Any Old Theory Will Do?: Why Cause-and-Effect Performance Links Form Parsimonious Mental Models of Complex Strategic Environments

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"If any old map will do to help you find your way out of the Alps, then surely any old story will do to help you find your way out of puzzles in the human condition." ~Karl Weick

1. INTRODUCTION

Research shows that mental models help decision-makers find more successful strategies by helping them think through how the performance of strategic choices are related (Gavetti & Levinthal, 2000). In this stream of literature, these performance links between strategic choices are implicitly associative: choices are related but the direction of causality is not specified. These mental models with associative performance links help decision-makers find more successful strategies by narrowing their focus to a smaller set of choices, making it easier to search the environment quickly and avoid getting stuck on poor strategies (Csaszar & Levinthal, 2016).

However, a new stream of research proposes that theories – mental models that specifically propose cause-and-effect performance links between strategic choices — find more successful strategies than mental models with associative performance links (see Theory-Based View of Strategy: Felin et al., 2024; Camuffo et al., 2024). In this theory-based view, cause-and-effect performance links help decision-makers find more successful strategies by directing experimentation and improving their ability to learn from this experimentation (Camuffo et al., 2020; Valentine et al., 2024; Camuffo et al., 2024; Ehrig & Schmidt, 2022). While there's evidence that theories can improve the performance of strategic search, and several explanations have been proposed for which characteristics of theories are likely to improve this performance (Camuffo et al., 2024; Sorenson, 2024), there is no model that explains why or how mental models with cause-and-effect performance links are better than mental models with associative performance links for decision-makers looking to find successful strategies.

In this paper I propose that the reason why mental models with cause-and-effect performance links find more successful strategies than mental models with associative performance links is because they more simply represent the true performance variation in the strategic environment — meaning they are more parsimonious representations of the strategic environment. Previous research suggests that both simple and accurate mental models find high-performing strategies. This is because simple mental models make it easier for a decision-maker to learn about a smaller subset of her organization's complex strategic environment and accurate mental models correctly characterize the performance links between strategic choices improving performance feedback interpretation (Gavetti & Levinthal, 2000). Unfortunately, as complexity in the strategic environment increases, decision-makers using mental models to find strategies face a trade-off between simply and accurately representing the environment.

Using a model that compares how decision-makers employ different mental models to find strategies in increasingly complex environments, I find that mental models with cause-and-effect performance links handle the trade-off between accuracy and simplicity better than mental models with associative performance links, finding more successful strategies. Specifically, as the number of strategic choices in the environment increases, mental models with cause-and-effect performance links remain both more accurate and simpler representations of the environment than mental models with associative performance links. And as the number of performance links between the performance of strategic choices in the environment grows, generating a trade-off between accuracy and simplicity, mental models with cause-and-effect performance links make the more performant choice of representing these strategic environments more simply.

My work contributes to the growing stream of research on the theory-based view of strategy by suggesting that one of the benefits of holding a theory is that its cause-and-effect performance links more parsimoniously represent complex strategic environments, consistently finding more successful strategies than the equivalent mental model with associative performance links. Thus, the cause-and-effect performance links of a theory make it more effective at forming a strategy than an associative mental model of performance, even if that theory is inaccurate. Overall, I suggest that theories are a powerful tool for organizational decision-makers looking to form successful strategies.

2. CHOOSING A STRATEGY WITH DIFFERENT MENTAL MODELS: AN EXAMPLE

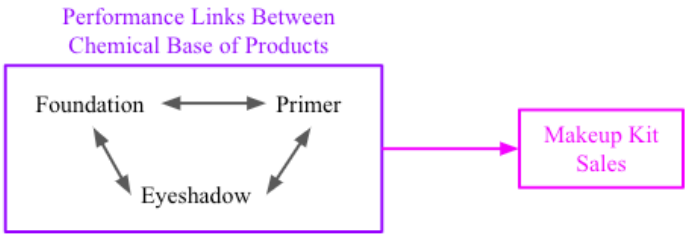
To illustrate the difference between strategic decision-making using mental models with cause-and-effect performance links versus those with associative links, I use the example of a decision-maker at a makeup company choosing the chemical bases for three connected products in a new makeup kit: foundation, primer, and eyeshadow. The key difference in decision-making is that mental models with cause-and-effect performance links prompt sequential decisions, while associative links prompt a set of simultaneous strategic choices.

In the strategic environment of makeup products, a key complexity is that water-based and silicon-based products do not mix well. For a decision-maker designing a makeup kit with multiple products that are meant to be applied together, it will be important to consider how the base of one product (water-based vs. silicon-based) affects the performance of the others. Figure 1 shows how these product base choices are linked and how their combination impacts the overall sales of the makeup kit.

FIGURE 1

Strategic Environment of the Performance Links

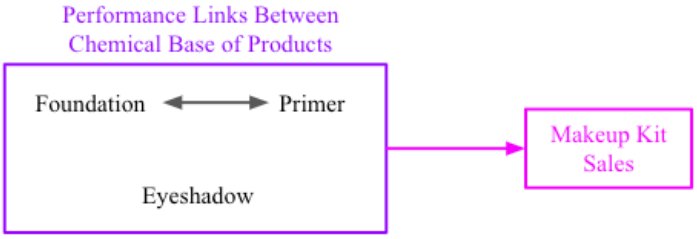
Between the Chemical Base of Makeup Products and Makeup Kit Sales



To handle the complex links between the makeup products' performances, the makeup company's decision-maker could use a mental model to guide her strategy selection. Consistent with previous research, her mental model could consist of associative performance links between a subset of makeup products, improving her decision-making by focusing her attention on a subset of strategic choices (Gavetti & Levinthal, 2000; Csaszar & Levinthal, 2016). Figure 2 shows this associative type of mental model, where the decision-maker focuses on choosing the chemical bases for the foundation and primer simultaneously, while deciding on the eyeshadow base independently.

FIGURE 2

Mental Model with Associative Performance Links Selecting the Makeup Kit Strategy

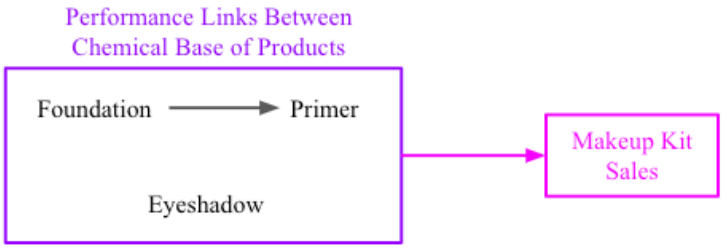


Alternatively, the decision-maker could use a mental model with cause-and-effect performance links to choose the makeup products' chemical bases. As shown in Figure 3, this model also focuses on the links between a subset of the strategic choices: the foundation and the

primer. However, unlike the associative model, the cause-and-effect performance links have a causal direction, where the selection of the foundation's chemical base is seen as a performance antecedent of the primer. This ordering of strategic choices in the mental model prompts the decision-maker to first choose the foundation's base (water-based or silicone-based), and then choose the primer's base conditional on the foundation selection. Like in the associative model, the eyeshadow base is chosen independently.

FIGURE 3

Mental Model with Cause-and-Effect Performance Links Selecting the Makeup Kit Strategy



The above example highlights how the way a decision-maker chooses a strategy depends on the performance link type (associative vs. cause-and-effect) in her mental model. Cause-and-effect performance links prompt sequential decisions, while associative performance links prompt simultaneous choice. Because these two types of mental models suggest different strategic decision-making processes, it is reasonable to think that they may result in different strategies and performance outcomes. Next, I use a model to explore how mental models with associative and cause-and-effect performance links affect strategy selection and performance.

3. MODEL

Adapting the canonical NK-landscape model (Levinthal, 1997; Gavetti & Levinthal, 2000), I find that mental models with cause-and-effect performance links (or theories)

outperform associative models in finding successful strategies because they are more parsimonious representations of the strategic environment.

3.1 Characterizing the Strategic Environment of Organizations as an NK-Landscape

Consistent with previous strategy research, I use the NK-landscape model to characterize the complex strategic environment of organizations (Levinthal, 1997; see Baumann et al., 2019 for a review). In this model, strategy selection is conceptualized as a decision-maker traversing a 'rugged' landscape, where the difficulty of finding successful strategies depends on the number of strategic choices (N) and the number of performance links between each strategic choice (K). The NK-landscape model presents a particular type of problem that faces decision-makers selecting strategies in complex environments.

Often called an NP-hard or NP-complete problem in mathematics, the NK-landscape formalizes strategic environments that are so complex that past performance feedback cannot guide decision-makers to the best strategy (see strategy as an NP-hard problem: Siggelkow, 2011; Ganco & Hoetker; Hochba, 1997). As these environments grow larger (high N) and more "rugged" (high K), it becomes harder to understand how each choice affect performance, since similar strategies can lead to very different outcomes. Thus, decision-makers facing these complex strategic environments must find effective ways to use performance feedback to improve their strategic choices.

3.2 The Impact of Mental Model Performance Link Type on Parsimonious Representation of the Strategic Environment

Mental models are representations of the strategic environment that help decision-makers select strategies. Previous research suggests that these representations can help decision-makers address the core challenge of correctly attributing strategic performance in complex

environments through simplifying the number of strategic choices that the decision-maker considers (Gavetti & Levinthal, 2000). However, mental models that accurately represent the strategic environment are also more likely to attribute strategic performance correctly. Below I model how the performance link type of mental models (cause-and-effect vs. associative) impacts the degree to which these mental models accurately and simply represent the strategic environment, which varies by the complexity of this environment.

In simple environments, mental models can be both accurate and simple, and in these cases, I find that models with cause-and-effect performance links are more accurate and simpler representations than associative models. As the number of strategic choices increases (N), cause-and-effect models remain both simpler and more accurate representations. But when complexity comes from a greater number of performance links between choices (K), mental models with cause-and-effect performance links are simpler, while mental models with associative performance links are more accurate.

3.2.1 The Effect of a Mental Model's Performance Link Type on the Simplicity of the Representation

To model how simply a mental model represents the strategic environment, I calculate how many performance links a mental model of M strategic choices will consider. I find that across all strategic environments, given a mental model of size M, mental models with cause-and-effect performance links will be simpler representations than the equivalent associative model.

In developing the intuition for why cause-and-effect performance links will more simply represent the strategic environment, I return to our motivating example. A decision-maker is using a mental model to select the chemical base for a makeup kit of three makeup products: a

foundation, a primer and an eyeshadow. In her mental model, she considers the performance links between two products, the foundation and the primer (M=2), selecting the eyeshadow's chemical base independently.

Using an associative mental model to choose the chemical base of makeup products for the makeup kit (with M = 2), she considers performance links between the foundation and primer's chemical bases. Even though it may seem like one connection, because this associative mental model doesn't specify which product affects the performance of the other, the decision-maker is implicitly representing two performance links in her associative mental model. In general, associative models include all possible performance links between choices since they don't specify a direction to the performance dependency between them. So, for an associative model with M choices, the total number of performance links follows the formula shown in equation 1.

$$I_{associative} = M * (M - 1) \quad (1)$$

Using a mental model with cause-and-effect performance links to choose the chemical base of makeup products for the makeup kit (M=2), the decision-maker considers how the choice of the foundation's chemical base impacts the performance of the primer's chemical base selection. Since this is a directed link between the foundation and the primer, the decision-maker is only considering one proposed performance link between these two products, that of the chemical base of the foundation's impact on the performance of the primer.

In general, as longer chains of cause-and-effect links are represented, the decision-maker is implicitly considering the performance consequences of all strategic choices that come prior to each strategic choice in the mental model. Thus, the number of performance links considered by

a mental model with cause-and-effect performance links follows the formula of equation 2 below.

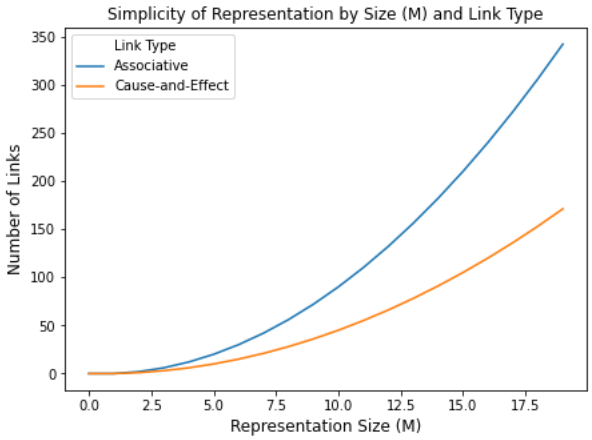
$$I_{cause-and-effect} = \sum_{j=1}^{M} j - 1 = \frac{M*(M-1)}{2} \quad (2)$$

Since equations 1 and 2 show the number of performance links in associative and cause-and-effect mental models based on the number of choices (M) included in the model, it is possible to compare them to calculate when cause-and-effect models are simpler. Specifically, equation 3 substitutes the number of links in associative models into equation 2 and shows for mental models of a given number of choices (M), cause-and-effect models contain half as many links as associative ones.

$$I_{cause-and-effect} = \frac{I_{associative}}{2}, \text{ thus } I_{cause-and-effect} < I_{associative} \; for \; a \; given \; M \quad (3)$$

Figure 4 visualizes equation 1 and equation 2 across values of M, showing that the number of performance links represented by cause-and-effect mental models ($I_{cause-and-effect}$) will always be half that of the number of performance links of the equivalent associative mental models ($I_{associative}$).

FIGURE 4



Because the number of performance links represented in each mental model does not depend on the number of strategic choices (N) or the number of actual performance links between these choices (K), this finding will hold across all strategic environments. Thus, for a given set of M strategic choices, cause-and-effect models will always be simpler representations than associative models. However, while the simplicity of a representation does not depend on the environment's complexity, the accuracy of each model does — a result which I turn to next.

3.2.2 The Effect of a Mental Model's Performance Link Type on the Accuracy of the Representation

To model how accurately a mental model represents the strategic environment, I measure the degree to which its performance links match the true performance links in the environment. Since the environment is based on an NK-landscape—an NP-hard problem with no generalizable solution—I use both a mathematical 'in expectation' calculation and a computer simulation to estimate accuracy. I find that which type of model is more accurate depends on the environment's complexity. When there are more strategic choices (higher N), cause-and-effect models are more accurate. But when there are more links between choices (higher K), associative models are more accurate.

First, I calculate how accurate mental models with cause-and-effect and associative performance links are on average. In our example, the decision-maker is choosing the chemical bases for three products (N = 3), and each product depends on the other two (K = 2). Because all possible performance links exist in this environment, each extra link a mental model includes increases its accuracy by 1 divided by N*(N-1)—the total number of possible links in the environment (equation 4a).

This relationship applies to strategic environments of varying K and N. On average, the chance that a performance link in a mental model is correct is equal to the total number of actual performance links in the environment (K*N, equation 4b) divided by the total number of possible performance links in the environment (N*(N-1), equation 4a). To find the expected number of correct links in a mental model, multiply the chance that any given performance link will be correct by the total number of links in the model (I), as shown in equation 4c. Using these equations (4a, 4b, 4c), it is possible to calculate a mental model's expected accuracy, as shown in equation 4 below.

Equation 4: Accuracy of Performance Links Represented in a Mental Model with I Performance Links

Total possible number of performance links, $TPT = N(N-1)$ (4a)

Total actual number of performance links, $TT = KN$ (4b)

Expected number of correct performance links, $TP = I * \frac{KN}{N(N-1)}$ (4c)

Expected number of incorrect performance links, $FP = I - (\frac{I*K}{N-1})$ (4d)

Expected number of correct non-links, $TN = N(N-1) - KN - (I - (\frac{I*K}{N-1}))$ (4e)

Expected number of incorrect non-links, $FN = \text{KN} - \left(\frac{I*K}{N-1}\right)$ (4f)

Accuracy of performance links, $Acc = \frac{TP+TN}{TP+FP+TN+FN}$ (4g)

Since equations 1 and 2 give the number of performance links (I) for associative and cause-and-effect models for a given M, I can plug these values into equation 4 to find when cause-and-effect models are more accurate. This result is calculated in equation 5 (see Appendix

A for all steps of the solution), an inequality that shows that for environments where ½ is greater than K/(N-1), cause-and-effect models are more accurate than associative ones.

$$\frac{1}{2} > \frac{K}{N-1} \tag{5}$$

Second, because the strategic environment is assumed to be an NK-landscape, a type of NP-hard problem with no general solution, I use computer simulations to compare how accurately a mental model of size M—one with associative performance links and one with a *random set* of cause-and-effect performance links—represent a specific NK-landscape. Figure 5 shows these results: Figure 5a compares model link accuracy as the number of strategic choices (N) increases (with K = 3), and Figure 5b compares link accuracy as the number of performance links (K) increases (with N = 10).

FIGURE 5

FIGURE 5A: Accuracy of Links by Representation Size (M) and Number of Strategic Choices (N) for Mental Models of Varying Link Types

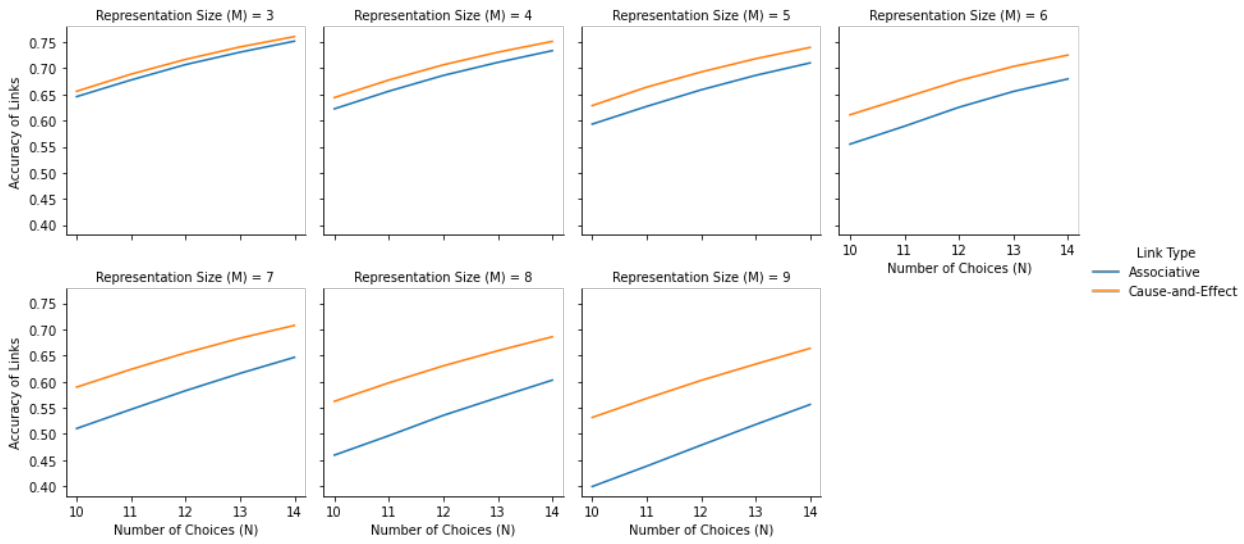
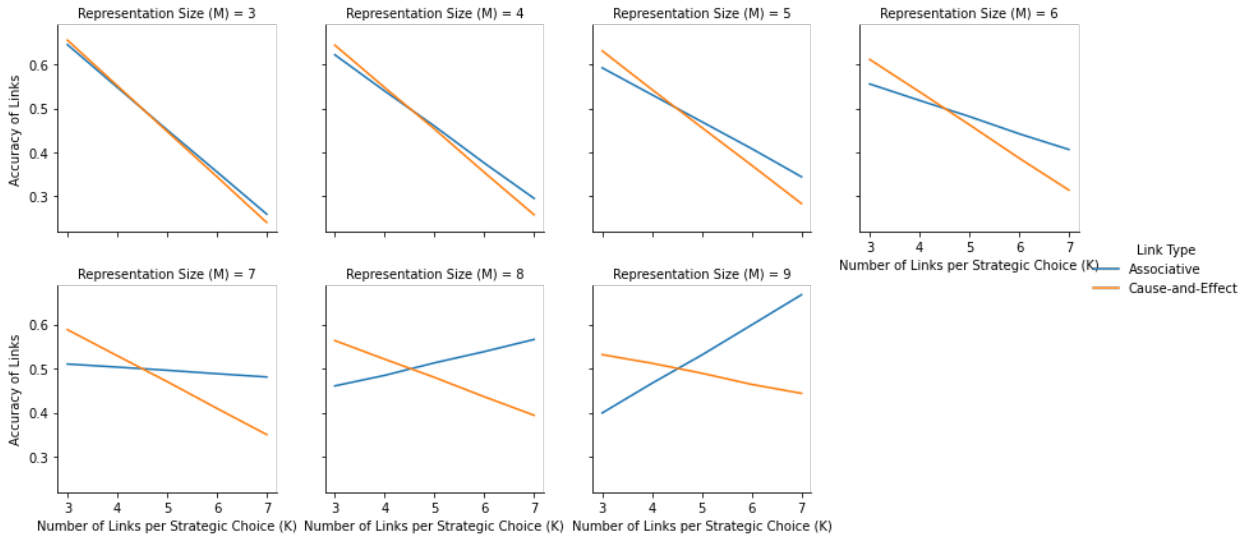


FIGURE 5B: Accuracy of Links by Representation Size (M) and Number of Performance Links Between Strategic Choices (K) for Mental Models of Varying Link Types



Supporting the calculations of equations 4 and 5, the computer simulations of Figure 5a above show that as the number of strategic choices (N) increases, cause-and-effect models are more accurate across all mental model sizes (M). When the number of links between choices (K) increases (with N fixed at 10), equation 5 predicts that cause-and-effect models are more accurate when K is below 5 and less accurate when K is above 5—which is exactly what Figure 5b shows.

Now that I've compared how mental models with associative and cause-and-effect performance links differ in simply and accurately representing the strategic environment, I turn to how these differences affect performance outcomes.

3.3 The Performance Consequences of the Parsimonious Representations by Performance Link Type of Mental Models in Environments of Increasing Complexity

To model how the simplicity and accuracy of mental models with different link types affects performance, I run computer simulations where mental models search for strategies across NK-landscapes. For mental models with associative performance links, decision-makers

use previous performance data to make a simultaneous decision for all M strategic choices in the model. For mental models with cause-and-effect performance links, decision-makers use previous performance feedback to select each M strategic choice sequentially using a fixed random order. Both mental models decide on the N-M strategic choices not included in the model independently based on prior performance feedback.

I find that for a mental model of size M, both simplicity and accuracy of representation help in finding successful strategies. But when there's a trade-off between the two, simpler models perform better. At any number of choices (N) and at lower numbers of performance links between choices (low K), mental models with cause-and-effect performance links are both simpler and more accurate than associative ones, leading to better strategies. As K increases, simplicity comes at the cost of accuracy, however, cause-and-effect models make the more performant choice in the trade-off by choosing simplicity. Overall, mental models with cause-and-effect performance links are more parsimonious representations of the strategic environment than associative models, finding more successful strategies.

3.3.1 Simpler Representations are More Performant, and Cause-and-Effect Models are Simpler

First, I show that for a given mental model of size M, simpler representations of the performance links in the strategic environment find more successful strategies, and since mental models with cause-and-effect performance links are simpler, they perform better.

Figure 6a shows the performance of strategies found by mental models of varying size (M) relative to the number of links represented in the mental model (I) as the number of strategic choices (N) in the environment increases (with K = 3). This result shows that given a mental model of size M, mental models that represent fewer links select more performant strategies

compared to those mental models that represent more links across environments of varying numbers of strategic choices (N).

FIGURE 6: Performance of Mental Models by Simplicity (I) and Link Type Across Environments of Increasing Number of Strategic Choices (N)

FIGURE 6A: Performance of Mental Models by Number of Links (I) and Size (M)

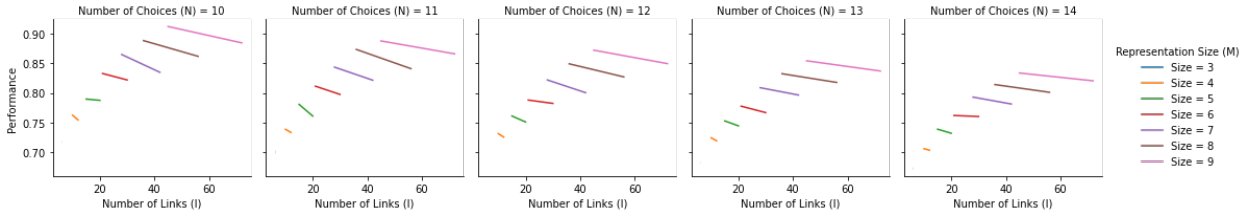
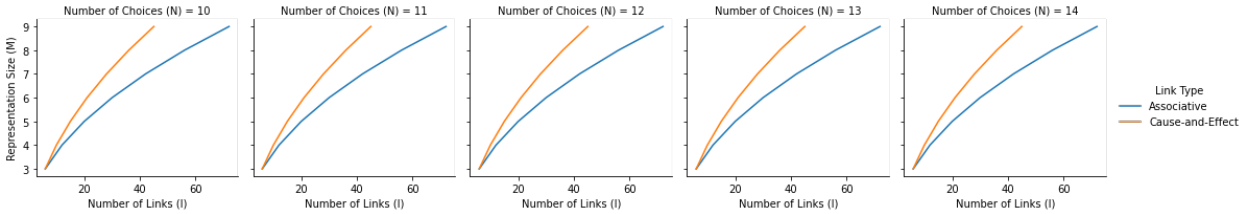


FIGURE 6B: Number of Links (I) by Size (M) and Link Type



The performance difference in Figure 6a between the number of links and the performance of strategies found by mental models can be explained by the link type of the mental model. Figure 6b shows the number of links represented in the mental model (I) for mental models with cause-and-effect vs. associative performance links relative to the size of the mental model (M) as the number of strategic choices (N) in the environment increases (with K = 3). Figure 6b illustrates that the shape of performance differences in Figure 6a between mental models of the same size (M) with varying number of links (I), reflects whether the performance link type in the mental model is cause-and-effect or associative.

The number of links represented in a mental model with cause-and-effect or associative performance links does not vary by the complexity of the strategic environment. Thus, the results of Figure 6 across strategic environments of increasing numbers of strategic choice (N) hold in

strategic environments of increasing number of performance links between strategic choices (K), as shown in Figure 7 (N = 10).

FIGURE 7: Performance of Mental Models by Simplicity (I) and Link Type Across Environments of Increasing Number of Performance Links Between Strategic Choices (K)

FIGURE 7A: Performance of Mental Models by Number of Links (I) and Size (M)

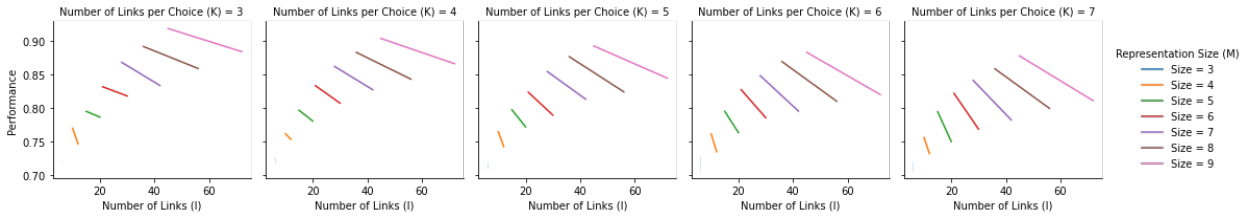
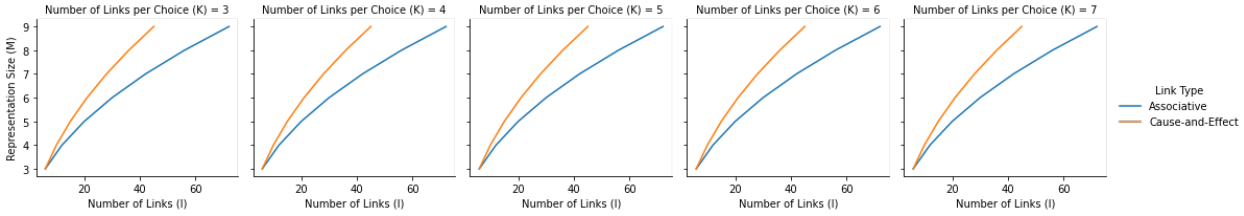


FIGURE 7B: Number of Links (I) by Size (M) and Link Type



Thus, mental models with cause-and-effect links are more simple representations of the strategic environment and this simplicity finds more successful strategies across environments of increasing complexity.

3.3.2 More Accurate Representations are (Mostly) More Performant, and Both Performance Link Types Can be More Accurate

Next, I show that for a mental model of size M, more accurately representing the performance links in the strategic environment is often more performant, except when strategic environments have a high number of performance links between strategic choices (high K). Both mental models with cause-and-effect and associative performance links can be more accurate representations of the strategic environment. However, mental models with associative

performance links are only more accurate when it is less performant to do so, i.e. when the number of performance links between strategic choices (K) is high.

FIGURE 8: Performance of Mental Models by Accuracy (Acc) and Link Type Across Environments of Increasing Number of Strategic Choices (N)

FIGURE 8A: Performance of Mental Models by Accuracy of Links (Acc) and Size (M)

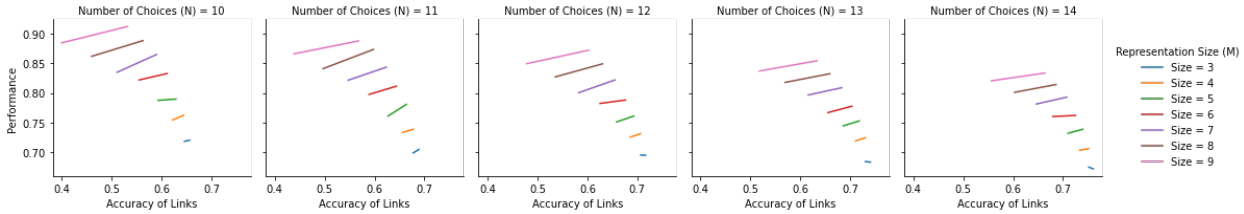


FIGURE 8B: Accuracy of Links (Acc) by Size (M) and Link Type

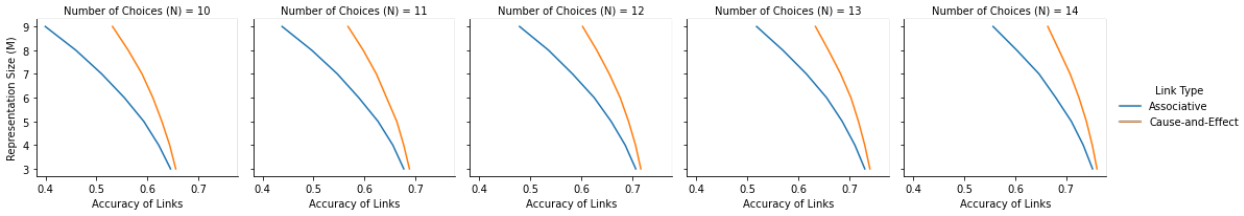


Figure 8a shows that across environments of increasing numbers of strategic choices (N), mental models that more accurately represent the performance links of the strategic environment perform better than equivalently sized mental models with less accurate link representation. Figure 8b shows that mental models with cause-and-effect performance links are more accurate than mental models with associative performance links in these increasing strategic choice environments, which generates the performance results seen in Figure 8a.

The accuracy of performance links represented in a mental model varies as a function of both the number of strategic choices (N) and the number of performance links between strategic choices (K) in the strategic environment. As the number of strategic choices (N) in the environment increases, mental models with cause-and-effect links remain more accurate. However, as the number of performance links between strategic choices (K) in the environment

increases, mental models with associative links become more accurate. Figure 9 shows the performance impact of this shift in accuracy.

FIGURE 9: Performance of Mental Models by Accuracy (Acc) and Link Type Across Environments of Increasing Number of Performance Links Between Strategic Choices (K)

FIGURE 9A: Performance of Mental Models by Accuracy of Links (Acc) and Size (M)

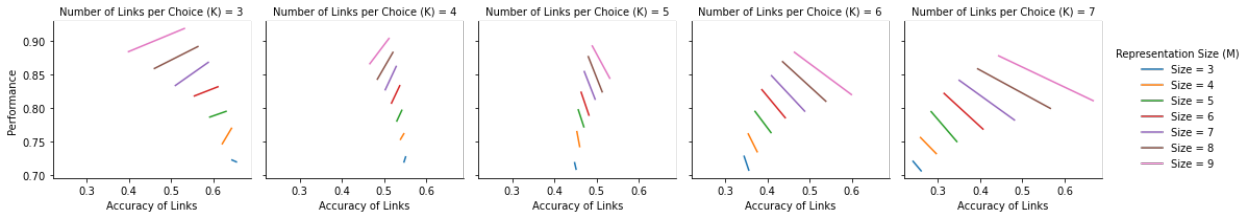


FIGURE 9B: Accuracy of Links (Acc) by Size (M) and Link Type

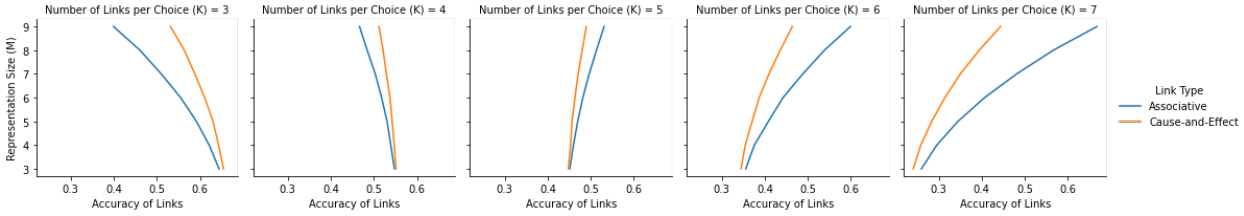


Figure 9a shows that when the number of links per choice (K) in the environment is low, accurate representation of links is associated with finding more successful strategies. However, as the number of links per choice (K) in the environment increases, accuracy of links in the mental model is associated with lower performance.

Figure 9b shows, consistent with the inequality of equation 5, when the number of links per choice (K) is less than half of the number of strategic choices minus 1 (N=10, N-1 = 9) in the environment, mental models with cause-and-effect links are more accurate. In tying these results to those of Figure 9a, while mental models with cause-and-effect links are less accurate for environments with a high number of links per choice (K), these causal mental models remain more performant. This result tracks with previous work on mental models that suggests that one of the major benefits of these representations is simplifying environmental complexity to

facilitate effective search for strategies (Gavetti & Levinthal, 2000). However, in highlighting that mental models with cause-and-effect performance links are simpler than the typically used associative mental models, this result also suggests why theories may be more powerful tools for finding performant strategies in highly complex environments.

4. Discussion and Conclusion

The cause-and-effect links in mental models help decision-makers choose successful strategies by being more parsimonious models of the strategic environment than models with associative links. Mental models with cause-and-effect links are generally more accurate and simple representations of strategic environments. For highly interdependent environments where there is a trade-off between accuracy and simplicity, mental models with cause-and-effect links make the more performant choice of representing the strategic environment more simply.

Overall the above results, which suggest that theories are always better than associative models at finding successful strategies in complex strategic environments, prompt a series of questions and, hopefully, a series of paths for future research. In the sections below I ask several of these questions and suggest some promising areas for addressing them through further work.

4.1 Simplicity Over Accuracy?: Simple, Causal Mental Models Provide Structure that Helps Incorporate Performance Feedback

A key question these results raise is: why does simplicity outperform accuracy in strategic environments that require a trade-off between the two? Research on mental models in strategy, and on human cognition more generally, shows that people often use simple models to make effective decisions in complex situations (Schwenk, 1984; Simon, 1977; Gigerenzer, 2008). However, there's debate over whether causal reasoning actually improves decision-making (Sperber et al., 1995; Mercier & Sperber, 2017).

My findings suggest that cause-and-effect links make mental models simpler in a way that helps decision-makers better use performance feedback in complex environments. In these settings, the main challenge is turning past feedback into better future strategies (Siggelkow, 2011; March, 1991). When there's no true solution to environmental complexity (strategy as an NP-hard problem), mental models with cause-and-effect performance links provide the next best thing — a simple structure of sequential choices that makes performance feedback easier to understand (see Pearl, 2009).

This result can be seen as a formalization of the empirical findings in the theory-based view of strategy, where holding a theory improves experimentation and allows for the application of the scientific method to organizational strategy (Camuffo et al., 2024; Camuffo et al., 2020). I outline two implications of the simplicity of theories outperforming more accurate associative mental models below.

First, my results suggest that evaluations of the quality of a theory should be separated from evaluations of the performance benefits of holding one. While previous work shows that iterating with theories can improve the accuracy of performance understandings (Camuffo et al., 2024; Ehrig & Schmidt, 2022), my work shows that performance gains may come from how the theory structures decision-making—which does not depend on how accurate the theory is. Future research should separate these two types of benefits.

Second, I propose that cause-and-effect models lead decision-makers to choose strategies in a step-by-step (sequential) way, while associative models lead to all-at-once (simultaneous) decisions. Beyond validating this basic difference, future research should explore how these mental models create distinct decision-making processes, especially in how strategic choices are ordered.

4.2 Does it Really Not Matter if My Theory is "Good"?

Because my model compares the average performance of cause-and-effect versus associative mental models, it doesn't show how individual theories—each with different levels of accuracy—perform. This raises another question: does a theory's performance depend on how accurate, or "good", it is?

While my results show that accuracy doesn't always generate performance, they cannot directly answer this question because of how the NK-landscape works. In this model, it is assumed that every strategic choice (N) depends on K others, and while some choices have more impact than others through the weight matrix (W), it is difficult to conceptualize any strategic choice as more or less causally central to the performance of a strategy. Because the strategic environment is largely causally non-ordered, most theories which causally order strategic choices are equally as accurate or "good." Future research should explore how theories affect decision-making in more structured (or "ordered") environments—where some theories clearly reflect the environment better than others and might perform differently as a result.

4.3 What is the Role of Theories in Generating Group Consensus?

Recent research on strategic decision-making in organizations has emphasized the need for group consensus (Adner & Levinthal, 2024; Carroll & Sørensen, 2021). My findings show that theories help individuals navigate complex environments, but they may also lead to more disagreement through what I call the "chicken-and-egg effect". While everyone may agree two things are related, theories which assign a clear causal direction (e.g., chicken before egg or vice versa) are more likely to spark conflict. Future research should explore how assigning causal direction can create disagreement in groups and look for ways to reduce this downside of using theories in strategic decision-making.

4.4. Conclusion: Any Old Theory Will Do?

Karl Weick once told the story of lost soldiers who found their way back to camp using a map of the wrong mountain range—and from it came the phrase "any old map will do" (1998). Similarly, my results show that even a randomly generated theory (a simple mental model with cause-and-effect performance links) can outperform a more accurate but complex associative model in hard-to-learn environments. This suggests that having a simple theory to guide strategy may be like having the wrong map: helpful, even though it is inaccurate.

Just as water flows towards valleys in a mountain range, complex strategic environments still have patterns linking choices to performance. A mental model that assumes a clear (even if incorrect) path through the environment may better detect these patterns than one that tries to track everything (see Denrell et al., 2004). This helps explain why simpler theories can outperform more accurate models when the environment is too complex to fully understand—a finding supported by broader research on heuristics and cognitive shortcuts (Simon, 1977; Gigerenzer, 2008). Overall, my model shows that cause-and-effect mental models find more successful strategies because they offer a simpler way to navigate complexity.

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