Skills corner
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Grounding
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Readings for Today
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Lecture - Hypotheses and models
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Preparation for next class
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Class 5 - Elements II: Models and hypotheses

Agenda

- Skills corner (5 minutes)

- Conceptual grounding (10 minutes)

- Core paper discussion (40 minutes)

- *Break*

- Compare-contrast presentation (40 minutes)

- Summative lecture on concepts (20 minutes)

Skills corner

Developing discernment

What makes an article credible? How can we assess its quality?
Should we trust the findings?

- Internal consistency - does the logic of the argument hold?

- External consistency - are the arguments and data consistent
  with what is already known?

- Craft - is the article nuanced and layered theoretically and
  empirically, paying attention to multiple factors?

- Clarity - does the paper have a point of view and makes clear
  what it is adding to the conversation?

- Fit - is there a reasonable connection between the argument
  raised and the methods used to test it?

Developing discernment

Potential correlates of quality

- Journal of publication (?) - good articles may be too revolutionary; reviewers are an imperfect screen for errors

- High citation counts (?) - citations for interest, rather than correctness

- Predictive validity (?) - later work that replicates and extend findings; what about Newtonian mechanics?

- Your judgment (?) - improves with experience; tempered by biases you may accumulate

Finding articles to consider

In rough order of "rigor" and "reach"

- targeted "mini-search" (e.g., quick Google Scholar Search)

- literature "scan" (quick set of keyword searches on Web of Science)

- "[Insert type here] Literature Review" (capital letters) (follow a protocol)

- Some thoughts on methodological rigor

- My WIP approach

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Making things concrete

- Model-building: Drawing in theory and phenomenological features

- Hypotheses: Making model-based predictions and providing a basis to accumulate knowledge

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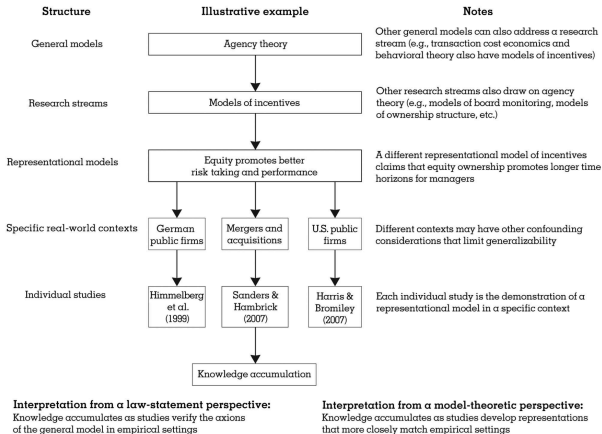OOOOOOOOOOO

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Common Readings

1. Harris, J. D., Johnson, S. G., & Souder, D. 2013.
   Model-Theoretic Knowledge Accumulation: The Case of
   Agency Theory and Incentive Alignment. Academy of
   Management Review, 38(3), 442-454.

2. Chamberlin, T. C. (1965). The Method of Multiple Working
   Hypotheses. Science, 148(3671), 754-759.
   https://doi.org/10.1126/science.148.3671.754

3. Pearl, J. 2010. 3. The Foundations of Causal Inference.
   Sociological Methodology, 40(1), 75-149.

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Harris Johnson and Souder (2013)

FIGURE 1
Law-Statement versus Model-Theoretic Interpretation of Knowledge Accumulation

Harris Johnson and Souder (2013)

Discussion Questions

- Can you see yourself employing a model-theoretic lens in your work?

- Is this view consistent with our research "principles"?

Harris Johnson and Souder (2013)

Key Points

- Empirical research can build theory without changing theoretical claims by building models that graft, contextualize, and repurpose **representational models**: synthesizing general models / theories with aspects of the real world **from which hypotheses can be derived** (Harris, Johnson, and Souder 2013, 445)

- Figure 1 provides a nice worked example of how we can traverse from a particular phenomenon to a theory and back

Chamberlin (1965)

The effort is to bring up into view every rational explanation of new phenomena, and to develop every tenable hypothesis respecting their cause and history. The investigator thus becomes the parent of a family of hypotheses: and, by his parental relation to all, he is forbidden to fasten his affections unduly upon any one. (Chamberlin 1965, 756)

Chamberlin (1965)

Discussion Questions

- How would you actually implement the method of multiple working hypotheses in your work?

- Where might our discussion of "thinking about thinking" (Bayesian and sketpical thinking) help or hurt us in its application?

Chamberlin (1965)

Fertility in processes is also the natural outcome of the method. Each hypothesis suggests its own criteria, its own means of proof, its own methods of developing the truth; and if a group of hypotheses encompass the subject on all sides, the total outcome of means and of methods is full and rich. (Chamberlin 1965, 765)

Chamberlin (1965)

Key Points

- While a particular theory focuses our attention when designing a study, we should not be blinded to alternative explanations

- Alternative explanations should be "baked into" a study and given due consideration

- Discriminating evidence is needed to distinguish between multiple plausible theories

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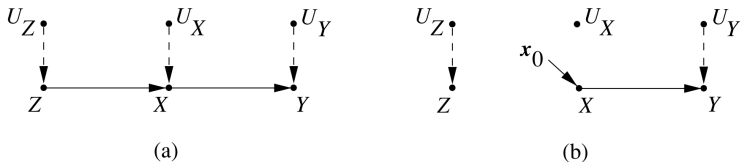○○○○

Pearl (2010)

FIGURE 2. The diagrams associated with (a) the structural model of equation (5) and (b) the modified model of equation (6), representing the intervention $do(X = x_0)$.

Pearl (2010)

Discussion questions

- I know this was dense, what did you get out of this paper?

- Based on this paper, what is necessary to make a causal claim?

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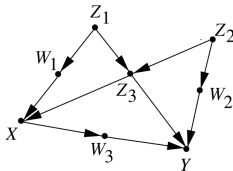Preparation for next class
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Pearl (2010)

FIGURE 4. A Markovian model illustrating the back-door criterion. Error terms are not shown explicitly.

Pearl (2010)

Key points

- Models can be represented using **directed acyclic graphs**

- The effects do not need to be linear in nature (but it is often nicer to talk about the linear case and generalize)

- To determine if an estimated effect is causal, the graph must meet certain criteria such as the back-door criteria (e.g., {W1, Z3})

- Experimental designs allow for a "do X" operation which make identification easier

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Break

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Compare / Contrast Presentations

- Adner, R., Pólos, L., Ryall, M., & Sorenson, O. 2009. The Case for Formal Theory. Academy of Management Review, 34(2), 201-208.

- Miller, K. D. & Tsang, E. W. K. 2011. Testing management theories: Critical realist philosophy and research methods. Strategic Management Journal, 32(2): 139-158.

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Hypotheses: A method for accumulating knowledge

Knowledge accumulates through refining the theoretical statements at the top of the diagram, but it also accumulates as scholars cobble to- gether a better understanding of reality (Cart- wright, 1999) by improving their ability to de- velop and use representational models. Empirical support for hypotheses derived from a representational model demonstrates the use- fulness of that model in the proscribed context. (Harris, Johnson, and Souder 2013, 447)

Hypotheses: A foundational element

Given that hypotheses are so fundamental to model building, you would expect that I would have given you a reading about how to write them, right?

Despite trying, I could not find a great one - the best I could find (drawn upon below is Neuman (2014) in concert with Pearl (2001) - both books)

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Hypotheses: Some desiderata

Criteria	Why
Falsifiable	We are looking to update our beliefs regarding the truth of the hypothesis, due to the number of alternative explanations the law of the excluded middle is difficult to apply; easier to show the falseness of a hypothesis than its truth
Predictive	Allows us to take action on our beliefs or forecast the future
Pertinent	We want our hypothesis to provide useful information to address our research question / concern
Specific	If actually testing the hypothesis (and not just formulating as a proposition), you need to be able to measure the elements to perform statistical analyses
Relational	Relationships allow us to begin to ask questions about causality (but note that hypotheses about the level of something can still be informative)
Causal	(This is hard for us to do, but the intent); there should be a temporal sequencing between the independent and dependent variable and this relationship should (at least) satisfy the "backdoor criterion"

Figure 1: Selected desiderata

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Hypotheses: Some anti-criteria

(Some) anti-criteria

Compound "double-barreled"	Ambiguous predictions make it difficult to discern what information we have learned (may sometimes be reformulated as an interaction)
Tautological	Truth inherent through deduction; i.e. non-falsifiable (Can help verify whether you have made false assumptions)
Value-laden	"Should" questions do not help us uncover the underlying states of the world
Teleological	"Just so" stories where we don't specify the temporal order of goal formation and attainment (or not)
Ecological fallacy	We try to predict an individual outcome with aggregate-level behavior without considering individual level differences
Reductionist fallacy	We try to predict an aggregate outcome with individual behavior without appropriate consideration of aggregation
Spuriousness	Failing to take into account a reasonable alternative explanation (this can be done empirically through design or controls)

Figure 2: Selected anti-criteria

Models: Styles of construction

- Verbal theorizing: the standard method employed by most papers

- Directed acyclic graphs (DAGs): becoming more common, even if the logic is operating in the background

- Formal theory: use varies significantly by discipline

- Subtle point: **Each relationship in a model is technically a hypothesis**; you elect to focus on certain relationships of interest (e.g., the novel ones)

Progressing your final project: Building a model

This week's readings should help start launching you on a trajectory to convert your research question into a **model** with associated **hypotheses**

These hypotheses are often one of three flavors:

1. Tests of relationships between constructs that you intend to perform (the standard empirical paper strategy)

2. Relationships that are implied by a theoretical system that can be tested in the future (these are often called propositions)

3. Assertions of the existance of a particular construct or mechanism (this is often the point of a qualitative piece)

Given the nature of this class, my preference is (1)

Some example models

FIGURE 2
Indirect Effects of TMT Industry Experience Variety on Firm Performance via Repertoire Calibration
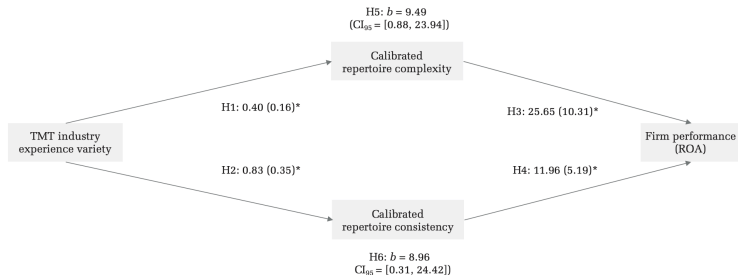
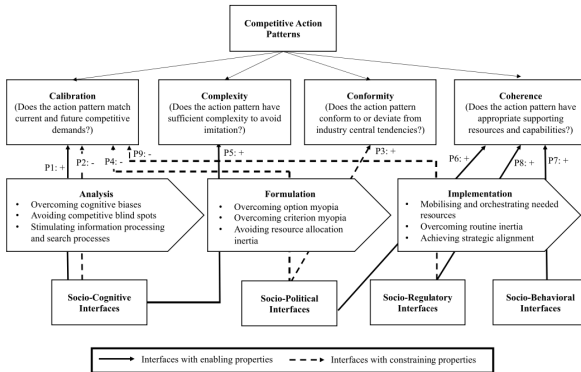Figure 3: A tested model with results shown Fox, Simsek, and Heavey (2022)

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Some example models

Fig. 2. A managerial interfaces perspective on competitive action patterns.

Figure 4: A theoretical model that could be tested Simsek, Heavey, and Fox (2022)
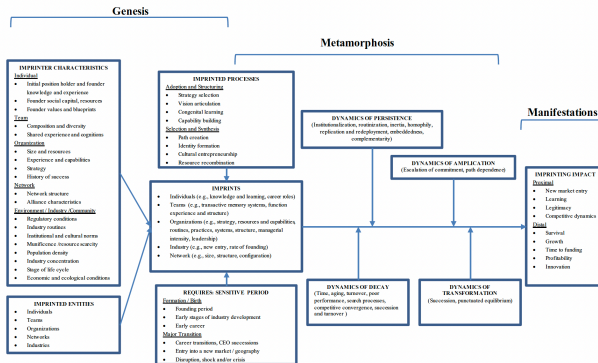
A counter-example

Figure 5: A framework, not a model Simsek, Fox, and Heavey (2015)

Preparation for next workshop

*During our second in-person meeting, we will have another workshop session about four hours long. For the first two hours or so, **students will make a five-minute presentation about the draft model that they will examine for their dissertation work that builds upon their research topic/idea.** Again, this can involve a few PowerPoint slides to help guide the discussion. This will be graded by the presence or absence of your preparation for this session. The balance of the workshop will be group work to discuss and advance those research questions, where I will move from group to group to facilitate discussions.*

Preparation for next class

Next class

Elements III: Constructs and variables

1. Suddaby, R. (2010). Editor's Comments: Construct Clarity in Theories of Management and Organization. Academy of Management Review, 35(3), 346-357. https://doi.org/10.5465/amr.35.3.zok346

2. Larsen, K, Bong, CH. 2016. A tool for addressing construct identity in literature reviews and meta-analyses. MIS Quarterly 40, No. 3: 529-552.

3. Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991). Assessing Construct Validity in Organizational Research. Administrative Science Quarterly, 36, No. 3, 421-458. https://doi.org/10.2307/2393203

Next class

Elements III: Constructs and variables

4 Compare / Contrast

- Schaffer, J. A., DeGeest, D., & Li, A. 2016. Tackling the problem of construct proliferation: A guide to assessing discriminant validity of conceptually related constructs. Organizational Research Methods, 19: 80- 110.

- Law, K. S., Wong, C.-S., & Mobley, W. H. (1998). Toward a Taxonomy of Multidimensional Constructs. The Academy of Management Review, 23(4), 741. https://doi.org/10.2307/259060

References

Chamberlin, T. C. 1965. "The Method of Multiple Working Hypotheses." *Science* 148 (3671): 754–59.

Fox, Brian C., Zeki Simsek, and Ciaran Heavey. 2022. "Top Management Team Experiential Variety, Competitive Repertoires, and Firm Performance: Examining the Law of Requisite Variety in the 3D Printing Industry (1986–2017)." *Academy of Management Journal* 65 (2): 545–76.

Harris, Jared D., Scott G. Johnson, and David Souder. 2013. "Model-Theoretic Knowledge Accumulation: The Case of Agency Theory and Incentive Alignment." *Academy of Management Review* 38 (3): 442–54.

Neuman, William Lawrence. 2014. *Social Research Methods: Qualitative and Quantitative Approaches*.

Pearl, Judea. 2001. *Causality- Models, Reasoning, and Inference*.

Simsek, Zeki, Brian Curtis Fox, and Ciaran Heavey. 2015.