

February 8, 2022 Theory Working Group Call

Theory Notes from the January 11, 2022 Call [HERE](#)

Attendees: Gerbrand Koren, Jody Peters, Glenda Wardle, Andrew Allyn, Christy Rollinson, Abby Lewis, Shubhi Sharma, Cole Brookson, Steph Brodie, Noel Juvigny-Khenafou
 Regrets: Jono Tonkin

Agenda:

1. Work in pairs/small groups:
 - a. Intro
 - i. What is missing? What needs to be reorganized/added/rewritten?
 - b. Section 2 (group 1): Glenda, Shubhi, Jody
 - i. Figure 1: I am considering cutting this figure because I am not sure it is helpful in making the case that all model types can contribute to theory (I think the text does a better job of communicating that point). Thoughts?
 1. Current figure show split between empirical and mechanistic models, but don't think the text highlights that.
 2. Do we need to make empirical and mechanistic are so different.
 3. Start paragraph with "We argue..." but not sure we are setting up the argument with what we exactly want to argue
 4. "Forecasting lets us know more about theory" is the goal of the paper, so want to point towards that.
 5. Want to head toward forecasting and predictions including the spectrum of empirical to mechanistic models.
 6. In Christy's figure - could collapse Empirical/mechanistic into one arrow
 7. Need to work on X and checks for Evaluation
 8. Constant improvement is the main goal from evaluation. Bring uncertainty into evaluation
 9. Show probabilistic distributions like Mike's figure so there is observations between observations/forecasts
 10. Like the figure because the feedback loop is the key message
 11. 3 key points: 1) Think version of Christy's figure will add and 2) Remove division between empirical and mechanistic and reinforce feedback arrows. 3) Section 2.2 Drawing together again of theory and application and bring in time
 - ii. What (if anything) is missing from section 2.2 to make the case that forecast transferability advances ecological theory?
 1. Flesh out -when we say it is advancing theory is it advancing knowledge. There is the way we are doing theory or the content of the theory or the actual structure of the theory. It is mainly the

difference in the way we are doing theory. Doing theory means we are putting it to work. Want to take away the artificial divide between forecasting and theory and that connects with taking away the artificial divide. Same business of knowing the theory of fisheries and applying that theory to fisheries. Applying the forecast is actually doing the theory.

2. Add time as something that is transferable with forecasts as well as the location
- c. Section 2 (group 2)
- i. Should the first and second paragraphs of 2.1 be expanded to avoid just listing benefits of forecasting? If so, how?
 1. Andrew/Noel:
 - a. Don't think that there is a need for expansion, focus instead on "structure" and simplifying/clarifying benefits (reader should be able to summarize three benefits after reading this easily). Most of the text is already there.
 - i. First paragraph, forecasting places an emphasis on mechanism over general relationship
 1. not entirely sure what the "forecaster" gains – see colony dynamics
 - ii. Second paragraph, iterative process for hypothesis testing and keep theory component in the third paragraph
 - iii. Third paragraph, iterative updating forces you to rethink theory and make advancements quicker
 - ii. Thoughts on whether table 1 is important to making the case that forecasting is a powerful tool to advance ecological theory? Or does it set up a contrast between forecasting and other types of modeling we don't want to make
 1. Andrew/Noel:
 - a. Don't think that the table makes the case for forecasting as a powerful tool beyond what is written in the text and introduces some confusion (historical modeling vs. forecasting, but then some rows have two "types" of forecasts, benefits not obviously specific to forecasting vs. historical modeling – example cross validation to avoid overfitting can be done using historical modeling)
 - b. Some graphic would still be valuable, though, presenting forecasting in context of "other" modeling? Potential thoughts/ideas – presenting things along a temporal continuum, or venn diagram ([here's a potential example](#)), other?
- d. Section 3: see notes in the manuscript

- i. I have identified several places where I think section 3 needs to focus more on ecological theory. Please add suggestions to help with this framing
 - ii. Does the logic for each of the hypotheses make sense? Are there places where you get lost? Are there places where the hypotheses seem disconnected from ecological theory?
- 2. Reconvene as a whole group:
 - a. Volunteers to help push forward each task
 - i. Filling in references:
 - ii.
 - b. Suggested reviewers for the MS
 - i. Gavin Simpson
 - ii. James Thorson
 - iii. Mark Payne
 - c. Timeline (DUE April 15th)
 - i. Feb 8 Meeting**
 - ii. Feb 8–Feb 22 ASL resolve edits, finish MS with support from group
 - 1. Small group meetings
 - iii. Feb 22–March 8 major feedback, edits.**
 - iv. March 8 Meeting**
 - v. March 8–21 ASL resolve edits, write cover letter
 - vi. March 21–April 5 Final feedback on final MS**
 - 1. **Sign off on whether you are okay with submitting or would like to see another version**
 - vii. April 5 Meeting**
 - viii. April 5–15 ASL resolve comments, ping people as necessary
 - 1. **2–3 volunteers to do a final read through of MS and cover letter**
 - ix. April 15 ASL submit
 - d. References - Abby do you have references compiled somewhere? Zotero, Endnote? Should people just add them to the end?

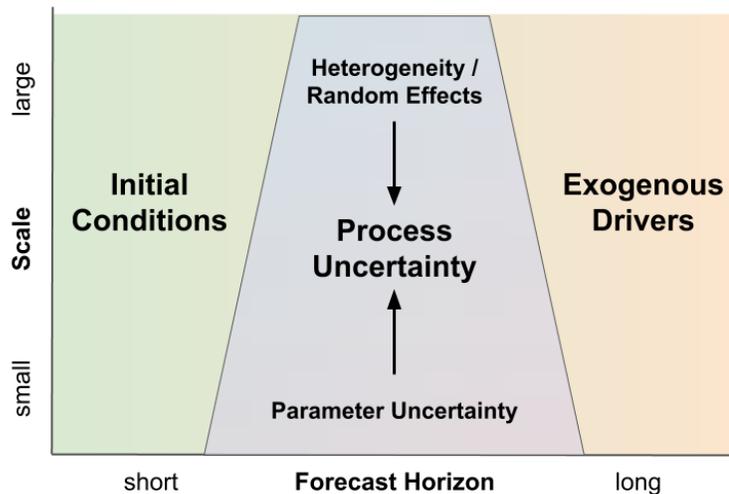
Other Items Previously Discussed that Jody is leaving in for reference

- 1. Original [Authorship Guidelines](#) Reminder
 - a. See updates above in point 2
- 2. [Old Draft Outline](#) of Theory group manuscript
 - a. Updates from:
 - i. Ecology question 1: How does predictability relate to spatiotemporal variability? How do forecasts change over a forecast horizon
 - 1. Materials from previous calls: [Google doc for Q1 notes](#), [Slides](#)

- ii. Ecology question 2: What can we learn about ecological theory through the transferability of forecasts?
 1. Materials from previous calls: [Google doc for Q2 notes](#), [Slides](#)
 - b. Next steps
3. [Forecasting Vocab Terms](#)
- a. Abby is working to compile the terms for a box for Anna Sjodin and Gretchen Stokes manuscript. [Vocab Box](#)
 - b. From Nov call, the goal was to compare these terms with how they are used in the [Forecast Standards](#) to make sure they are consistent

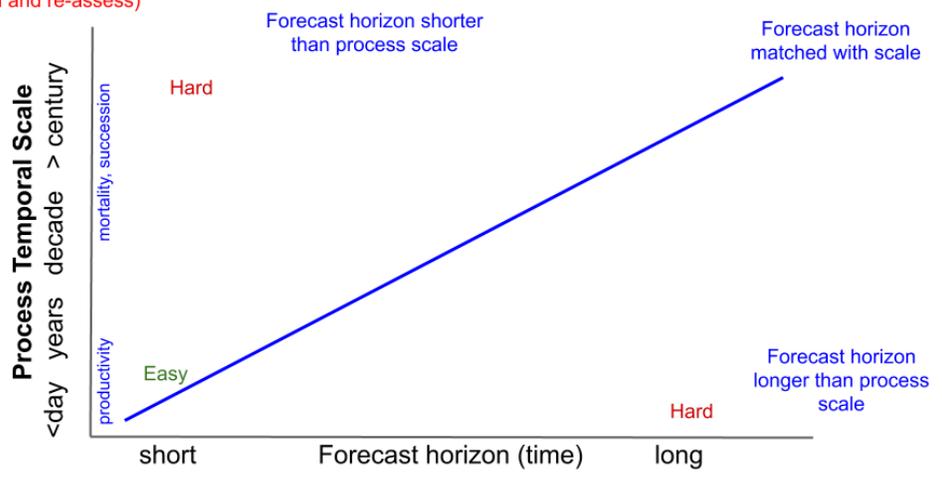
Old Material Referring to the Common Framework slides for reference especially for thinking about the RCN Forecasting Challenge examples:

- a. Slide 8

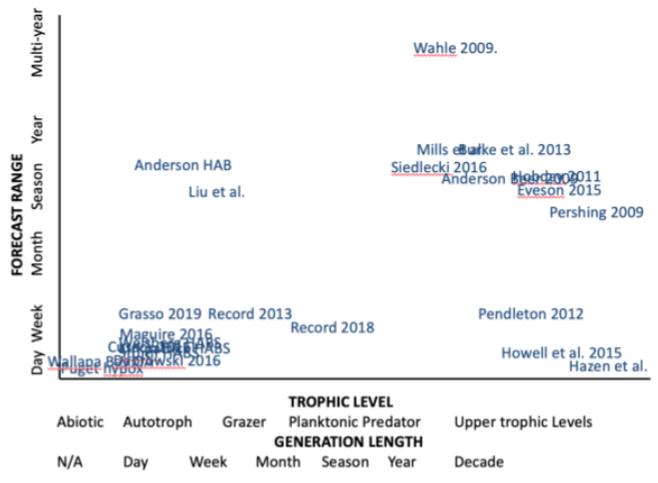


b. Slide 9

Rollinson Note: Are temporal scaling issues in forest modeling are separate from levels of organization or not. Can the temporal scale be independent of the forecast horizon? (I did this before seeing the [Adler pre-print](#); will read and re-assess)



c. Slide 10



This is from a literature review I've been working on for marine ecological forecasts. Just from my notes-- I've just eyeballed the positions on this graph. Placing it here as food for thought. -Nick

d. Uncertainty components in forecasts

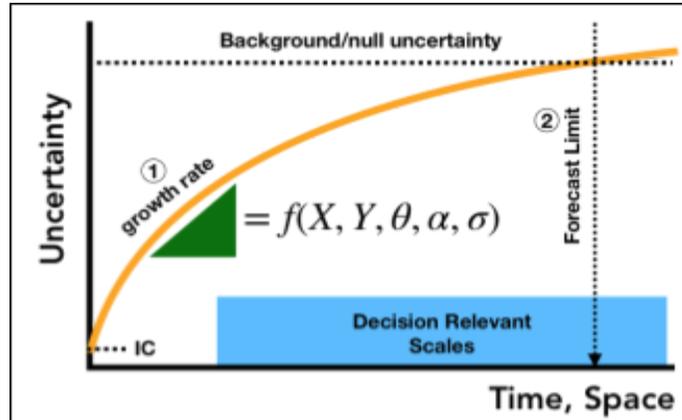


Figure 3: The predictability of a forecast is measured by the rate at which forecast uncertainty grows, in space or time, and the limit at which the forecast performs no better than chance. IC = initial conditions, X = exogenous drivers, Y = internal system state, θ = parameters, α = random effect variability, σ = process error.