CHAPTER 1

The Nature of Explanation

In our daily lives, the practice of giving explanations is ubiquitous; we often want to explain or obtain an explanation for certain events we encounter. Using more formal language, "explanandum" refers to the event to be explained while "explanans" refers to that which does the explaining. The example of deaths (explanandum) following Covid-19 vaccination (a possible explanans) mentioned in the Preface belongs to the domain of scientific explanations, which this book focuses on.[1] Yet there are explanations that fall outside this domain; one example might be an explanation for why our friend, Mary, got married last year. Scientific explanations and explanations in everyday life appear to be distinct. The former tend to be more objective, systematic, precise and rigorous than the latter, but the distinction may be more apparent than real. This notwithstanding, explanation should be a unified notion in the sense that explanations in everyday life are more or less continuous with scientific explanations (McCain 2015); that is, the differences between the two types of explanation are a matter of degree rather than a distinction in kind (Woodward 2003) and "no argument has ever proved that the logic of explanation in everyday life differs from that of explanation in science" (Faye 1999: 61). In response to a query about her recent marriage, Mary may reply, "I was already thirty years old last year. As you know, in our society, people expect a woman to settle down around that age." Mary's casual everyday-life explanation contains an implicit scientific flavor, revealing a first-person reaction to a social norm concerning the socially desirable marital age for women. Her explanation points to a legitimate research topic in sociology, psychology, or even anthropology. It goes without saying that the structure and very nature of explanations may depend on the explanandum (i.e., what sort of thing is being explained) (Wilson and Keil 1998); explaining why Mary got married last year is very different from explaining why the Hunga Tonga-Hunga Ha'apai volcano

erupted in January 2022 or why a jetliner of China Eastern Airlines crashed on March 21, 2022, resulting in 132 deaths.

Explanations, whether scientific or otherwise, are answers to why-questions, as put forward forcefully by Hempel and Oppenheim (1948: 135):[2]

> To explain the phenomena in the world of our experience, to answer the question "why?" rather than only the question "what?", is one of the foremost objectives of all rational inquiry; and especially, scientific research in its various branches strives to go beyond a mere description of its subject matter by providing an explanation of the phenomena it investigates.

The act of explaining should be distinguished from explanation. Explaining is an action that we take to communicate verbally or non-verbally an explanation to others (McCain 2015), while an explanation is "something one grasps or understands that makes things more intelligible" (Harman 1986: 67). Here the thing we grasp refers to a set of propositions; that is, "an explanation is a set of propositions with a certain structure" (Strevens 2013: 510). According to this view, explanations assume the form of arguments. Put simply, when we explain, we communicate verbally or non-verbally a set of propositions to others. As such, explaining is an intentional act of communication bounded by context, directed at the questioner and potentially persuasive (Faye 1999). This view of explanation belongs to the epistemic conception of explanation discussed in the next section.

The Epistemic versus Ontic Conception of Explanation

In the second half of the twentieth century, philosophers of science set for themselves the task of answering questions related to the nature of explanation, such as "What are the essential features of an explanation?" or "Do different science disciplines have different methods of explaining their research results?" Although the twentieth century closed with no real consensus on the nature of explanation, at the very least, most philosophers of science presumed that explanations belong to a special class of representations (Wright and van Eck 2018). A typical example is Hempel and Oppenheim's (1948: 136–137) description of the relationship between the explanandum and the explanans: "By the explanandum, we understand the sentence describing the phenomenon to be explained (not that phenomenon itself); by the explanans, the class of those sentences which are adduced to account for the phenomenon." Providing an explanation is an attempt to account for a phenomenon and such an account

necessarily represents matters in a certain way but not in another way. In other words, explanations explain by subsuming a phenomenon under a general representation.

The above is essentially the epistemic conception of explanation, according to which "explanations are complexes of representations of entities in the physical world" (Wright and van Eck 2018: 998). Explanation is concerned with understanding and the cognitive abilities of human beings. Ruben (1990: 6) argues that "the analysis of explanation belongs to general epistemology, in the same way as the analysis of knowledge does, and not just to the philosophy of science, narrowly conceived. Scientific explanation, like scientific knowledge, has a special importance and pride of place in a general theory of knowledge." Scientific explanations are texts or descriptions that aim to increase our knowledge about phenomena. For the epistemic conception, it is the text or description that explains (Illari 2013).

At the beginning of the twenty-first century, some philosophers of science challenged the epistemic conception by proposing the ontic conception, according to which "the term *explanation* denotes a class of non-representational, mind-independent entities that are located within reality among its other extant spatiotemporal parts" (Wright 2015: 20). The key difference between the two conceptions concerns "whether explanations are representations of entities in the world or the worldly entities so represented" (Wright and van Eck 2018: 1001). Instead of being representations, ontic explanations are physical entities that reside and participate in the causal structure of the world. In his study of how the brain functions, Craver (2007: 27) provides a definitive description of the ontic conception:

> the term explanation refers to an objective portion of the causal structure of the world, to the set of factors that bring about or sustain a phenomenon (call them objective explanations) . . .. Objective explanations are not texts; they are full-bodied things. They are facts, not representations. They are the kinds of things that are discovered and described. There is no question of objective explanations being "right" or "wrong," or "good" or "bad." They just are.

Mechanismic explanation, which is discussed in Chapter 3, has become the key battlefield where the debate between the epistemic conception and the ontic conception is located. For proponents of the epistemic conception, "since explanation is itself an epistemic activity, what figures in it are not the mechanisms in the world, but representations of them"

(Bechtel 2005: 425). In contrast, the ontic conception maintains that "mechanisms explain the phenomena they explain by being responsible for them" (Illari and Williamson 2011: 821). As such, the mechanisms involved in an explanation might sometimes be beyond our cognitive capacity to comprehend.

Following most philosophers of science, in this book I adopt the epistemic conception of explanation. In addition to the fact that "explanation has traditionally been taken to be squarely in the realm of epistemology" (Humphreys 1989: 3), there are some problems with the ontic conception. For instance, since explanations are a portion of the mind-independent causal structure of the world, explanations do not have any unnecessary or irrelevant parts and "scientists can discover, dissect, disrupt, depict, and describe – but, ironically, not explain" (Wright 2015: 20–21). Since explanations are not arguments, multiple competing good or bad explanations for a given phenomenon do not exist (Waskan 2006). Finally, the ontic conception focuses on the occurrence of an event "explained" by a singular causal interaction (Wright and van Eck 2018). Salmon (1975), however, argues that explanations of particular events seldom have genuine scientific import (as opposed to practical value) and that explanations which deserve serious attention are almost always explanations of categories of events.

The Influence of Ontology

The debate between the epistemic conception and the ontic conception is concerned with the ontological nature of explanation. Ontology in fact also affects how one explains certain phenomena. The current heated debate concerning entrepreneurial opportunities is an excellent illustration. In our daily conversations, a business opportunity is something that can be identified, spotted, seen, seized, or discovered, as shown in the following passage from a *Forbes* article written by the CEO and founder of a technology company dedicated to simplifying digital security for consumers: "Endless business opportunities await those who can spot the openings. Think about the challenges you have faced, services you use regularly and the frustrations you might have had. You might just identify your next big opportunity" (Ravichandran 2021). When an entrepreneur is asked why she set up a new company, a standard answer is something like, "I just discovered an opportunity to provide a new product (or service) that serves a certain market niche." The validity of the explanation hinges on whether an opportunity is something that can be discovered,

leading to the question: "In what mode does an opportunity exist?" This is squarely an ontological problem.

The debate concerning the ontological nature of entrepreneurial opportunities was initiated more than two decades ago by Shane and Venkataraman's (2000) seminal paper "The Promise of Entrepreneurship as a Field of Research," in which they maintained that the defining feature of entrepreneurial phenomena is "the discovery and exploitation of profitable opportunities" (217) and that the objective existence of entrepreneurial opportunities offers a solid foundation for entrepreneurship as a distinctive subject of study. They defined entrepreneurial opportunities as "those situations in which new goods, services, raw materials, and organizing methods can be introduced and sold at greater than their cost of production" (220). That is, entrepreneurial opportunities have to be profitable, in line with people's usual conception of business opportunities. After all, it is nonsensical to say that one has discovered (or created) an opportunity to lose money.[3]

This discovery view of opportunities has been challenged increasingly by scholars expressing their dissatisfaction with the idea that opportunities exist objectively "out there" in ways visible to potential entrepreneurs (McMullen et al. 2007; Davidsson and Wiklund 2009; Alvarez et al. 2014). Challenging the ontological shallowness of Shane and Venkataraman's conceptualization, Görling and Rehn (2008: 101) commented that "opportunities are assumed to simply exist . . . without any real clarity as to what this would mean." Some scholars even denied categorically that opportunities are preexisting entities in the external world, arguing that opportunities are created endogenously through entrepreneurial agency (Wood and McKinley 2010; Korsgaard 2011). The core idea is that "opportunities do not exist until entrepreneurs create them through a process of enactment" (Alvarez et al. 2013: 307). This creation approach places more emphasis on human agency in entrepreneurial activities.

Both the discovery and the creation approaches have obvious fatal flaws. In the case of the former, suppose that a business executive claims to have discovered an entrepreneurial opportunity and then exploits it by establishing a new company. Since the opportunity, by definition, must be profitable, this profitability attribute of the outcome is known with certainty at the moment of "discovery" even before the exercise of entrepreneurial action during exploitation (Ramoglou and Tsang 2016). This is an impossible situation. However, the creation approach does not fare any better. The statement that "opportunities do not exist until entrepreneurs create

them through a process of enactment" (Alvarez et al. 2013: 307) is a universal statement. As such, a single counter-example is good enough to overturn the statement. In fact, one can easily think of many cases where the business opportunity was not created by the entrepreneur but emerged from certain structural changes in the economy. For instance, although many businesses were hit hard by the Covid-19 pandemic, some new business opportunities did emerge because of the structural changes brought about by the pandemic (Colvin 2020). Alvarez et al. (2013) may abandon the universal statement and concede that some opportunities are created whereas others aren't. Yet this is anything but a solution because they will then face the uphill task of distinguishing clearly between these two types of opportunities and delineating their relationship, as well as dealing with the fatal flaws associated with the discovery approach (Ramoglou and Tsang 2017).

As a remedy, Stratos Ramoglou and I proposed the actualization approach. Based on a realist philosophy of science, we rehabilitated ontologically the objectivity of entrepreneurial opportunities by elucidating their propensity mode of existence. We defined entrepreneurial opportunity as "the propensity of market demand to be actualized into profits through the introduction of novel products or services" (Ramoglou and Tsang 2016: 411). Opportunities exist akin to a flower seed's propensity to germinate into a flower versus the flower itself. There are three ways individuals might have cognitive contact with opportunities: (1) imagining the state of the world where one makes profits by engaging in an entrepreneurial course of action; (2) believing that this state of the world is ontologically possible; and (3) after the realization of profits, knowing retrospectively that the opportunity in question was truly there. That is to say, the only occasion where we can know the existence of an opportunity is at the realization of profits; in the case of failure, we are agnostic. Our approach provides an intuitive and paradox-free understanding of what it means for opportunities to exist objectively.

The fatal flaws of the discovery and creation approaches are also reflected in the different explanatory efficacies of the three approaches. This can be illustrated by the case of Theranos – a high-flying but ultimately failed biotech start-up that promised to revolutionize blood testing by inexpensively performing dozens of tests based on a single finger-prick. Theranos is said to have been Silicon Valley's greatest disaster in recent years. The trial of Theranos's former CEO and founder, Elizabeth Holmes, ended in early January 2022 and drew a great deal of media attention; Holmes was found guilty on four charges of defrauding

investors. Let's conduct a thought experiment. Rewind to 2013 when Theranos was at its peak, valued at about US$9 billion, with Holmes not only an entrepreneur but also a celebrity. Suppose that in an entrepreneurship course, a student asks the professor somewhat naively, "Why did Elizabeth Holmes establish Theranos?" How would the professor reply?

If the professor is a follower of the discovery approach, he would probably reply, "Holmes discovered a business opportunity that will revolutionize blood testing. She set up Theranos to exploit the opportunity." If he subscribes to the creation approach, his answer would be something like: "Holmes created an opportunity to revolutionize blood testing and is exploiting the opportunity through Theranos." With the benefit of hindsight, both answers are problematic. Given the current state of blood testing technology, it can be concluded safely that the entrepreneurial opportunity that Holmes came up with simply didn't and still doesn't exist. Since the opportunity never existed, there was nothing to be discovered, period. As to the creation-based answer, it was simply impossible for Holmes to have created the so-called opportunity. Note that an entrepreneurial opportunity has to be profitable and, in this case, the opportunity in question could not be profitable. Rather, what she had in fact created was Theranos, nothing more, nothing less.

If the professor buys our argument that opportunities exist objectively as propensities, he would have replied, "Since Theranos hasn't been profitable, we are not sure whether Holmes's *imagined* business opportunity exists. At this moment, what we can say is only that she seems to *believe* that the opportunity does exist and so established Theranos to exploit it." In 2015, John Carreyrou, who at that time was working for the *Wall Street Journal*, began writing a series of investigative articles on Theranos that questioned the firm's blood testing claims and exposed its alleged fraudulent activities. His book, *Bad Blood: Secrets and Lies in a Silicon Valley Startup*, provides a detailed account of the Theranos case. The book, as well as media reports of the case, indicate that Holmes's coming up with the idea of performing dozens of blood tests based on a single fingerprick and her belief that her idea would work are consistent with the first two ways of cognitive contact with opportunities, namely, imagining and believing. (It's just that in this case, her imagined opportunity did not exist.) Holmes had little relevant technical knowledge when she conjured up her revolutionary idea of blood testing. It is not an exaggeration to say that her idea was born out of passion and pure imagination:

> She quoted Jane Austen by heart and referred to a letter that she had written to her father when she was nine years old insisting, "What I really want out of life is to discover something new, something that mankind didn't know was possible to do." And it was this instinct, she said, coupled with a childhood fear of needles, that led her to come up with her revolutionary company. (Bilton 2016)

Despite her idea lacking any scientific foundation, the following description indicates Holmes's strong belief in the idea's feasibility:

> Phyllis Gardner, an expert in clinical pharmacology at Stanford, recalled discussing Holmes's skin patch idea and telling her it "wouldn't work."
>
> "She just stared through me," Dr Gardner told the BBC.
>
> "And she just seemed absolutely confident of her own brilliance. She wasn't interested in my expertise and it was upsetting." (Thomas 2022)

Such a belief propelled Holmes through the obstacles encountered in growing Theranos until its fraud was exposed by people like Carreyrou. In brief, the actualization approach provides the best answer to the student's why-question in 2013 without the benefit of hindsight.

Explanation involves relationships between entities. As demonstrated by the above example, ontology plays a significant role when an entity's mode of existence is ambiguous. Such ambiguities are not rare in the social sciences, given the complexity of social ontology, which are concerned with the reality of money, government, property, marriage and so on (Searle 2006).

Understanding

The above distinction between explaining and explanation can also be framed in cognitive terms. Explaining is a cognitive process that, when carried out successfully by the initiator, yields a particular cognitive outcome – explanation – that in turn promotes understanding (McCain 2015) and is sometimes accompanied by an "aha" feeling or "Eureka!" moment. Wilkenfeld (2014: 3368) argues that "explanations just ARE those sorts of things that, under the right circumstances and in the right sort of way, bring about understanding." In other words, an explanation must be capable of "making clear something not previously clear" (Scriven 1962: 175), or "relating (or reducing) unfamiliar phenomena to familiar ones" (Friedman 1974: 9). Metaphorically describing the distinctive cognitive experience of explanatory understanding, Peirce (1908: 100) says that a good explanation "is turned back and forth like a key in a lock."

Since a phenomenon is inextricably bound up with others, a given explanation usually has implications for phenomena associated with the one it initially attempts to explain. Therefore, explanation increases understanding not just for its target but also for a larger domain of related affairs (Wilson and Keil 1998). Explanation is like detective work, in which the researcher meticulously pieces together otherwise disparate facts into a coherent, understandable picture.

To understand why an event occurs is a cognitive achievement greater than simply knowing that the event occurs (Lipton 2009). For example, in early 2010, there was news reporting that Toyota had recalled millions of vehicles in the United States. Knowing that this event had occurred is one thing; understanding why it occurred is another. Here, it is useful to distinguish between description and explanation. Put simply, "description tells us what is there, explanation why it is there" (Bergmann 1957: 79). News reporting provided a description of the Toyota recall, usually with an explanation: the recall was due to a problem with the gas pedal. This explanation promoted understanding of the event, leading to a greater epistemic gain than simply knowing of its occurrence through reading the related description.

Another example is in natural science. Robert Brown in 1827 discovered the continuous movement of small particles suspended in a fluid. He announced the following year this discovery – later termed Brownian motion – only by describing it. At the close of the century, Gouy's research convinced him that Brownian motion was a clear demonstration of the existence of molecules in continuous movement. Nevertheless, he failed to work out any mathematized theory that could be subjected to quantitative confirmation or falsification. In 1905, Einstein formulated the mathematical laws governing the movements of particles based on the principles of kinetic-molecular theory, thus providing an explanation for Brownian motion (Maiocchi 1990). The explanation renders the movement of such small particles intelligible. This is why understanding is said to be "a mental state with positive epistemic status" (McCain 2015: 833).

An explanation "fills in a particular gap in the understanding of the person or people to whom the explanation is directed" (Scriven 1962: 175). As a cognitive achievement, understanding necessitates the exercising of cognitive ability and can be an effortful activity; it "requires the grasping of explanatory and other coherence-making relationships in a large and comprehensive body of information" and "is achieved only when informational items are pieced together by the subject in question"

(Kvanvig 2003: 192). As such, understanding of complicated matters often comes in degrees (Elgin 2007). Suppose that immediately after its massive vehicle recall in 2010, Toyota releases a detailed and rather technical report of the gas pedal problem that explains how that problem was related to the scale of the recall. Individuals' cognitive ability, as reflected in their relevant background knowledge, affects the depth of their understanding promoted by Toyota's explanation. In other words, the same explanation may lead to different degrees of understanding by different individuals. The quality of an explanation is thus audience-relative.

Explanations should be based on facts: we want explanations to be truth-tracking (Faye 1999). However, citing that a fact in question is an instance of a generalization is not an explanation because it provides no additional understanding beyond the generalization (Bunge 1997). Suppose someone asked, "Why did Peter die last month?" The answer "Peter was human and all humans are bound to die eventually" is not an explanation for Peter's death, presuming that we already know Peter was a person. Rather, the answer merely identifies Peter as a member of the human race and so supplies no understanding at all. In contrast, the answer "Peter was hit by a car and died instantly" is a valid explanation, promoting our understanding of his death.

The cognitive sense of understanding is derived from the intellectual satisfaction that a research question has been answered adequately. This sense of satisfaction often increases one's confidence that the related explanation is true; that is, the explanation is an accurate description of the underlying causal factors that bring about the phenomenon in question. A helpful example is Jean Perrin's work on molecules. At the turn of the twentieth century, there was heated debate among scientists about the reality of molecules. Perrin proposed a lucid argument in favor of molecules' existence. His argument was based on the experimental determination of Avogadro's number, N, which is the number of molecules in a mole of any substance. Perrin performed a spectacular set of experiments on Brownian motion of colloidal particles. Using an ultramicroscope, he was able to determine N based on observations of the vertical distribution of these particles in suspension. A number of distinct experimental techniques were developed in the science community to determine N. Perrin counted thirteen different techniques, including those with a basis in Brownian motion, alpha decay, X-ray diffraction, blackbody radiation, or electrochemistry (Jenson 2015). All these methods produced practically the same number, enabling Perrin to comment with confidence

concerning the validity of his molecular hypothesis as an explanation for the striking agreement among the methods:

> Our wonder is aroused at the very remarkable agreement found between values derived from the consideration of such widely different phenomena. Seeing that not only is the same magnitude obtained by each method when the conditions under which it is applied are varied as much as possible, but that the numbers thus established also agree among themselves, without discrepancy, for all methods employed, the real existence of the molecule is given a probability bordering on certainty. (Perrin 1913 [1923: 215–216])

Perrin's confidence is natural in the sense that his explanation contributes significantly toward the understanding of the agreement among the widely different methods.

One caveat is that it is possible for a sense or feeling of understanding to come from two well-documented psychological biases – hindsight and overconfidence. For the former, explanation accounts for events that have happened. When we construct an explanation, we may not be aware of the extent to which we are affected by outcome information, such as the extinction of a species, the explosion of an aircraft or the bankruptcy of a company. We tend to conceptualize the outcome as inevitable and may claim that it was fairly predictable all along. This hindsight bias leads us to believe that we have a rather thorough understanding of an effect and thus regard the search for an explanation as complete (Trout 2002). As to overconfidence bias, it exists among both laymen and experts, such as chief financial officers of large corporations predicting the Standard & Poor Index for the following year and physicians providing a diagnosis (Kahneman 2011). Similar to the case of hindsight bias, the subjective, "settled" feeling of understanding associated with overconfidence may prompt a "stopping rule" that sees us cease considering alternative explanations of an event on the grounds that we have understood the relevant causes (Trout 2002). After completing the DNA model, the intrinsic elegance of the DNA structure seemed obvious to Crick and Watson from the start: "The idea was so simple that it had to be right . . .. A structure this pretty just had to exist" (Watson 1968: 131). Their claim reflects both hindsight bias (the DNA structure had to exist) and overconfidence (the structure had to be right).

The fact that an explanation conveys a sense of understanding seems to offer a reason for thinking it is also a true explanation. Yet, a false explanation may convey a sense of understanding too. For instance, Aristotle created the well-known geocentric model of the planets, in which

the earth is stationary and is the center of all other motions such as the circular movements of the sun and the moon around the earth. Claudius Ptolemy, who worked out the details of the model, claimed that if the earth did not lie in the center of the universe, the whole order of things that we observed concerning the increase and decrease in the length of daylight would be fundamentally upset (Toomer 1984). For centuries, the geocentric model surely contributed to people's understanding of the change between day and night and the movements of the planets. Explanation plays an objective, truth-tracking role (Faye 1999), which contrasts with the subjective feeling of understanding that explanation may generate. We have to be cautious about attributing an epistemic virtue to a sense of understanding when evaluating an explanation; an explanation that conveys a deep sense of understanding is not necessarily more accurate than one that conveys a shallower sense. The discussion of inference to the best explanation in Chapter 6 elaborates on the distinction between the understanding provided by an explanation and the truthfulness of the explanation.

Tautology

Explanation brings about understanding but tautological explanation does not. More than three centuries ago, Locke (1975) wrote about tautologies (or what he called "trifling propositions"), being of the opinion that this sort of proposition brought no increase in knowledge:

> What is this more than trifling with Words? It is but like a Monkey shifting his Oyster from one hand to the other; and had he had but Words, might, no doubt, have said, Oyster in right hand is *Subject*, and Oyster in left hand is *Predicate*: and so might have made a self-evident Proposition of *Oyster*, *i.e. Oyster is Oyster*; and yet, with all this, not have been one whit the wiser, or more knowing. (IV.viii.3)

Stated more formally, tautologies are propositional statements that "have the property of being true regardless of the truth values assigned to the constituent elements of the proposition" (Caplan 1977: 390). For instance, a proposition of the form "A is A," "A or not A" or "If A then A" is tautological because the proposition is true whether A is true or false.

Tautologies are not rare in our daily lives. The most famous of all tautologies is probably God's reply to Moses, "I am that I am." Emmet (1962) identifies seven uses of tautology and categorizes God's reply as a "shut up" tautology: "You mind your own business: I am that I am." (23).

None of Emmet's seven uses are about increasing our knowledge due to the very content of a tautology. Alleged or real tautologies encountered in research usually take a more complicated form than "Oyster is Oyster" or "I am that I am." An early challenge to evolutionary theory made by Scriven (1959) is the tautological nature of its well-known "survival of the fittest" thesis – if researchers define "the fittest" as those that survive, then it will lead to the empirically empty statement that evolution is concerned with the survival of the survivors.[4]

A well-known accusation of tautology in economics and management research is related to the attempt of transaction cost economics (TCE) to explain the size of a firm. Coase (1988: 19) provides a concise description of the accusation:

> The limit to the size of the firm would be set when the scope of its operations had expanded to the point at which the costs of organizing additional transactions within the firm exceeded the costs of carrying out the same transactions through the market or in another firm. This statement has been called a "tautology." It is the criticism people make of a proposition which is clearly right.

Peters (1976: 2) argues that "tautologies are not subject to empirical falsification"; so does Popper (1959). Thus, an acid test of whether a proposition is tautological is whether one can come up with a thought experiment that falsifies the proposition. It is not difficult to think of a situation where the proposition concerning the size of the firm is falsified. A major weakness of TCE, as argued by Zajac and Olsen (1993), is that the theory over-emphasizes cost minimization and neglects the value creation aspect of a transaction. A more comprehensive approach should take both cost minimization and value maximization aspects into account (Tsang 2000). As such, it is possible empirically for a firm to have expanded beyond the point at which "the costs of organizing additional transactions within the firm exceeded the costs of carrying out the same transactions through the market or in another firm" (Coase 1988: 19) if it created value that more than compensated for the extra costs incurred in the expansion. The alleged tautology thus does not exist and Coase (1988) rightly denies the accusation.

A more recent and well-known accusation of tautology in strategic management research is Priem and Butler's (2001a) critique of Barney's (1991) heavily-cited paper delineating the resource-based view. To explain why competitive advantage arises, Barney (1991: 107) maintains that "valuable and rare organizational resources can be a source of competitive

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advantage." This propositional statement is the foundation for his explanation of the generation of sustained competitive advantage. If the proposition is flawed, the explanation for sustained competitive advantage collapses too. Here, I provide a simpler version of Priem and Butler's challenge that Barney's proposition is tautological. In Barney's paper, firm resources refer to "firm attributes that may enable firms to conceive of and implement value-creating strategies" (101),[5] and "a firm is said to have a *competitive advantage* when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors" (102). Substituting these definitions of firm resources and competitive advantage for the corresponding terms in the statement "Valuable and rare organizational resources can be a source of competitive advantage," we arrive at a revised statement: "Valuable and rare firm attributes that may enable firms to conceive of and implement value-creating strategies can be a source of implementing a value creating strategy not simultaneously being implemented by any current or potential competitors."[6] When elaborating the meaning of rare resources, Barney (1991: 106) maintains that "if a particular valuable firm resource is possessed by large numbers of firms, then each of these firms have the capability of exploiting that resource in the same way, thereby implementing a common strategy that gives no one firm a competitive advantage." Therefore, the word "rare" in the revised statement refers to the point that the value-creating strategy is "not simultaneously being implemented by any current or potential competitors." As a result, "competitive advantage is defined in terms of value and rarity, and the resource characteristics argued to lead to competitive advantage are value and rarity" (Priem and Butler 2001a: 28). In short, the statement "Valuable and rare organizational resources can be a source of competitive advantage" is tautological and thus unfalsifiable. As such, the statement does not increase our understanding of why competitive advantage arises.

The tautological nature of Barney's (1991: 107) statement "valuable and rare organizational resources can be a source of competitive advantage" is somewhat similar to that of Agassi's (1971) example of the law of diminishing returns used in his discussion of tautology and testability in economics. For example, the law says that if we have two production factors and if we increase one while keeping the other constant, a moment will come when it will be more profitable to start increasing the latter rather than to keep increasing the former. Suppose "a precondition for a factor to be a production factor rather than an initial investment – or overhead, for that matter! – is that it obeys the law of diminishing returns" (51). If that

is the case, the law is a tautology because "a precondition of our attempting to apply it is our knowledge that it applies successfully" (51).

In response to Priem and Butler's (2001a) critique, Barney (2001: 41) makes a bold, sweeping claim that at the definitional level, "all strategic management theories are tautological in the way Priem and Butler describe." To support this claim, he uses the examples of TCE and Porter's (1980) five forces framework. For the latter, he argues that "Porter's (1980) assertions about the relationship between industry attractiveness and firm performance can be reduced to tautology by observing that firms in attractive industries will outperform firms in unattractive industries and by defining industry attractiveness in terms of the ability of firms to perform well" (41). Priem and Butler (2001b: 58) aptly rebut this as an inaccurate account of Porter's theory:

> Reading Porter's (1980) chapter on the structural analysis of industries shows that he *does not* claim that industry attractiveness is related to firm performance. He never mentions "industry attractiveness" at all. The only place where the term appears in Porter's 1980 book is in the appendix, concerning the GE/McKinsey matrix.

In other words, Barney distorts Porter's theory in order to make it tautological. Using the acid test mentioned above, the theory is obviously not tautological. Consider Barney's (2001: 42) own description of Porter's core proposition: "firms operating in industries characterized by high rivalry, high threat of substitutes, high threat of entry, high buyer power, and high supplier power will perform at a lower level than firms operating in industries without these attributes." It is surely possible that this proposition is falsified empirically; that is, firms operating in industries without those attributes perform at a lower or similar level than firms operating in industries with such attributes because the effects of the five factors (or forces) on firm performance are complicated and may not be consistent with Porter's prediction. As to the other example of TCE, Barney (2001: 41–42) restates its proposition as: "hierarchical forms of governance will replace market forms of governance when the costs of market governance are greater than the costs of hierarchical governance." Unlike the case of Porter's theory, this restatement does not make the proposition tautological because, as discussed, the proposition is falsifiable. Barney (2001: 42) further argues that "the critical issue is not whether a theory can be restated in such a way as to make it tautological – since this can always be done – but whether at least some of the elements of that theory have been parameterized in a way that makes it possible to generate

testable empirical assertions." The above discussion has indicated that if a theory is not tautological, it can't (without serious distortion) be restated in a way that makes it tautological, period. If a theory is tautological, it is simply impossible to parameterize some of its elements so that testable empirical assertions are generated; otherwise, the theory is not tautological in the first place. For example, can anyone parameterize some elements of the statement "All bachelors are unmarried" so that the statement can be empirically tested?

Barney (2001: 42) attempts to justify tautologies in a footnote:

> Moreover, because a theory is tautological does not mean that it might not be insightful and even empirically fruitful. For example, all game theoretic models are tautological in the sense that the hypotheses they generate are completely determined by the assumptions adopted in the models and the laws of mathematics applied to these assumptions. However, these tautological models can sometimes generate quite counterintuitive insights that can, in principle, lead to important empirical research. Again, the issue is not tautology, per se, but, rather, whether the propositions derived from a tautology can be parametrized in a way that makes empirical testing possible.

Since Barney seems to have mixed up scientific theories with mathematical models, such as game theoretic models, we have to first distinguish between the two. Mathematical models are not created for the purpose of explaining empirical phenomena, although they may generate useful implications, as illustrated by Ramsey's (1925: 347) example:

> Thus we use "2x2 = 4" to infer from "I have two pennies in each of my two pockets" to "I have four pennies altogether in my pockets." "2x2 = 4" is not itself a genuine proposition in favour of which inductive evidence can be required, but a tautology which can be seen to be tautologous by anyone who can fully grasp its meaning.

Tautologies involve different levels of complexity, depending on the number of premises and the amount of logical manipulation performed on the premises (Peters 1976). The premises and analyses can be so complex that the validity of the conclusion is not immediately apparent. An excellent example of a complex tautological system is Euclidian geometry learned commonly in school. Some of this geometry's theorems require a strenuous reasoning process to deduce from axioms. Such tautologies can, as Barney (2001) maintains, generate counterintuitive insights.[7] Yet it makes absolutely no sense to talk about parametrizing mathematical theorems in a way that makes empirical testing possible;

does it make sense, say, to measure the three angles of a triangle in the empirical world to see whether they add up to 180 degrees? A key characteristic of mathematics is its separation from the empirical world: "Once the axioms and the rules are fully formulated, everything else is built up from them, without recourse to the outside world, or to intuition, or to experiment" (Lane 1981: 465). Thus, the issue of parametrizing is nonexistent.

In contrast to mathematics, the primary objective of scientific theories, which include management theories, is to explain empirical phenomena (McCain 2015). In searching for a criterion of demarcation between science and non-science, Popper (1959) argues that a theory is scientific if and only if it is testable. He then goes on to equate testability with falsifiability. In other words, the distinction between scientific and non-scientific theories is that the former are falsifiable whereas the latter are not. Although his argument has been criticized heavily (see Jones and Perry 1982), falsifiability remains one of the main criteria for judging whether a theory is scientific. Since tautologies are unfalsifiable, tautological theories do not belong to science. To conclude, if the explanation offered by a scientific theory is tautological, it won't increase our understanding of the phenomenon in question and is thus useless in this respect.

Explanatory Completeness

In mid-2020, it was reported that Samsung Electronics planned to shift much of its display production from China to Southern Vietnam in 2020 (Reuters 2020). This piece of short news quoted a Vietnamese state-run newspaper saying that "Samsung sees Vietnam as an important gateway to other Southeast Asian countries and a link in its global supply chain." The quote provides an explanation to *one* aspect of Samsung's action. Explanation completeness can be discussed from two dimensions: psychological and philosophical. Although this book focuses on the latter, it is worth discussing briefly the former.

When people read the above quote from the Vietnamese state-run newspaper, some may deem that the explanation is complete, whereas others may not. In Zemla et al.'s (2017) study of how people evaluate naturalistic, everyday explanations, they found that incompleteness (i.e., whether there are gaps in the explanation) was one of the six attributes associated with explanation quality. That is, "if an explanation suggests that A causes B, but it is not immediately clear *how* A causes B, participants will be sensitive to this omission" (1495). According to this

finding, how Vietnam being an important gateway to other Southeast Asian countries and a link in Samsung's global supply chain would impact Samsung's relocation plan affects one's perception of explanatory completeness.

Korman and Khemlani (2020) propose a theory predicting that if there exists an unspecified causal relation – a gap – anywhere within an explanation, individuals have to use multiple models to handle the gap and will treat such explanations as less complete than those without such a gap. Korman and Khemlani conducted four experiments that provided participants with causal descriptions, some of which yielded one explanatory model (e.g., A causes B and B causes C) and some of which demanded multiple models (e.g., A causes C and B causes C). Participants generally preferred one-model descriptions to multiple-model ones on tasks that implicitly or explicitly required them to assess explanatory completeness. The results of these experiments corroborated Korman and Khemlani's theory, suggesting that an explanation is considered complete when it refers to a single, integrated mental model, but incomplete when referring to multiple models.

Going back to the Samsung example, suppose we receive a piece of additional information that due to Vietnam's strategic position as stated in the newspaper quote, Samsung decided to set up a production hub there. This decision led to the relocation of its display production from China to Southern Vietnam. That is, Vietnam's strategic position caused the setting up of the production hub, which in turn caused the relocation of display production. In contrast to this hypothetical explanation, suppose the additional information is that Samsung's concern about concentrating too much of its production activity in China was another cause of the relocation. In other words, both Vietnam's strategic position and Samsung's concern caused the relocation. According to Korman and Khemlani's (2020) theory, the first explanation would be considered more complete because it is contained within an integrated mental model. As to the second explanation, the relation between two separate causes of the relocation is unspecified. People would thus find it difficult to construct an integrated model to accommodate both causes and so would judge the explanation as less complete. However, this conclusion is counterintuitive in that because the second explanation provides two causes, as opposed to only one, of the same event, people should consider the second explanation to be more complete. Therefore, more research is needed to test Korman and Khemlani's theory.

Regardless of one's subjective evaluation of an explanation's completeness, the fact is that we do not explain the totality of an event, only certain aspects of it (Hempel 1965). Thus, explanation is necessarily incomplete in this sense. The idea of a complete explanation is, in fact, "foreign to science" (Scriven 1962: 201). The contrastive approach to explanation captures this intrinsic characteristic of explanation.[8] A basic tenet of the approach is that explanation-seeking questions often have an implicit or explicit contrastive form (Garfinkel 1981). There are two crucial elements of a contrastive question – (1) allomorph and (2) fact and foil.

Allomorph

Returning to Samsung's relocation of production, the newspaper quote answers the question as to why Samsung moved production to Vietnam rather than, say, Thailand. A request for an explanation of why a certain event occurred raises different questions, depending on which word or words in the description of the event are stressed (Dretske 1977). Samsung's relocation can be described in the following statement:

(S) Samsung Electronics planned to shift much of its display production from China to Southern Vietnam in 2020.

The statement may be given different embodiments, which Dretske (1977) calls allomorphs, depending on its contrastive focus. This seemingly simple statement in fact contains eight different allomorphs, stated in italics:

(S_a) *Samsung Electronics* planned to shift much of its display production from China to Southern Vietnam in 2020.
(S_b) Samsung Electronics *planned to shift* much of its display production from China to Southern Vietnam in 2020.
(S_c) Samsung Electronics planned to shift *much* of its display production from China to Southern Vietnam in 2020.
(S_d) Samsung Electronics planned to shift much of its *display production* from China to Southern Vietnam in 2020.
(S_e) Samsung Electronics planned to shift much of its display production from *China* to Southern Vietnam in 2020.
(S_f) Samsung Electronics planned to shift much of its display production from China to *Southern* Vietnam in 2020.
(S_g) Samsung Electronics planned to shift much of its display production from China to Southern *Vietnam* in 2020.

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(S_h) Samsung Electronics planned to shift much of its display production from China to Southern Vietnam in *2020*.

Each of the eight allomorphs refers to a different aspect of the event and suggests a distinct type of contrastive question. An allomorph reflects the interest of the questioner and invokes an answer that addresses that interest. Needless to say, an explanation associated with one allomorph is irrelevant with respect to other allomorphs. The abovementioned quote from the state-run newspaper is related to allomorph S_g, answering the question as to why Samsung planned to move to Vietnam, instead of another country. The difference between S_g and S_f is that the latter's focus is on the location within Vietnam, not Vietnam itself. The difference between S_b and S_c is less obvious and needs elaboration. A question related to S_b could be "Why did Samsung plan to shift its display production from China to in Southern Vietnam, instead of setting up a new display production factory in Southern Vietnam?" That is, the focus here is the way in which display production was to be set up in Southern Vietnam. S_c is concerned with the extent of production shifting. Note that some of the above allomorphs may not make sense in the real world. For example, S_e assumes that Samsung had display production in countries other than China; otherwise, the question about why the shift of production was from China instead of another country makes no sense.

An explanation is often incomplete in the sense that it only captures a slice of an event's causal history. As Lewis (1986: 217) well says, "to explain an event is to provide some information about its causal history," usually from someone who possesses the information to someone who does not. However, for every why-question, there is an almost infinite number of causes that could be cited. Every causal explanation may lead to a further explanation ad infinitum, with each of these earlier causes a part of the causal history of the event. If we want to answer the question of why Samsung moved its display production to Vietnam, we could go as far back as the big bang, if we believe the big bang theory. For those who do, without the big bang, Samsung would not have existed in the first place. Based on this line of argument, the big bang is part of the causal history of every event but explains only a few (Lipton 1990).

Better questions lead to better explanations (Mäki 2004). The question "Why did Samsung plan to shift its display production from China to Southern Vietnam?" is vague because it may refer to any of the above eight allomorphs. To render the task of explaining an event manageable, we need to indicate which aspect of the event is up for explanation by, for

instance, paraphrasing the question as "Why did Samsung plan to shift its display production from China to Southern Vietnam, instead of Thailand?" The revision makes clear which aspect of Samsung's relocation needs to be explained. In this case, the focus is on the comparison between Southern Vietnam and Thailand as potential locations. As such, the contrastive form of questioning eliminates a vast number of elements and aspects of the causal history of an event that are explanatorily irrelevant to the explanation-seeking question (Ylikoski 2007) and so aids selection of appropriate explanantia from the causal history (Marchionni 2006). Many why-questions that scientists ask are in fact contrastive in nature (Weber et al. 2013) although, more often than not, the foil is not stated explicitly because it is understood in the context of the discussion.

Fact and Foil

The question "Why *P*?" may be construed as "Why *P* in contrast to (other members of) *X*?", where the contrast class *X* is a class of propositions including *P* together with alternatives to *P* (van Fraassen 1980). More specifically, a typical contrastive question is of the form "Why *P* rather than *Q*?" where *P* is the fact to be explained and *Q* is the foil, an alternative to *P*. *Q* can be either a single alternative or a set of alternatives. Consider the abovementioned question associated with S_b "Why did Samsung plan to shift much of its display production from China to Southern Vietnam, rather than setting up a new display production factory in Southern Vietnam, in 2020?" Shifting display production from China to Southern Vietnam is the fact and the single alternative – setting up a new display production factory in Southern Vietnam – is the foil. A contrastive question related to S_g "Why did Samsung plan to shift much of its display production from China to Southern Vietnam, rather than Thailand or India, in 2020?" has two alternatives as the foil. An explanation has to compare between Southern Vietnam and these two alternatives.

The idea is that a fact is often not specific enough and we need to include a foil to indicate which aspect of the fact is up for explanation. Hence, a contrastive explanation of a fact is just a partial explanation of that fact, focusing on one of its aspects. Note that a contrastive question of the form "Why *P* rather than not-*P*?" is problematic because the global foil – not-*P* – is usually too general to narrow down the scope of explanation (Lipton 1993). In fact, this contrastive question is effectively the same as the non-contrastive question "Why *P*?" (Day and Botterill 2008). Since the factors that explain a fact relative to one foil often do not

explain it relative to another foil, a contrastive question imposes a constraint on explanation by allowing only some of the virtually infinite number of causes in the causal history of a fact to be explanatorily relevant.

The contrastive question "Why *P* rather than *Q*?" presupposes that it was not possible for both *P* and *Q* to occur, implying that the fact and the foil are incompatible in this sense. Yet it is a misconception that contrasts must be incompatible (Barnes 1994). Consider a contrastive question related to S_g "Why did Samsung plan to shift much of its display production from China to Southern Vietnam, rather than Thailand, in 2020?" If one interprets "much of" as "greater than 50 percent," the fact and the foil are incompatible; otherwise, they are compatible. As another example, the fact and the foil in the question "Why did Samsung plan to shift its display production from China to Southern Vietnam, rather than setting up a new display production factory in Southern Vietnam?" are compatible because Samsung could do both.

In terms of problem solving, the contrastive approach to explanation helps to identify the cause of a problem, as shown by Lipton's (1993: 53) example below:

> Suppose that my car is belching thick, black smoke. Wishing to correct the situation, I naturally ask why it is happening. Now imagine that God (or perhaps an evil genius) presents me with a full Deductive-Nomological explanation of the smoke. This may not be much help. The problem is that many of the causes of the smoke are also causes of the car's normal operation. Were I to eliminate one of these, I might only succeed in making the engine inoperable. By contrast, an explanation of why the car is smoking *rather than running normally* is far more likely to meet my diagnostic needs.

Compared to the deductive-nomological explanation, which is discussed in Chapter 3, focusing on the contrast between the fact (the car smoking) and foil (the car is running normally) helps to narrow down the set of factors that cause the smoke.

Explanatory Generality

In addition to completeness, explanations also vary in terms of generality. Some explanations are more general than others, depending on the nature of the explanandum in question. In natural science, "scientific explanations can be given for such particular occurrences as the appearance of Halley's comet in 1759 or the crash of a DC-10 jet airliner in Chicago in 1979, as well as such general features of the world as the nearly elliptical orbits of

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planets or the electrical conductivity of copper" (Salmon 1984: 3). In management research, the explanation of why multinational corporations (MNCs) planned to move their production facilities out of China in 2020 is more general than the explanation of why Samsung planned to move its display production from China to Southern Vietnam in 2020. This is because the latter includes more contextual details. Simply put, "context is the set of circumstances in which phenomena (e.g. events, processes or entities) are situated" (Griffin 2007: 860) and can explain some salient aspects of the phenomenon under investigation (Cappelli and Sherer 1991). The explanation of Samsung's move is less general (or more contextualized) in that it involves specific details of the circumstances in which the event is situated. Scientific research usually aims at more general explanations. As mentioned, explanations of particular events seldom have genuine scientific import and explanations that draw serious attention usually explain classes of events (Salmon 1975).

Some management researchers hold the mistaken view that explanations are necessarily general in nature and so contextualization may hurt the quality of an explanation. Welch et al. (2011), for example, construct a typology of theorizing from case studies based on the trade-off between causal explanation and contextualization and "consider how the case study generates causal explanations and how it incorporates context – two features of the case study that are often regarded as being incompatible" (740–741).[9] They use the term "trade-off" to refer to the incompatibility. Here, I interpret their meaning of trade-off to be similar to that used in Bartlett and Ghoshal's (1989) typology of MNCs' operating options – "a trade-off (or conflicting contingencies) between integration and responsiveness" (Brock and Hydle 2018: 118). When an MNC attempts to achieve global efficiency through integrating its overseas subsidiaries, it often faces the challenge of simultaneously making these subsidiaries more responsive to the host countries in which they are located. In other words, a high level of integration can be achieved only at the expense of responsiveness. Using the term "trade-off" with a similar meaning, Welch et al. (2011) state a growing concern that "in the pursuit of robust explanations, contextualization has suffered" (741). By "robust explanations," Welch et al. are, in fact, referring to explanations that are causal in nature.

A serious problem is that Welch et al.'s so-called trade-off simply doesn't exist; that is, causal explanation and contextualization are certainly compatible.[10] They define causal explanation as something that "makes claims about the capacities of objects and beings to make a difference to their world" (741). According to this definition, there are many

explanations that are unequivocally causal and yet highly contextualized. Suppose a main reason for Samsung's relocation of its display production from China to Southern Vietnam was, as the abovementioned Vietnamese state-run newspaper claimed, the strategic location of Vietnam in Southeast Asia. The explanation is surely causal – the cause (or one of the major causes) being Vietnam's strategic location. At the same time, the explanation is highly contextualized – it is about the production relocation plan of a specific MNC in a specific year from one specific host country to another; it is not about production relocation by MNCs in general. Hence, there is simply no relationship between whether an explanation is causal and how far the explanation is contextualized. As mentioned, the extent to which an explanation is general depends a great deal on the nature of the explanandum. Welch et al.'s (2011) paper subsequently won the 2021 Journal of International Business Studies Decade Award. In their retrospective paper on the award, Welch et al. (2022) drop their "trade-off" claim but keep their typology. Unfortunately, there is little variation along the dimension of causal explanation because, as I show elsewhere (Tsang 2013, 2022a), few case studies provide weak causal explanation. As such, their typology is of little use in guiding case study research.

In the main, management researchers investigate three types of explanandum. The first type refers to phenomena that have few spatiotemporal constraints and so are more abstract. Such phenomena are often targets of explanation by theories and theories are necessarily general. This may be a reason for Welch et al.'s belief that explanations are general in nature. A good example of this type of explanandum is Coase's (1937) pioneering work on TCE. In fact, Coase asks not just the simple question "Why is there any organisation?" but a contrastive question: "Having regard to the fact that if production is regulated by price movements, production could be carried on without any organisation at all, well might we ask, why is there any organisation?" (388). His question can be paraphrased as: Why are some production activities organized in firms rather than markets? He does not impose any national boundary or other constraints on the kind of organizations TCE attempts to explain. Therefore, the corresponding explanation is general in the sense that it does not refer to a specific organization or group of organizations, neither does it refer to a specific period of time during which organizations operate. TCE is designed to have a high level of explanatory power, with its explanation intended to be applicable widely such that the theory can be used to explain the other two types of explananda.

The second type of explanandum refers to phenomena that have well-defined spatiotemporal boundaries. This is the most common kind of empirical study published in management journals. Researchers often face this type of explanandum when they attempt to explain the results of quantitative studies. One of my own empirical studies offers a good example. Su and Tsang's (2015) sample consisted of US Fortune 500 firms during the period from 1996 to 2003, which defined the spatiotemporal boundary of the study. Our results indicated that secondary stakeholders – as represented by various nonprofit or nongovernmental organizations – play a positive moderating role in the relationship between product diversification and financial performance. This is the explanandum in question. We proposed an explanation – maintaining relationships with secondary stakeholders through donations can help firms that pursue diversification mitigate the costs of external controls in their sociopolitical environments. The explanation applies to our sample within the specific period of time only and thus is less general than the kind of explanation attempted by Coase (1937) discussed above. In our statistical analysis, we had to include a number of control variables, such as firm performance, firm size, advertising intensity and R&D intensity, which reflected the contextual details of our sample. How far our explanation can be generalized to phenomena outside our sample's spatiotemporal boundary is a different question (see Tsang and Williams 2012 for a typology of generalization).

The last type of explanandum refers to specific events, such as Samsung's plan to relocate its display production; the associated explanations are less general (or more contextualized) than those of the above two types of explanandum. Intensive case studies investigating specific events belong to this domain. Quantitative studies, especially those that are based on cross-sectional data, mostly generate correlative rather than causal relationships, an issue discussed in Chapter 7. In contrast, "getting closer to constructs and being able to illustrate causal relationships more directly are among the key advantages of case research vis-à-vis large-sample empirical work" (Siggelkow 2007: 22). However, this does not imply that identifying causal relationships in a case study is a straightforward task. Using the "Honda Effect" – Honda's success in capturing a large share of the US motorcycle market soon after its initial entry in 1959 – as an illustrative example, Runde and de Rond (2010: 445) propose three broad criteria for evaluating causal explanations of specific events:

> (1) that the factors cited as causes were present in the run-up to the event in question; (2) that those factors were causally effective in contributing to that event, and (3) that, given an affirmative answer to (1) and (2), the causes actually cited in the explanation explain well, taking into account

> various contextual and epistemic considerations relating to the intended audience for the explanation, and the interests and theoretical presuppositions of the person providing the explanation.

Since the explanation is often highly contextualized, the causes evaluated by the criteria are likely to be contextualized as well. Runde and de Rond (2010) admit that the criteria are rather general and may be insufficient for discriminating between competing explanations in some cases.

From time to time, case researchers develop propositions from their findings, often as a means of contributing to theory development. For example, Yan and Gray's (1994) comparative case study of four Sino–US joint ventures indicates that the bargaining power of potential partners affects the structure of management control in a joint venture, which in turn affects venture performance. Based on their case findings, they develop an integrative model regarding bargaining power, management control, performance and the dynamic aspects of international joint ventures. They then derive five propositions from the model, the first of which is: "The bargaining power of a potential joint venture partner will be positively related to the extent of its management control over the joint venture's operation" (1507). This and the other four propositions are more general than the explanations they provide for some of their findings, such as: "The pattern of parents' management control of IndusCon had not significantly shifted because changes in bargaining power occurred simultaneously to both parents and were relatively equal" (1504). Propositions should not be mixed up with explanations. One major purpose of propositions is to guide future research and thus propositions have to be general. Yet, propositions are not explanations and the explanations case researchers provide are necessarily contextualized, although they may employ theories in the explanatory process.

Explanatory Interestingness

Should researchers care about whether their explanation of a phenomenon is interesting? The answer is related to the current interesting research advocacy in the management field originating from Murray Davis's (1971) article "That's Interesting! Towards a Phenomenology of Sociology and a Sociology of Phenomenology," which promotes the idea that great theories need to be interesting in the sense that they put forward counterintuitive arguments: "What seems to be *X* is in reality non-*X*," or "What is accepted as *X* is actually non-*X*" (313). Davis uses a number of examples, mostly

from sociology, to illustrate his idea of interestingness. One example associated with explanation is Max Weber's (1958) argument in *The Protestant Ethics and the Spirit of Capitalism* that "the religion of a society, which was considered at the time he wrote to be determined by the economy of the society, in fact determines the economy of the society" (Davis 1971: 326). Davis elaborates his point by discussing the nature of the causation involved in the phenomena:

> What seems to be a simple one way causal relation between phenomena is actually a complex mutual interaction between phenomena. Scholars who have read Max Weber's entire *Sociology of Religion* continually point out that he does *not* exclusively define either religion or economy as the independent or the dependent phenomenon, as dilettantes who have read only his *Protestant Ethic* assume; rather he actually shows how both the religion *and* the economy of a society reciprocally influence each other's development. (326)

According to Davis, what makes Weber's argument counterintuitive is that although people at Weber's time thought that there was one-way causation from the economy to the religion, Weber in fact showed that the causation was mutual.

As the title of Davis's article clearly indicates, his target audience was sociologists. Yet Davis probably did not foresee that his idea would be particularly influential among management researchers decades later.[11] For instance, the following remarks from four former editors of the *Academy of Management Journal* – a top journal in management – in their editorial essays show how much they appreciate Davis's idea:

- "Murray Davis's (1971) analysis showed that the most influential sociological theories become widely cited, not because they are necessarily 'accurate' or 'correct,' but rather, because they are 'interesting.' On the basis of an examination of the content and subsequent citation rates of various sociological theories, Davis concluded that in order to generate interest, a new theory had to violate at least some expectations of readers. If it did not, the readers' perception was that no value was added." (Eden and Rynes 2003: 680)
- "Davis's (1971) 'index of the interesting' is one useful way to describe how to arouse a reader's curiosity." (Colquitt and George 2011: 433)

Davis's article has also affected how management scholars train the next generation of researchers, as indicated by this glowing remark: "When taking a broader view of theoretical insights, Murray Davis's (1971) classic, *That's Interesting*, is an article I've read yearly since my graduate school

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days that provides a number of concrete ways that works can provide novel interest by establishing counterintuitive observations." (Short 2009: 1315). Similarly, Podsakoff et al. (2018) claim that their own experiences of working with doctoral students indicate that Davis's suggestions are useful for generating good research ideas. In sum, interesting research advocacy is in full force.

Davis's article was concerned with interesting theories or theoretical propositions. Management researchers subsequently expanded its core arguments to include empirical findings. After rehashing Davis's idea about interesting propositions, Salvato and Aldrich (2012: 127) argue that "in the case of *empirical* works, challenging established assumptions and theory through counterintuitive research questions is also regarded as central in making an article interesting." More specifically, Cornelissen and Durand (2012: 152–153) model their concept of interesting explanation on Davis's arguments: "A novel conceptualization or explanation is generally considered interesting depending on the degree to which it is analogically 'related' or 'connected' and, as such, plausible or informative while simultaneously being counterintuitive, surprising, or unexpected, given the novel parallel that is drawn between previously unconnected and disparate domains and modes of understanding." The characteristic of "being counterintuitive, surprising, or unexpected" reflects Davis's core idea.

A pertinent question here is: From the perspective of scientific research, what is the value of having interesting theories or explanations? The short answer is "nil." McMullin (2008) proposes a list of virtues of a good scientific theory. The two *primary virtues* are empirical fit and explanatory power. The former refers to the extent that a theory can "account for data already in hand" (501), while the latter is "the persuasiveness in general of the underlying causal structure postulated by the theory" (502). There are three categories of *complementary virtues*: internal, contextual and diachronic. Surprisingly, whether or to what extent a theory is interesting, counterintuitive or novel is not a complementary virtue. In other words, contrary to interesting research advocacy, the interestingness of a theory is regarded to be of little value in science. Since a major function of a theory is to explain certain phenomena, interesting explanations are also of little value. This outcome is somewhat expected by those who have some knowledge of philosophy of science. Nothing in the arguments of Thomas Kuhn and Karl Popper – unquestionably two of the most influential philosophers of science – "values novelty for its own sake" (Cohen 2017: 3). I also cannot recall any announcement made by the

Nobel Committee citing interestingness of a scientist's theories and/or research findings as a key reason for awarding the Nobel Prize.

The above conclusion concerning the value of interestingness is understandable if we consider that the two main objectives of scientific research are explaining and problem solving, which are associated with pure and applied science, respectively (Yaghmaie 2017). Researchers working in the domain of pure science attempt to find an explanation for a phenomenon that happens in the world, such as lunar eclipses. By contrast, applied science researchers focus on finding a solution to a problem that affects human life, such as creating a method of capturing and storing renewable energy as a solution to the problem of greenhouse gas emissions and air pollution. These two distinct objectives are sometimes closely related to one another. For example, explaining why Covid-19 spreads so fast between people helps the development of measures to prevent infection. It is obvious that both objectives are only related remotely to interestingness. Regarding the objective of explaining, even if the phenomenon in question is interesting, it does not imply that its explanation is also interesting (in the sense of being counterintuitive or novel) in and of itself. In fact, whether the explanation is interesting isn't even relevant; what *is* relevant is whether it is a true explanation. The objective of problem solving is completely unrelated to interestingness. For example, I have been following closely news concerning the development of Covid-19 vaccines and related medicines and have never seen any mention of whether these vaccines or medicines were based on interesting theories or empirical findings. In an emergency such as this, who has the luxury of bothering with interestingness? What people care about is how effective and safe a vaccine or medicine is, period.

An Overview of the Book

As stated in the Preface, the objective of this book is to bridge the gap between a technical, philosophical treatment of the subject of explanation and the more practical needs of management as well as other social science scholars. My approach is more descriptive than prescriptive. That is to say, I discuss the key topics in the domain of explanation that are relevant to management research, incorporating where relevant occasional commentary, such as the above critiques of Barney (2001), Davis (1971) and Welch et al. (2011). My intention is to enhance readers' understanding of, and hopefully also arouse their interest in, the subject matter. I expect that readers will choose their own method or approach for their research after

reading the information and analysis in this book. Although I propose several heuristics in the last chapter, these heuristics are just suggestions for readers to consider. Readers with a proclivity for a specific philosophical perspective or research method may disagree with some of the heuristics. Overall, this book consists of two parts: Chapters 1–4 present the conceptual foundation of explanation while Chapters 5–8 discuss the practical issues researchers may encounter when they attempt to explain their results. While readers will have to spend more effort on understanding the first part, they will benefit from their effort when reading the second part.

As Craik (1943: 46) well says, "most of the great hypotheses and experiments of Newton, Maxwell, Rutherford, Darwin and the rest have been inspired by the idea of tracing the action of causes in nature." Chapter 2 presents the nature of causation, which is a highly technical topic. I remove some of the technical details while maintaining a reasonably strong philosophical flavor. This chapter lays the foundation for the discussion of the various modes of explanation in Chapter 3 because explaining a phenomenon or event usually involves spelling out its cause. While Chapter 3 introduces different modes of explanation, mechanismic explanation is the one that I usually adopt in this book. These two chapters form the backbone of the subsequent chapters that deal with specific topics.

Chapter 4 discusses the recent microfoundations movement in management studies, which promotes the process of explaining a particular phenomenon in terms of lower-level phenomena. I trace the movement back to the heated debate in social science between methodological individualists and methodological holists that started more than a century ago. While the microfoundations movement is a laudable attempt to generate better quality explanations, I highlight the principle of emergence as one of its serious limitations.

It is well known that leading management journals, such as the *Academy of Management Journal*, place a great deal of emphasis on theory development. Chapter 5 shows that a good explanation does not necessarily invoke any theory although many management journals have "contribution to theory" as a key criterion for accepting a manuscript. The chapter illustrates how luck can provide a better explanation than any management theory in some situations. As to theoretical explanations, they may involve such complications as theory-ladenness of observation and incommensurability of theories. The role played by meta-theories in explaining phenomena or events poses another challenge.

Most management phenomena are the result of complex decisions. When managers make such decisions, they naturally consider a variety of factors that are at the individual, firm, industry, national and/or even international level. Yet a theory is limited in scope and level and therefore unable to cover most of these factors, implying that researchers often have to bring in multiple theories. However, multi-theoretical studies are seldom published in management journals. Chapter 6 identifies the reasons for the lack of such studies, discusses the functions of a multi-theoretical approach in empirical research and provides some suggestions for not only promoting the approach but also highlighting some precautions when researchers adopt it.

The common empirical research methods used by management researchers include analysis of archival data (longitudinal or cross-sectional), questionnaire survey, experiment and case study. While the saying "correlation does not imply causation" is well-known for statistical analysis, few researchers are aware that the nature of a research method affects the quality of explanation. In addition to discussing this issue, Chapter 7 discusses the differences between structural and reduced models of quantitative analysis, the practice of post-hoc hypothesis development and why replication can be a remedy for the practice. The chapter ends with a proposal for a multi-method approach, analogous to the multi-theoretical approach presented in Chapter 6.

Chapter 8 – the concluding chapter – discusses inference to the best explanation, which is concerned with selecting the best explanation among competing ones. I propose some heuristics to help management researchers formulate explanation. It argues that despite these and related rules governing logical inference, such as deduction, induction and abduction, explaining social phenomena in general and management phenomena in particular requires imagination (e.g., using counterfactuals) and intuition (e.g., drawing on experience). Thus, more often than not, the endeavor is not just a scientific activity but also an art.