Using Historical Methods to Improve Abduction and Inference to the Best Explanation in Strategy

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Abstract: We argue that historical methods -- the analysis and representation of the past through the interpretation of records -- complement the statistical analysis of archival data to generate explanations closer to the truth. Historical methods achieve this goal by providing the understanding needed to balance an explanation's consistency with statistical patterns and its consistency with contextual detail. Further, we suggest that to infer to the best explanation using archival data, as scholars predominantly do in Strategy, scholars need to reconcile incommensurable and sometimes contradictory explanatory virtues. This process inevitably requires an act of judgment on non-quantifiable information about the past. Historical methods facilitate this judgment of explanations by providing strategy scholars a pathway to assess the relative merits of competing virtues.

1. Introduction

There is a long-standing tension in strategic management between the desire to create general explanations of strategic behavior and the reality that knowledge claims arising from industrial contexts must take the idiosyncrasies of those contexts into account (e.g., Andrews, 1971). In this paper, we argue that historical methods -- generally, the analysis and representation of the past through the interpretation of records -- complement the statistical analysis of archival data to generate explanations that are hopefully closer to the truth. Historical methods achieve this goal by providing the understanding needed to balance an explanation's consistency with statistical patterns and its consistency with contextual detail. This reconciliation requires careful judgement of incommensurable and sometimes contradictory explanatory virtues. Historical methods offer the capacity to judge explanations by generating accounts of strategic decision-making that are rooted in the actors' realities, rather than solely the researcher's. Thus, though calls to use history in strategy are not new (Maclean et al., 2016; Rowlinson et al., 2014; Godfrey et al., 2016; Argyres et al., 2020; Jones & Khanna, 2006), we extend this conversation by exploring how historical methods can improve explanations arising from statistical reasoning in strategy research .

As a desk clearing exercise, it is useful to consider why it is challenging to rely solely on statistical reasoning to generate new knowledge in strategy. First, as has been well documented, it has proven difficult to rely on statistical claims alone in interpreting patterns in the data (Goldfarb & King, 2016; Bettis 2012, 2014; Bettis et al., 2014). This is, perhaps, unsurprising given that the interpretation of frequentist statistical claims requires pre-specification, and prespecification is challenging with archival data commonly used by scholars in strategic management (King et al.,

2020).[1] Second, there is no agreed-upon algorithmic tool to generate potential explanations entirely from a dataset. Rather, the generation and evaluation of plausible explanations requires using a broad range of information and theoretical ideas that lie outside datasets.[2] No less an authority than James Heckman observes that "[t]he information in any body of data is usually too weak to eliminate competing causal explanations of the same phenomenon (Heckman, 2000, p. 91)."

Given these difficulties, historical methods can be applied to both the recent and distant past to help strategy scholars navigate the challenge of explanation. Practically, sometimes historical methods reveal why people did what they did more transparently than can be shown in a statistical dataset. Historical methods can anchor the interpretations of statistical patterns in the complex realities of the actors whose experiences and outcomes are reflected in those data. The historical approach brings focus not only to the agency of the actors governing the data generating process, but also to the role of the researcher in interpreting those patterns (Kirsch, Moeen and Wadhwani, 2014; Mantere and Ketokivi, 2013).

The historian's tools are abductive, or perhaps more accurately, they are tools to infer to the best explanation (IBE) (Lipton, 2004).[3] IBE, which appears to be a close approximation to reasoning as generally practiced (Lipton, 2004; Sætre and Van de Ven, 2021), provides a framework to generate, discuss, and judge potential explanations. This practice is an exercise in modesty, and historical methods clarify the reason for this modesty: our judgments usually rely on non-quantifiable information about the past, and our information is always incomplete.[4]

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[1] Frequentist statistics are factual statements about the predicted frequency of an empirical pattern in a population, conditional on a set of assumptions.

[2] This mismatch between the hypothetical-deductive framework and the practical use of frequentist statistics in strategy is the foundation of the testimony problem identified in King et al (2020). See the Appendix for a broader exposition of types of claims made in strategy and challenges in making frequentist claims.

[3] The distinction between abduction and IBE has entertained philosophers of science recently (Douven, 2011). Generally, abduction refers to a judgment of the viability of an explanation where IBE includes a step of explicitly generating potential explanations and then choosing one amongst them (Campos, 2011).

[4] This, of course, is an expression of Hume's problem of induction (Henderson 2018).

IBE provides a structure to consider multiple, contrasting explanatory *virtues*. Labeling the virtues of an explanation provides a language to facilitate judgments of the relative importance of these virtues. Describing our judgments in the language of virtues allows the scholar to clarify their epistemic values that lead to a preference for one explanation over another is a statement of taste. Because the virtues themselves are incommensurable -- lack a common standard of measurement -- and at times at odds with each other, this will inevitably result in disagreements over which explanations should be privileged over others. The explanatory virtues provide a vocabulary to productively articulate these disagreements, and historical methods allow strategy scholars a pathway to assess the relative merits of competing virtues. Taken together, these tools and this language will allow more productive scholarly debates.

The rest of the essay will proceed as follows. In Section 2 we provide a nuanced definition of what we mean by explanation in strategy and introduce the various explanatory virtues and the requirements they serve. In Section 3, we describe how historical methods can vastly improve the verisimilitude of explanations. Section 4 addresses the role of judgement when employing historical methods to balance the tradeoffs between explanatory virtues. We discuss the opportunities historical methods present when inferring to the best explanation in Section 5, and conclude in Section 6.

2. Explanation and virtues

Most people have an intuitive understanding of what an explanation is: an explanation relates causes and effects, inputs and outputs, actions and consequences. Theoretically, explanations range from mere conjectures to complex arguments that are judged to be consistent with considerable evidence. However, explanations, by definition, are not claims to truth (Hacking, 2001). The best we can hope for is verisimilitude -- approaching truth. Historical methods, by engaging in IBE, focus a scholar's

attention on balancing the likelihood that an explanation is close to the truth with the requirement that in order for an explanation to be useful, it must also provide meaning. When engaging in IBE, as we do in strategy, the art lies in the choice of the best explanation.

Evaluating explanations requires judgment; the scholar must weigh attributes of explanations that are not easily quantified and are sometimes incommensurable. There are many attributes -- or *virtues* -- of explanations that will lead a researcher to prefer one explanation over others. For example, better explanations are generally judged to explain more facts. This explanatory virtue is sometimes referred to as *consilience* (Thagard, 1978). Within statistical analyses, consilience takes the form of robustness tests to, say, alternative measures and specifications. Historical methods can enhance a candidate explanation's consilience when more parts of these descriptions are consistent with a particular explanation.

In practice, explanations are judged based on other virtues as well. For example, *coherence* of an explanation with prior beliefs, be they private opinions or generally accepted ideas in a community, is generally valued (Kuhn, 1962). Accounting for this virtue acknowledges that all information necessary to judge an explanation may not be found in the data and analyses that are presented. A corner case may help clarify. Famously, Simmons et al. (2011) leverage the lack of coherence to prior beliefs to demonstrate the fallibility of p-values by presenting statistical evidence that listening to particular songs will make you younger. This explanation does not cohere with the community's prior knowledge and theories of aging, and hence is not preferred -- even though it is presented as *likely* based on statistical metrics.[5] More generally, attending to coherence implies a degree of conservatism as ideas outside commonly accepted beliefs are often discounted (Rowbottom 2011). However, coherence is not absolute. Thomas Kuhn (1962) teaches us that there

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[5] We authors can attest that in our own private experiments, listening to songs specified by Simmons et al. has not made us younger.

is no guarantee that valuing coherence leads us closer to the truth; incommensurability comes with the terrain.

Other virtues are commonly employed when expressing a preference for particular explanations. The *parsimony* or simplicity of an explanation is often valued (Mackonis, 2011). In statistical models this is sometimes built into criteria. For example, the Bayesian Information Criterion explicitly penalizes the addition of parameters to a model, as does the adjusted R-squared measure of model fit. Of course, Occam's razor informs us that there is no guarantee simplicity leads us closer to the truth. Nevertheless, complex explanations may be more context specific, and hence not particularly useful in generating understandings that are widely applicable. Thus, parsimony is closely related to *universality*, which is sometimes referred to as generalizability of an explanation (Polit and Beck, 2010). We value universality because universal explanations can be thought of as rules of thumb that scholars can claim to have discovered and managers may learn and employ across contexts.

Philosophers have suggested that an explanation is *fruitful* if it is useful in generating new explanations or is a building block in contributing to new theoretical understandings.[6] For example, as noted by the philosopher Carnap (1950, p.5-6), relative to the concept of fish, which refers to all aquatic creatures, the concept of piscis, which refers to cold-blooded aquatic animals with gills, is more fruitful in advancing our understanding of marine life.[7] Fruitfulness can be (imperfectly)

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[6] Philosophy of science has offered a variety of definitions for fruitfulness. An explanation is considered fruitful if it is "useful for the formulation of many universal statements (Carnap, 1950, p 7)," able to "disclose new phenomena or previously unnoted relationships among those already known (Kuhn, 1977, p. 103)," provides "answers to significant questions (Kitcher, 2008, p. 115)," can deliver "results that could not be delivered otherwise (Dutilh Novaes and Reck, 2017, p. 206)," and can allow scholars to "make epistemic progress" (Koch, 2019, p. 709). Fruitful is closely related to the ideas of fundamental or basic knowledge.

[7] Fruitfulness is similar to the concept of loveliness from Lipton's IBE concept, which states that "likeliness speaks of truth; loveliness of potential understanding (Lipton, 2004, p.61)." It should be further acknowledged that the definition and articulation of explanatory virtues has been elevated into somewhat of an artform. One should not view explanatory virtues as orthogonal ideas. Rather, they overlap and are subtle. For the purposes of this paper, we consider likelihood, consilience, coherence, parsimony and fruitfulness. There are other ways to slice the pie, such as depth and breadth, or, say, a more explicit idea of explanatory elegance.

measured in terms of uptake by the scholarly community, i.e., in terms of citations (Pinder, 2017, p. 453).

Empirical researchers in strategy are perhaps most familiar with the virtue of likelihood which is often evaluated based on statistics of econometric model fit, or precision of parameter estimates. For example, a coefficient that is characterized by a relatively small standard error with a correspondingly high test statistic and low p-value, or one that has a high posterior probability, will be interpreted as more likely to be true than a coefficient that is imprecisely measured or has a low posterior probability. As summarized by King, et al., (2021) and in the appendix, using statistics to determine the verisimilitude of an explanation is difficult.

One may presume that strategy scholars will generally prefer the most likely explanation. Intriguingly, as we lay out below, this isn't necessarily the case. At times the most likely explanation may lack in parsimony or coherence. At other times less likely explanations are preferred because they are fruitful and provide strong action guidance. For example, the theory of disruption is a poor description of industrial change in both disk drives and more generally (King and Baatartogtokh 2015; King and Tucci 2002; Lepore 2014; Gans 2016), however it remains a commonly accepted foundation to technology strategy. Alternatively, a regression with a fixed effect for each observation is very likely, but it provides no path to universality and has little meaning; it is not fruitful.

Balancing explanatory virtues such as likelihood, consilience, coherence, parsimony, and fruitfulness is an act of judgment. Either implicitly or explicitly, strategy scholars must rely upon our judgment to develop useful knowledge, and it is upon the skill of our argumentation that we rank explanations. Explanatory virtues are not orthogonal. For example, fruitfulness will often overlap with universality and parsimony. In fact, finding explanations in which the virtues overlap has been identified by some as the goal of IBE. Lipton defines such explanations as "lovely" (Lipton, 2004, p. 61) and to him, the best explanations are both *lovely* and likely.

Finally, finding an explanation that is arguably close to the truth requires that explanations close to the truth be considered. A failure to consider such explanations is referred to as the bad lot problem (Dellsen, 2018; van Fraassen, 1989:142; Wray, 2008; 2011). It has been argued that some researchers are more skilled than others in identifying explanations (Mantere & Ketokivi, 2013, Sætre and Van de Ven, 2021). IBE suggests that it is the rich consideration of prior knowledge and new observations of the phenomenon of study that makes it more likely that explanations close to the truth are considered. The process of weighing proposed explanations and generating new ones is iterative and sits at the heart of the reasoning process. For example, a set of observations may be considered in light of the researcher's prior information to develop a potential explanation. This can then lead to the search for additional information either within a setting or more generally to adjudicate the virtues of such an explanation. It is this process which sits at the heart of IBE.

With the stage set, we can now move forward to considering how and why historical methods help the researcher identify explanations and evaluate their virtues. In the next section, we explore in detail how historical methods facilitate the evaluation of explanations so as to achieve a broader consensus as to how these explanations should be rank ordered.

3. Historical methods increase the verisimilitude of explanations

Historical methods act as a tool to make an abstract, theoretical cause-effect relationship concrete. We now consider how techniques used by historians such as hermeneutics, contextualization, multi-source triangulation, and narrative construction lead to more consilient explanations. The logic is simple. Historical methods provide a systematic approach to uncovering and tying together rich, contextual information. Reconciling a range of disparate contextual facts and observations leads to, by definition, greater *consilience,* as well as perspectives on other virtues,

including universality, coherence, parsimony, and fruitfulness. In Section 4 we will then consider how an explanation's virtues might balance.

Historical methods refer to the analysis and representation of the past through the interpretation of records (Argyres et al., 2020; Wadhwani & Bucheli, 2014). Just as statistical methods refer to a variety of techniques used for summarizing and interpreting patterns in quantitative data, historical methods also refer to a collection of practices that historians use to collect, analyze, and interpret the information about the past. Historical methods rely on repeated iteration between past and present -- between the unfolding historical record and the interpretive interests of today's scholars -- to develop understandings of historical settings and contemporaneous attitudes that are clear, translatable and provide new insights of past events (Fulbrook, 2002:, p.187). These representations of past realities permit scholars to recognize multiple potential explanations, thereby increasing the likelihood that more verisimilar explanations are part of the consideration set (Gaddis, 2004). The historical perspective allows that candidate explanations may be competing or complementary; historical methods broaden the range of tools available to strategy scholars facing the challenge of explanation and provide comprehensible approaches to assess the relative virtues of different possible explanations (Roberts, 2010).

3.1 Hermeneutics

Hermeneutics refers to the interpretation of "evidence from the point of view and experience of actors as a basis of comprehending their actions (Wadhwani & Decker , 2017, p. 120)." More plainly, hermeneutics is a tool to ensure that a proposed mechanism is reasonable by examining if it makes sense in a context by understanding the likely or recorded motivations of the actors, and the context in which they operated. An explanation that does not pass this test, is not very likely.

Often, retrospective sense-making by researchers is colored by theories that cohere with commonly accepted theories of human behavior or motivations (Kirsch, Moeen, & Wadhwani, 2014). However, a pitfall of strong imposition of theory is that specifics of a time and place may render prior theories out of place and / or anachronistic. That is, explanations from one setting should not be imposed on another without consideration for how differently people thought, acted and organized in each setting (Lipartito, 2014). To overcome this challenge, historical methods use records to understand "the actor's preferences, their perceptions, their evaluation of alternatives, the information they possess, the expectations they form, the strategies they adopt, and the constraints that limit their actions (Bates et al., 1998, p. 11)."

In this sense, hermeneutic interpretation is the reconstruction of the decision-making process that allows the researcher to understand how actors thought about their own place and time (Gaddis, 2004; Wadhwani, 2016). This ensures that explanations are rooted in the actors' reality, rather than the researcher's. Explanations that take this into account are more *consilient* in that they are consistent with the thinking and setting of the actors making the studied decisions. Thus, they are also more *likely*. Hermeneutic interpretation compels the researcher to account for the perspective of the actors at the time rather than codifying abstract regularities of our own present time that are independent of intentions or circumstances. In this respect, explanations that rely on historical methods take the perspective of the actors seriously.

3.2 Narratives

Historical methods, of course, not only compel the consideration of the perspective of the actor in their context, but also the creation of a sufficiently accurate picture of this context to understand how multiple events interacted and thereby come up with an explanation of outcomes. That is, a narrative, or "an account of the linkages among [discrete] events as a process leading to the

outcome one seeks to explain (Roth, 1988, p. 1)". In the historian's view, the narrative *is* the explanation.

This is akin to contextualization. Contextualization, as it is often used in the strategy literature, refers to providing background or chronology: "[T]he empirical context becomes intertwined with the process by which grounds are linked to claims, and the author makes appeals to the context in justifying theoretical conclusions (Ketokivi & Mantere, 2010, p. 324)." Contextualization can identify plausible counterfactuals, why they did not materialize, their antecedents, and their unseen consequences that can be contrasted with hypothesized claims to validate causal arguments (Durand & Vaara, 2009; Kipping & Lamberg, 2017, MacLean, Harvey, & Clegg, 2016). It ensures that the researcher's assumptions about the period in which the researcher is situated do not bias her interpretations about the period under study (Wadhwani and Hansen, 2014).

Historians view contextualization more broadly. For the historian, contextualization is established through periodization and narrative reconstruction (Rowlinson et al., 2014). Periodization refers to the organization of events and actions into coherent time periods. Structural changes in the environment, strategic inflection points, periods of crisis, etc. may determine the appropriate time horizons. Periodization has critical implications for the analysis of outcomes because different types of periodization may offer different causal explanations to the researcher. For example, organization of events into short periods (0-10 years) permits the researcher to assign agency to actors, into longer periods (10-100 years) permits formal institutional considerations, and into even longer periods (100-1000 years) permits considerations of informal institutions, customs, traditions, and norms (Williamson, 2000). However, such periodization must be contextualized carefully. It may be reasonable to assume a fixed effect over ten years for an automobile firm in the relatively stable 1960s though not in the 1900s, when the entire industry was experiencing rapid

change. Thus, the historian not only uses contextualization to construct a consilient explanation, but also broadens this exercise to shed light on an explanation's generalizability.

The details of a context together with the hermeneutic analysis of the actors' perspectives are brought together in narratives. Narratives organize evidence in a sequence that assigns causes and consequences. They have a clear and meaningful beginning and end, a central subject, and a plot in which people and events are endowed with meaning and roles (White, 1973). Thus, narratives are internally consistent, transparent accounts that describe changes or dilemmas of choice over time (Zald, 1996).

The researcher's role in the construction of an historical narrative involves the *selection* of a set of events from an infinite series of events that can occur within a finite period, *emphasis* on the status of each event to organize them into a hierarchy of significance, and *emplotment* to convey information and meaning in a manner that supports the author's conclusion (White, 1978; 1980). Narratives offer scholars an opportunity to build contextual details, the sequence of processes, and causal complexity into an explanation (Mahoney, 1999; Mahoney et al., 2009). It is a particularly compelling tool to order reality when explanations need to account for temporal sequencing and path dependence (Dray, 1971; Salmon, 1984).

Simply creating a chronicle by putting events beside each other in temporal order without the assignment of a causal relation would not be considered a narrative until this ordering incorporated a hermeneutic consideration of how these events were perceived and acted upon (Pentland, 1999). Narratives project structure onto the facts of the plot, and it is this imposition of structure upon the events that endows the events with meaning in the sense that the researcher conveys if an event mattered, to whom, and why (White, 1984). Narratives and historical records complement each other because, while narratives are constrained by historical records, those same records are given meaning by the narratives (Hansen, 2013).

Narratives can have the appearance of overly deterministic, less parsimonious explanations (e.g., "if not for Ford, we would not have mass produced automobiles"). Just as statistics summarize data, the historian's narrative provides a central plot line to explain an outcome. Not every story can be told, and hence the historian will necessarily sanction some voices and silence others (Cronon, 1992). Narrative construction offers the researcher great freedom "for selectivity, simultaneity, and the shifting of scale: they can select from the cacophony of events what they think is really important; they can be in several times and places at once; and they can zoom in and out between macroscopic and microscopic levels of analysis (Gaddis, 2004, p. 22)." This freedom can be put to good use. Historical methods give the researcher the capacity to shift across different levels of analysis, such as individual, firm, group, industry, and institutions, to facilitate the generation of multiple plausible explanations. At the same time, a researcher's evolving understanding forces them to move back and forth between the interpretation of the uncovered evidence and modification of their explanation. This exposes the researcher to theoretical implications of explanations proposed by contemporary observers and prior scholars. New explanations may emerge as prior explanations are reconciled with newly uncovered observations of the setting, of the setting's larger context, and /or newly understood theoretical ideas of human behavior.

That the passage of time might reveal new secrets should not be surprising. Historical methods exploit contemporaneous records of past events and researchers can plumb broad aspects of experience that are not accessible through direct, ethnographic observation. Historical methods "lifts us above the familiar to let us experience vicariously what we can't experience directly: a wider view (Gaddis, 2004, p. 5)." Hindsight enables a more expansive view and permits a researcher to see mechanisms that may only be visible retrospectively. Thus, often, historical methods reconsider prior explanations that were made by contemporary actors or observers. Historical analysis is itself insurance that the search for mechanisms is not prematurely closed, patterns are not overdetermined

to ensure artificial coherence, there is no overemphasis on outliers, and infatuation with a particular methodology does not alone drive the explanations considered.

Moreover, a consilient explanation will be situated in the broader historical narrative. Historical records' expanded horizon reveals aspects that are only perceivable over the long run, such as the differences in structures and behavior between organizations in different cultures, it confronts repetitive phenomena that spuriously claim novelty, it identifies decisions and possible choice opportunities that lead to current structures, and evaluates whether theories developed from short-run changes are consilient with historical developments and if not, can lead to new explanations (Jones & Khanna, 2006; Kieser, 1994).

Some questions are only addressable with a longer lens. For example, the formation of institutions and their role in shaping cognition and action requires a long enough window to allow slowly evolving institutions to emerge and change (Baumol, 1990; Suddaby, Foster, & Mills, 2013; Wadhwani, 2011). It may take time to understand how actions shape context (Jones & Wale, 1998; Welter, 2011). Longer perspectives may illuminate the formation, culture, and communication within teams (Aldrich & Fiol, 1994; Lounsbury & Glynn, 2001; Ruef, Aldrich, & Carter, 2004). Finally, the analyses of path dependence and imprinting requires sufficiently long perspectives to evaluate the path upon which the outcome depends and the organizations that both imprint and are imprinted (Godfrey et al., 2016; Kipping & Lamberg, 2017).

The long lens can shed light on whether particular contingencies were important. Historical methods require additional interrogation of contingencies,[8] which are particularly attractive to

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[8] What historians refer to as "contingencies" (Gaddis, 2004, p. 30-31), strategy scholars generally label them "shocks" or "exogenous events." Contingencies identify critical junctures where certain choices or events lead to long trajectories of change; contingencies "don't fall within the realm of repeated and therefore familiar experience … [and include] situations where an imperceptible shift at the beginning of a process can produce enormous change at the end of it (Gaddis, 2004, p. 29)." Historians define contingencies based on observed outcomes, which is potentially problematic if the counter-factual cases are not also explicitly evaluated. Contingencies include breakthrough technological shocks that improve economic outcomes, such as railroad, internet, or agricultural discoveries, and traumatic shocks that result in negative and, often, long-term

strategy scholars as they are, when exogenous, useful in forming causal arguments because they provide natural experiments with exogenous variations that persist over time. Contingencies also allow researchers to articulate critical turning points and counterfactuals. And generally, because contingencies are somewhat discrete events, they are attractive to study because they lead to parsimonious explanations.

Historical methods also reveal continuities, patterns that extend beyond the time frame of a given study or dataset. Strategy scholars are often concerned about left-censoring, where a study or sample misses early instances of related events, but right-censoring may represent a more pervasive challenge. It is often difficult to know when a temporally-situated process has run to completion. Historical methods acknowledge that consilience is a moving target subject to events that may not yet have happened and to understandings that have not yet been formulated. To wit, the history of Enron has already been rewritten more than once (Bradley, 2018; Fox, 2004; McLean & Elkind, 2003; Benke, 2018).

3.3 Further bends in the road to consilience

Historical methods enhance the consilience of explanations by identifying additional facts that hypotheses must explain and by offering scholars the ability to test an explanation across changes that are most likely to be salient in the domain of interest. More consilient explanations are generally more likely, but are also often less parsimonious.[9]

Historical methods shed light on a variety of factors that may or may not be relevant to a proposed explanation. Rather than ignoring outliers, neglecting unexplained facts, or viewing time merely as a clock variable, historical methods use these elements to enable comparative evaluation.

disruption, such as the Great Depression or the African slave trade (Klüppel et al., 2018), and, we note, they also include smaller events that may affect particular firms, such as the death of a company leader.
[9] One might presume that greater consilience always implies greater likelihood. But this is not the case. Some religions propose consilient explanations for human outcomes, as outcomes can be explained by supernatural powers. However, these explanations are, perhaps, not the most likely.

Historical methods, due to their ability to scale across different time periods and levels of analysis, reveal evidence that may be relevant to a hypothesis. It scales between microscopic and macroscopic levels of explanations that simultaneously account for different actors, events, and contextual factors within the same period under consideration (Gaddis, 2004). It allows the researcher to ask what else should be true for a given hypothesis to be the best explanation. The researcher can evaluate such deductive implications of the theory under consideration using historical methods because in-depth contextual knowledge permits tracing of the actual consequences of the theory in past realities. That is, the historical methods "serve as a lens through which the apparently independent and disconnected elements of existence are seen as related parts of a whole (Polkinghorne, 1988, p. 36)." We now consider dimensions of this claim in greater detail.

3.3.1 The iterative nature of narrative construction

Historical records are collections of a wide range of ascertained facts. Given that a complete representation of historical experience is not attainable, historical accounts aim to summarize such collections to form a fair rather than a complete representation of the past. Better representations strive to "include all prominent features of the subject, omit no features whose omission would imply something false about the subject; and represent the subject with a fairly uniform degree of detail (McCullagh, 1987, p. 35)."[10]

Understanding a context compels the historian to engage at the individual, firm, industry, institutional, etc. levels to reconcile offered explanations with a broad variety of facts. More consilient explanations reconcile and explain more relevant facts and provide a means to triangulate if results and suggested causal mechanisms are consistent with rich, non-statistical evidence.

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[10] Limitations of articles, as opposed to books, make this constraint even more binding as it is not possible to represent all aspects of a period or phenomenon within a few pages. Hence historical methods in strategy place a premium on researcher judgement in selecting and interpreting the records to determine the significance of each fact and selecting the ones relevant for the explanation.

Historical methods identify additional facts that each hypothesis must explain and ties them together through the development of historical narratives. By considering and comparing different historical narratives, both the researcher and reader can arrive at better judgments as to whether the measured relationships are likely predictive statements of fact, or are random patterns.

In the practice of IBE, when the facts do not align with a particular explanation, the researcher must consider whether alternative explanations are required, or if the facts themselves are reliable. For example, the researcher may weave together a different narrative that embodies a competing explanation to better explain the totality of facts. It may be that the non-conforming fact is driven by chance and can therefore be ignored. The richness and depth of historical methods can thereby increase consilience. More formally, the consideration of the historical record can increase confidence that a broad set of plausible explanations have been considered and can weaken or strengthen our judgments about the verisimilitude of explanations: "Though not proof of causation, [statistical] correlation is a smoking gun; and history can often supply sufficient circumstantial evidence to convict (Morck & Yeung, 2011, p. 42)."

3.3.2 Source criticism

While narrative construction will always retain an element of subjectivity, narrative verisimilitude can be increased if researchers systematically establish the integrity of the evidence. As noted by Murmann (2012), "[u]nlike physical facts [that] exist independent of the observer, social facts depend fundamentally on the agreement between human beings (p. 91)." Historians do not treat records generated in the past as objective sources and instead interpret them in the context of their creation and survival (Rowlinson & Hassard, 2014). That is, the perspective of the author or creator of the records needs to be understood because the texts and the authoring process are intertwined (Martin, 1986). How individuals perceive and classify interacts with that which is being classified and changes it (Hacking, 2002, p. 46). Thus, the historian will ask "what were the motivations and biases

of the author of the source?" For example, a document written with a future orientation may be different from an internal memorandum designed to bring light to a problem at hand (Decker, 2013). Understanding this bias will allow the historian to ascertain to what extent the historical records in question inform more about the motivations of their creators and to what extent accounts of facts and events can be taken at face value.[11]

To generate a complete picture, the historian also must consider selection bias in the survival of records and engage in the thought experiment: What sources have not survived? What's missing? How might the surviving archives bias my interpretation (Kipping et al., 2014)? Strategy scholars might recognize this as analogous to the "ideal experiment" question. The strategist asks, "What would be the ideal test of my theory?" while the historian asks, "What sources -- existing or lost -- would enhance my understanding of the past ?" Though proceeding from different starting points, both approaches privilege the mind of the researcher as she frames the inquiry.

Other objective heuristics are also applied. Verisimilitude will generally increase if the record was generated close in time and space to the events under scrutiny.[12] Documents created for internal communications may be more accurate descriptions of events than those created for external release. Proprietary sources are often deemed less trustworthy than those available to any would-be researcher (Decker, 2013). Similarly, the provenance of statistical data has theoretical implications because archives acquire records based upon firms and individuals as central units of record keeping.

The historian triangulates across different types of sources. However, historical triangulation is about much more than producing similar results. Historical triangulation emphasizes reliance on

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[11] An exemplar of source criticism is Khaire & Wadhwani (2010). The authors conducted twelve semi-structured interviews that lasted two hours each with specialists from auction houses to provide contextual information on the creation of the written texts that the authors used as evidence.
[12] The link between the problem of testimony and the problem of induction is very tight in the present context. Written and oral historical sources are forms of human testimony. The veridicality, i.e., the competence and sincerity of these sources, must be evaluated to judge the verisimilitude of the narrative that relies upon the sources. See King, Goldfarb, & Simcoe (2021) for a primer on the philosophy of testimony in the context of management research.

different types of documentary sources to reveal different aspects of the phenomenon and then asks the historian to determine whether the sources paint a consistent picture. In the process, the able historian will generate a richer understanding of a setting's complexities (Greene, Caracelli, & Graham, 1989). Because no single source is able to provide a complete account of the facts, historical methods proceed via iterative, multi-source triangulation of independent accounts to converge on an explanation. This process offers the ability to observe different viewpoints across different time periods simultaneously. Triangulation using multiple sources allows the researcher to "place the event in a broader context in a way that a single source may be incapable of … [and] track an event or development over a long[er] period of time than any single source may be capable of (Wadhwani, 2016, p. 137)." Thus, historical triangulation permits the scholar to know more and increases the scope of realities for which an explanation needs to account, thereby allowing a better determination how to weigh the importance of explaining certain facts.

4. Balancing of virtues

The integration of information across settings, perspectives and lens into a meaningful concise, yet transparent exposition is challenging. Whereas historians use historical methods to highlight novel insights about the past, strategy scholars will be interested in using historical methods to create narratives to bring focus to particular questions of interest to strategy. Thus, the expositional narrative constructed by the history-friendly strategy scholar will be more selective, and necessarily omit some aspects of the broader context that are not critical to the strategist's narrative. What to omit, of course, is a judgment. When constructing narratives, this judgement is guided by the potential tradeoffs between virtues.

Instead of simply codifying abstract regularities that are independent of intentions or circumstances, historical narratives are thick descriptions that assign significance to action, identify

contingent assumptions, and judge the degree of transferability of findings across contexts. That is, historical narratives compel the researcher to consider more explanations, and decide which historical facts to explain, and what not to. More elaborate historical narratives will generally reconcile more facts and events, increasing the consilience of an explanation; it will also bring to light potential scope conditions of these explanations. However, explaining more facts will often come at the cost of explanatory parsimony, and adding scope conditions does so by definition.

To the extent that an explanation coheres with prior theoretical thinking, the historical methods make the abstract mechanisms of theories concrete. Indeed, contextualization should highlight salient contingencies. That is, contextualization connects the abstract to a setting, and this reveals not only whether that abstraction is applicable to a circumstances, and which facts are explained and which are not, but also highlights potential scope conditions that may limit the generalizability of the theory (Firestone, 1993; Lewis & Ritchie, 2003; Tracy, 2010; Yin, 2002). As consilient findings accumulate across multiple contexts, these findings get pieced together into a coherent story, and researchers may become more certain as to the generalizability of the theory and the relevant scope conditions.

However, scope conditions limit generalizability and by definition imply less parsimonious explanations. Scope conditions are additional theoretical assumptions that must be satisfied for an explanation to explain. Parsimony is lost. Historical methods reveal the price of preferring a more parsimonious explanation and this price is those elements of the narrative that such an explanation does not explain, or even those elements that it explains incorrectly but might be attributed to a different, countervailing cause.

Similarly, hermeneutic interpretation does not prevent the researcher from developing their own analyses and assigning significance to actions and actors based upon the theoretical coherence that a scholar prefers (Mantere & Ketokivi, 2013; Wadhwani & Bucheli, 2014). But it does require

that the interpretation of these actions be rooted in the experienced reality of the actors. When done well, the researcher's interpretation will maximize likelihood through increasing consilience given coherence with our contemporary understandings and interests. That is, historical methods constrain the pursuit of the virtue of coherence by requiring that an interpretation not reduce likelihood or require anachronistic theorizations.[13]

The need for judgment implies that scholars will not always, or even, usually agree as to the preference ordering of explanations. Hence to allow re-consideration of this judgment, the process needs to be transparent for the reader. When using historical methods this transparency is created through careful articulation of sources. This allows the reader to exercise their own judgment as to whether the author's imagination of the perspective of an actor whom she does not directly observe is reasonable. A questioning and motivated reader could then return to these sources and attempt to reinterpret the data.[14] With these judgments, both the researcher and reader can then decide whether proffered interpretations are restricted to the experiences of a few actors in a relatively narrow time frame or whether they can be extrapolated to a broader set of contexts that incorporates the lived experience and perceptions of a wider set of inhabitants across longer time periods. Thus, historical narratives offer a systematic method of providing the readers with the information necessary to evaluate the assumptions and choices that the researcher made in building her explanation so that the readers can form their own inferences to the generalizability of the findings.

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[13] For example, [[Using status, embeddedness and network theories to explain the actions of Liverpool elites' participation in the slave trade must not require us to make assumptions that are inconsistent with other established understandings of how these individuals lived their lives.]]

[14] For examples of such debates over historical fact see Liebowitz and Margolis (1990)'s reinterpretation of David's (1985) seminal account of the QWERTY keyboard or the debate between Edwards and Olgilvie (2012) and Avner Greif (1993, 2012) about the whether the example of medieval Magrahbi traders are an example of informal enforcement mechanisms that facilitate trade.

5. Historical methods and the best explanation

All scholarship seeks truth. In practice, however, strategists -- like historians -- must content ourselves with better or worse explanations. If we take the foregoing discussion of explanatory virtues seriously and acknowledge that different explanations are more or less virtuous but that the virtues themselves are incommensurable, how do we decide upon the best explanation from among a set of possible explanations? One might, for instance, think of a narrative with greater consilience as the most likely. And indeed, in pursuit of truth, the most likely explanation is the one with the most verisimilitude.[15]

However, the problem lies in the fact that our information is always incomplete. Statistical evidence of likelihood is not interpretable without situating data in its context. Data generating processes are rarely knowable, let alone known. Historical evidence is not interpretable without the historian to piece a story together. There is always additional, unconsidered information that may require revisiting an explanation. This information may sit outside the data, sample or account, or it may be "within" the data, just not considered due to the constraints of time or attention.[16] For example, historical methods are biased by surviving structures, qualitative studies are biased by the records and personnel that can be accessed, and statistical analysis is biased by the quantifiability of

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[15] One might ask about the link between verisimilitude, reliability, and validity. Reliability is the agreement between two efforts to measure the same trait through maximally similar methods. Validity is represented in the agreement between two attempts to measure the same trait through maximally different methods (Campbell & Fiske, 1959, p. 83). Thus, both reliability and validity speak to the consistency in which information is processed, not how this information is interpreted and given meaning. In other words, the what, not why. An historical narrative is a linked chain of causality that explains why events unfolded as they did. It is these insights into causality that inform policy makers and are of interest to the strategy scholar, and indeed, most social scientists.

[16] Given the presumptive advantage of temporal distance and the disadvantage or risk of remoteness, there is probably a curvilinear relationship between our ability to use history and the time that has elapsed since the events in question. If events are too recent, we lack sources and perspectives with which to generate rich, varied explanations. If events are too far in the past, evidence may well have been lost to time, prior explanations may seem anachronistic or otherwise unsupportable, and we may overweight our own temporally-situated explanatory devices.

constructs. Explanations that appear very likely given one presentation of findings, are subject to question due to the humbling limitations of any one scholar or source.

To characterize this problem, we think of *local likelihood* as the likelihood given the detailed set of evidence explicitly considered and / or presented. In the world of the strategy scholar, this evidence would be the datasets considered and the researcher's exploration of their context, while *general likelihood* is the judgment of verisimilitude that balances local likelihood with prior knowledge including an explanation's coherence with other findings in alternate contexts.[17] In the case of the historian, a judgement of general likelihood balances consilience of a new explanation against coherence with existing historiography and known sources. In the case of the econometrician, local likelihood would refer to the set of frequentist tests balanced against the coherence of the theoretical frame that gave rise to a hypothesized data generating process. A judgment that listening to certain songs reverses aging will not be judged generally likely, no matter how locally likely it may appear to be based on the p-value that tests such a hypothesis. More broadly, if the most likely explanation as measured by these tests fails to cohere to prior thinking of human behavior, then the most (locally) likely explanation, as measured, will not be judged the most (generally) likely to be true. Of course, these judgments are subjective. The sociologist may prefer coherence to theories of sociology, while the economist may prefer coherence to theories in economics. Thus, the researcher will arrive at a judgement of general likelihood as local likelihood is balanced against the researcher's prior understandings of human behavior. Their readers' judgments may, and often will, differ. Given the limitations on the completeness of evidence, evaluating whether local likelihood maps to general

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[17] The idea that a locally likely explanation may not be preferred sits at the foundation of abduction and IBE: "Peirce himself (1992, p. 193) says that the `commonest fallacy of retroduction' is `the idea that the [antecedently] most probable hypothesis is the best... In local theorizing, we are interested in finding an explanation of a particular piece of data or evidence E, while in global theorizing evidence E is only a stepping stone to a more generally applicable theory (Niiniluoto, 1999, p.S443-S445)."

likelihood requires balancing local likelihood against other virtues of an explanation, such as the coherence of an explanation to prior knowledge or evidence that is outside the study.[18]

Somewhat surprisingly, the most generally likely explanation is not always preferred. Explanations are often chosen because they are parsimonious and /or they appear to provide fruitful understandings. That is, more parsimonious explanations that have less predictive power may be preferred to less parsimonious, but more consilient explanations. For example, the theory of incentives may have some predictive power in many settings, but more complete theories of human behavior that take into account other motivations such as social status, power dynamics, altruism, trust, all of which are context dependent. To the degree that some of these factors are more idiosyncratic and context dependent, they may be less fruitful, and hence ignored or not offered by the strategy researcher rewarded by creating general rules of thumb.

Historical methods provide a powerful tool to understand how explanatory virtues are balanced by the researcher and thereby guide scholarly debate as to which explanation is preferable, or, shall we say, better. It does so along several dimensions. In particular, historical methods lay bare the consilience of an explanation. Thus, they provide a tool to evaluate local likelihood outside of common statistics. Moreover, since statistics do not inform causality, historical methods provide a structure to evaluate whether causal linkages are consilient with what happened. In so doing, historical methods increase the likelihood that the researcher will minimize the bad lot problem, which is a failure to include the true explanation in the set of considered alternatives (Dellsen, 2018; van Fraassen, 1989, p. 142; Wray, 2008; 2012).[19] Historical methods illuminate many potential causes

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[18] Peter Lipton defines this balancing as "likely vs. lovely", where lovely is some combination of explanatory virtues that are "better" (Lipton, 2004). Lipton acknowledges the difficulty in defining lovely, though he argues that IBE aspires to explanations that are both likely and "lovely". In our experience, what is lovely is a matter of judgment and at times, preferences. Hence, we refrain from adopting his language and instead move the focus to making explicit what these judgments are as a way to frame the scholarly debate.
[19] Strategy scholars encounter this problem most frequently as "omitted variable bias," when an unidentified causal factor is acting upon both dependent and independent variables.

of events, simply because either others have offered them in their attempts to explain, or the requirement to weave together a narrative compels the researcher to consider and reconcile a wide variety of facts. More consilient explanations are less likely to miss the explanation most likely to be true. This is not, of course, a guarantee. Even if we use historical methods to generate additional possible explanations, we could still end up missing the right one(s).

Historical methods can be consilient but not fruitful. Historians will recognize this as a form of antiquarianism. Knowing more details about a particular context will almost certainly be consilient and increase local likelihood, but if this comes at the price of decreased universality, then its fruitfulness is reduced. Just as historians tip their hat to a fine antiquarian explanation, strategists may appreciate an explanation that incorporates historical methods, but have trouble knowing how to make use of it. For example, the *Standard Catalogue of American Cars* (Kimes and Clark, 1987) is exceptionally consilient, as it provides short accounts of hundreds of automobile manufacturers, as well as consolidated lists of produced automobiles. That is, it is consilient in that it documents many facts and offers short explanations of the success or failure of individual firms. However, it lacks a general narrative. It does not seek to generate a general explanation that ties the individual corporate narratives together. Thus, each entry in the *Standard Catalogue* is locally likely, but provides little general meaning. It is not useful to the strategist without further interpretation, because it lacks parsimony. Thus, both historians and strategists are relatively unmoved by such accounts. Most social scientists, the present authors included (Pillai et al. 2019), would prefer a more general, parsimonious account of the events of the early automobile industry that is by definition less consilient to every event that may be documented in the *Standard Catalogue*. Pillai et al. may be more fruitful in that it purports to isolate general forces that perhaps will provide insights in other settings, though without the *Standard Catalogue* as a building block, it would not have been able to derive its parsimonious and (hopefully) fruitful account.

The cost of consilience is real, as more fruitful explanations order our thinking across a broad range of phenomena. Historical methods provide a tool to judge if the reduction in consilience is moving us too far from general likelihood; it compels us to confront such tradeoffs head on. For example, Jill Lepore's critique of Clay Christiansen's accounts of success and failure in the disk drive industry reveal the inability of Christiansen's theory of disruption to explain certain historical facts (Lepore 2014).[20] Indeed, the lack of consilience of the theory of disruption is general King and Baatartogtokh (2015). Nevertheless, Christiansen's theory has been fruitful as an organizing principle and has often been preferred as an explanation. However, only as we understand its lack of consilience can we use it wisely. Alternatively, Carl Weick (1996) provides a parsimonious and fruitful explanation of a disaster at Mann Gulch. Firefighters, caught off guard by a sudden and severe change in weather conditions, failed to subjugate their identities as firefighters sufficiently quickly and hence did not flee quickly enough. 12 of 15 firefighters lost their lives. However, Weick's explanation is not consilient with Norman MacLean's account, *Young Men and Fire,* which happens to be the source upon which it is based.[21] Nevertheless, we should recognize that a well-told story is hard to resist: As Jonathan Gottschall cautions, a good storyteller can "drag readers' minds out through their eyes, teleporting them across time and halfway around the world." The astute reader may observe that fishing, in the sense of p-hacking, may be thought of as an unsuccessful trade off of consilience with fruitfulness. Apophenia is tempting.

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[20] Lepore's (2004) pithy essay is searing: "'Nowhere in the history of business has there been an industry like disk drives,' Christensen writes, which makes it a very odd choice for an investigation designed to create a model for understanding other industries." Though her most stunning critique is that Christiansen framed Seagate as a failure, when in fact, it was a leader in the disk drive industry. King and Tucci's (2002) earlier critique questions the statistical consilience of the original account as well.

[21] King writes: "What [Maclean's explanation] lacks in loveliness, it makes up in likeliness. MacLean tracks the time of every report; correlates it with wind direction, conditions on the ground, and the memory of the survivors. He consults with the most famous fire experts in the world, who then build mathematical models of how the fire may have behaved. He weaves together a story that explains most of the known facts, and is in contradiction with none. He and his assistants even go past storytelling and test their story on new data (predicting the location of a missing marker). They conduct the aforementioned speed test. Their predictions check out."

Admirably, both Weick and Christiansen were transparent with respect to their sources, this transparency sitting squarely in the historian's toolkit. This has allowed scholars such as King and Lepore to evaluate the consilience of the original explanations in light of other accounts and sources. Had their sources been less transparent, later scholars would have struggled to evaluate their consilience.

n=1 is a meaningful critique. However, historical methods, through forcing a broader perspective, also shed light as to when an explanation is consilient but non-generalizable. That is, when an explanation may be locally likely, but not generally so. To generate new theory in strategy, qualitative researchers often take advantage of remote, unique or otherwise extreme contexts; "Nowhere in the history of business has there been an industry like disk drives." Rich historical accounts bring to light attributes and factors that would otherwise remain invisible can be teased out. Like these extreme contexts, historical methods generate explanations that are necessarily context-specific. However, unlike qualitative research in extreme contexts where the goal is to isolate behaviors associated with novel theory, when we rely upon contextual similarity to make claims that a locally likely explanation in one context is locally likely in another, then a clear eyed view of whether it is an outlier is critical. Universality of explanations that incorporate historical methods derive from the generalizability of specific elements of explanation -- e.g., parallel fact patterns or the presence of common mechanisms. That is, a skilled application of the historical method will hopefully prevent history in the service of a narrative, or context insensitivity.[22]

Historical methods also provide tools to evaluate this universality. The evaluation of whether the history of a single firm, event, or industry is an outlier necessarily requires a broader perspective; that is it is a judgment that sits outside the specific data. Christiansen does not claim that the disk drive industry is exceptional based upon a systematic comparison with other industries, rather, he

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[22] e.g., Fisher body, QWERTY, VHS/Betamax

states the attributes of the industry and relies on his and the readers general knowledge of industrial

histories to justify his claim. Nobly, Christiansen is using a wider lens to contextualize his setting.[23]

To this point, we have discussed how historical methods may be used to illuminate

competing virtues of an explanation. In so doing, they, we hope, will focus the discussion on the

virtues of an explanation and clarify the judgments researchers make as they endorse particular

explanations. Judgments, by definition, are to be questioned. However, by recognizing the virtues of

an explanation, and adopting labels of these virtues, such as consilience, coherence, universality,

parsimony, and fruitfulness, we may have more constructive scholarly conversations about how and

when we are trading off general and specific likelihood, for other virtues. Moreover, the recognition

that general and specific likelihood are themselves judgments, may free scholars from insisting that

locally likely findings must be truths. Instead a scholar may map the explanations of a virtue, and the

debate can center around the weights each scholar gives to them.

5. Conclusion

Strategy scholars have predominantly engaged in Inference to the Best Explanation to generate

conjectures about observed patterns of evidence, eliminate disfavored explanations from among

them, and select one that is preferred, or "best". To judge whether explanations are useful, general,

and at the same time accurate, the interpretation of observational results requires an understanding

of context that statistical analysis alone cannot provide.

We have argued that methods used by historians such as hermeneutics, contextualization,

multi-source triangulation, and narrative construction better account for contextual idiosyncrasies.

Historical methods generate non-quantifiable information that compels scholars to consider more

candidate explanations to ensure consilience with facts. Further, historical methods also give scholars

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[23] As a result, Ingram & Silverman go to considerable lengths to anchor their findings in a theoretical
context that is readily translated to other decision environments.

the capacity to systematically judge, privilege, and balance consilience with other incommensurable explanatory virtues such as fruitfulness, coherence, parsimony, and universality. Prioritization of explanations follows from how we assess the desirability of different virtues. Thus, historical methods improve explanations in strategy research by giving scholars the capacity to infer the most verisimilar explanation as the best explanation.

6. Appendix: Limitations of statistical research claims

Following King et al. (2020), research claims in strategic management can be categorized into three groups: belief claims, frequency claims, and explanations. We now consider why veridical frequentist and belief claims are very difficult to make.[24]

Belief claims are objective, *quantitative* claims about the truth of a theory, conditional on a set of assumptions. One can also make quantitative belief claims based on subjective probabilities (Hacking 2001, page 127-133), but for our purposes, this may be better considered an explanation.[25] Belief claims are challenging to make given that quantitative claims about a particular theory are only veridical if alternative theories are considered. That is, a veridical belief claim requires not only reporting that a statistical pattern is consistent with a theory, but also ruling out alternative explanations. Mayo and Spanos (2006), in their attempt to reconcile hypothetical deductive hypothesis testing and frequentist statistics with the updating of beliefs argue that we should only update our belief that H_1 is true when H_1 is not only better, but when $H_2\ldots, H_n$, have been ruled out *completely*. They label this approach "severe testing." Not coincidentally, severe testing is also the criteria for estimating causal effects.

Belief claims are often evaluated based on our certainty about relationships in the data as measured by frequentist statistics such as p-values, test statistics, or confidence intervals. These statistics are frequency claims. They are factual statements about the predicted frequency of an empirical pattern in a population, conditional on a set of assumptions. Frequency claims are not belief claims. There is no claim that a reason a pattern appears is due to a particular mechanism, rather, simply that we can expect the pattern to happen again. For this reason, frequentist orthodoxy suggests calling a frequency claim "useful", rather than "true". Frequency claims are only justifiable

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[24] A claim is veridical if it is justified by proper empirical analysis and reported in a forthright manner (King et al., 2020).
[25] Frequentist statistics do not rely on priors (indeed, priors are not defined in a frequentist framework) and some Bayesians insist on diffuse priors for inference.

as predictions of expected patterns in repeat samples with strict, pre-specification procedures (Spanos 2013; King et al. 2020). Practically speaking, a necessary requirement to interpret a reported test as an accurate prediction of a pattern in a population is that the sampling strategy, independent, dependent, and control variables, regression methods, and interpretation of potential findings be specified prior to beginning data collection. Without pre-specification, frequentist statistics understate the likelihood that a reported relationship is random. In most empirical studies in strategy (and other sibling fields), pre-specification is challenging. Researchers enjoy many degrees of freedom and, generally, we should expect that reported statistical results overstate the accuracy and precision of estimates (Goldfarb and King 2016).

The literature has offered two central solutions to this problem. The first is to restrict researcher degrees of freedom through pre-specification, and the second is to find conditions under which pre-specification is plausibly irrelevant. The first approach is used famously in randomized controlled trials, as in clinical trials of therapeutic drugs, where we need strong assurances that the reported statistics are meaningful. Pre-specification as a solution to the reliability problem has been heralded as a viable solution in the social sciences as well (Angrist and Pischke, 2008), because, under strict assumptions, one can rule out all other theories (NOT H), except chance, which, in turn, is conveniently quantified by a p-value.[26] This approach has been gaining popularity in management research (Di Stefano and Gutierrez, 2019; Burbano, 2021). Because pre-specification requires developing questions, measures, sampling and estimation procedures prior to seeing the data, this method is most useful when the question to ask and the setting are well understood.[27] Given the

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[26] Specifically, one can state that if the pre-specified procedures are correct, the probability of a pattern repeating itself in this way if there is no effect is the p-value.

[27] Note that exact replication is a form of pre-specification, in that the replicated study serves as a pre-specification for the replicating study. However, for exact replication to be informative, beyond the isolation of mistakes in an original analysis, it requires an independent sample from the same population. For example, replicating by reanalyzing a set of COMPUSTAT firms should be thought of as a reproduction, as opposed to a replication.

challenges associated with severe testing of frequentist claims in strategic management, most of our studies rely upon explanations of various sorts.

An alternative approach to overcome the necessary assumption that a specified model is true is to examine the relationship across all reasonable models. Model uncertainty is not a problem if all plausible models lead to the same result. Epistemic Mapping is a leverages systematic approaches to evaluate the consistency of relationships across a great number of models, or average results across models, to examine whether a relationship is conditioned by the choices in sample construction, empirical proxies, and/or the combination of controls, econometric method, and functional form (Leamer 1985; Young and Holsteen 2017; King et al. 2020; Simonsohn et al. 2020).[28] If a relationship is consistent across all reasonable assumptions, then one might conclude that this relationship will replicate in a population that satisfies the conditions of severe testing. If not, one may be able to explain the patterns with a comprehensive understanding of the conditions under which the relationship can be measured. can then understand under which conditions a relationship might holdholds. Of course, we cannot know if the variationin findings across models is driven by unquantifiable chance. The Mapping approach requires research judgment as to the scope of reasonable possible models to mapkeep such analyses tractable and are an active area of research.[29]

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[28] Note that this is a more general solution than running a small number of 'robustness checks'. The scope of robustness checks have generally been limited by the practicality of reporting numerous regressions, and the limitations of researcher and reviewer imagination.

[29] How to create useful epistemic maps is an active area of research. SeeSee Berchicci & King (2021) for an exemplar mapping exercise.

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