

This week

Topics

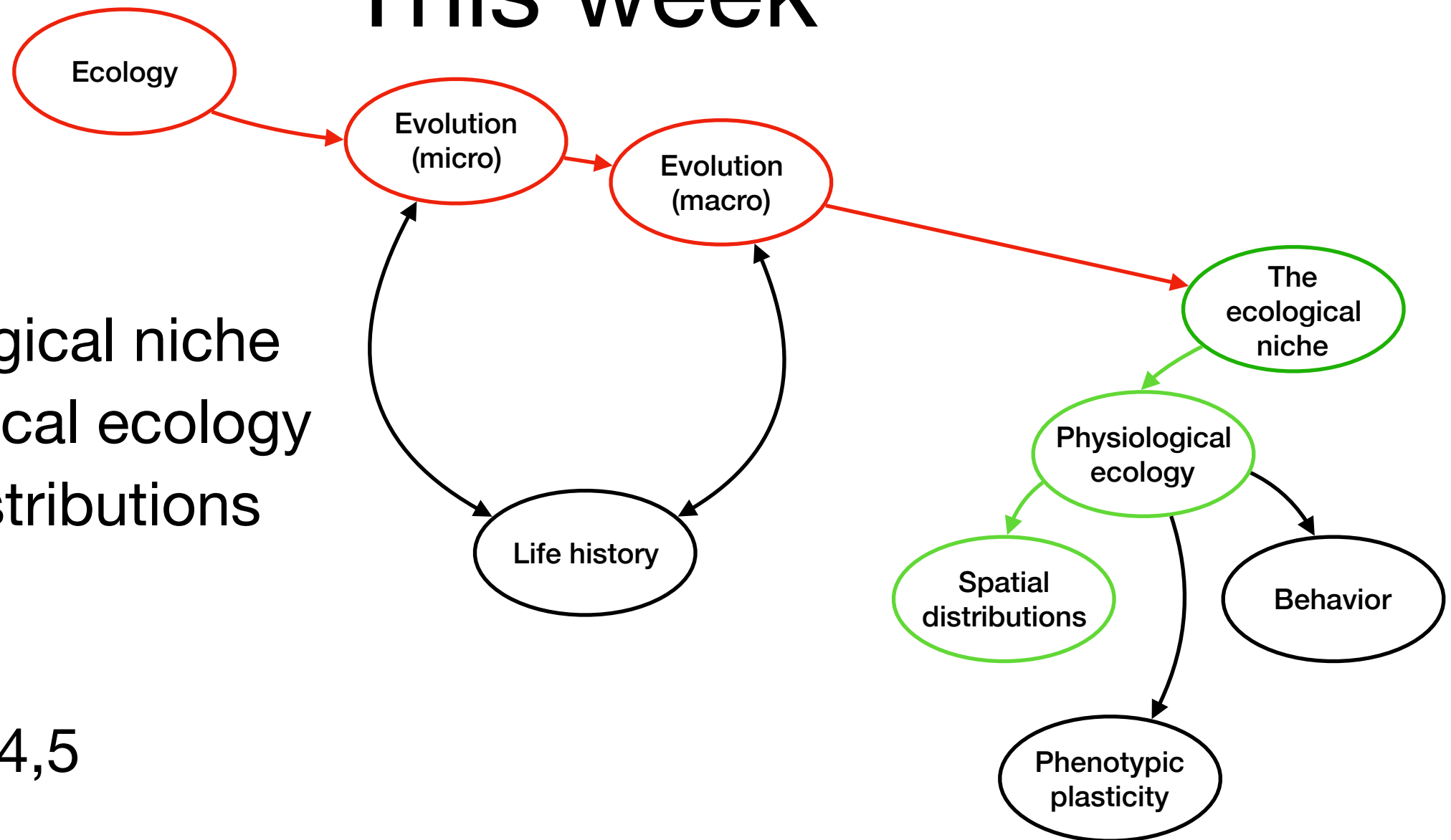
1. The ecological niche
2. Physiological ecology
3. Spatial distributions

Readings

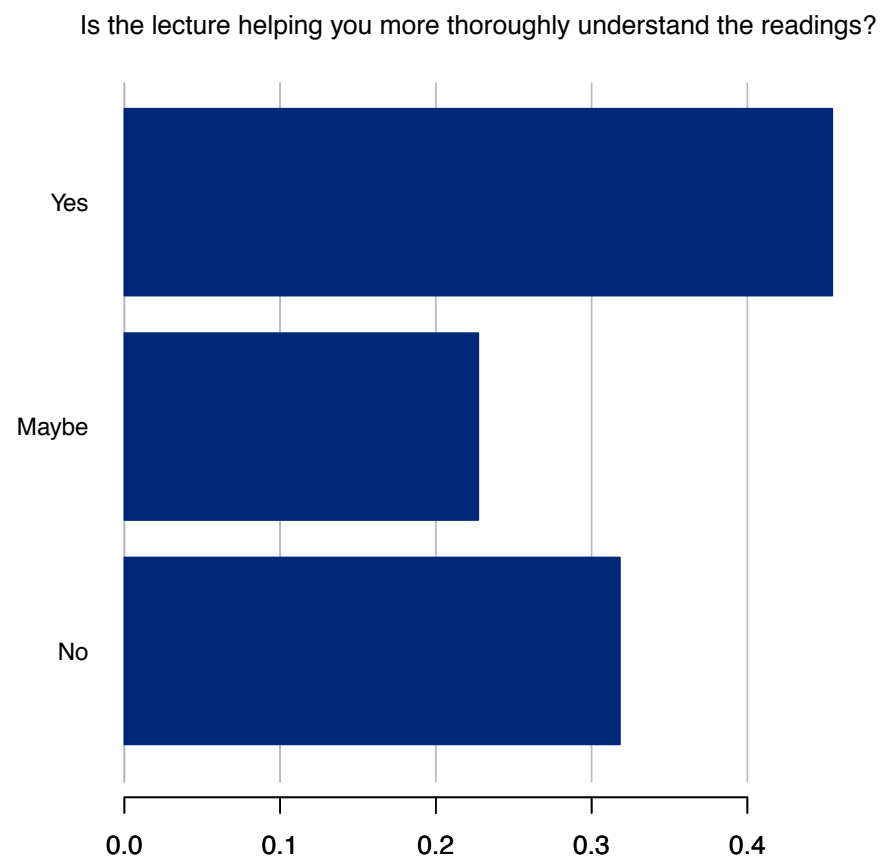
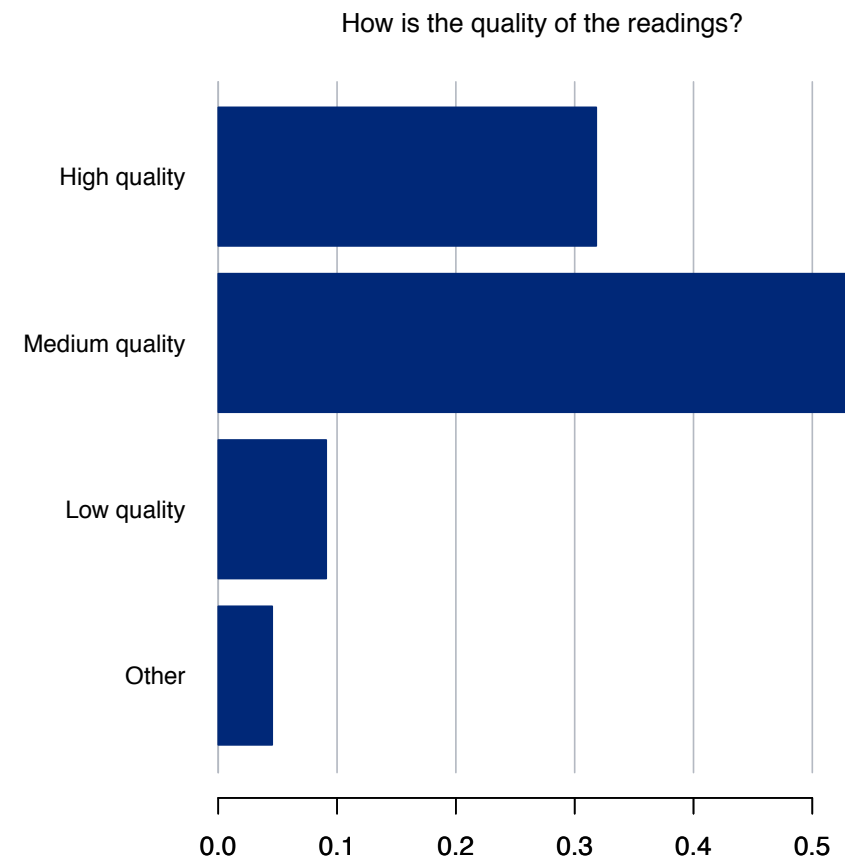
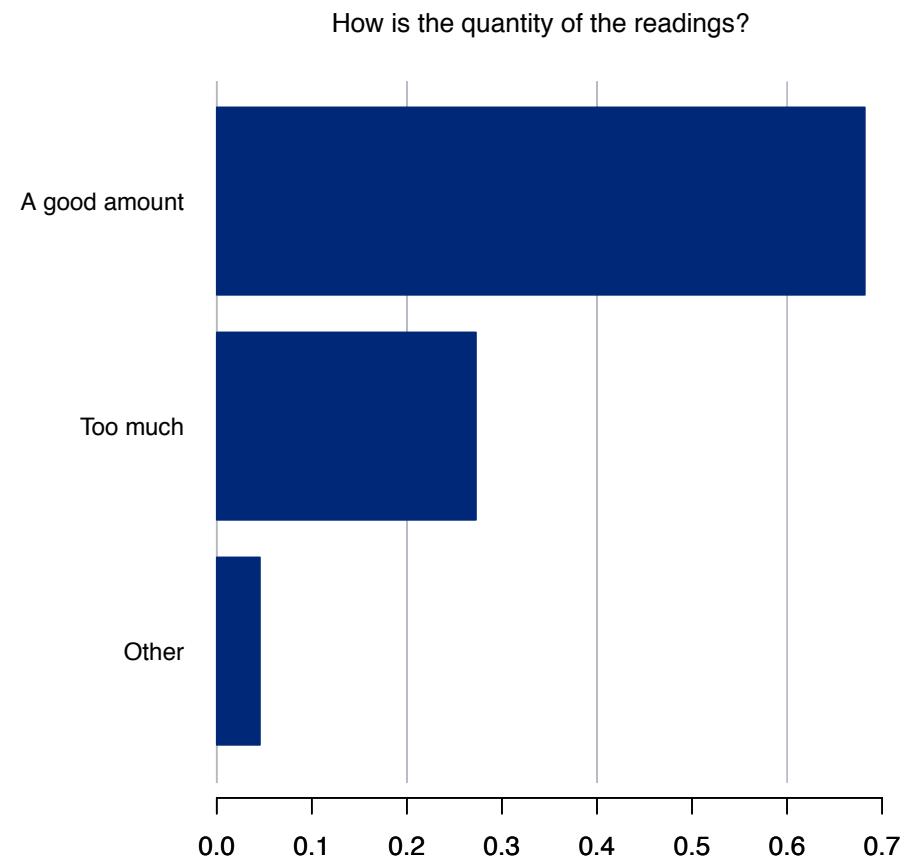
1. CBH: ch. 4,5

Assignment

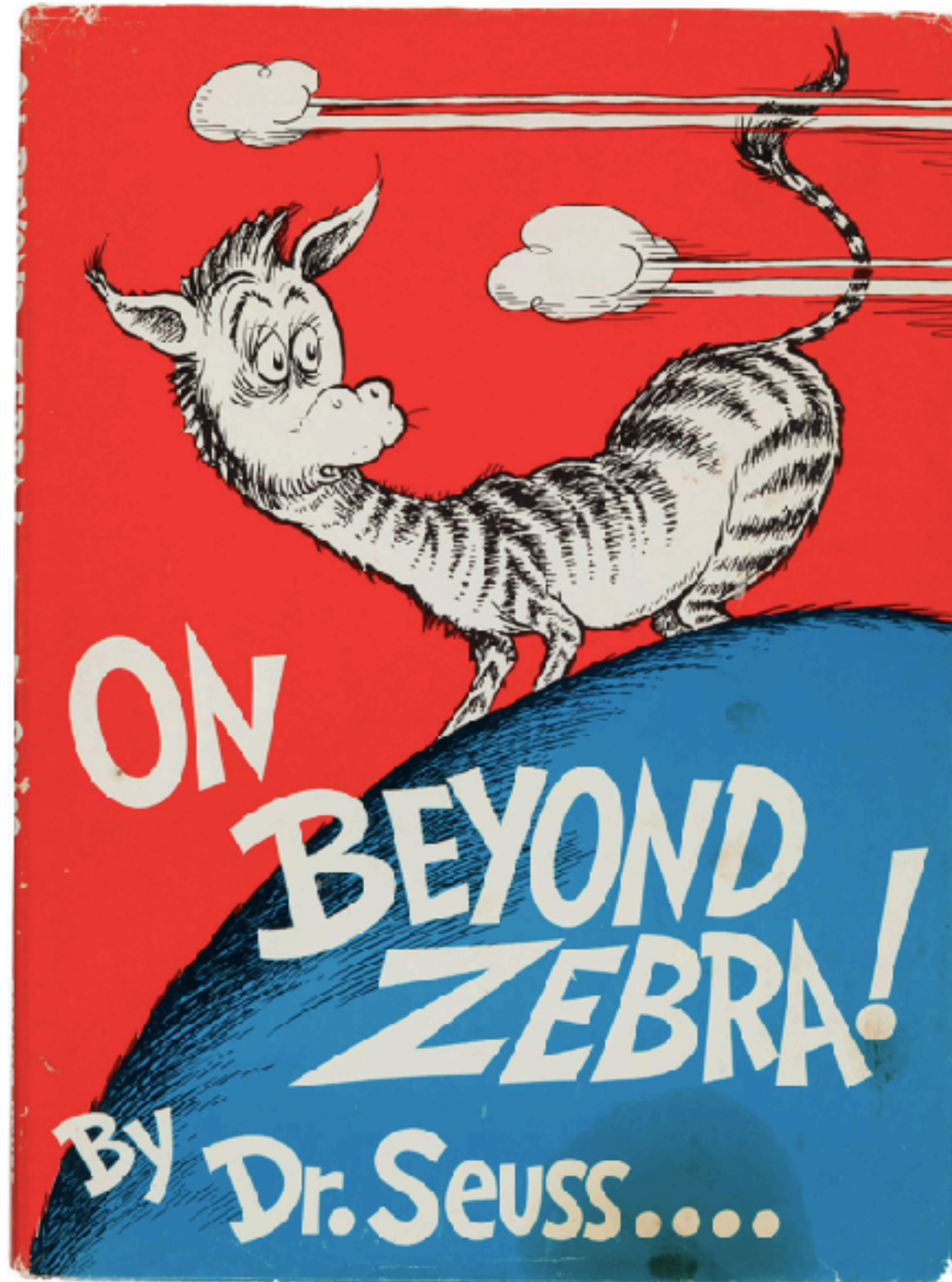
1. Paper critique I due (Friday, 9/22)



Survey says . . .



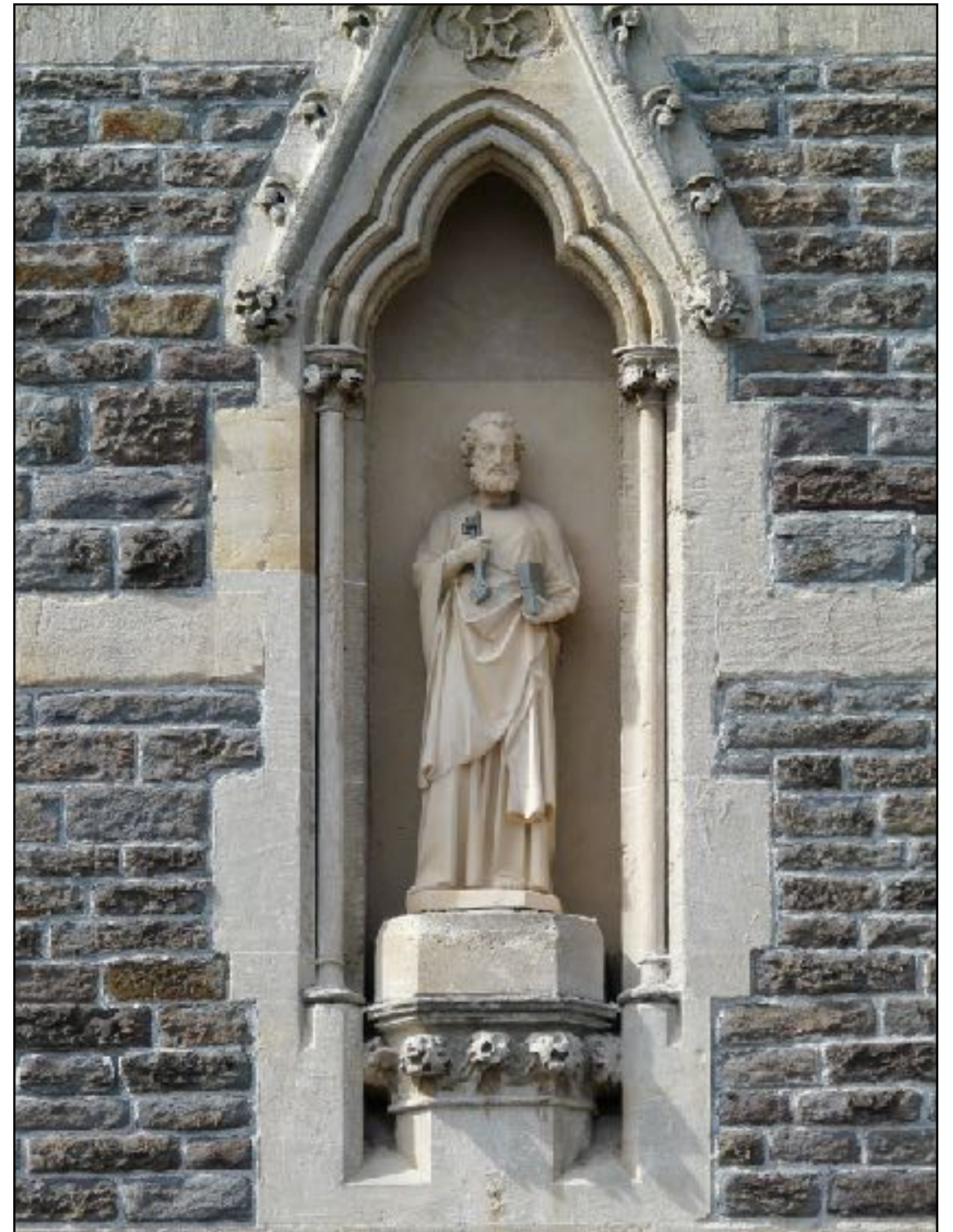
The ecological niche



Lecture 2, BI271: Introduction to Ecology
Fall 2017

Origin and meaning of *niche*

- Origin: *nidus* L. for 'nest'
- Definition: *a position or role taken by a kind of organism within its community*



St Peter in niche, St Peter's Church, Cardiff.
Source: WikimediaCommons

Three concepts of the niche

(from Schoener, in Levin ed., 2009, *The Princeton Guide to Ecology*)

1. The recess/role niche
2. The population-persistence niche
3. The resource-utilization niche

The recess/role niche

THE NICHE-RELATIONSHIPS OF THE CALIFORNIA THRASHER.¹

BY JOSEPH GRINNELL.

THE California Thrasher (*Toxostoma redivivum*) is one of the several distinct bird types which characterize the so-called "Californian Fauna." Its range is notably restricted, even more so than that of the Wren-Tit. Only at the south does the California Thrasher occur beyond the limits of the state of California, and in that direction only as far as the San Pedro Martir Mountains and

¹ Contribution from the Museum of Vertebrate Zoölogy of the University of California.

- Termed by R. H. Johnson in 1911, but popularized by Joseph Grinnell in 1917
- Recess/role niche: the ecological niche of a species is its 'role,' 'place,' or more literally 'recess' (in the sense of a 'nook' or 'cubbyhole') in an ecological community
- The idea that there exists a set of characteristic habitat and food types with accompanying behavioral, morphological, and physiological adaptations
- At the heart of the recess/role niche is the idea of *ecological equivalents* (two or more species with very similar niche characteristics that occur in completely different localities)

The recess/role niche



Photo: reptiles4all/Shutterstock

The recess/role niche



Photo: Chris Moore



AnimalArk.com

The recess/role niche



Photo: MotherNatureNetwork

The population-persistence niche

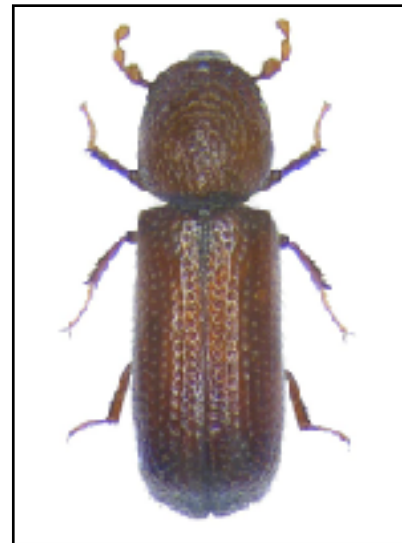
Concluding Remarks

G. EVELYN HUTCHINSON

Yale University, New Haven, Connecticut

- G. Evelyn Hutchinson, 1957
- A quantitative (as opposed to the recess/role's qualitative) description of the niche—this is important for science!
- The population-persistence niche: the range of environmental conditions that allow a population to persist in some location; the term persist means having a positive or at least zero (break-even) population growth rate, r (if r is negative, the population dwindles away to extinction)
- Described *fundamental* and *realized* niches

A photograph of a dark brown, elongated beetle, likely a bark beetle, shown from a dorsal view. The beetle has a textured, ribbed surface and its legs are visible extending from the sides.



Maguire, B., Jr. 1973. Niche response structure and the analytical potentials of its relationship to the habitat. *American Naturalist* 107: 213–246

The resource-utilization niche

Vol. 101, No. 921

The American Naturalist

September–October, 1967

THE LIMITING SIMILARITY, CONVERGENCE, AND DIVERGENCE OF COEXISTING SPECIES

ROBERT MACARTHUR AND RICHARD LEVINS*

Department of Biology, Princeton University, Princeton, New Jersey, and
Department of Biology, University of Puerto Rico,
Rio Piedras, Puerto Rico

- Robert MacArthur and Richard Levins, 1967
- Instead of focusing on all of the environmental conditions, it focuses on the resources
 - A definition: the range of resources that allow a population to persist in some location
- Also multidimensional and quantitative (like population-persistence niche)

The resource-utilization niche

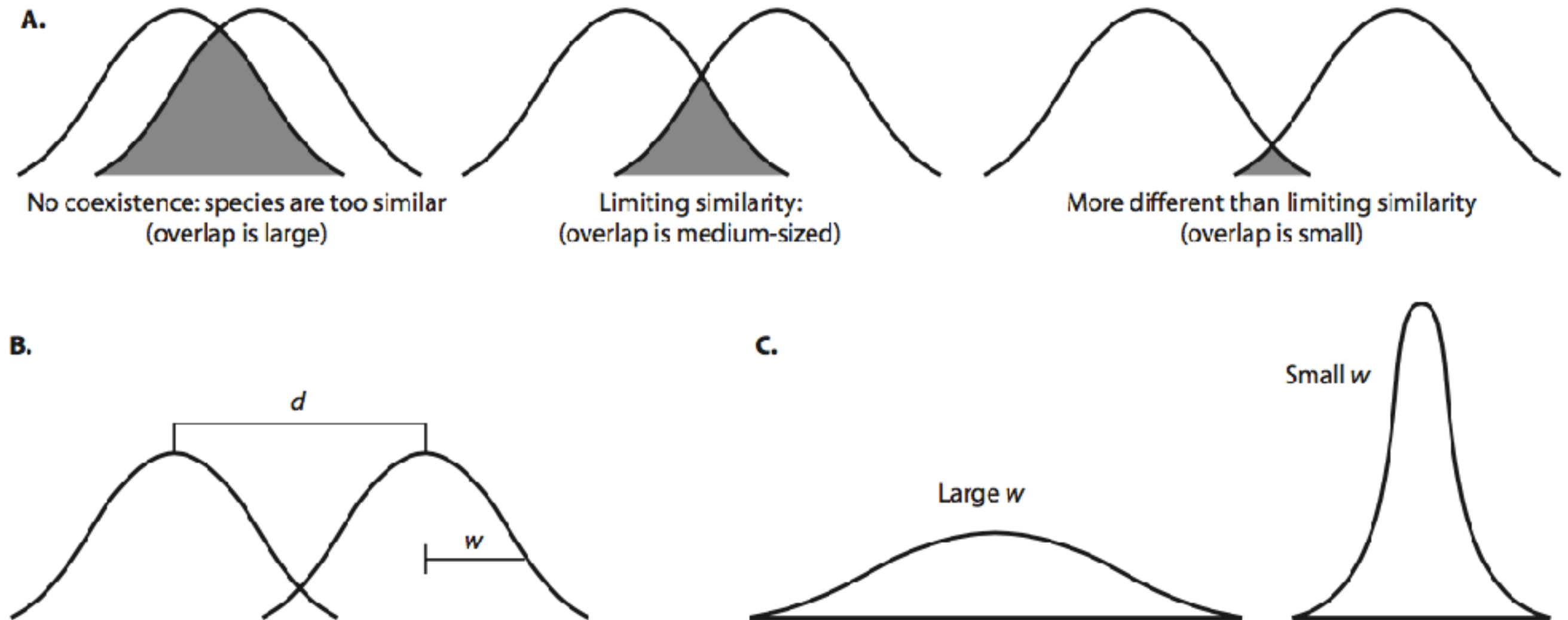


Figure 7. [A] One dimensional resource utilization niches of two species showing no coexistence because niches are too similar (left), limiting similarity species can just coexist (middle), and

greater than limiting similarity also allowing coexistence (right). [B] Niche distance d and niche width w for two species. [C] Niches of generalist (large w) and specialist (small w) species.

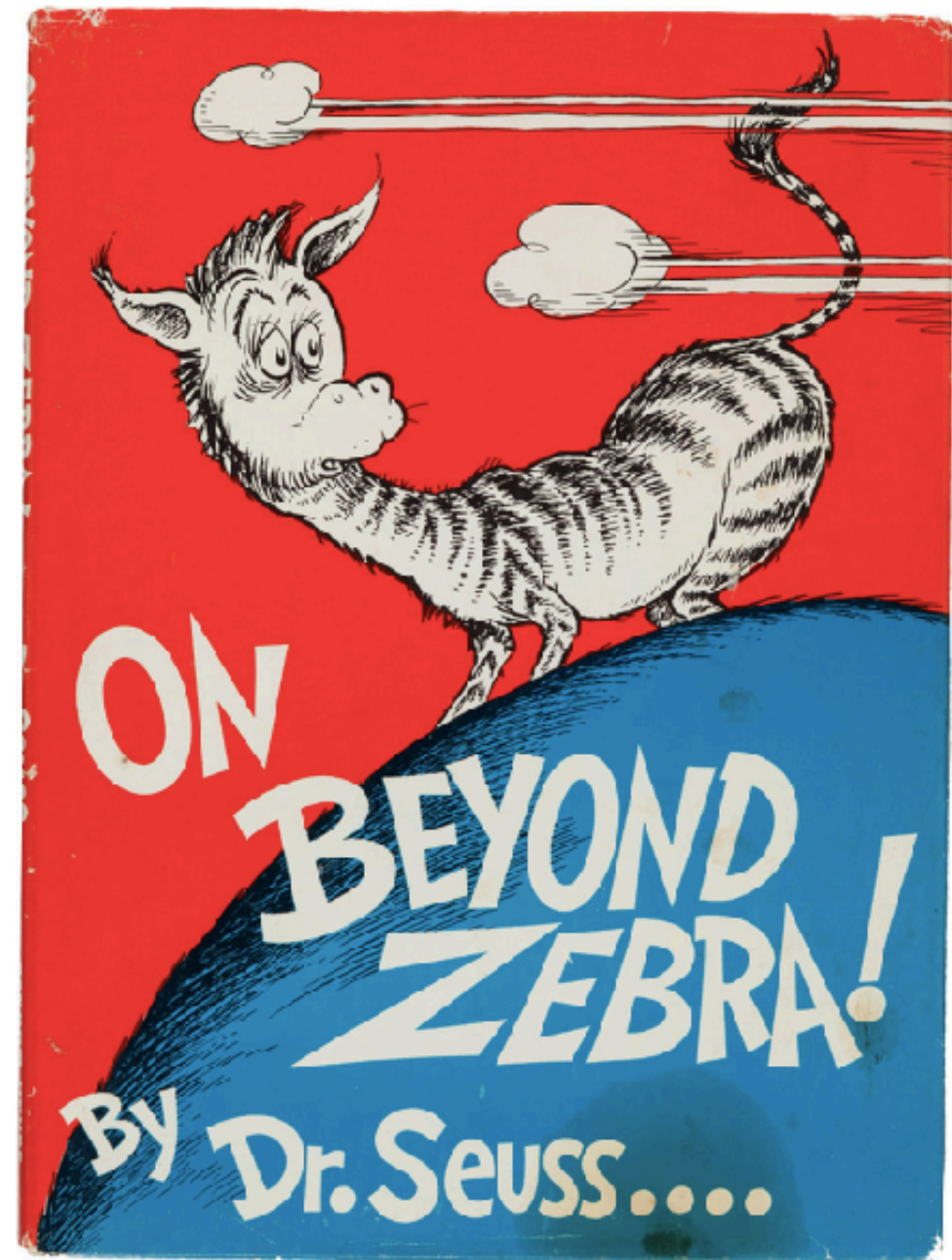
The Seussian niche

And NUH is the letter I use to spell Nutches,
Who live in small caves, known as Niches, for hutches.

These Nutches have troubles, the biggest of which is
The fact there are many more Nutches than Niches.

Each Nutch in a Nich knows that some other Nutch
Would like to move into his Nich very much.

So each Nutch in a Nich has to watch that small Nich
Or Nutches who haven't got Niches will snitch.



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