

# How do biological traits affect brachiopod taxonomic survival?

A hierarchical Bayesian approach

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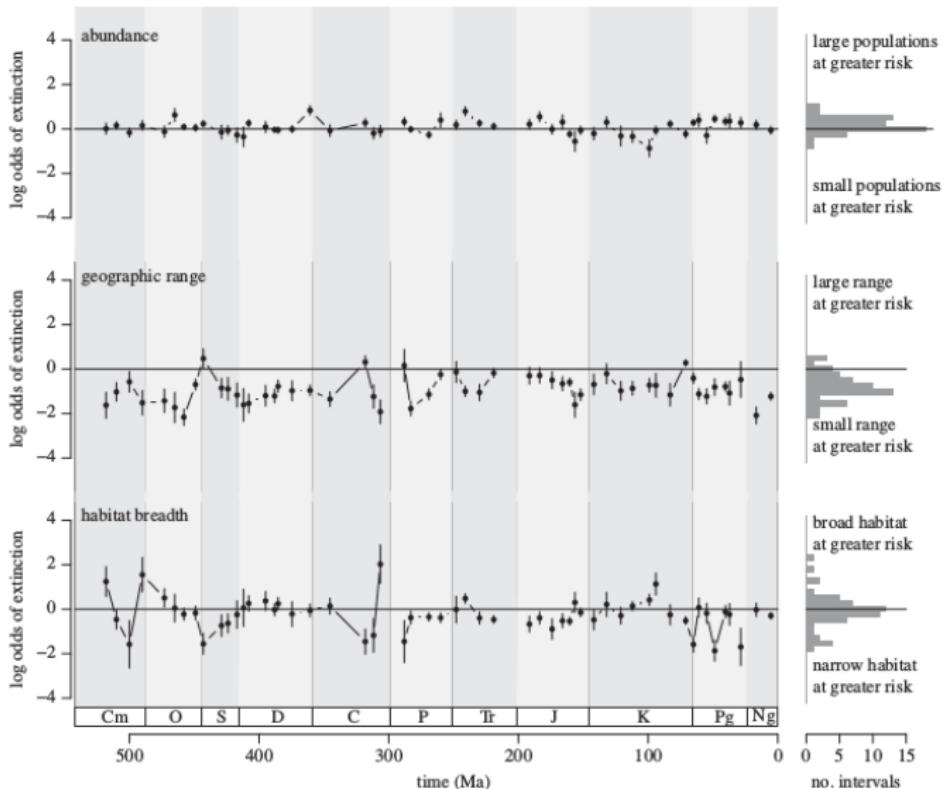
The Paleobiology Database  
revealing the history of life



# Observation

# Hypotheses

# Relationship between range size and extinction risk



(Harnik and Simpson 2013 *Proc B*)

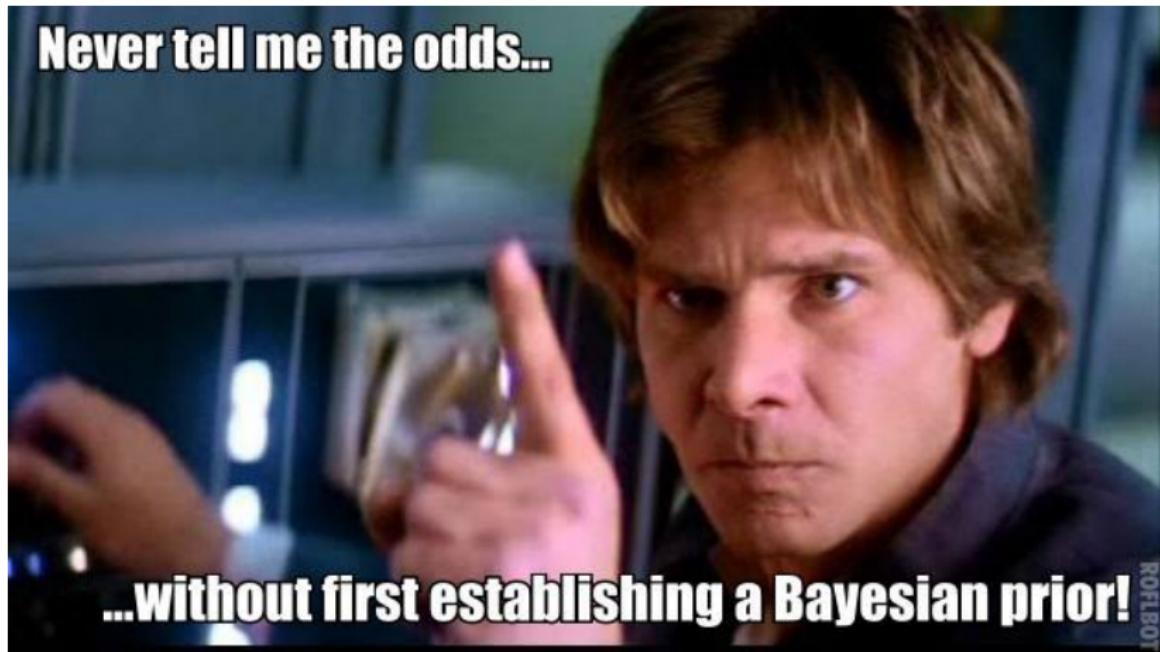
## Survival of the unspecialized

*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 effect of environmental preference

## Hierarchical Bayesian modeling approach

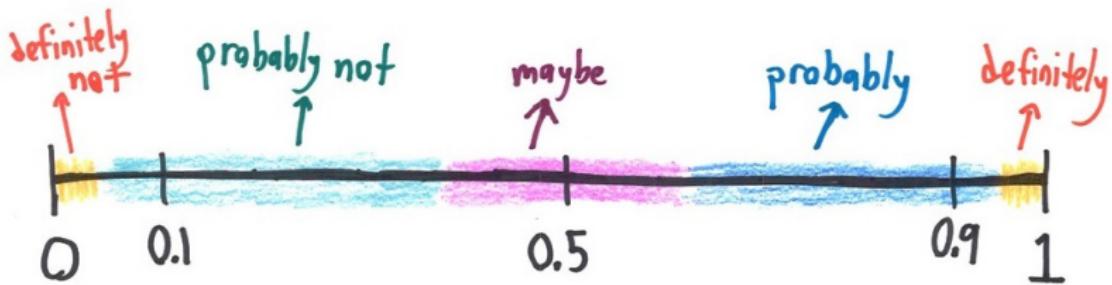


([www.countbayesie.com](http://www.countbayesie.com))

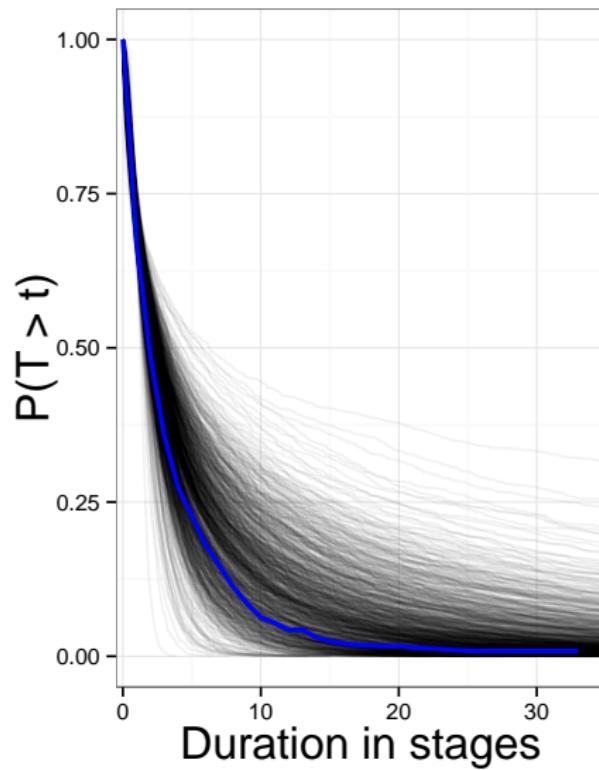
## Hierarchical survival model

# Refresher on probability

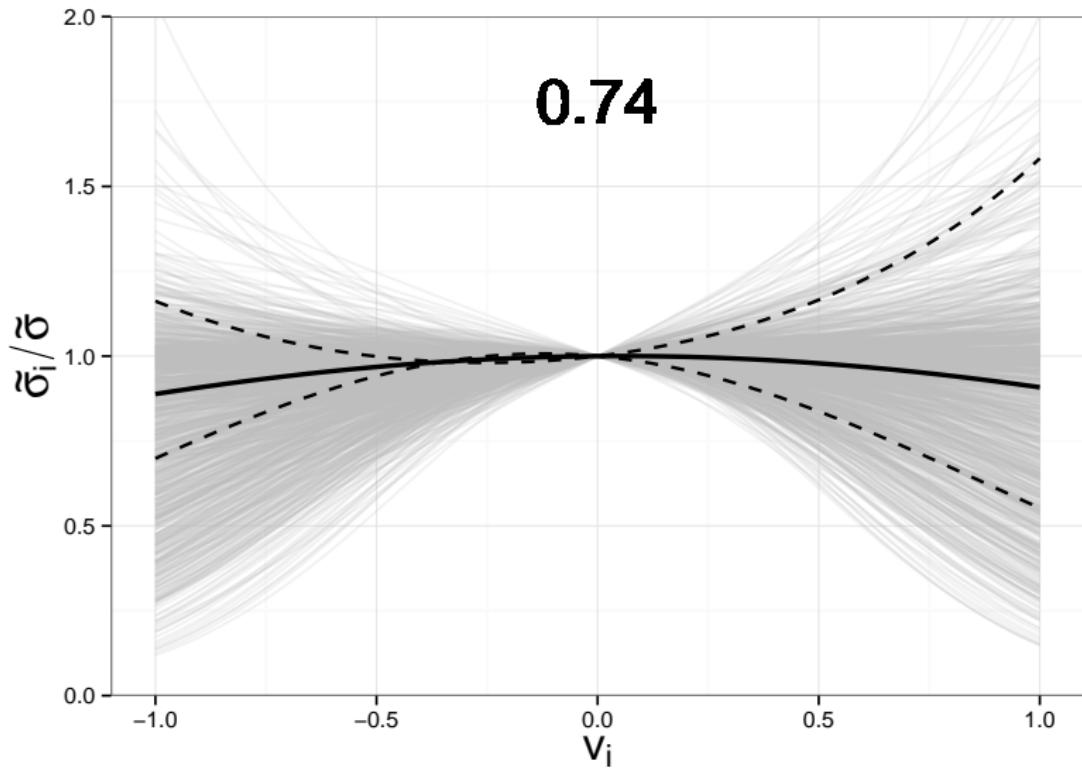
Actual Meaning



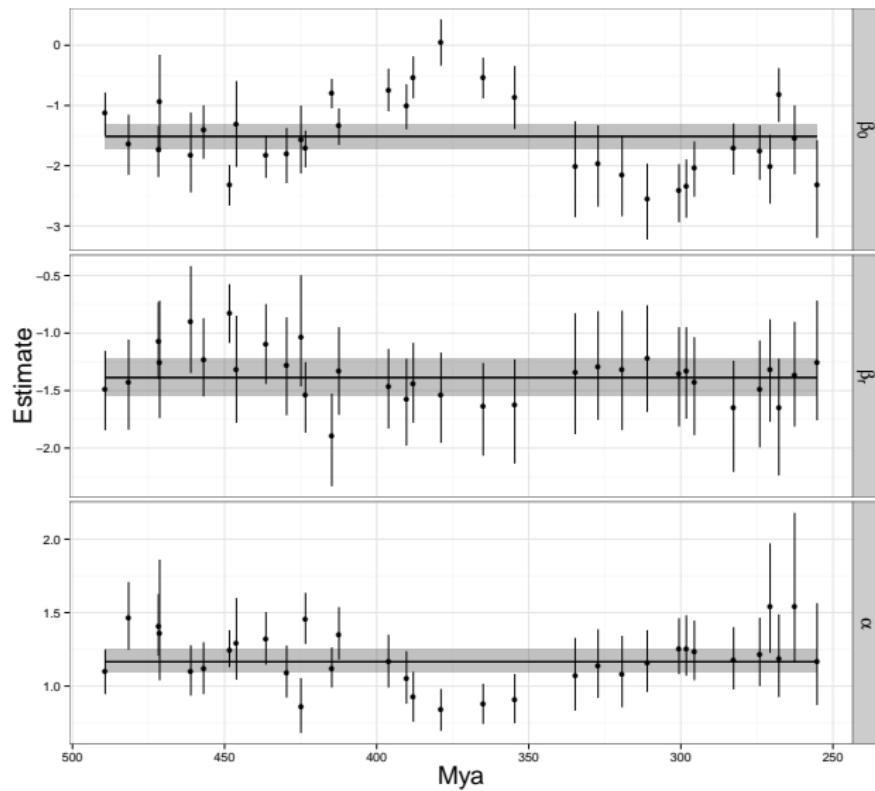
# Posterior predictive distribution of $S(t)$



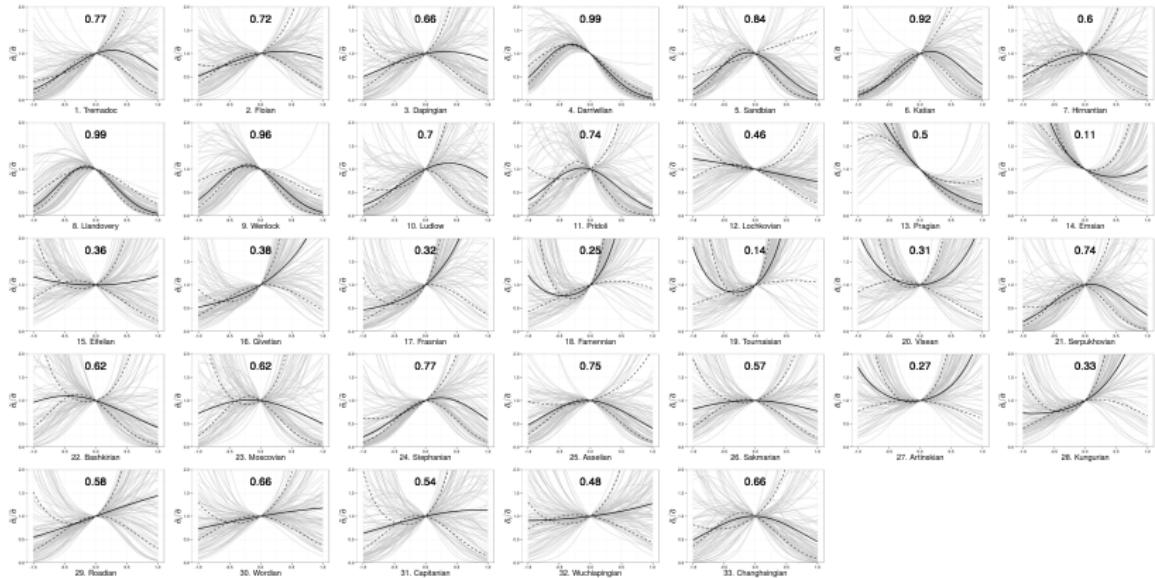
# Overall effect of environmental preference



# Change in trait effects between cohorts

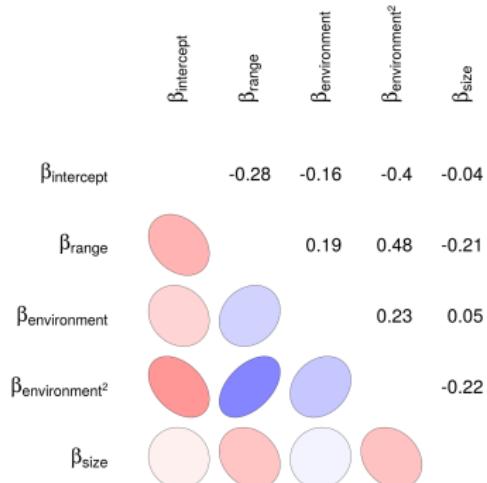


# Change in effect of environment between cohorts

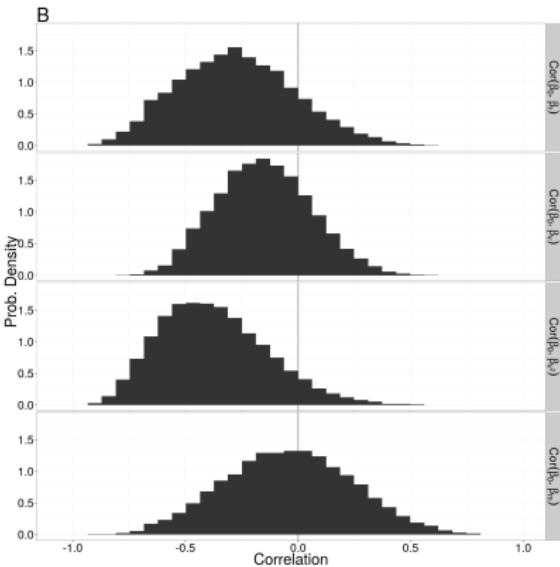


# Correlation of effects between cohorts

A



B



# Conclusions

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