Death and Taxa

time-invariant differences in mammal species durations

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Question

Why do taxa go extinct at different rates?

Motivating questions

- How do mammal species traits affect extinction risk?
  - How do shared time of origination or evolutionary history relate to extinction risk?
- How do my findings compare to current risk factors?
- Is species extinction risk age-independent?

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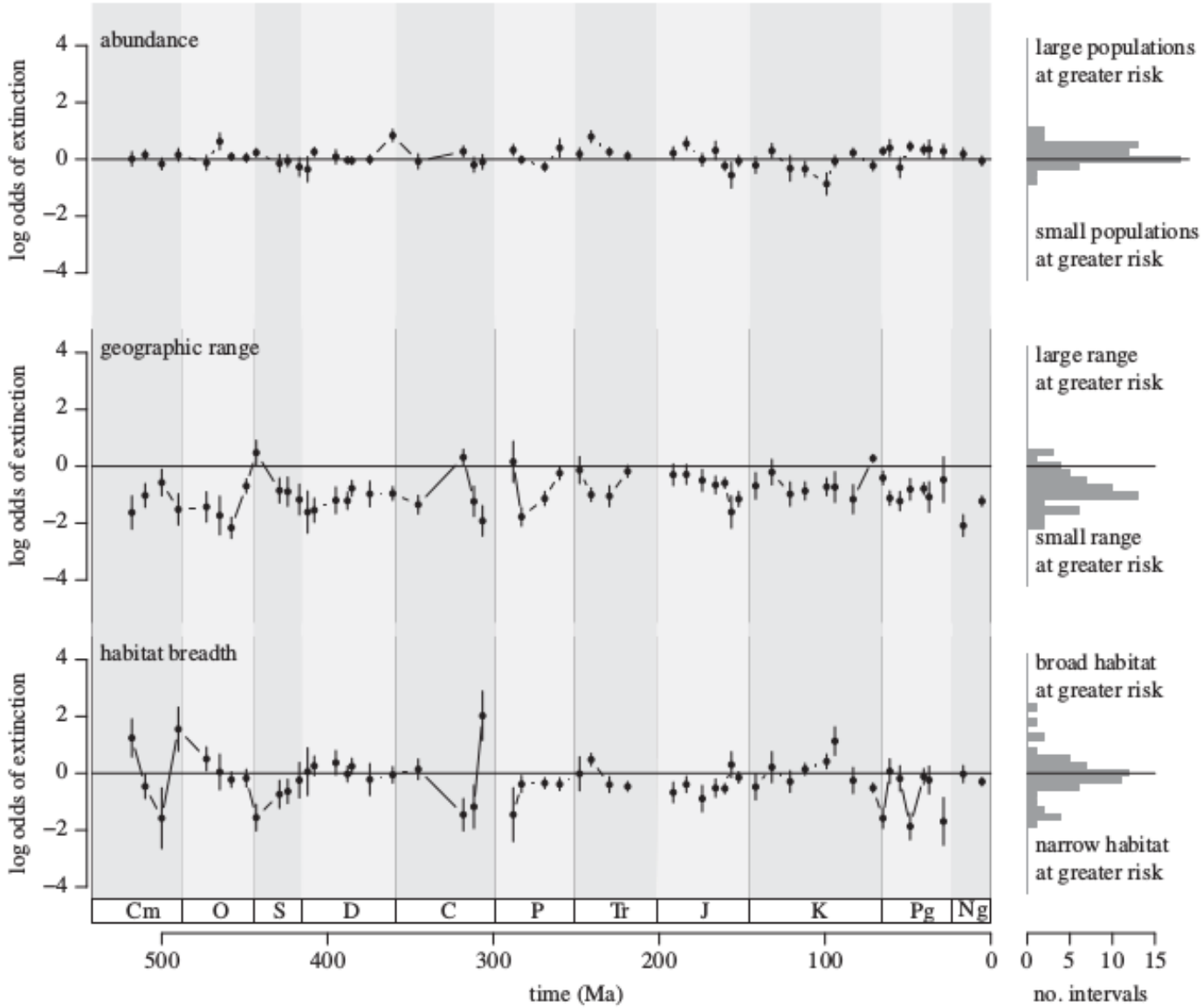
Relationship between range size and extinction risk



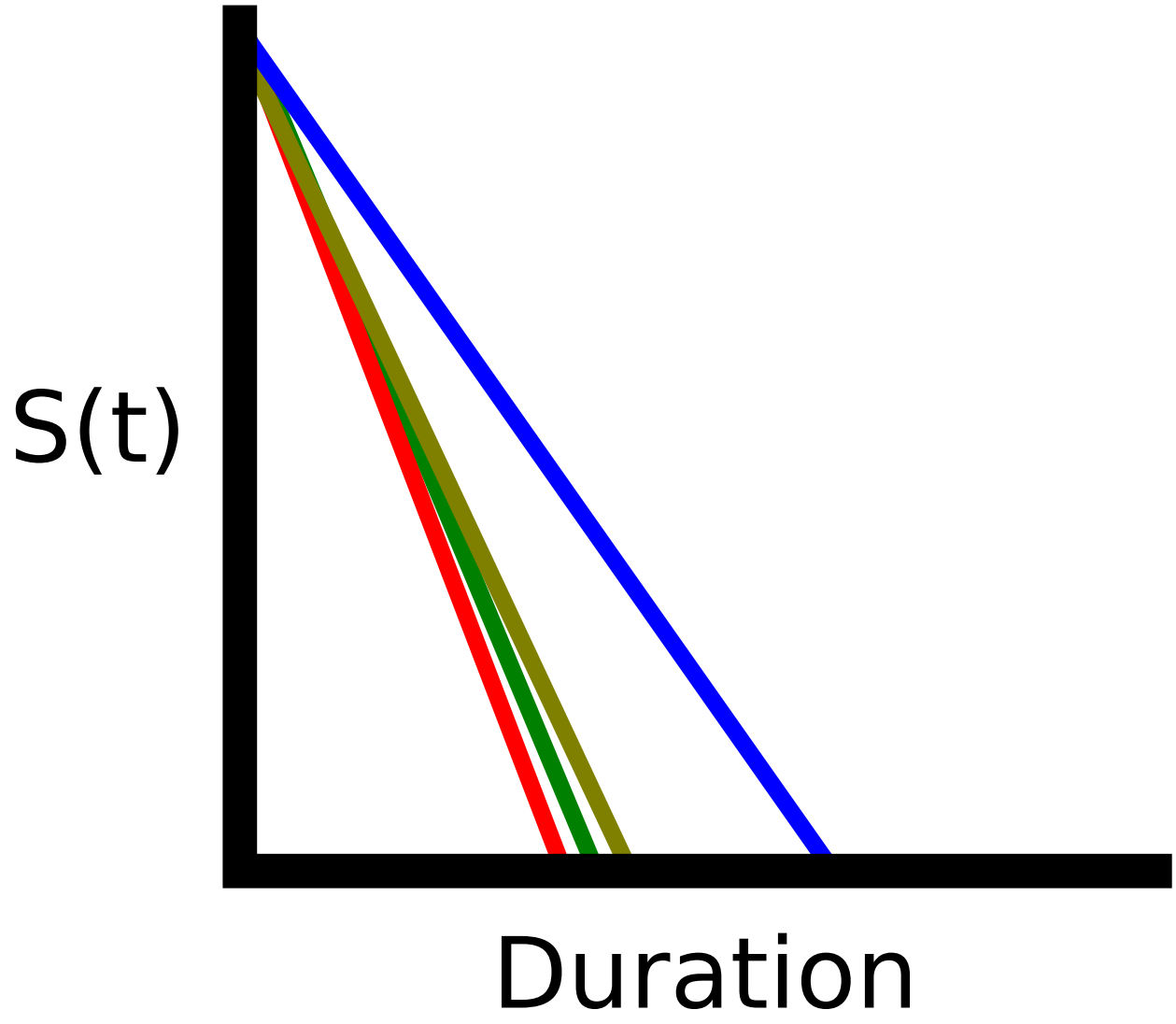
(Harnik and Simpson 2013 *Proc B*)

Survival of the unspecialized

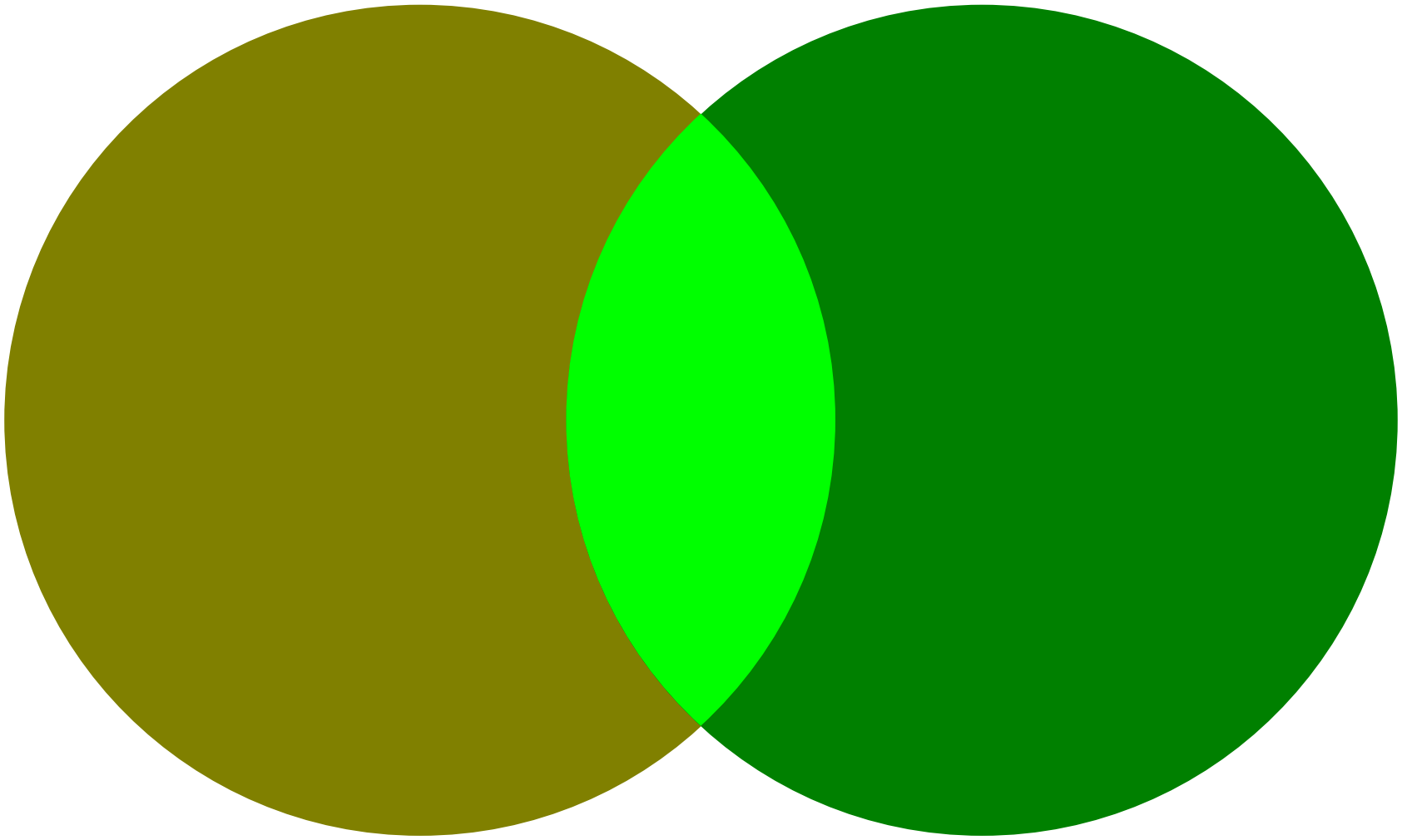
When related phyla die out . . . more specialized phyla tend to become extinct before less specialized. This phenomenon is also far from universal, but it is so common that it does deserve recognition as a rule or principle in evolutionary studies: **the rule of the survival of the relatively unspecialized.**

(Simpson, 1944, Tempo and Mode of Evolution, p. 143*)*

Hypotheses of effects of dietary category



Hypotheses of effects of locomotor category



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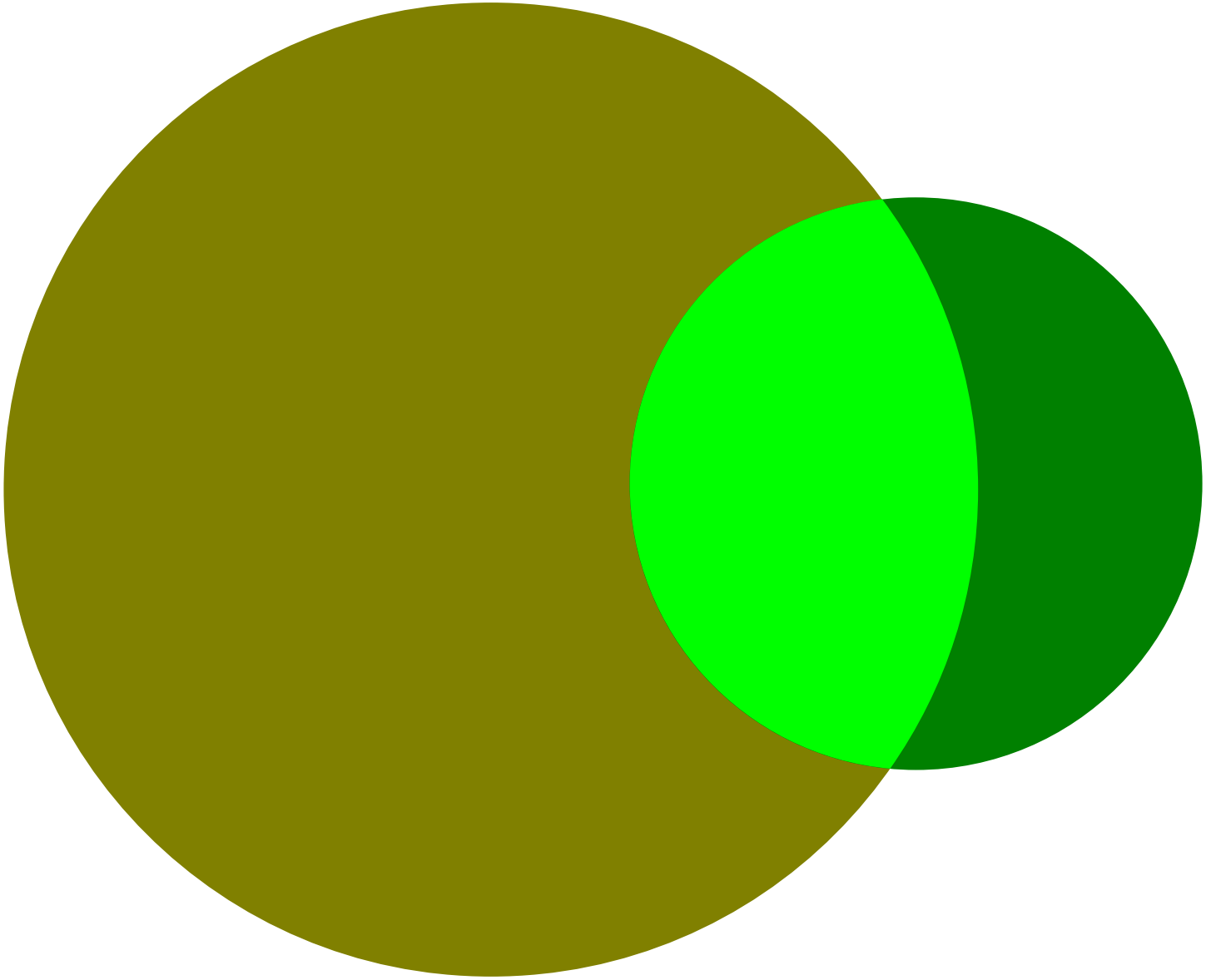
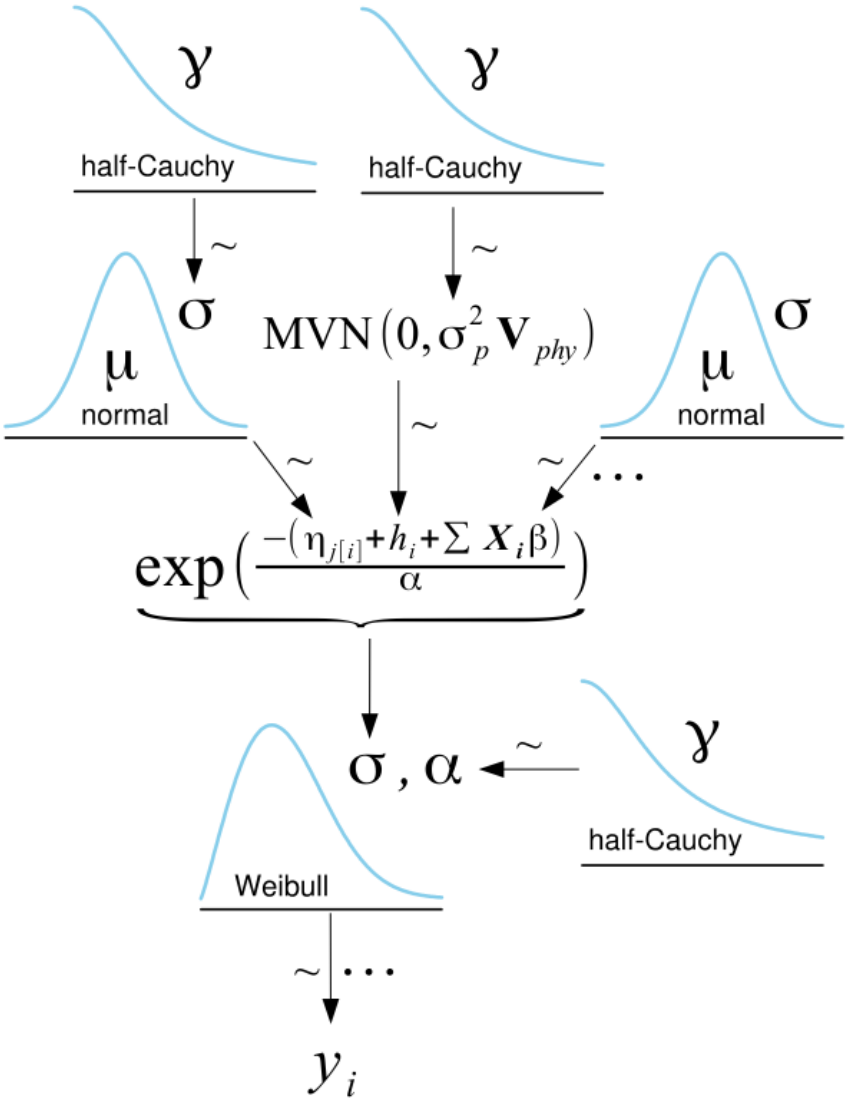


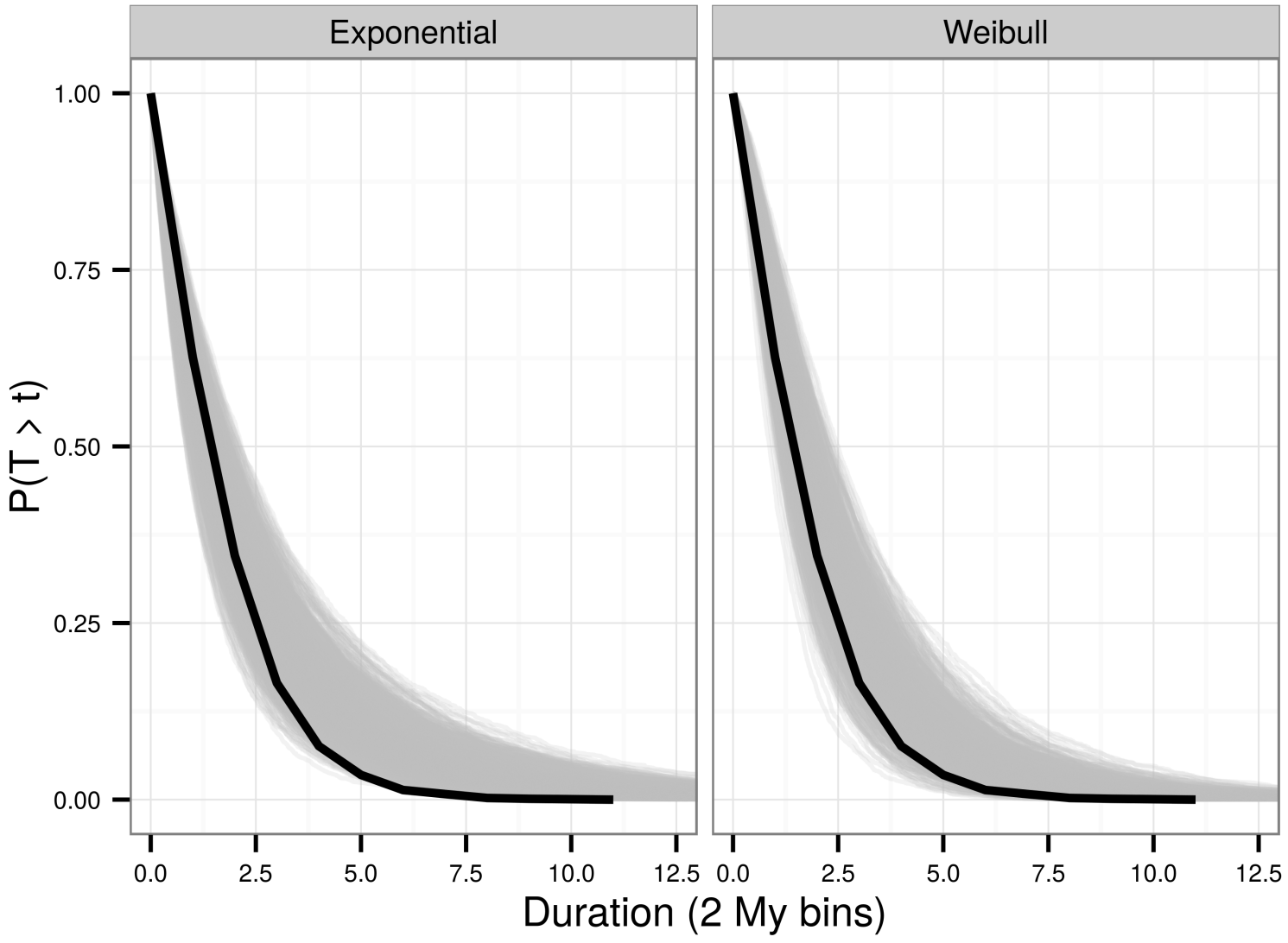
Hierarchical Bayesian modeling approach

(www.countbayesie.com)

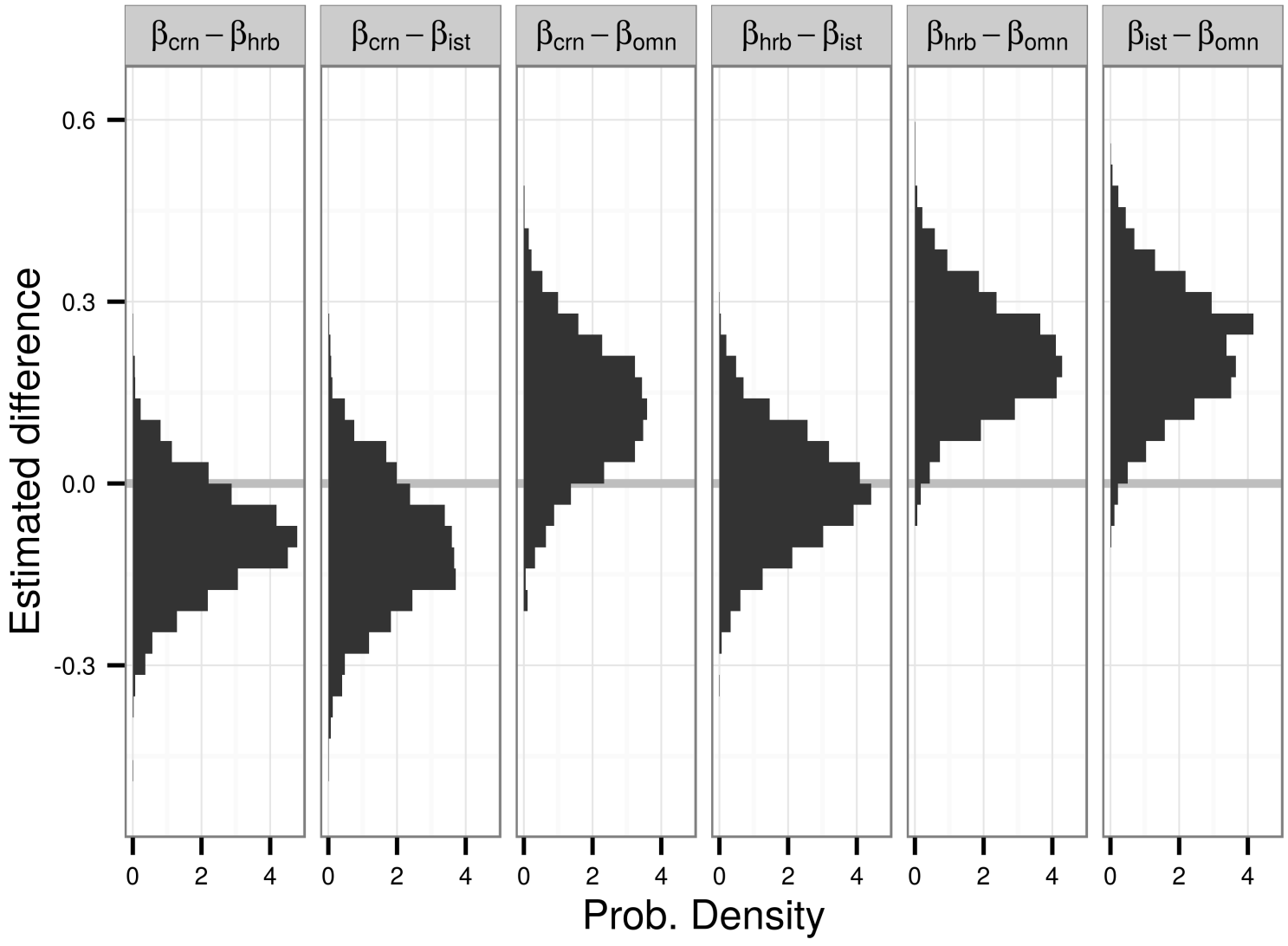
Survival model diagram



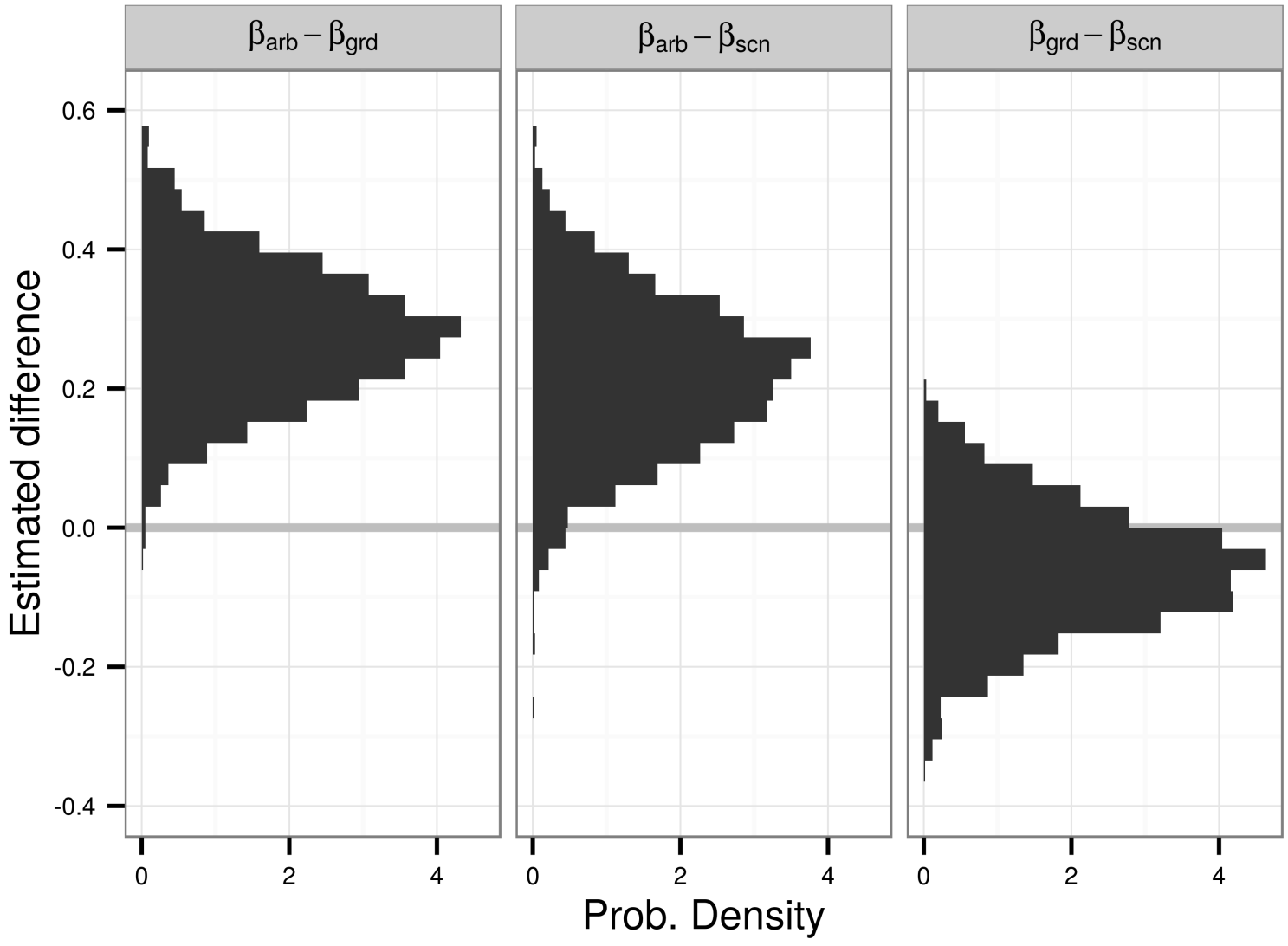
Pattern of species survival under two models



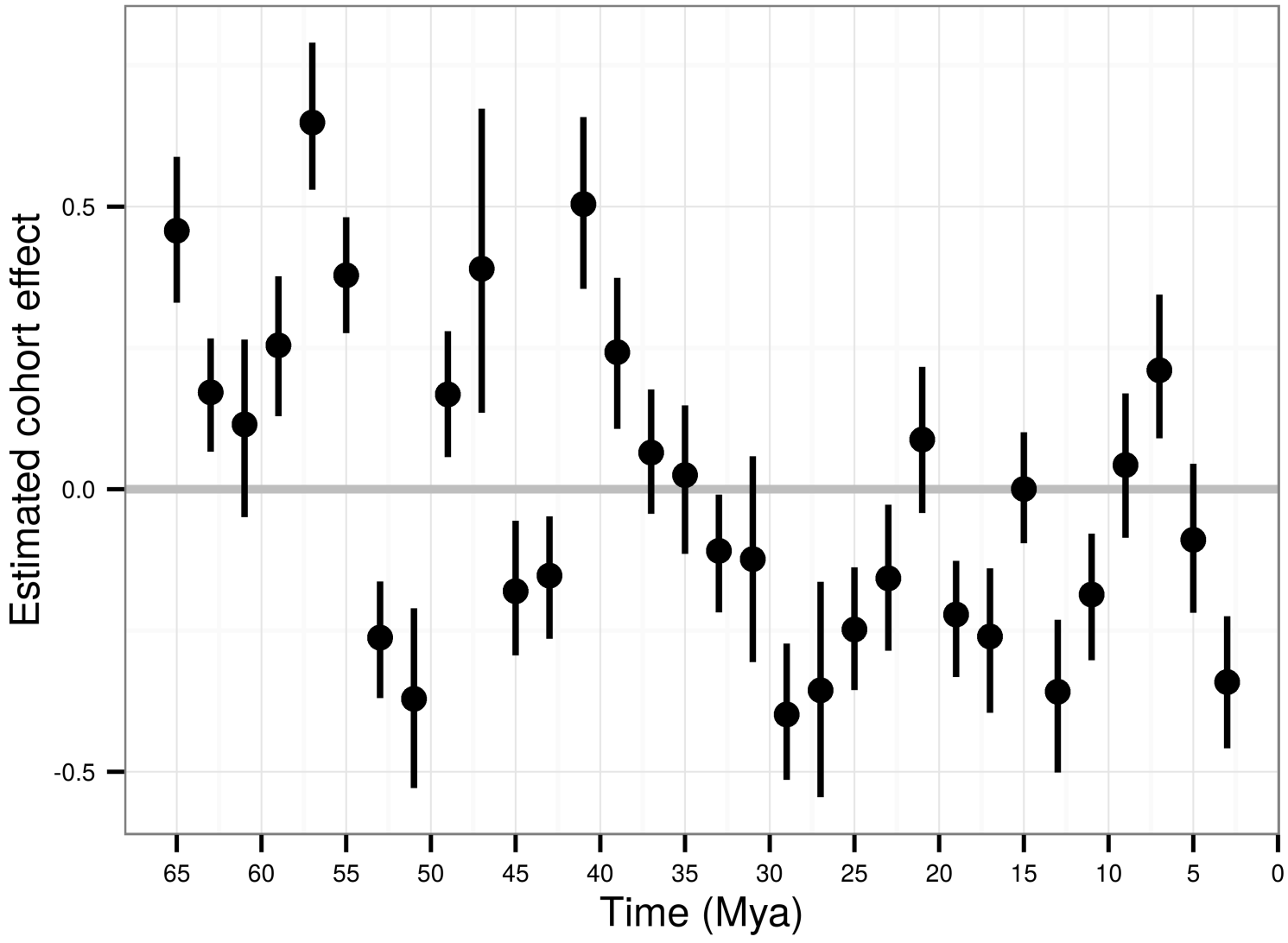
Effect of dietary category on extinction risk



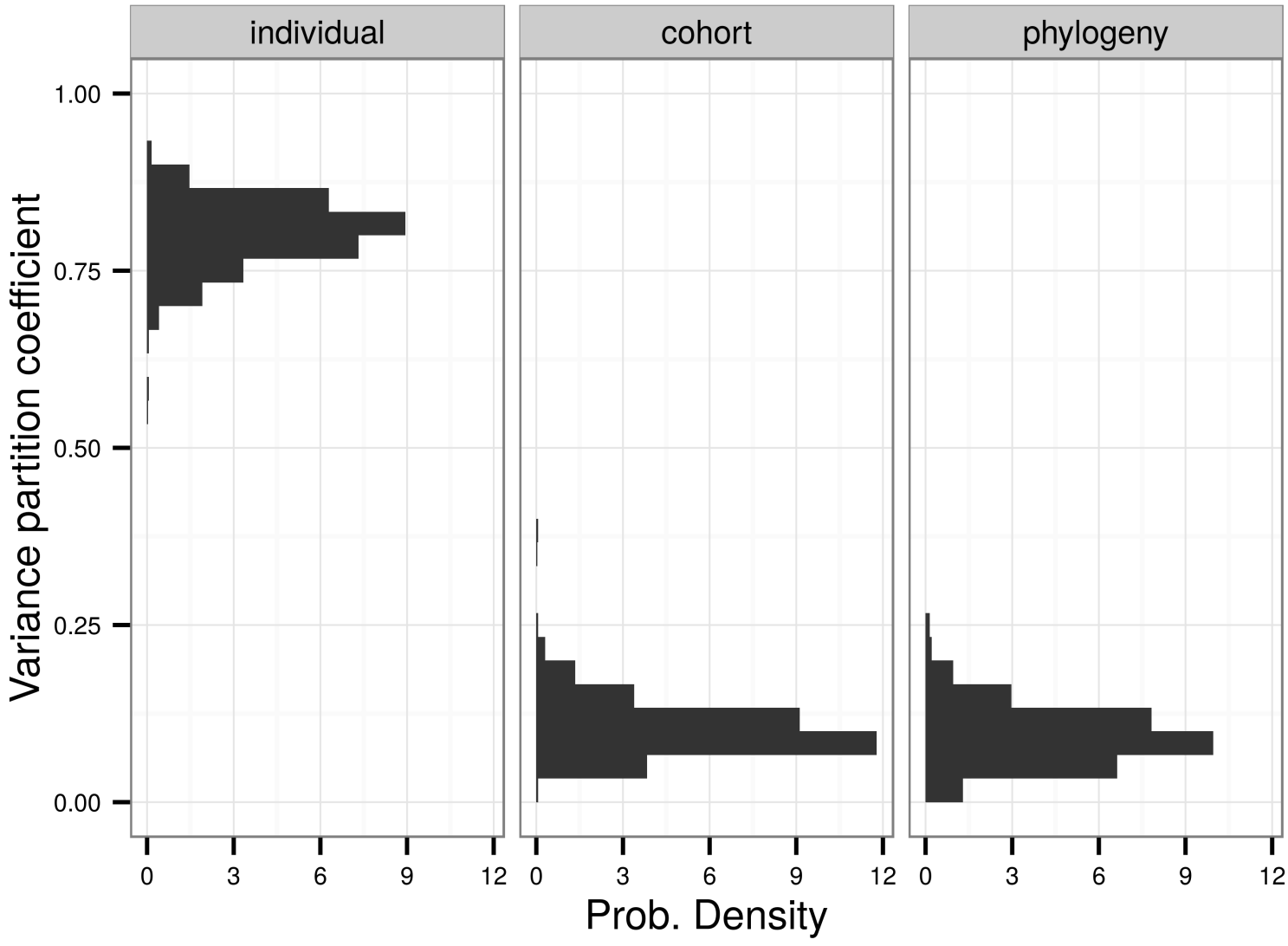
Effect of locomotor category on extinction risk



Difference in risk between origination cohorts



Three sources of variance



Conclusions

- Survival of the unspecialized as time-invariant generalization.
- Decrease in extinction risk with time.
  - Both cohort/temporal and phylogenetic effect.
- Some incongruence with risk factors in the Recent.
  - e.g. effect of body size, trophic category, phylogenetic clustering.

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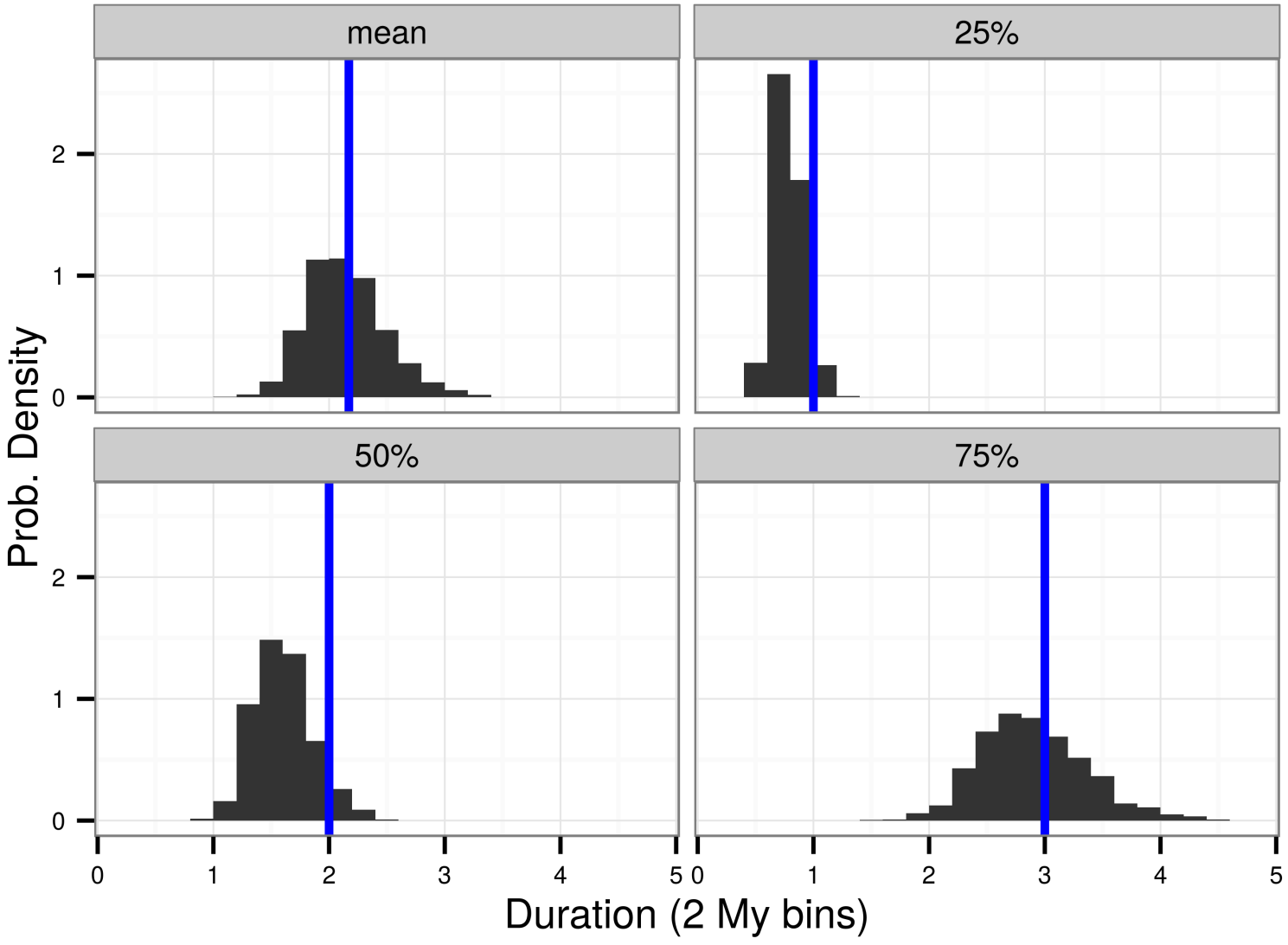
- John Alroy, David Bapst, Ben Frable, Graeme Lloyd, Carl Simpson, Graham Slater, Peter Wagner

Further posterior predictive checks



Concerns regarding estimation of α