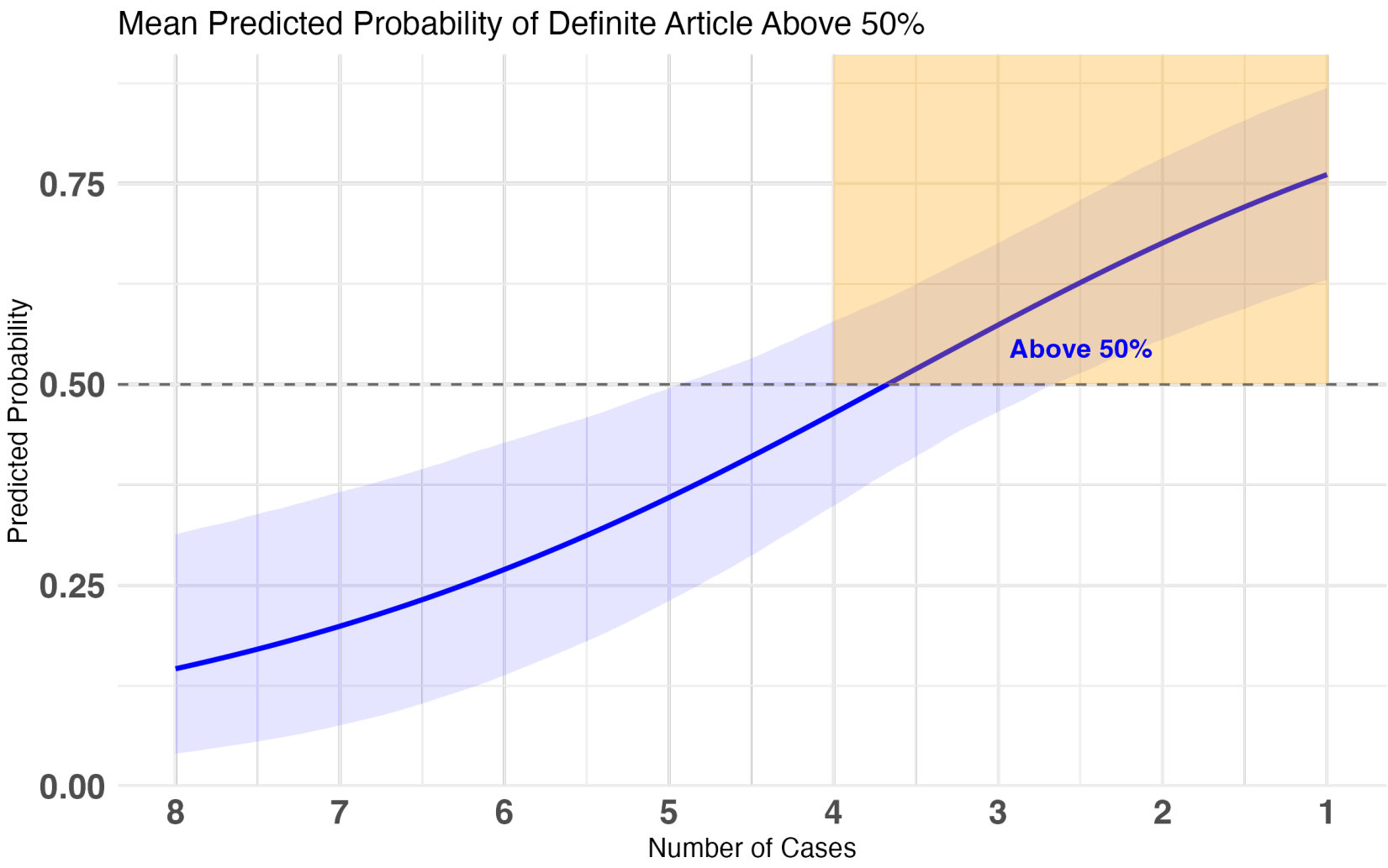


Results

Posterior distributions of predictor variables



Posterior predictive distribution: Definite article



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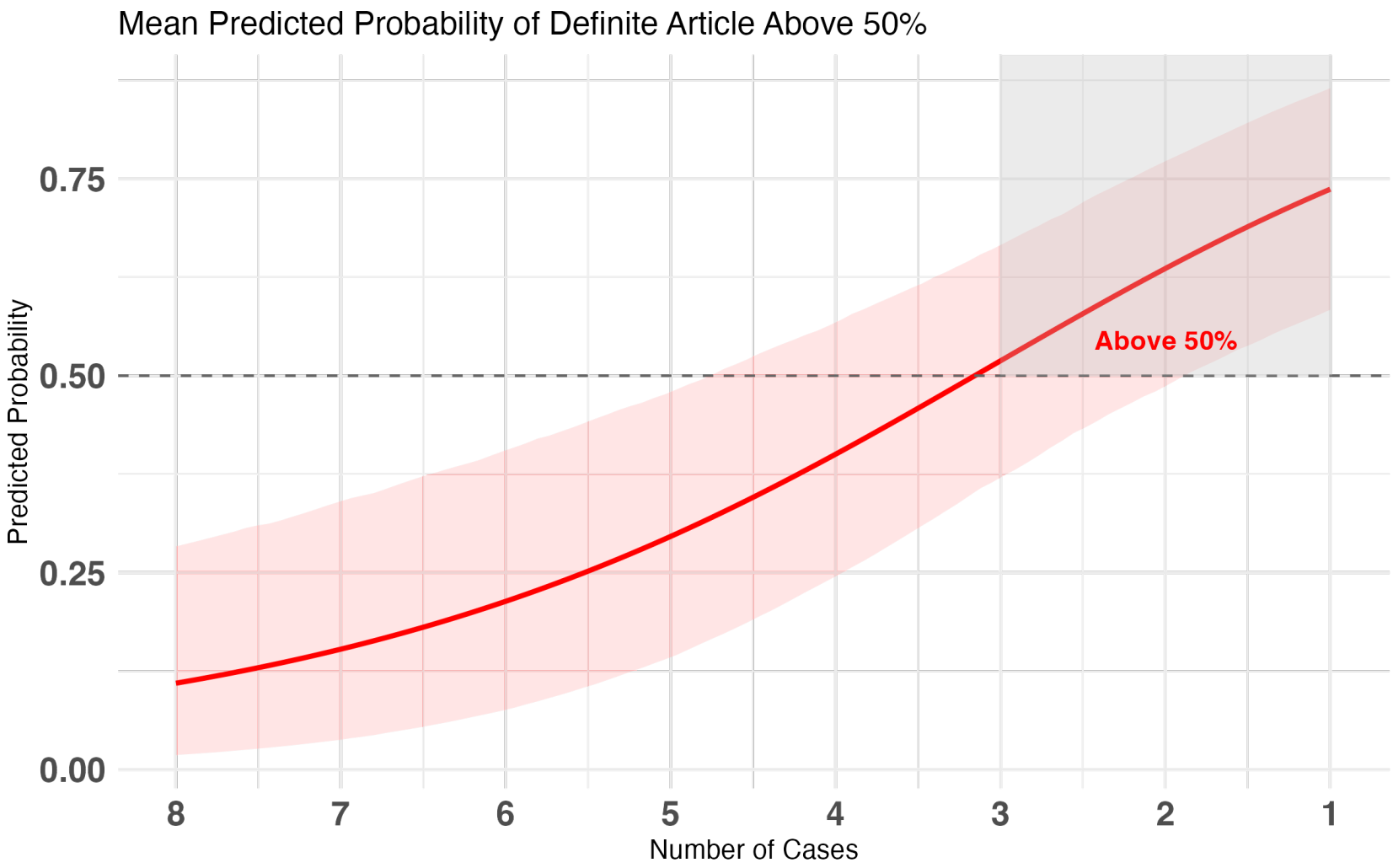

Discussion

Blake's case hierarchy (Blake 2001, p. 89)

- Nominative » Accusative/Ergative » Genitive » Dative » Locative » Ablative/Instrumental » Others

Blake's case hierarchy (Blake 2001, p. 89)

- Core: Nominative » Accusative/Ergative » Genitive » Dative

Blake's case hierarchy (Blake 2001, p. 89)

- Peripheral: Locative » Ablative/Instrumental » Others

Reframing the generalization

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- As the number of cases within the core class diminishes, the probability of articles increases

Is the relationship between case and articles causal?

A compensatory account

With the repurposing of the demonstrative as the article, Old High German developed a very simple means of addressing the collapse of case distinctions: the task that the case ending could no longer reliably fulfill was taken over by the demonstrative, which was thereby transformed into the definite article. The task assigned to it by the grammatical system has proven to be one that it has successfully managed to this day! (Tschirch 1975, p. 175, my trans.)

Theoretical accounts

- Various theoretical proposals try to make articles and case realization of the same underlying category or grammatical function (e.g., Giusti 1995; Martin et al. 2021)

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- The relationship is **cumulative**, however: the fewer cases a language has, the more likely it is to have articles

Motivation for a causal account

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- Genitive/partitive case can be used to signal indefiniteness (Philippi 1997; Kiparsky 1998)
- Case loss thought to impact other aspects of syntax (Dragomirescu and Nicolae 2016, p. 911)

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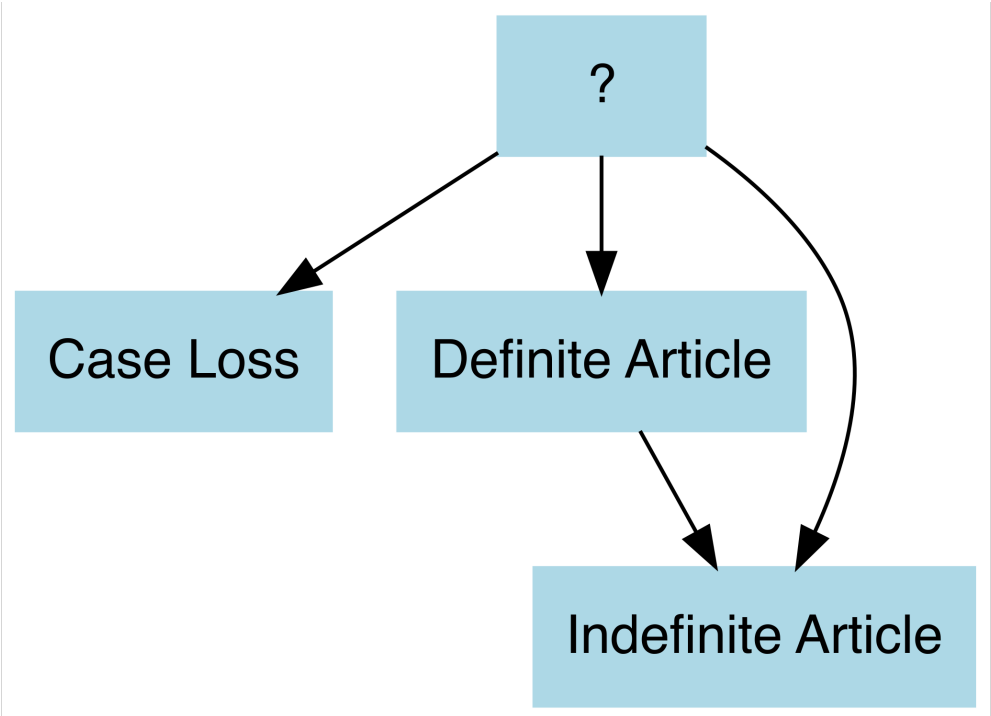
- How to rule out other scenarios?

Indirect causal effect?

Unobserved confounder?



Final thoughts

Summary

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- Evidence from Indo-European provides robust support for the statistical association between nominal case and articles
- Articles become more likely as languages lose case markers, in particular after they've lost peripheral cases
- The question of causation remains open as does the import of the association between case and articles for linguistic theory

Future work

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- Confounders: What happens if we include other predictor variables (such as word order and aspect)?

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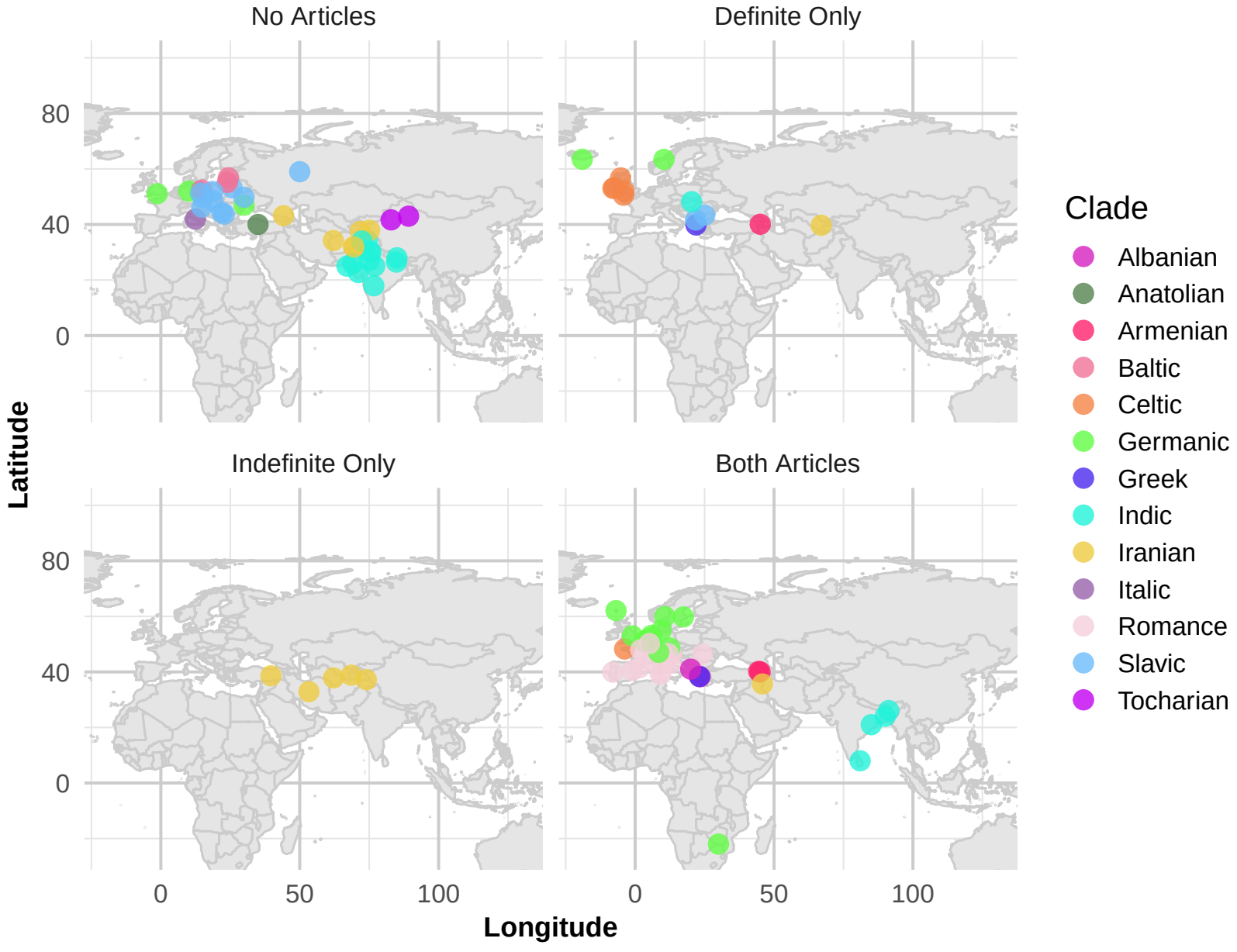
- Is there evidence for the IE correlation elsewhere in the world's languages?

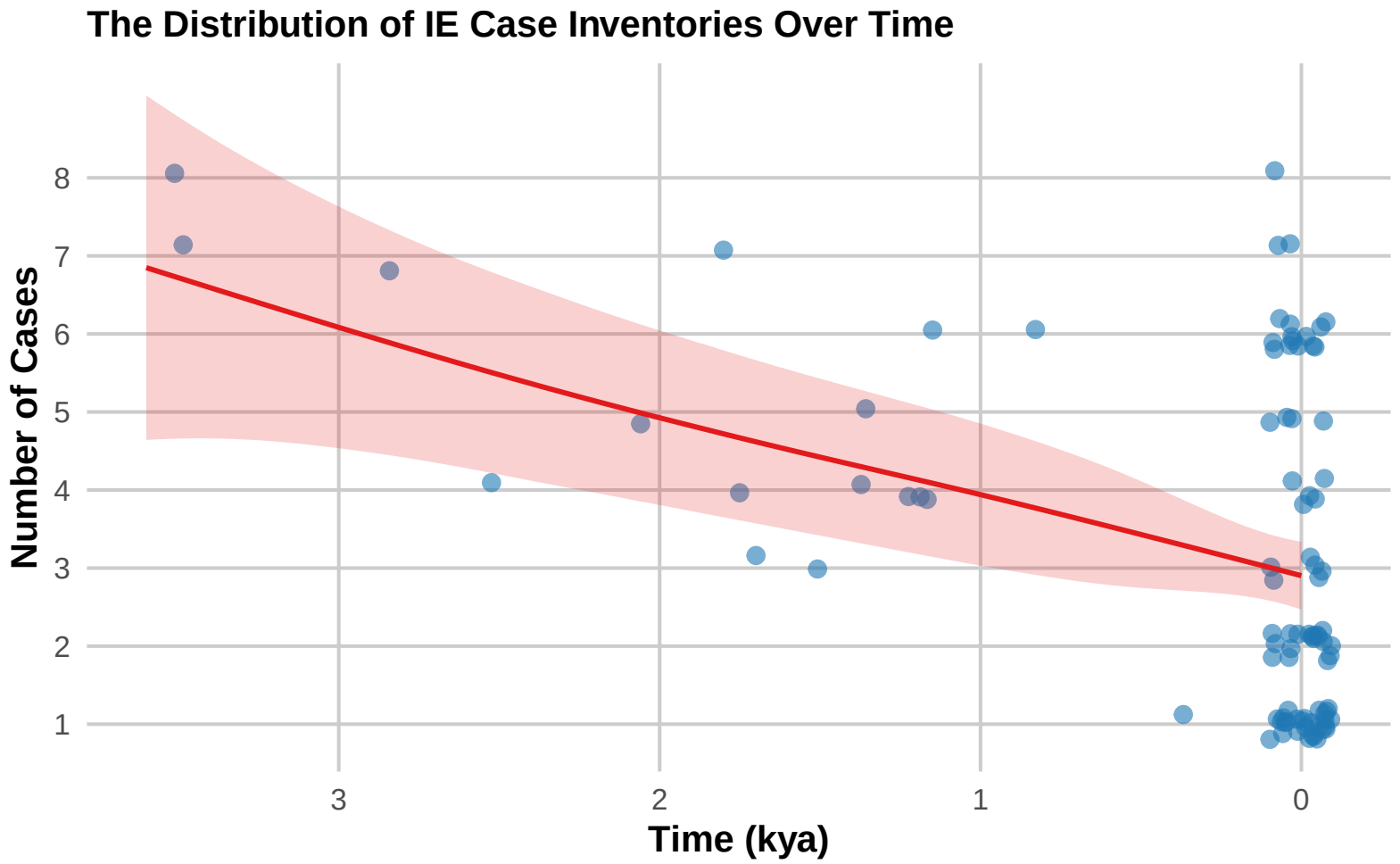
Vielen Dank!

Appendix

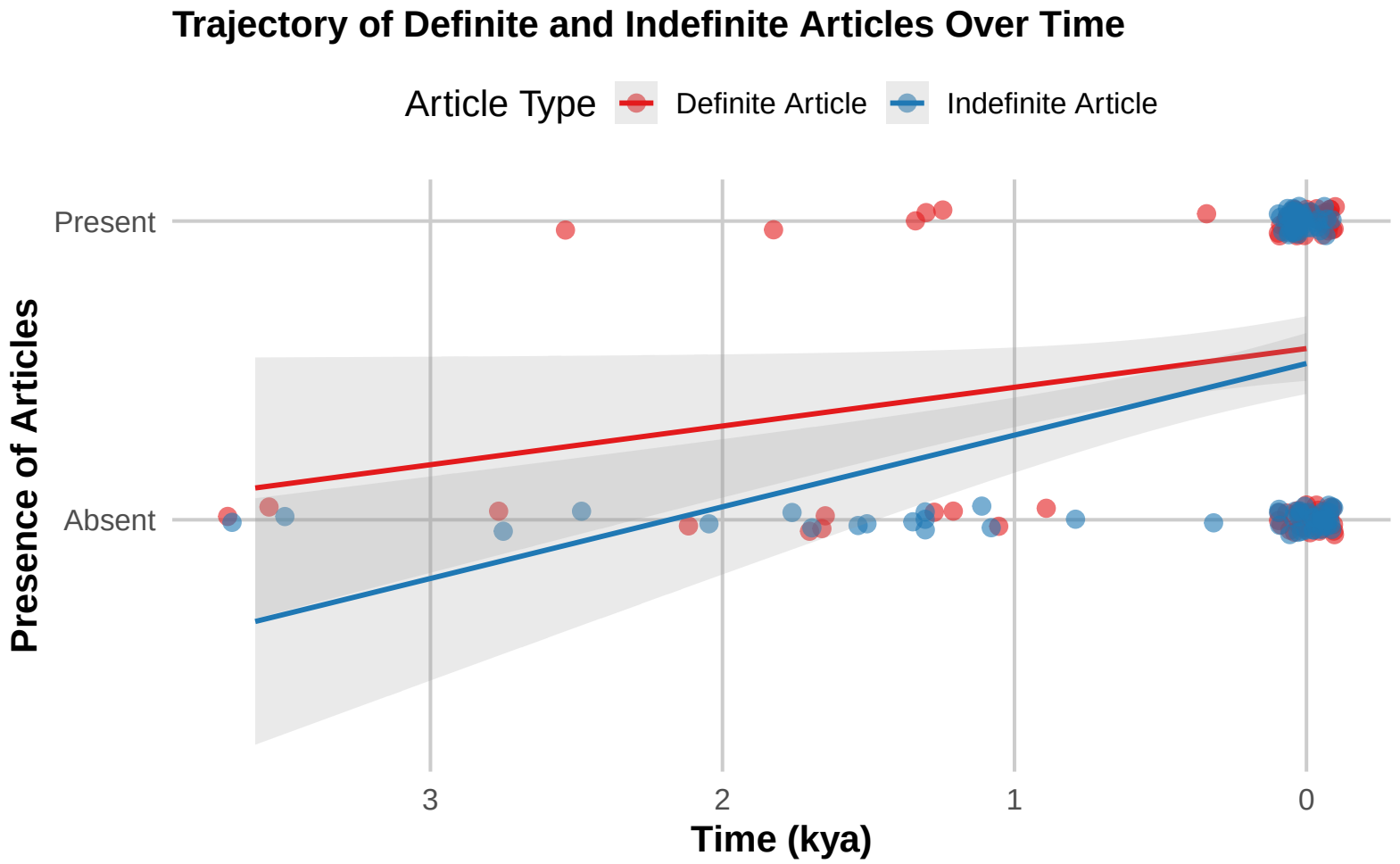
Distribution of article inventories by area and clade



Diachronic trajectory of case



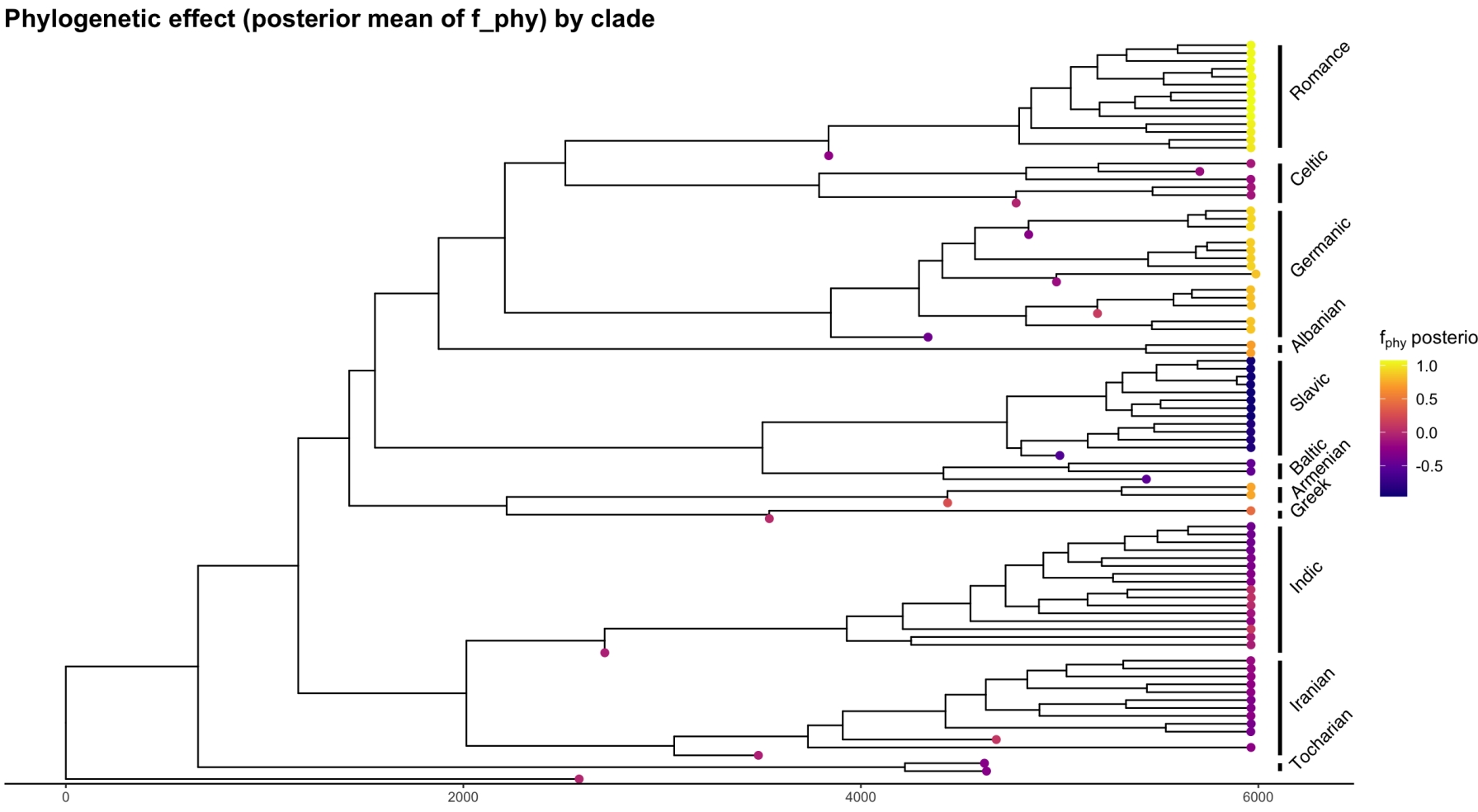
Diachronic trajectory of articles



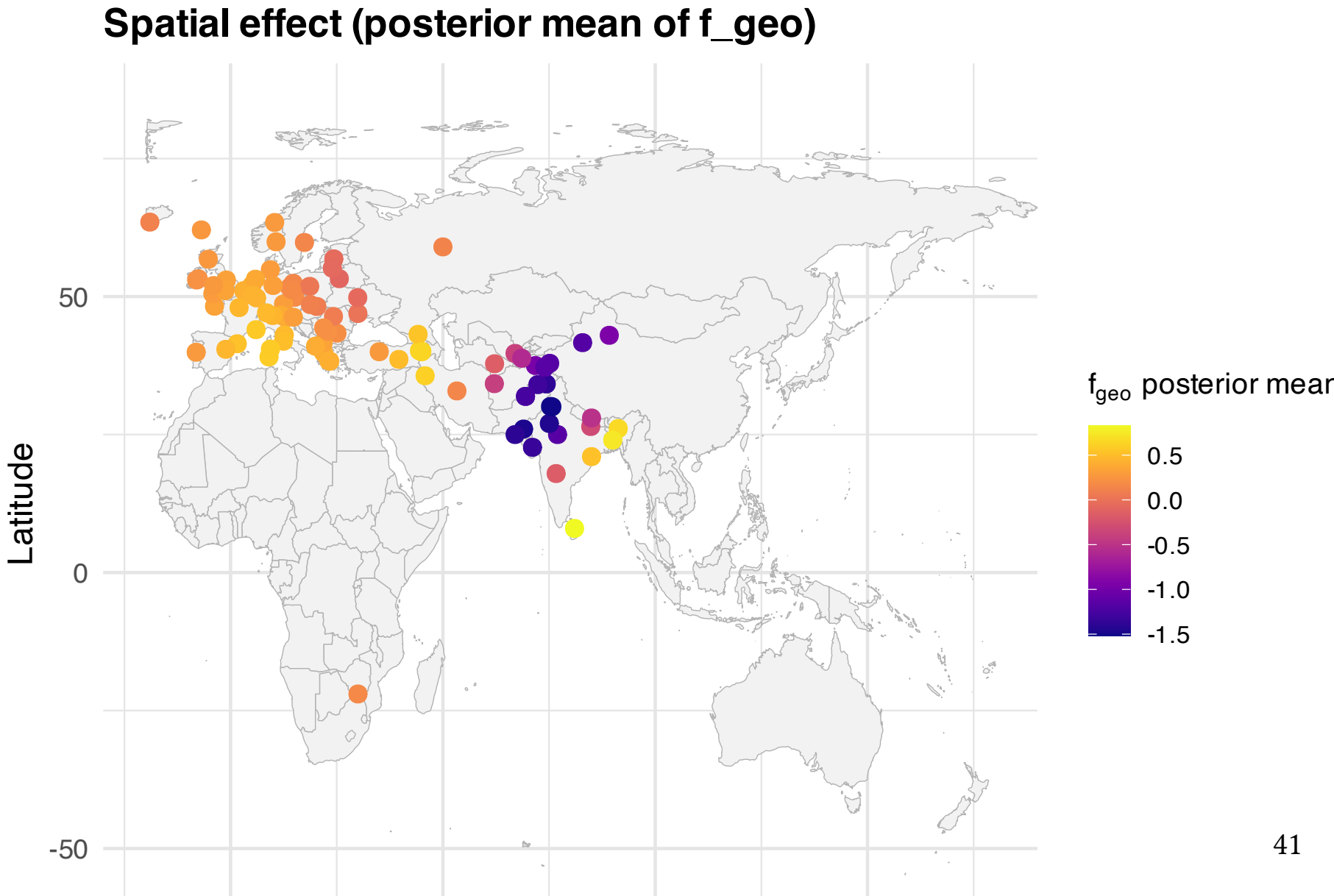
Predictive accuracy

Metric	Definite Article	Indefinite Article	Combined
Classification Accuracy	0.915	0.83	0.872
Area Under the Curve (AUC)	0.965	0.945	–
F1 Score	0.92	0.851	–
Brier Score	0.094	0.099	–

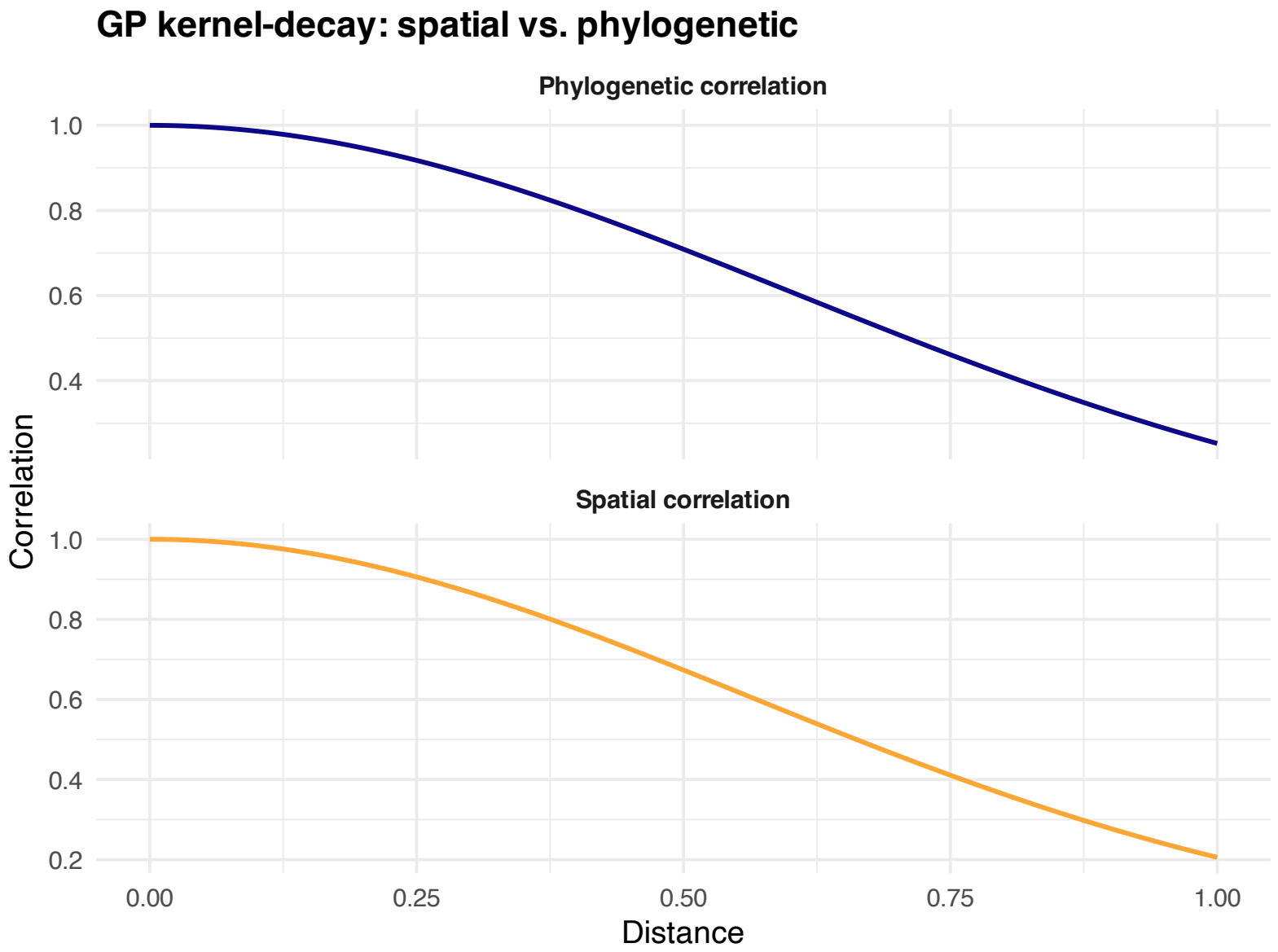
Phylogenetic autocorrelation



Spatial autocorrelation



Kernel decay



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