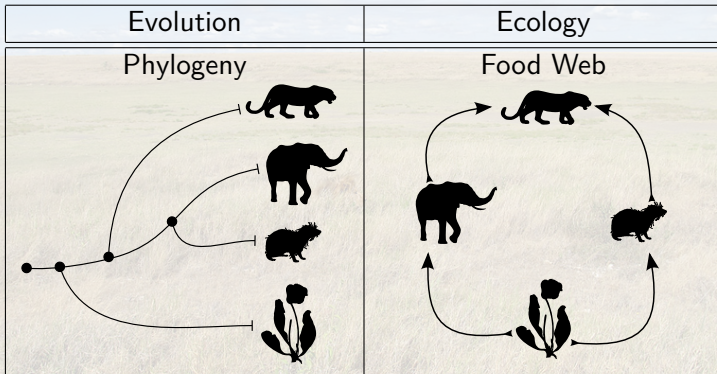


Stochasticity and Evolution in Food Webs

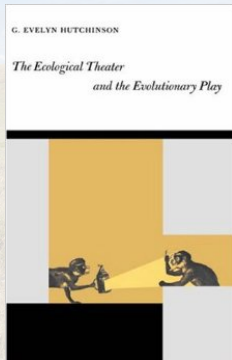
Giulio Dalla Riva
University of Canterbury, NZ

Granada Seminar June 16, 2015
gvdr16@uclive.ac.nz - [gvdr.github.io](https://github.com/gvdr)

species ARE related

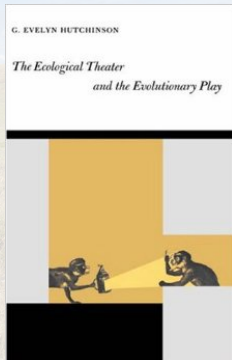


the Theater and the Play



Ecology and Evolution occur on different time scales?

the Theater and the Play



Maybe not, but it's complicated. Isn't it?

A Web on a Tree

It's hard to fit a Web on a Tree because of all the fine wirings.



Figure 1: Courtesy of Erik Moncada

A Web on a Tree

And you don't always get something out of it.

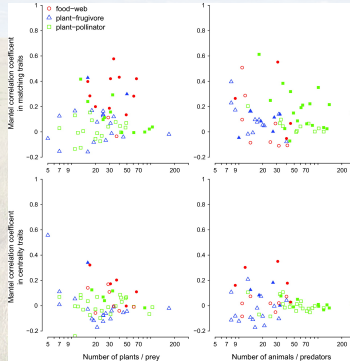


Figure 2: Courtesy of Rohr & Bascompte, Am Nat 184, 5 (2014)

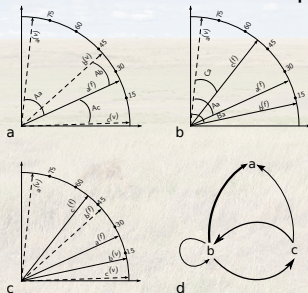
A Metric Space on a Tree

What if we could do without the wiring?

[Two images: Serengeti and Weddell]

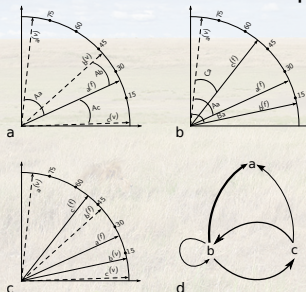
Food Webs embedded

► Random Dot Product Graphs



Food Webs embedded

► Random Dot Product Graphs



► Phylogenetic vs. Observed traits

$$\text{vcv}(\hat{X}|\tau, \text{model}) \text{ vs. } \text{vcv}(X)$$

More questions (than answers)

- There is phylogenetic signal

p-values anybody?

More questions (than answers)

- ▶ There is phylogenetic signal

p-values anybody?

- ▶ It is quite weak

20% 30% of variation explained

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$d \in \{2, \dots, 8\}$

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- ▶ It saturates with dimensionality

$d \in \{2, \dots, 8\}$

- ▶ \therefore “fine wirings” may be deceiving

- ▶ Evolutionary model is inadequate

no interaction effects

(Not a) Conclusion

- Spoiler 1: Evolutionary distinctiveness vs. Web Centrality
Do evolutionary unique species play a keystone role in Food Webs?

(Not a) Conclusion

- ▶ Spoiler 1: Evolutionary distinctiveness vs. Web Centrality
Do evolutionary unique species play a keystone role in Food Webs?
- ▶ Spoiler 2: An ecological informed model of species evolution
maybe it's (almost) there.
I am looking at you, Ornstein and Uhlenbecki ...

Thanks!

Joint work with Daniel B. Stouffer (University of Canterbury)

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By the way, I'm looking for a postdoc.
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