Dynamic Typology

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Reasons for Typological Similarity

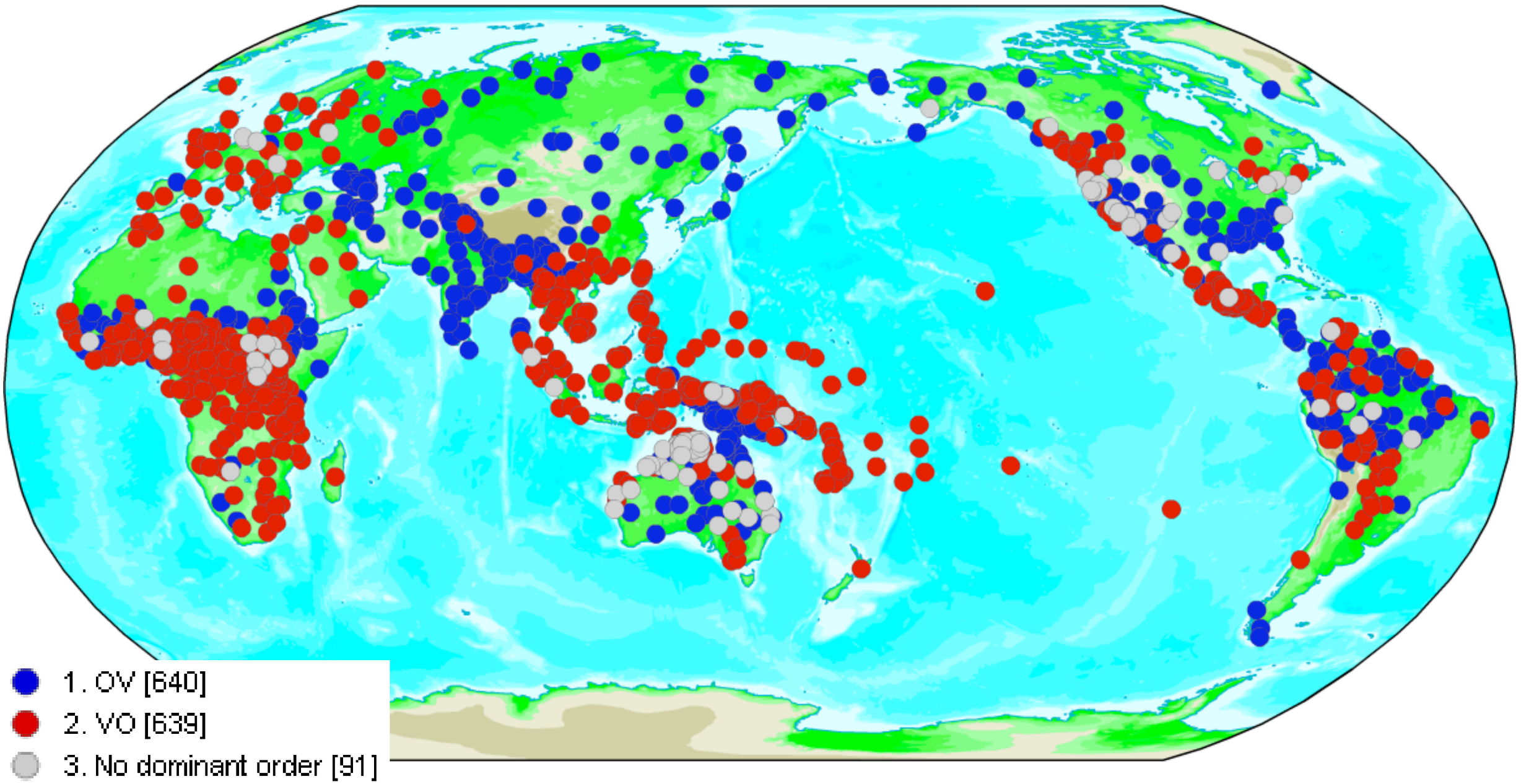
- Non-historical reasons
  - Universals
  - Chance
- Historical reasons
  - Common descent
  - Borrowing, substrate, etc.

The Importance of History

- The **actual** languages as attested in this world are not necessarily reflecting the **possible** human languages
- History (very probably) is still a significant factor for the explanation of current typological distributions

Order of Object and Verb

(Mathew Dryer 2005 from WALS)



LETTER

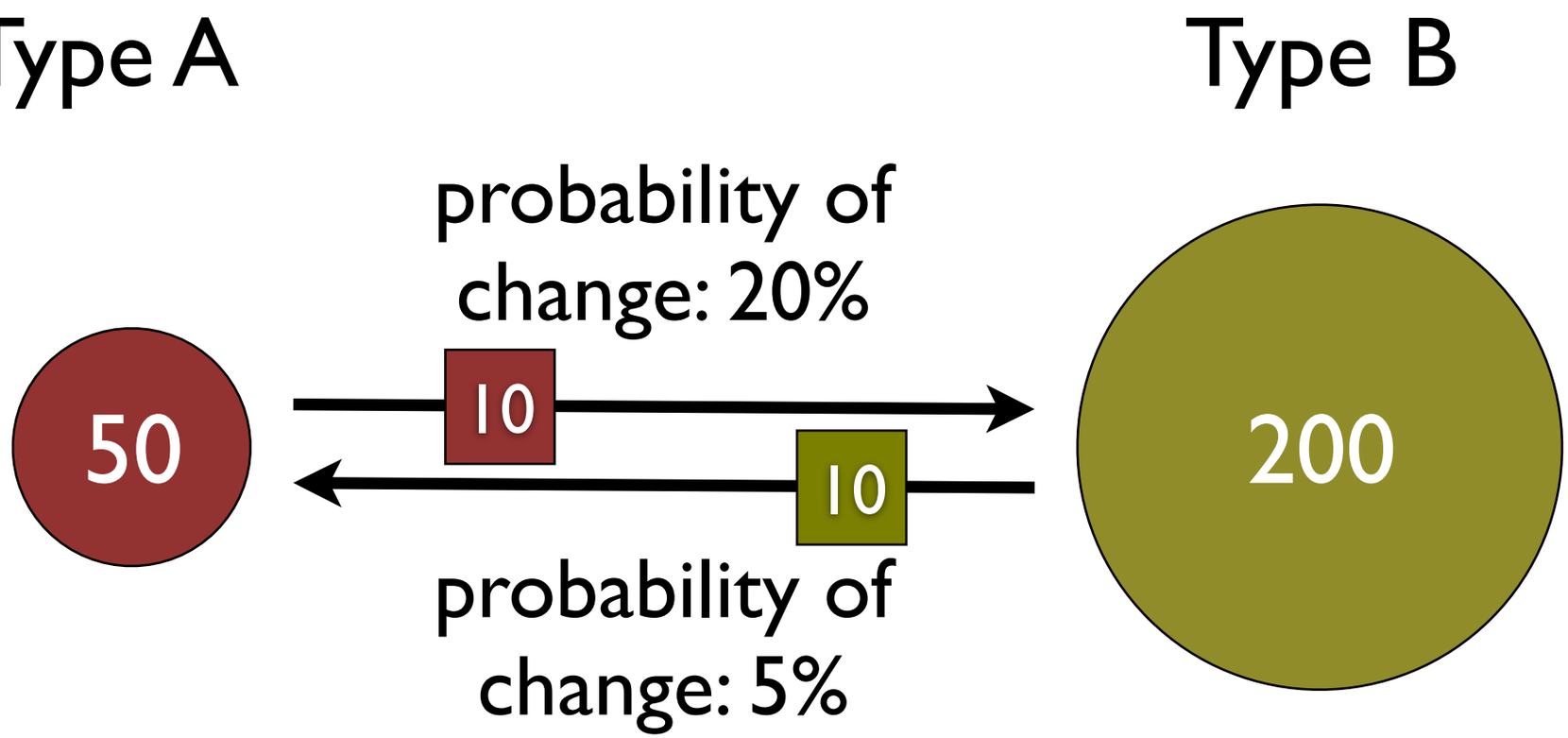
doi:10.1038/nature09923

Evolved structure of language shows lineage-specific trends in word-order universals

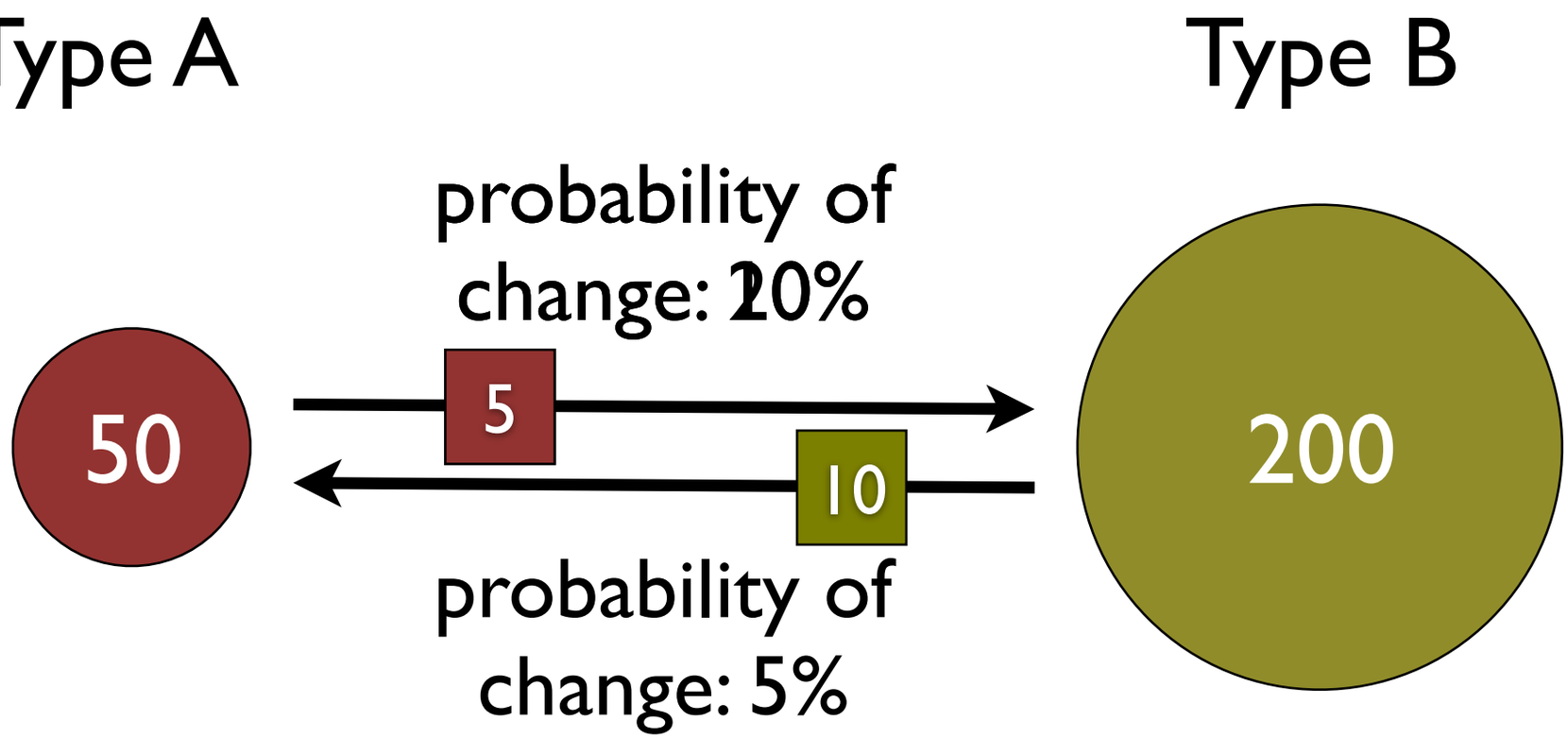
Michael Dunn[1,2], Simon J. Greenhill[3,4], Stephen C. Levinson[1,2] & Russell D. Gray[3]

Dynamic Typology

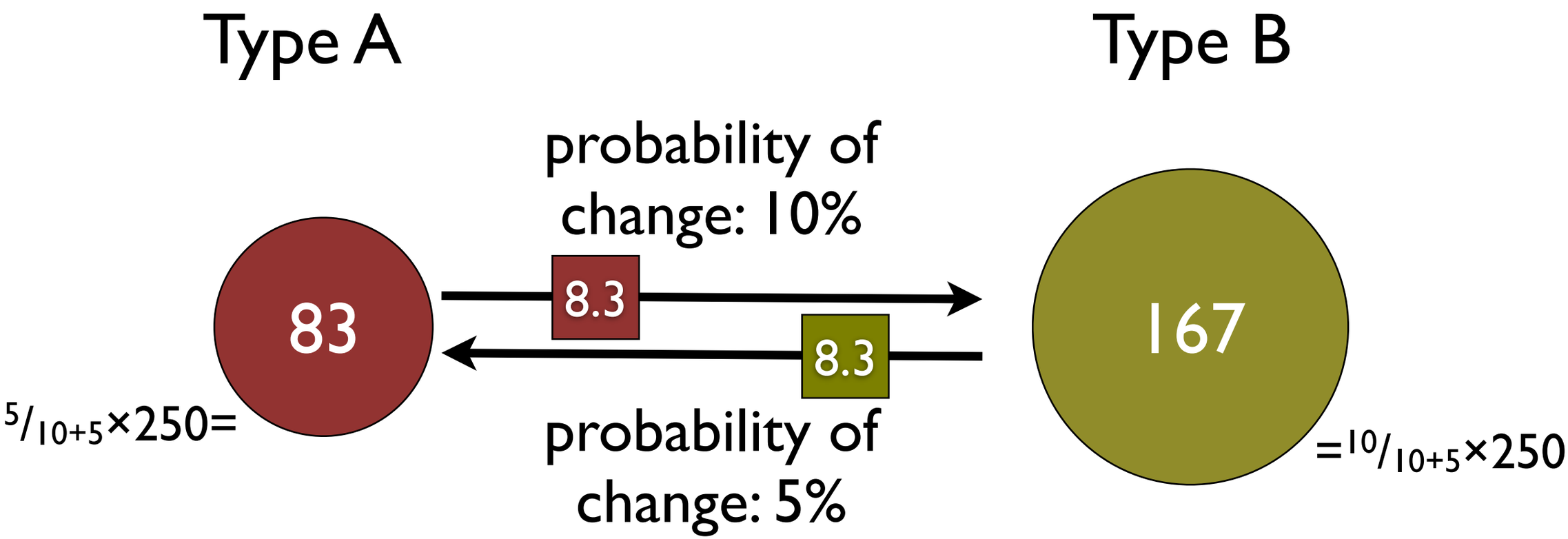
- It is not the **actual frequencies** that matter
- It is the **stable distribution** that matters
  - A stable distribution is a situation in which just as many languages change from **A to B** as change from **B to A**.
  - The extent to which the **actual is different from the stable situation** signals an effect of history



Stable distribution



Instable distribution



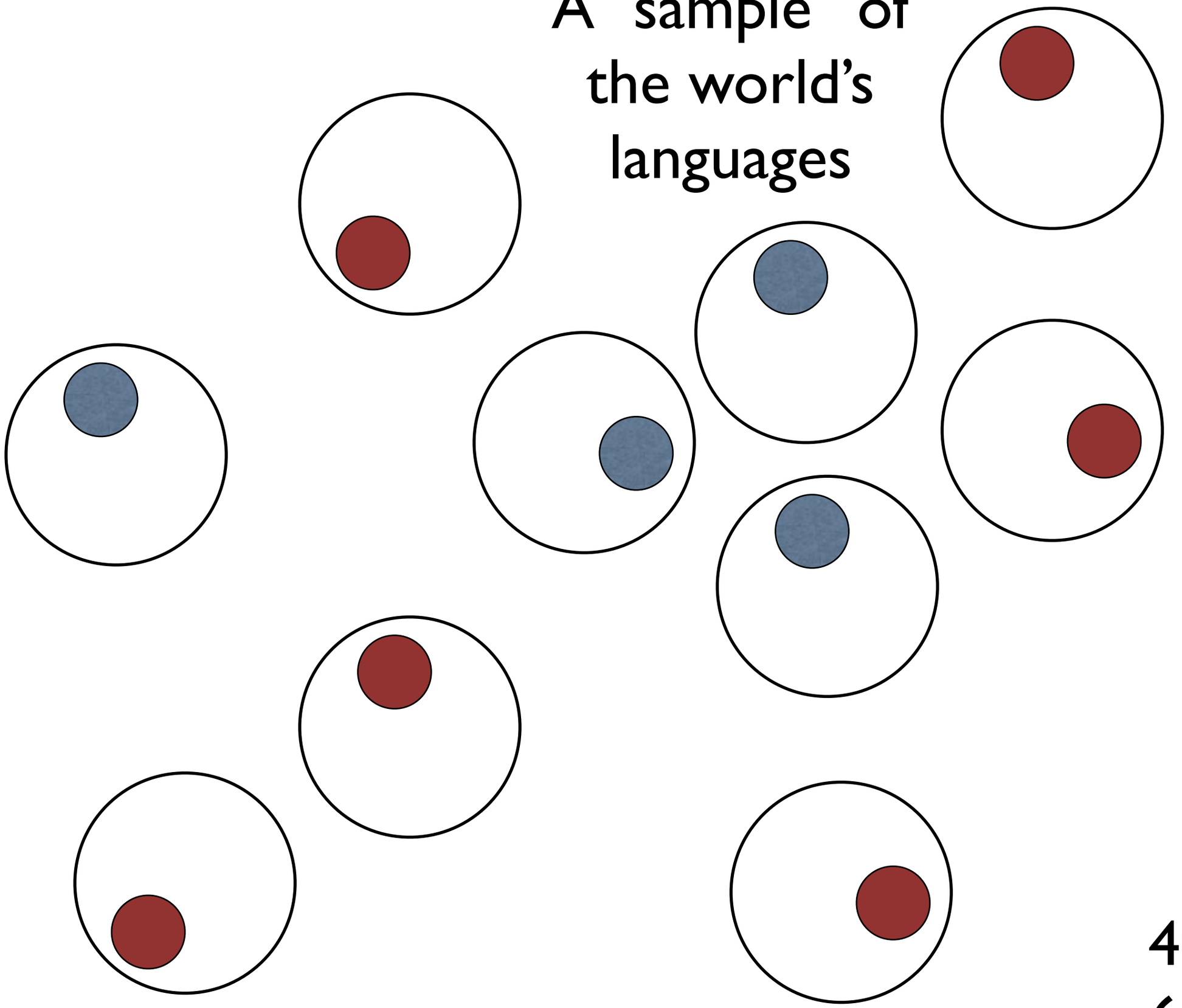
Expected stable distribution

Estimating Transition Probabilities

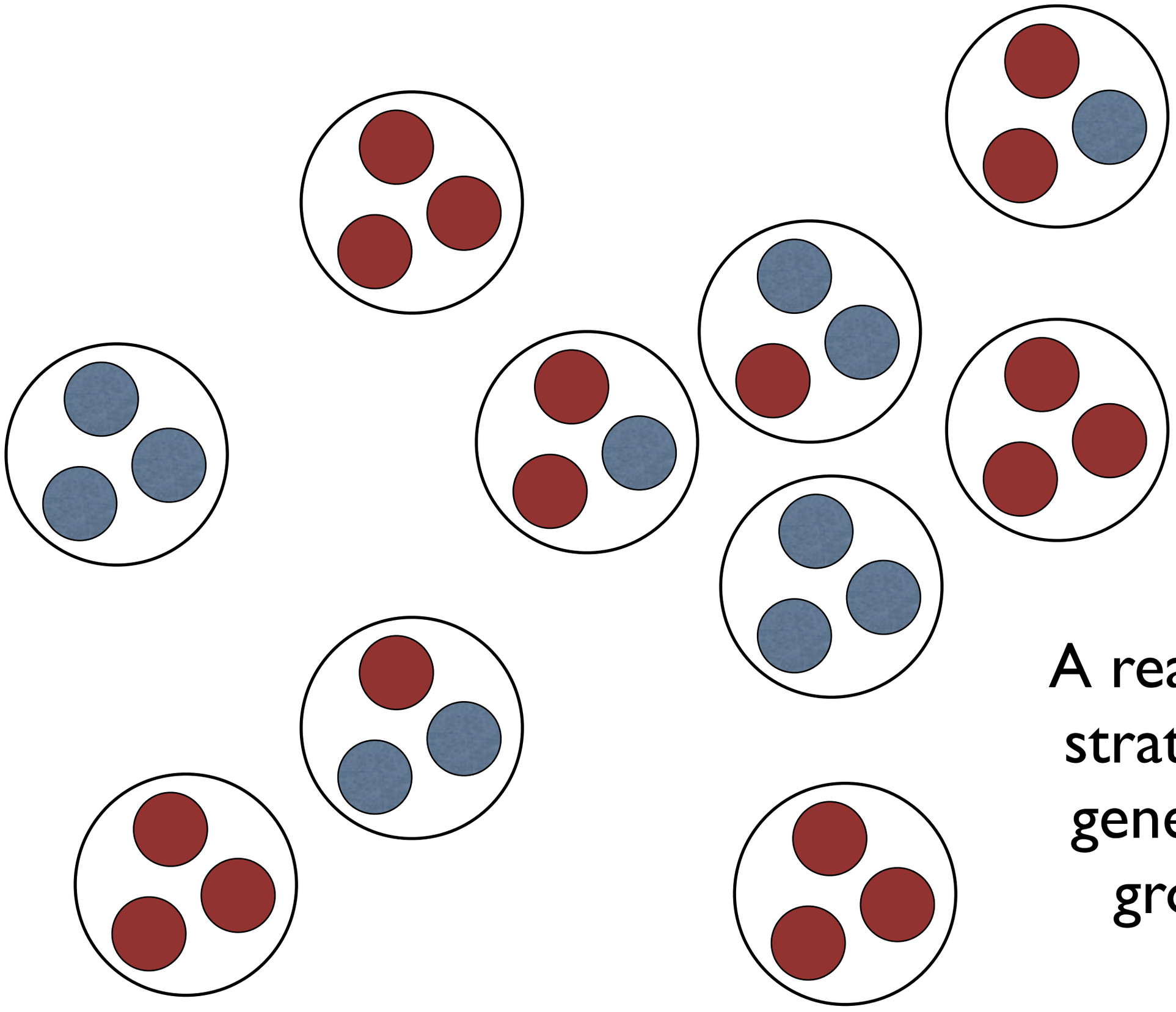
- Are transitions probabilities **measurable** ?
  - there is no assumption here **why** a change happens
  - might be internal or external (borrowing, substrate)
  - the question is whether specific features of language are more amenable to change than others
- If yes:
  - use **group internal variation** to estimate transition probabilities

The world's genera

A "sample" of the world's languages

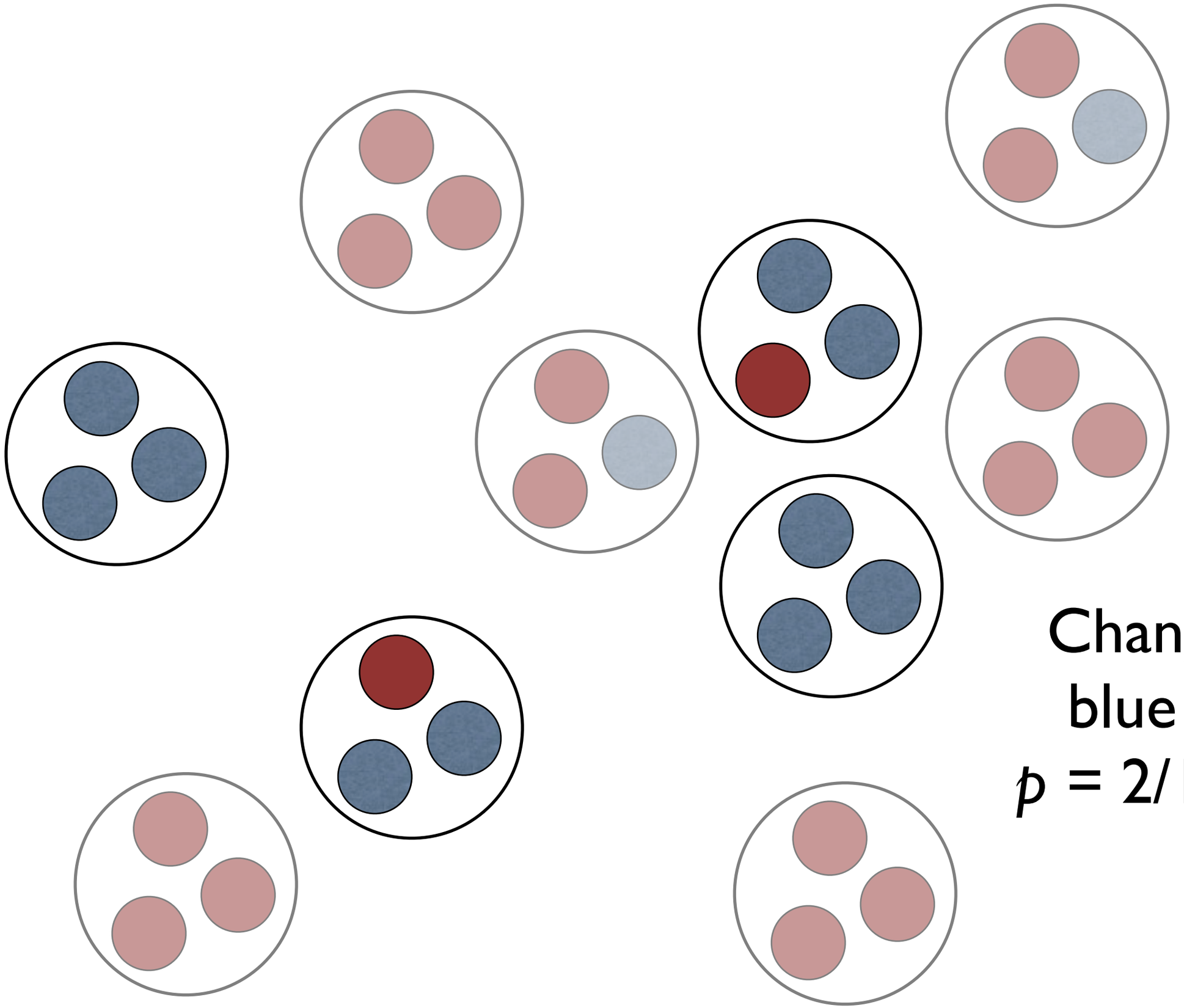


40% blue
60% red

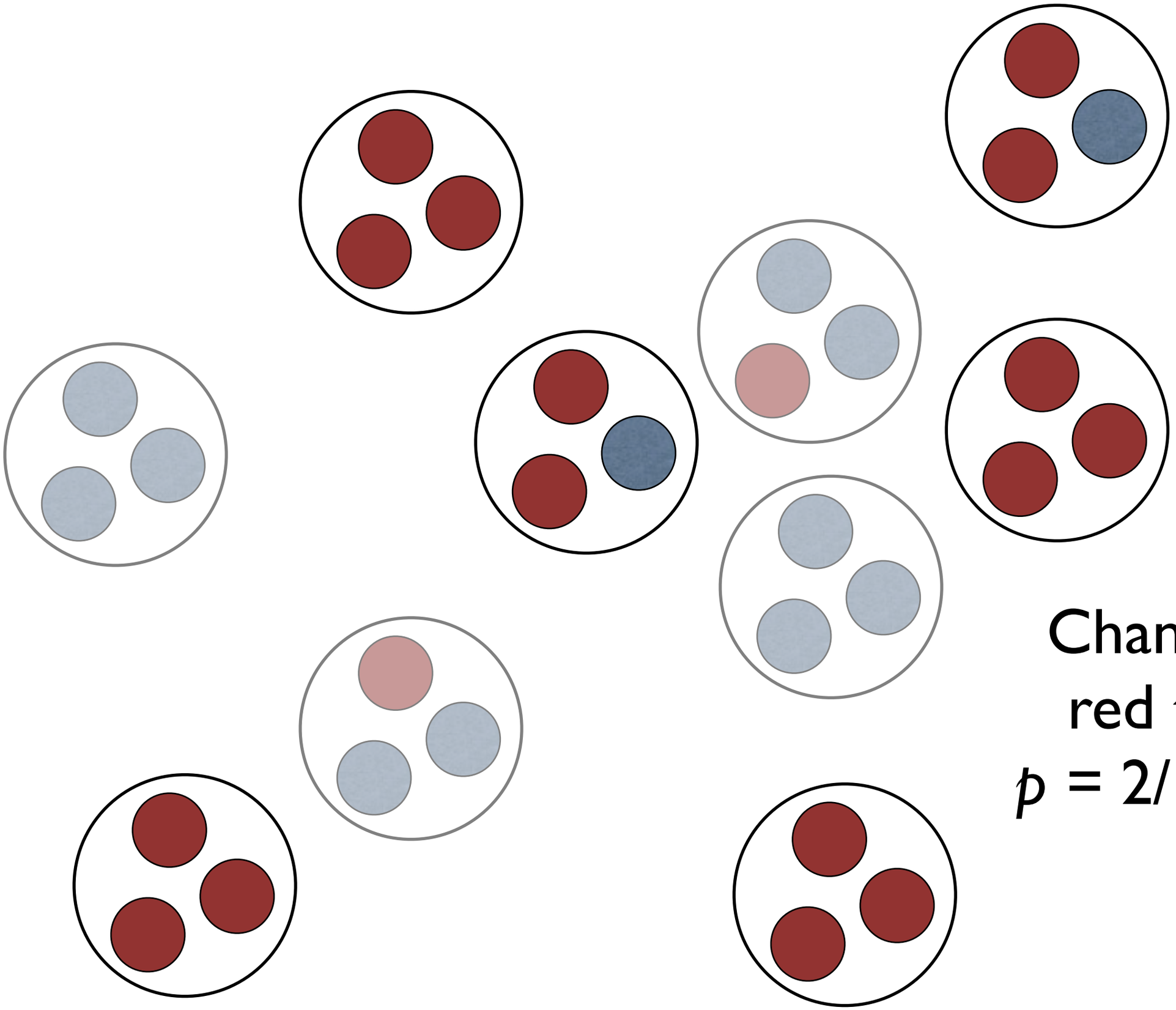


A real sample stratified for genealogical grouping

How to get probabilities of change ...

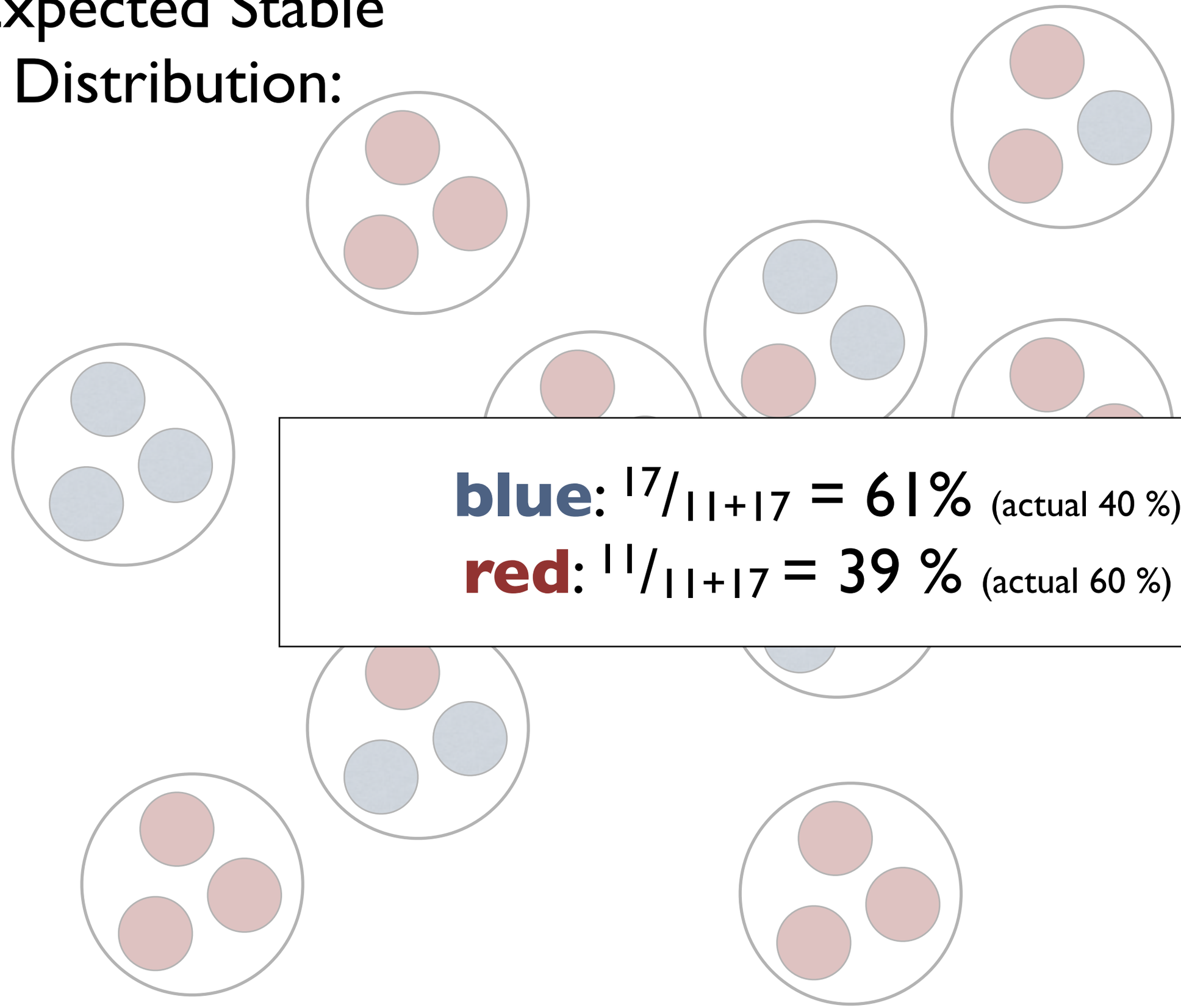


Change from blue to red:
p = 2/12 = 17%



Change from red to blue:
p = 2/18 = 11%

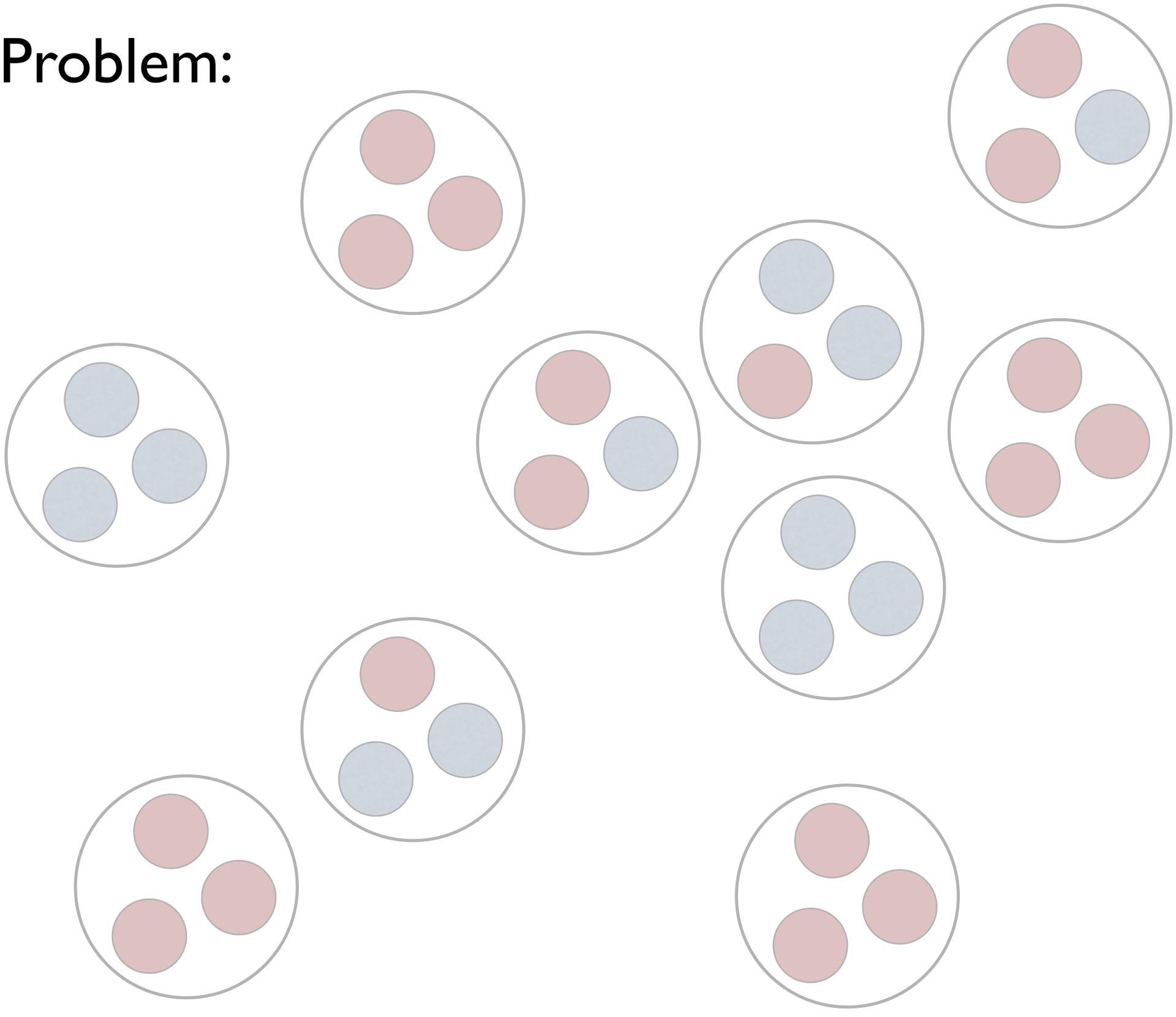
Expected Stable Distribution:



blue: $^{17}/_{11+17}$ = 61% (actual 40 %)

red: $^{11}/_{11+17}$ = 39 % (actual 60 %)

Problem:



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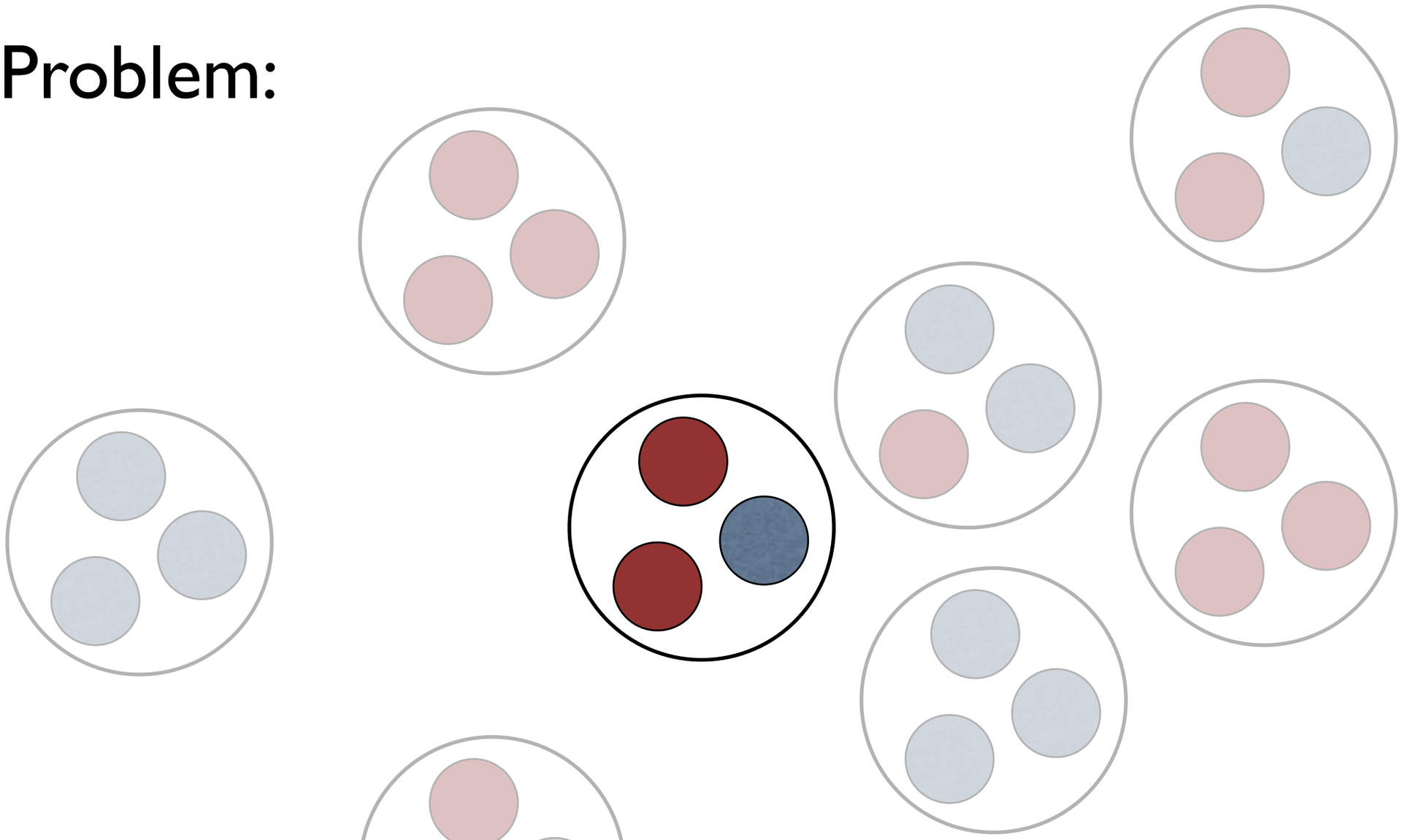


- Originally **red** with one change to blue ?
- Originally **blue** with two changes to red ?

Elena Maslova's proposal

probability of **any** change happening = $\alpha \cdot$ frequency (blue) + β

For groups of three languages:

$$\alpha = 3 \cdot (p_{\text{blue}\to\text{red}} - p_{\text{red}\to\text{blue}})$$

$$\beta = 3 \cdot p_{\text{red}\to\text{blue}} \cdot (1 - p_{\text{blue}\to\text{red}})$$

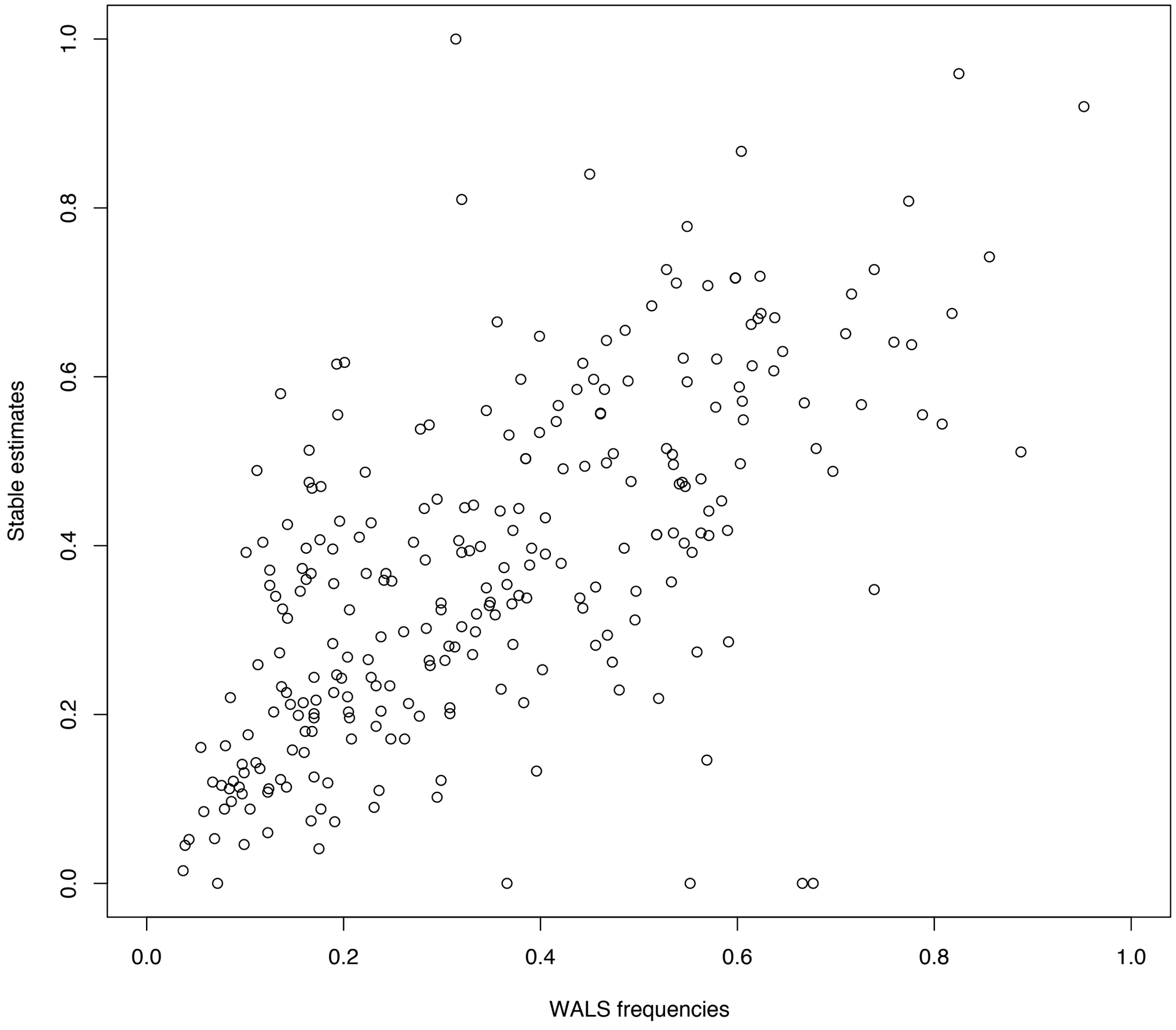
Elena Maslova's proposal **for contact**

probability of **contact triples** = $\alpha \cdot$ frequency (blue) + β

For groups of three languages A, B, C:
– A+B related
– B+C geographically close, not related
– A 'contact triple' is a set in which A≠B=C

$$\alpha = (p_{\text{blue}\rightarrow\text{red}} - p_{\text{red}\rightarrow\text{blue}})$$

$$\beta = p_{\text{red}\rightarrow\text{blue}} \cdot (1 - p_{\text{red}\rightarrow\text{blue}})$$


Stable estimates
0.0
0.2
0.4
0.6
0.8
1.0
WALS frequencies

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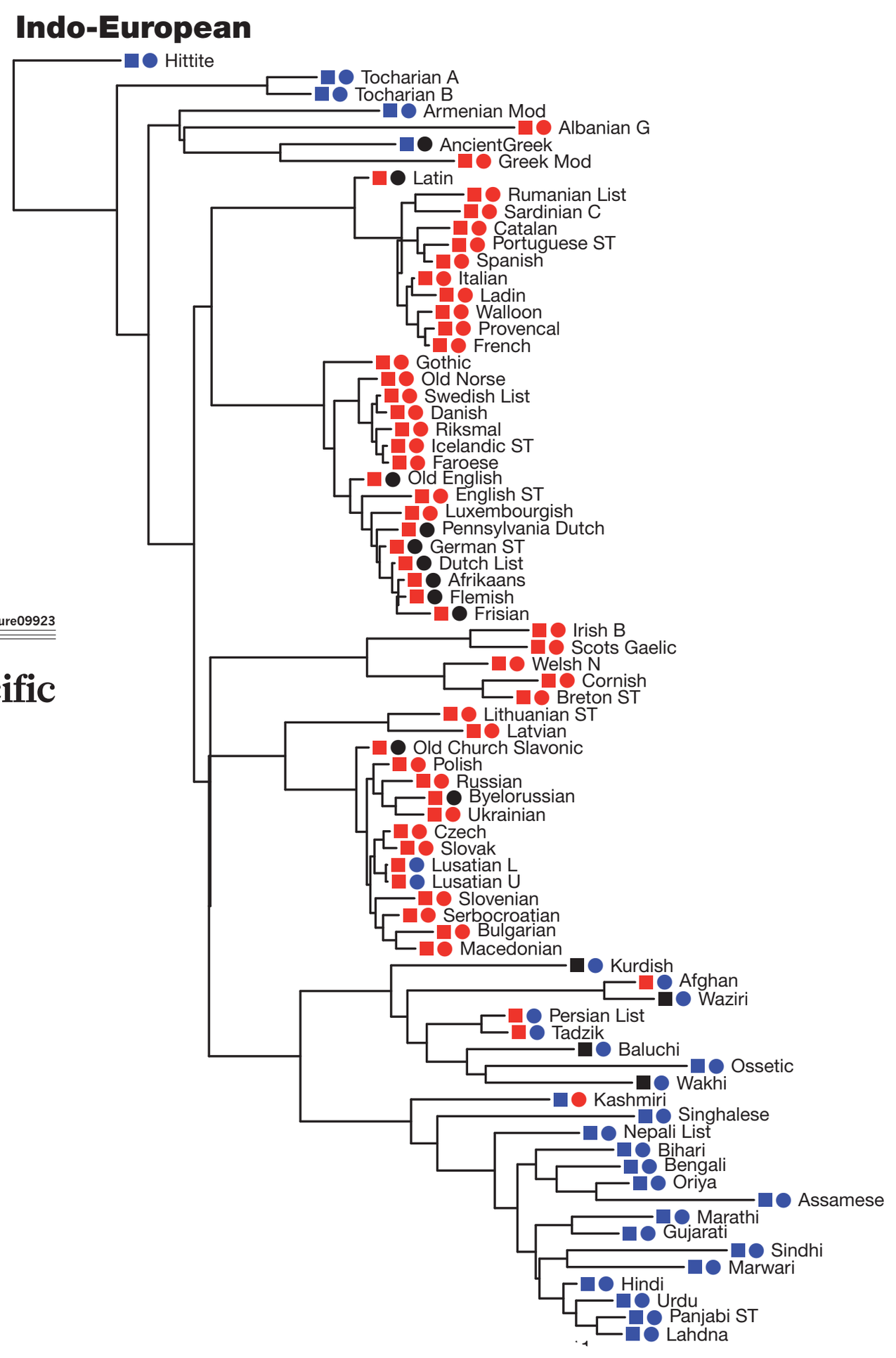
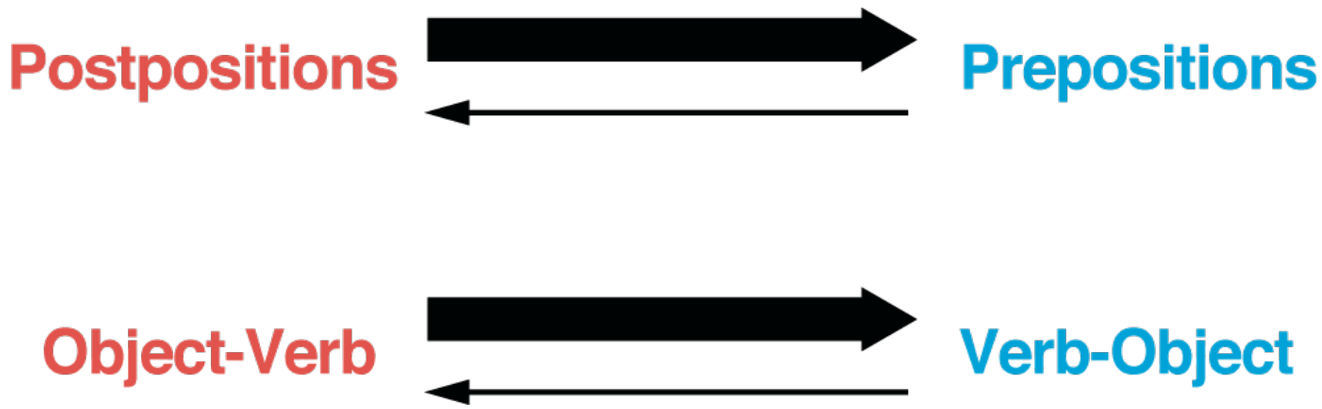
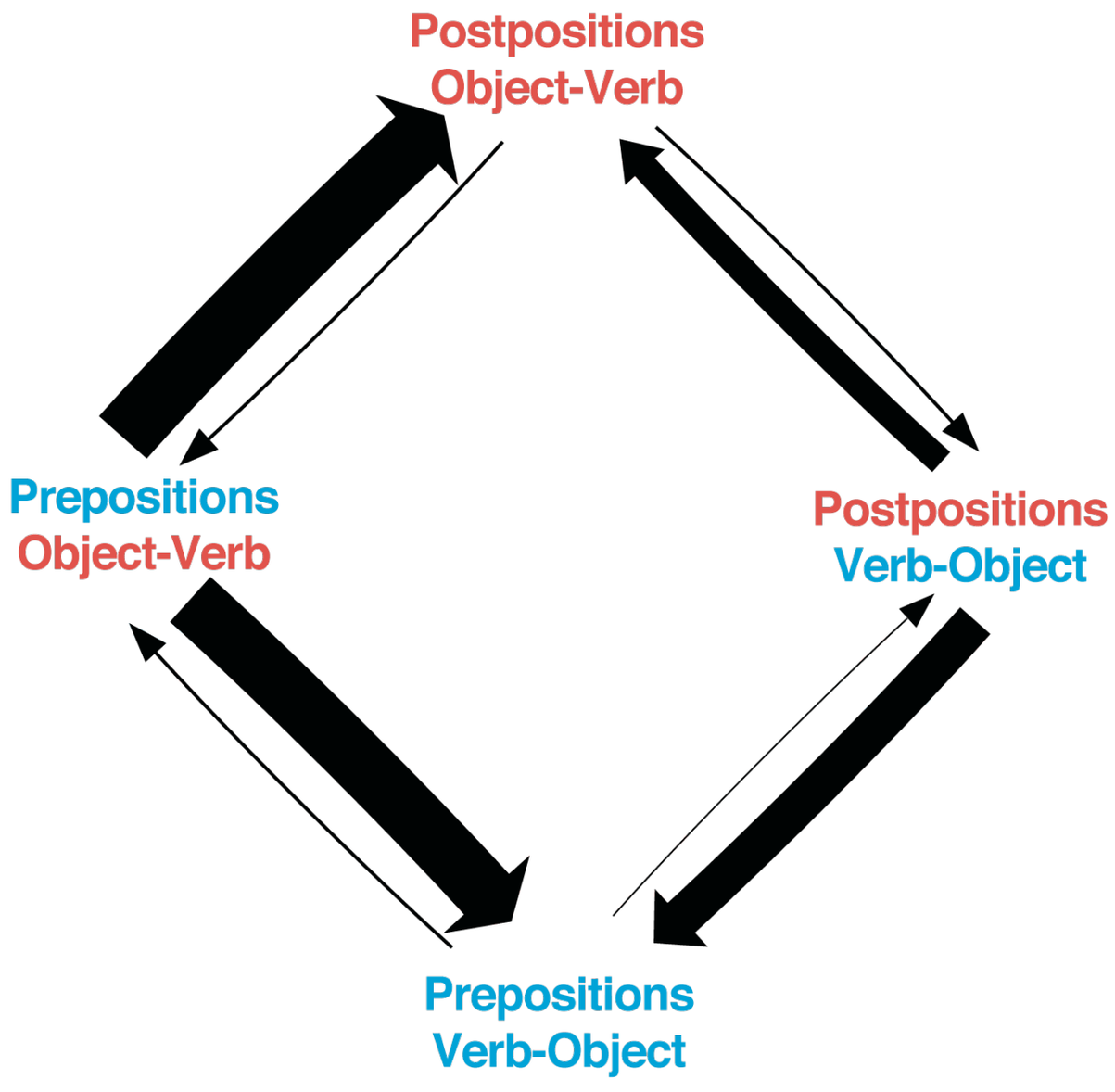
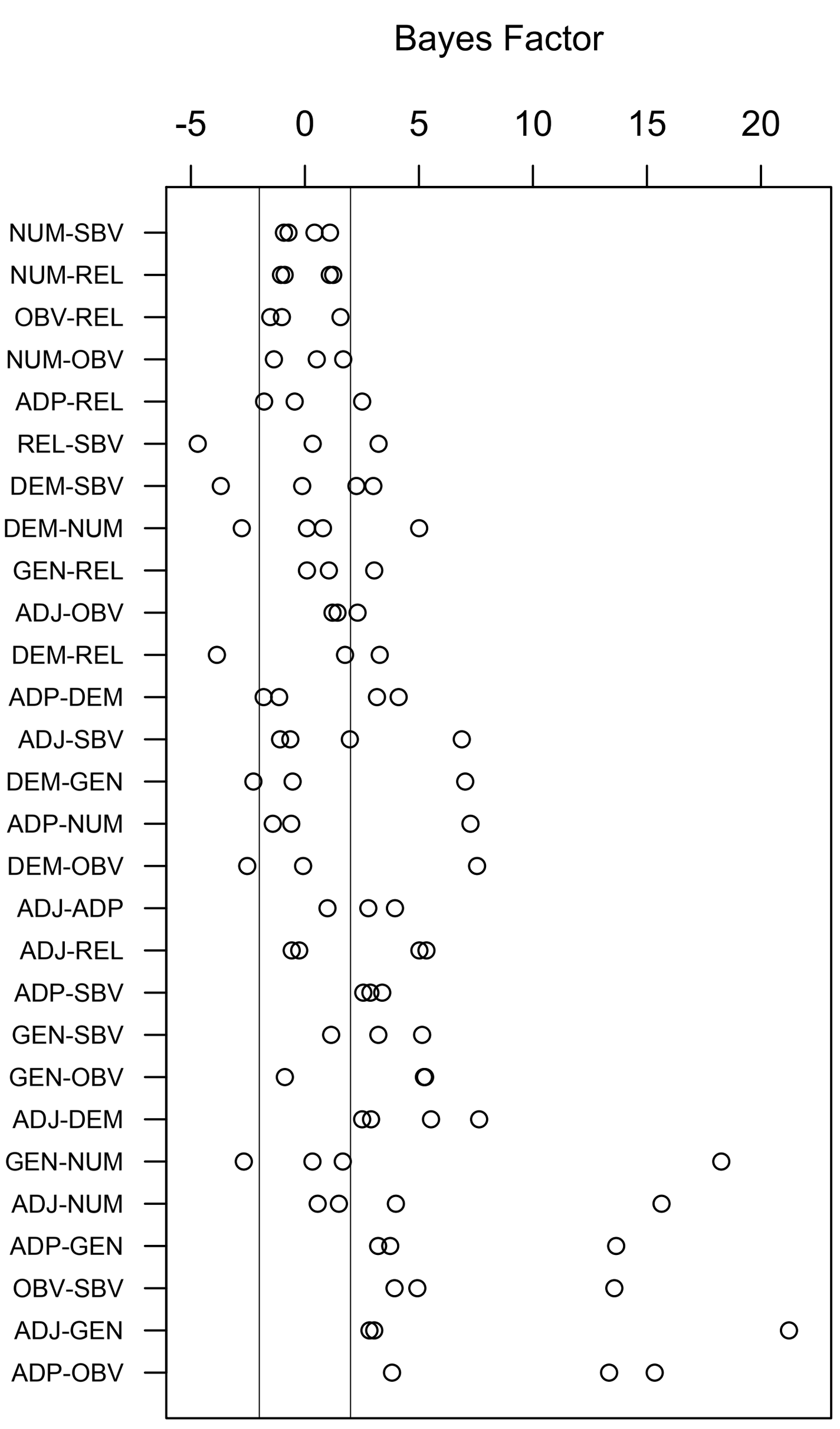


Independent Model



Dependent Model




Bayes Factor
-5
0
5
10
15
20
NUM-SBV
NUM-REL
OBV-REL
NUM-OBV
ADP-REL
REL-SBV
DEM-SBV
DEM-NUM
GEN-REL
ADJ-OBV
DEM-REL
ADP-DEM
ADJ-SBV
DEM-GEN
ADP-NUM
DEM-OBV
ADJ-ADP
ADJ-REL
ADP-SBV
GEN-SBV
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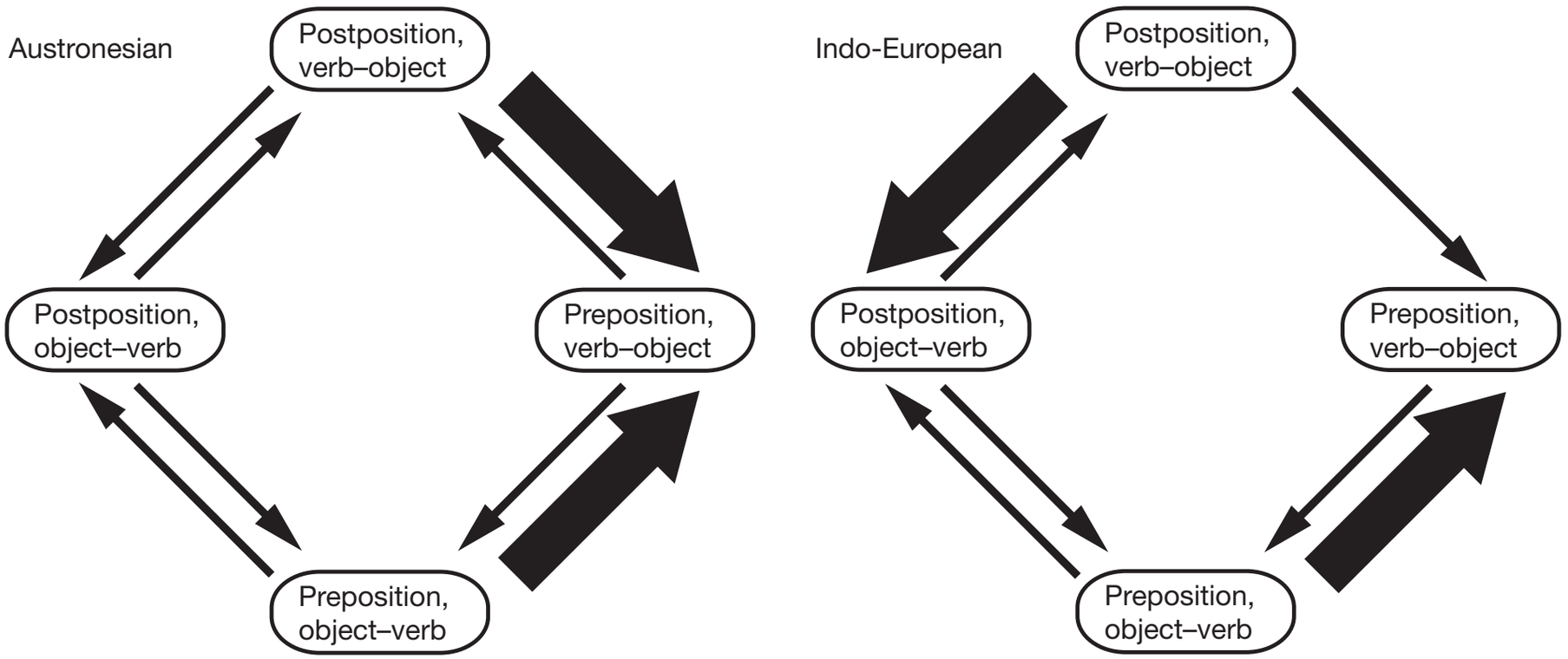
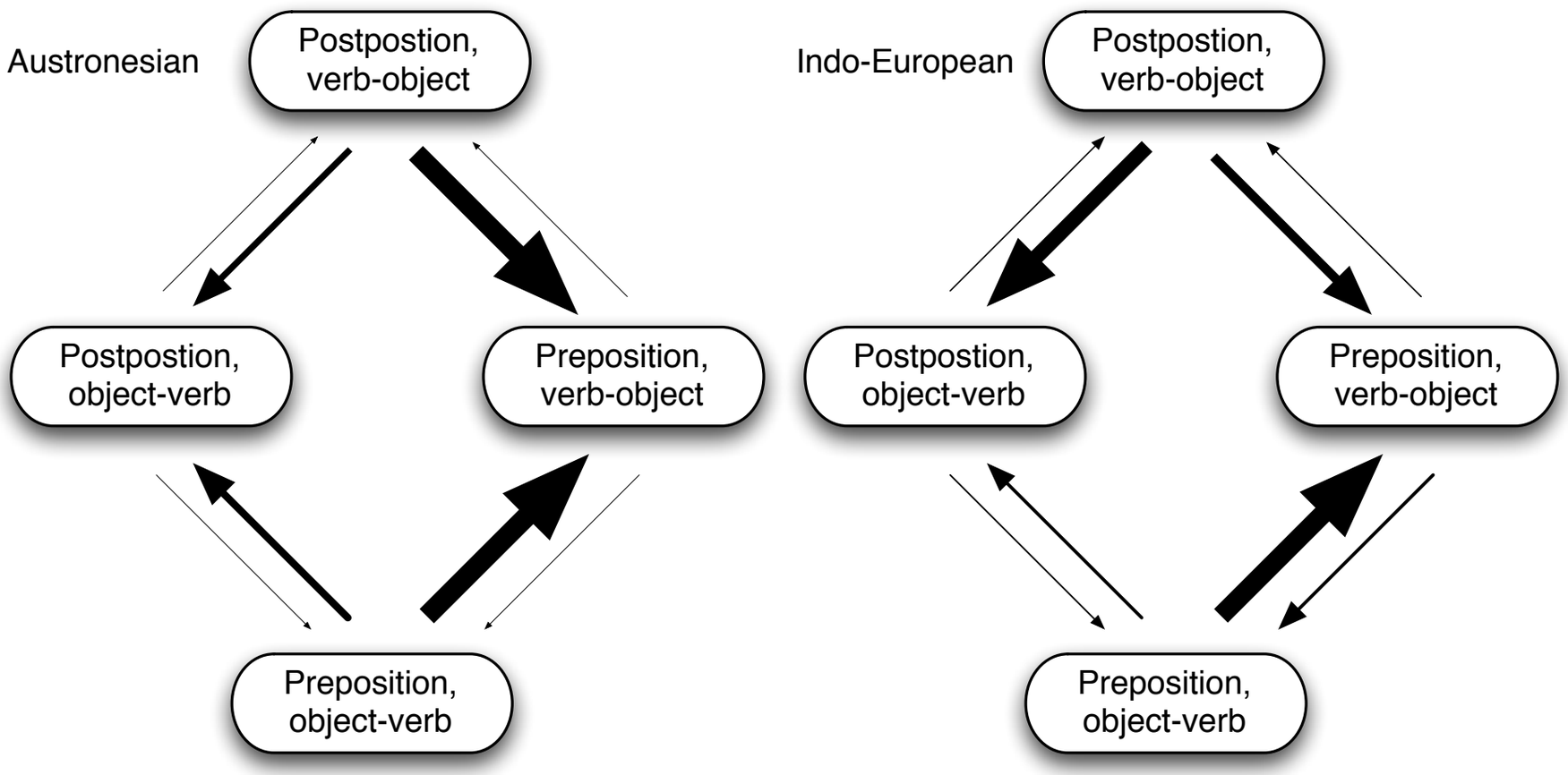
GEN-NUM
ADJ-NUM
ADP-GEN
OBV-SBV
ADJ-GEN
ADP-OBV


Austronesian
Postposition, verb–object
Postposition, object–verb
Preposition, verb–object
Preposition, object–verb
Indo-European
Postposition, verb–object
Postposition, object–verb
Preposition, verb–object
Preposition, object–verb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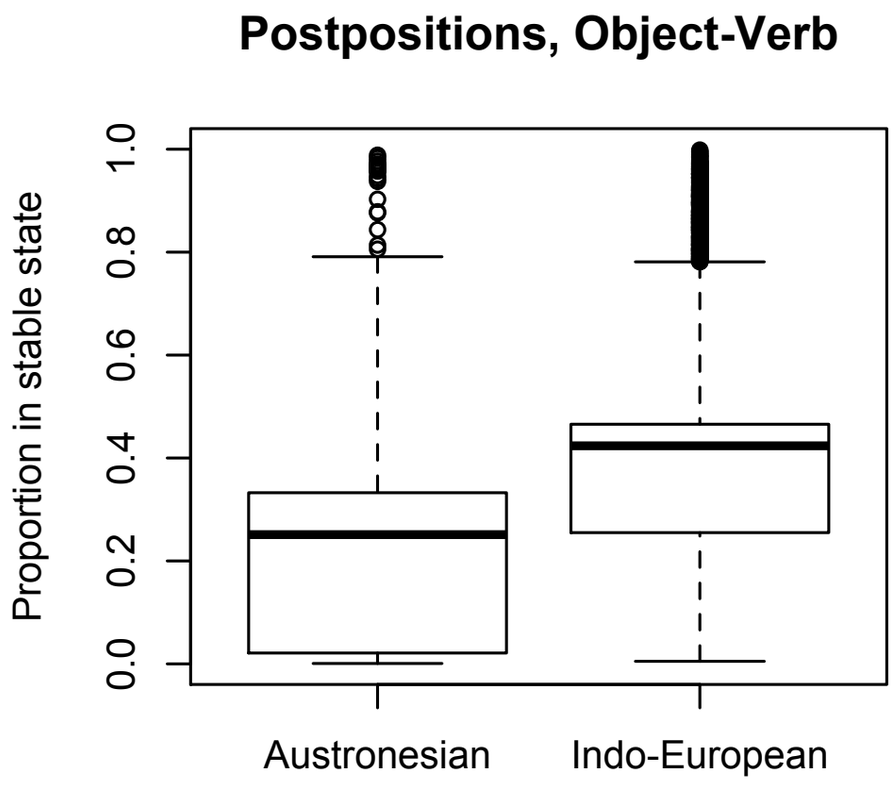
Postpositions, Object-Verb
Proportion in stable state
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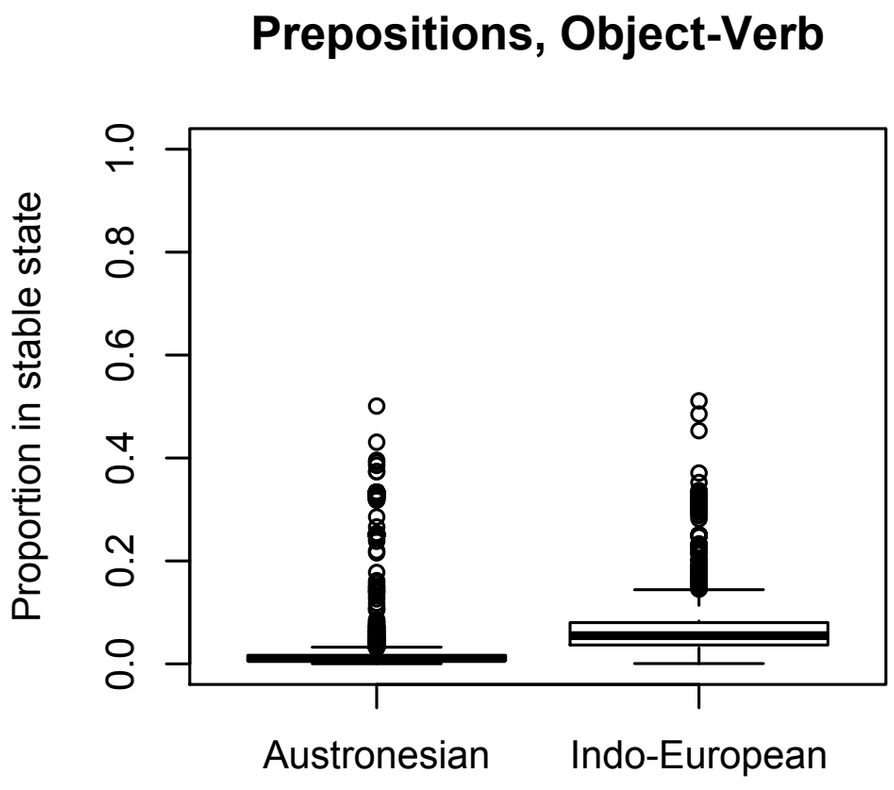
0.2
0.4
0.6
0.8
1.0
Austronesian
Indo-European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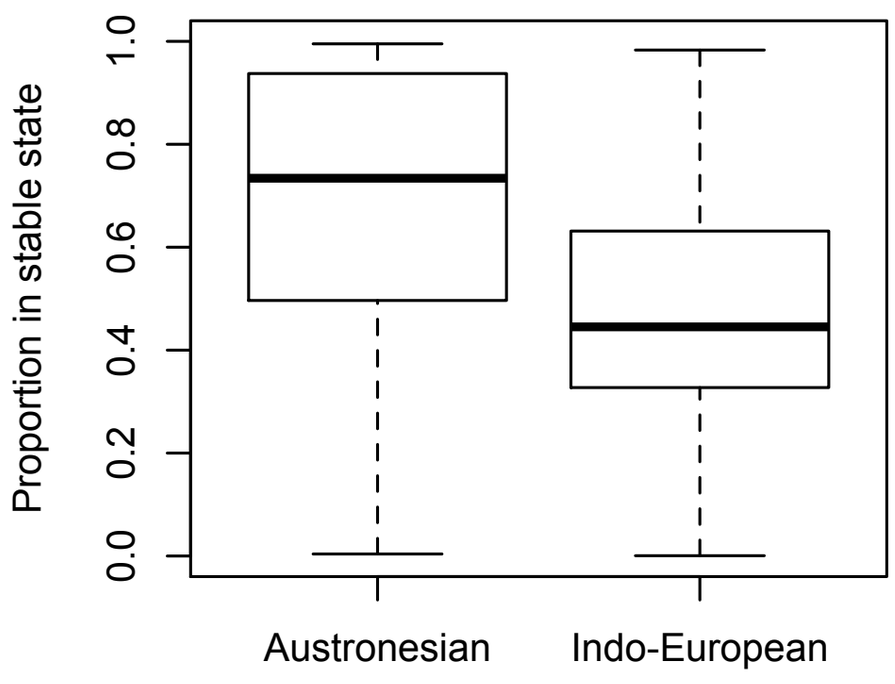
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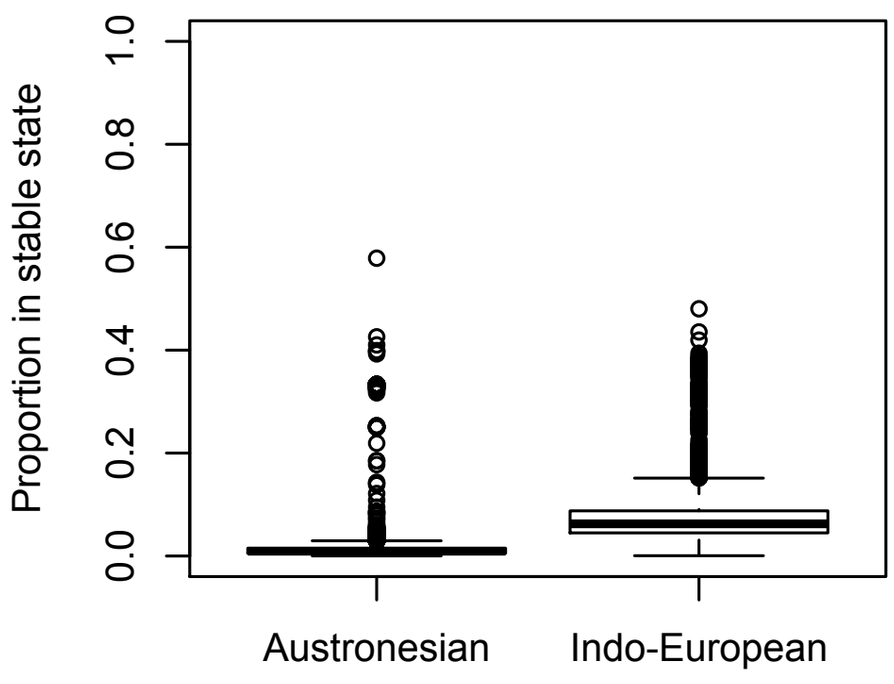
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Looking forward

- Much more testing necessary
  - do different approaches converge on the same estimates for transition probabilities ?
- Only very few types allowed
  - computations quickly get too large for the amount of available data on the world's languages