

Chloe P. Drummond

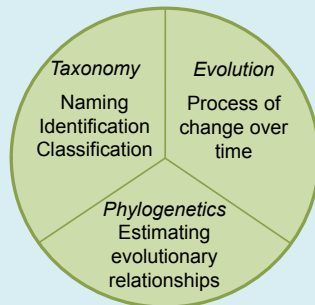
Department of Botany, University of Wisconsin-Madison

## Motivation

Undergraduates who have taken evolution courses still harbor evolution misconceptions and misinterpret phylogenetic trees.<sup>1234</sup>

Assessing student learning of evolution concepts allows informed adjustments in future iterations of the course.

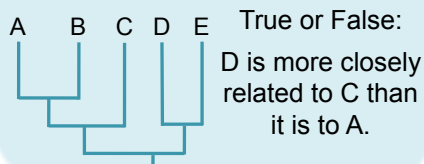
## What is Systematics?



## What is Tree Thinking?

The ability to understand evolutionary relationships by interpreting phylogenetic trees

## How good is *your* tree thinking?



## Project Questions

Do lectures on evolution & phylogenetics

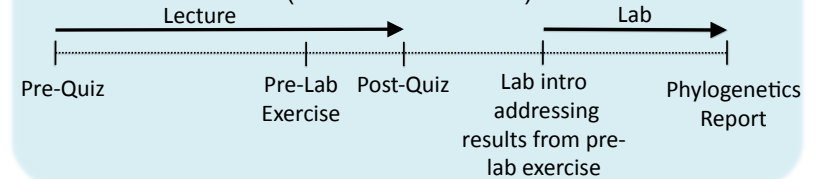
- teach students how to read trees?
- address student misconceptions?

Do in-class practice & feedback

- improve tree thinking skills?
- reduce evolution misconceptions?

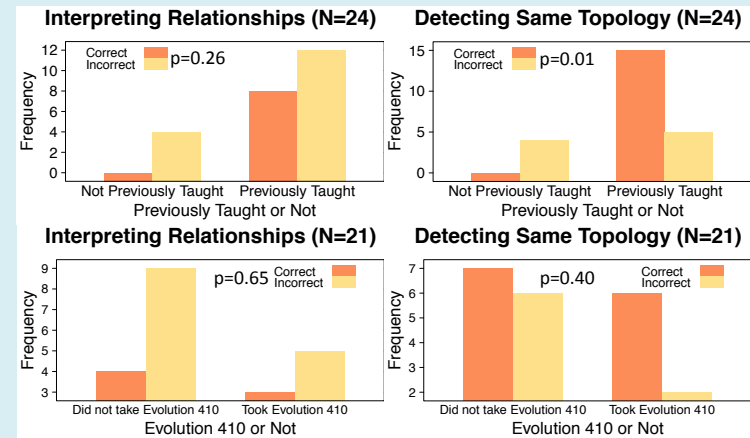
## Study Design

### Evolution Module Timeline (2<sup>nd</sup> half of semester)



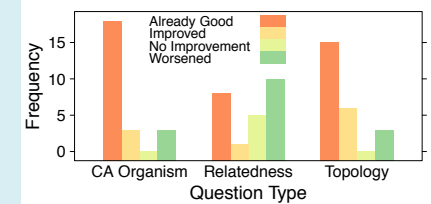
## Results

### Student Base-Line?

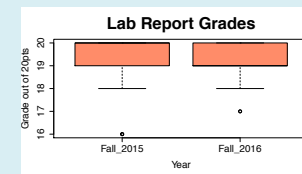


## Did Students Learn From Lecture?

### Pre/Post Quiz Comparison



## Did Students Improve from Pre-Lab Exercise?



Year	Class average	Class range
2016	19/20	17 - 20
2015	19/20	16 - 20

## Discussion

- Small N might explain lack of significant correlations
- Varying branch lengths might confuse students
- Rotated trees might confuse students
- Lab report grades may have limited power to reflect effectiveness of pre-lab exercise

## Lessons for instruction

- Teach tree thinking & misconceptions earlier on
- Provide regular assessment and feedback

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**References:** Baum et al. 2005. *Science*, 310(575):979-980; Meir et al. 2007. *ABT*, 69(7):e71-e76; Morabito et al. 2010. *JBE*, 44(4):166-174; Halverson et al. 2011. *Science Education*, 95(5):794-823.