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Refining Adaptation and Its Onset: Signals of Financial Innovation that Trigger Strategic Attention in Financial Services

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A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Business

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Abstract

Organizational adaptation is one of the most important concepts in strategic management. Historical conceptions suggest that without it, organizations are likely to succumb to inertia in dynamic environments and with it, organizations are likely to thrive. Despite its rich scholarly history, organizational adaptation continues to lack clarity and is often conflated with market entry, performance, or survival. More importantly, managers do not have a meaningful way to determine whether their organization is well-adapted or maladapted. Knowing when organizations begin to adapt to their changing environments subsequently becomes a difficult question to answer. In this thesis, I develop much-needed clarity to the concept of organizational adaptation while also examining its origins. I distil a clear and precise definition of organizational adaptation as intentional decision-making undertaken by organizational members, leading to observable actions that aim to reduce the distance between an organization and its economic and institutional environments. I then develop a multilevel conceptual framework that evaluates the full spectrum *adaptation* before zeroing in on a neglected question—how is adaptation initiated? By elaborating on the attention-based view of organizations in the context of financial services and the emergence of financial technologies, I argue that multiple attention-drawing attributes combine to initiate adaptation. I find that combinations of attributes provoke strategic attention to technological artifacts, known as *technological* innovations, but preclude strategic attention to consumer-based applications, known as *market* innovations. In addition, these attributes negate the effects of executive technological experience, long believed to be a driver of early adaptation. I demonstrate my results through a novel use of topic modelling and multivariate, mixed-effects Bayesian regression. Ultimately, I allude to a return to playfulness in the executive suite and that experience may be an inhibitor to initiating processes of adaptation. In a world filled with large incumbents faced with unprecedented change, initiating adaptation earlier is prudent and simultaneously allows for timely adaptation while avoiding the challenges of *suddenly* adapting to change.

Keywords

Organizational adaptation, strategic change, attention-based view, novelty, managerial experience, technological change, topic modelling, Bayesian regression

Summary for Lay Audience

What does it mean for organizations to adapt? Managers are often faced with the challenges of adapting to new environments and pursuing new technologies. Sometimes, adapting can be a matter of changing strategies and sometimes it is observed after the fact based on organizations that perform well. The manager is, therefore, faced with a challenge: how do they know if their organization is well adapted when it is not clear what adaptation truly represents. This thesis seeks to provide clarity for managers navigating their organization's changing environmental conditions. I first refine adaptation down to its core attributes, namely that an organization is intentionally aligning to multiple environments, and then examine a long-neglected question—how does adaptation begin? I use concepts of cognition and behavioural strategy to outline how various forms of stimuli in the technological environment can provoke or slow processes of adaptation. I then use advanced statistical techniques to prove my theoretical propositions in the context of incumbent financial service organizations adapting to the emergence of financial technologies. Ultimately, I find that incumbents tend to have their strategic attention drawn to technologies that are supplied to organizations versus market applications of technologies that are demanded by consumers. Moreover, the stimulating factors of technologies tend to offset technological experience present in the executive suite, suggesting that experienced managers are prone to delaying adaptation. Ultimately, remaining at the cutting edge of industries appears to call on experimentation and playfulness more so than expertise. Due to biases toward forms of novel stimulus in the environment that drives hesitation in experts, playfulness may allow adaptation to begin earlier, prolonging the process, without necessarily adapting too late as technological changes manifest around incumbents.

Co-Authorship Statement

This thesis benefitted from the ideas of two prominent scholars that co-authored portions of the chapters. Chapter 2 in particular is co-authored with Professor Rudolph Durand (HEC Paris) and Professor Jean-Philippe Vergne (Supervisor – University College London). As part of the co-author team, my role involved initially developing early versions of the manuscript, which is published in the *Journal of Management* (Sarta, Durand, & Vergne, 2021), and conducting the review of the literature through quantitative analysis.

Subsequently, each co-author (myself included) participated equally in the idea development, critical analysis of the literature, synthesis, and final drafting of the manuscript. Large portions of the full manuscript comprise Chapter 2.

In addition, Chapter 3 also includes ideas from both Professor Durand and Professor Vergne with portions of the text drawn from co-authored draft manuscripts. I prepared the figures and tables in Chapter 3; however, the ideas within each reflect the joint work of all authors. Large portions of the text in Chapter 3 are independently written and the propositions developed are not drawn from shared work.

A brief statement outlining the nature of co-authorship is included at the outset of each chapter, where applicable.

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41,931 words. It seems like a lot but, at the same time, it hardly seems like enough to capture a wonderful journey that took place over four and a half years at an institution that continues to leave an indelible mark on my life. When I joined Ivey's PhD Program in 2016, in many ways I placed a large bet on myself. Leaving a stable and promising career to start all over again was both an easy and difficult decision. Going through the PhD journey at Ivey has been at times challenging, humbling, inspirational, and rewarding. What I learned most though, beyond the highly intellectual conversations and complicated analyses of the organizational world, was something truly refreshing: when you bet on yourself, others tend to bet on you as well. For that, I wish to acknowledge so many that made the culmination of this journey possible. I owe a great debt of gratitude to so many people as I engaged them in my interests of how and why organizations adapt. I only hope that I can effectively express my thanks to so many that helped along this journey.

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Chapter 1

1 Introduction: Investigating the Initiation of Adaptation Processes

“the primary purpose of strategic management is adaptation”
(Chakravarthy, 1982: 35)

How does an organization begin to adapt? We often hear that organizations need to “Adapt or die”: a phrase that defines the Hollywood hit *Moneyball* and frequently reflects the mainstream business media’s perspective on strategic management in a rapidly changing world (Forbes, 2017; WIRED, 2017). But what exactly does it mean for an organization to adapt? What is the organization adapting to? Is being well adapted always the desired outcome? If adaptation is so critical, then understanding the triggers of adaptation becomes particularly important to understanding whether adaptation failed as a process or whether the process was stalled from its onset. Despite such a rich scholarly tradition in strategy and organizational theory, a clear answer to what adaptation represents and how adaptation is initiated remain elusive. As a result, strategic managers have only a loose conception of an increasingly important concept in their decision-making.

Adaptation is often contrasted with organizational failure in changing external environments. Slow-moving incumbent organizations fail to sufficiently change with their external environments and eventually cease operations (Eggers & Park, 2018; Hannan & Freeman, 1977). The external environment can take many forms but is most often reflected as a technological, market, or social environment (Aldrich, 1979; Aldrich & Ruef, 2006; Bourgeois & Eisenhardt, 1988; Durand, 2006; Soule & King, 2008).

Yet, only conceiving of adaptation as a dichotomous concept (survival versus failure) complicates the issue of what it truly means to adapt, especially considering the multitude of external environments faced by organizations. Blackberry and Sears, two former titans of their respective industries, continue to survive as organizations into the present day; however, describing either organization as “well-adapted” to any or all of their external environments would require considerable mental gymnastics.

To add depth, the decisions made by organizations in response to changes in the external environment have held a central place in adaptation research (Hrebiniak & Joyce, 1985; Zammuto, 1988). Organizations that adopt initiatives, technologies, or stakeholder demands reflect adaptation through the mechanisms of learning, the deployment of capabilities, or the desire for legitimacy. (Cyert & March, 1963; Eggers & Kaplan, 2009; Fox-Wolfgramm, Boal, & Hunt, 1998). Strategic decision-making and adoption almost certainly play a critical role in the adaptation process—environments change frequently and organizations often need to make decisions to keep pace (Miles, Snow, Meyer, & Coleman, 1978).

The point of adoption alone only partly explains adaptation, however. Rapid changes in the technological environment, especially those witnessed in the postwar era (Adner, Puranam, & Zhu, 2019), are likely to strain adaptation. The time horizon between the adoption of any new technology and the consequences of waiting (i.e. inertia) shrinks, inflating the rate of adoption that needs to take place within a given time. Organizations that *adopt* new technologies are also known to struggle when incorporating new technologies into their broader organizational structures and business models, complicating matters further (Gilbert, 2006; Tripsas & Gavetti, 2000). In particular, the prior experiences of incumbent organizations do not translate well to new environmental conditions (Cohen & Tripsas, 2018; Eggers, 2012a; Eisenhardt, Furr, & Bingham, 2010). Simply put, the difficulty associated with large incumbents *suddenly* adapting to technological change tilts the importance away from solely examining the point of adoption itself and towards the point at which adoption is considered—the initiation of a process of adaptation.

Studying adaptation requires a strong grasp of the concept itself amid ambiguous conceptions of what it means to adapt. As a result, this dissertation seeks to first clarify what it means for organizations to adapt and subsequently studies the triggers in the adaptation process. By examining the initiating and stalling factors in the adaptation process, depth is added to our understanding of how organizations adapt to environmental, and particularly technological, change.

1.1 Dissertation Structure

1.1.1 The Problem of Identifying Organizational Adaptation

Adaptation has developed under the guise of a variety of labels, constructs, and measurements that operate at different levels in response to different mechanisms. As a result, substantial ambiguity has burdened researchers and hindered the progression of research in adaptation. At times, this lack of clarity gives the impression that adaptation is but a loose analogy imported from the field of biology to characterize organizations that survived some turbulence and thereafter generated a certain level of profitability (Vergne & Depeyre, 2016).

It is no wonder that scholars and practitioners alike have difficulty pinpointing what it means for organizations to adapt. To rectify this challenge, a rigorous conceptual review, following the approach of Podsakoff et al (2016), was conducted to inductively draw out a definition of organizational adaptation as *intentional decision-making undertaken by organizational members, leading to observable actions that aim to reduce the distance between an organization and its economic and institutional environments*. This definition distinguishes adaptation from generic strategic change and refocuses adaptation research around a specific type of intentional change aimed at increasing convergence between the organization and (some of) its environment(s). Armed with this definition, scholars are better equipped to distinguish adaptation from its triggers (e.g., pursuing change, responding to institutional pressure) and consequences (e.g., performance, survival).

Clarifying what it means for organizations to adapt is tackled in Chapter 2 where the approach to inductively drawing out a definition is detailed along with a mapping of the literature that identifies three primary areas of inquiry that adaptation scholars have covered: why organizations pursue adaptation, what internal factors preclude or enable adaptation, and what environmental factors urge adaptation. Additionally, 11 common difficulties are uncovered that often preclude adaptation scholarship from providing logically consistent accounts of reality or actionable recommendations for managers. The foundation built in Chapter 2 sets the stage to reconceptualize adaptation as a multilevel process that emphasizes convergence to a greater degree.

1.1.2 Reconceptualizing Adaptation Across Levels

In synthesizing the research traditions of adaptation, a more holistic multilevel perspective emerges that adds conceptual clarity to adaptation and helps to better specify the causal relationships within and across levels of analysis. By integrating the systematic review of the adaptation literature in Chapter 2, I develop a framework in Chapter 3 that reconceptualizes adaptation as a multilevel concept of convergence that is comprised of three interrelated levels: internal adaptation that aligns resources and goals, market adaptation that aligns products and services with audience needs, and institutional adaptation that aligns citizenship with social norms.

Reconceptualizing adaptation as a multilevel concept does much service to scholars and managers alike. The model provides much-needed clarity by distinguishing adaptation from its antecedents and consequences while opening up exciting possibilities for new research, including the notion of being well adapted at some levels and maladapted at others. Additionally, I reintroduce the complexity for managers in decision processes that address the interrelated challenges of updating resources, servicing market needs, and considering social norms. An extension to theories of value creation is presented in Chapter 3 along with potential extensions to stakeholder theory.

1.1.3 The Onset of Adaptation and Strategic Attention

With a stronger conceptual foundation established, I turn to the initiation of adaptation with a specific emphasis on managerial and organizational attention as, perhaps, the most critical trigger of decision-making (March & Simon, 1993). In Chapter 4, I revisit the core attributes of adaptation within the theoretical framework of the attention-based view (Ocasio, 1997). Attention is frequently linked to adaptation, particularly as organizations pursue new opportunities present in the environment (Barr, 1998; Eggers & Kaplan, 2009; Joseph & Ocasio, 2012; Shepherd, McMullen, & Ocasio, 2017). A largely undertheorized element of the attention-based view is the so-called “environment of decision” which outlines the stimuli that initiate adaptation for (primarily incumbent) organizations (Ocasio, 1997).

Core to adaptation is decision makers' intentionally relating to environments that are changing, thus stimuli in environments that provoke adaptation become signals of the need to realign organizations with their environments. Much of the research on attention focuses on foresight in decision making where organizations shape their future environments (Gavetti, 2012; Gavetti, Helfat, & Marengo, 2017; Gavetti, Levinthal, & Rivkin, 2005) or organizations that develop routines over time and are more capable of sensing change (Helfat et al., 2009; Zollo & Winter, 2002). Each of these streams focuses internally within organizations and tend to derive insights from the benefits of prior experience in shaping attention and future action (Cho & Hambrick, 2006; Gavetti & Levinthal, 2000; Helfat & Martin, 2015).

The focus on heterogeneity within organizations somewhat neglects heterogeneity in the environment that may provoke adaptation by *drawing* the attention of organizations to change that is likely to occur. I develop a model outlining that attributes of environmental stimuli drive shifts in strategic attention—a notion that is underdeveloped in the study of attention and adaptation. Notably, three specific attributes of attention-drawing stimuli; *novelty*, *saliency*, and *vividness* (Li, Maggitti, Smith, Tesluk, & Katila, 2013); work in concert to shift organizational attention in different ways. Novelty represents the characteristics of an issue that, either partly or wholly, deviate from the prior experiences or knowledge bases of an industry (Barto, Mirolli, & Baldassarre, 2013; Li et al., 2013; March, 2010). Saliency refers to the degree to which an “issue resonates with and is prioritized by management” (Bundy, Shropshire, & Buchholtz, 2013: 353); and vividness refers to the distinctiveness of an issue relative to other issues occurring simultaneously (Li et al., 2013). Stimuli laden with specific combinations of the three attributes can interact with and work against prior experience, turning experience from a sensing mechanism to a skeptical mechanism (March, 2010). I develop propositions regarding the interaction between stimuli and attention-directing structures (such as prior experience) to identify the interrelationship between what organizations do and the situations they find themselves in (Ocasio, 2011). Situations can sometimes provoke and sometimes prevent shifts in strategic attention as a result, adding depth to the initiation of the adaptation process.

1.1.4 The Saliency Dialectic: A Bayesian Perspective on Attention-Drawing FinTech Innovation in Banking

In Chapter 5, I build on the propositions put forth regarding the onset of adaptation and culminate the thesis with an in-depth empirical study of innovation-based stimuli and their impact on strategic attention in the financial services industry.

I consider two important challenges in the attention and innovation literature by exploring not only the factors of stimuli that draw organizational attention, but also that organizations contemplate innovation in different forms. Notably, innovation can be *supplied* to organizations as technologies and also *demanded* by consumers as market applications of technologies (Aggarwal & Wu, 2015; Benner & Tripsas, 2012). The emergence of financial technologies (FinTech) offers an ideal setting through which both technologies (e.g., blockchain and artificial intelligence) and market applications (e.g., robo-advice, peer-to-peer lending) arise simultaneously to challenge large incumbent banks. I capitalize on this context and study strategic attention shifts toward FinTech in incumbent banks over a 12-year period in the United States from 2007 to 2018.

FinTech holds all of the necessary elements of attention-drawing stimulus. The venture capital community represents a repository of novelty where signals emerge to draw attention toward start-ups that deploy FinTech (Arner, Barberis, & Buckley, 2016; Maslach, Branzei, Rerup, & Zbaracki, 2018; Maula, Keil, & Zahra, 2013). Saliency and vividness are also present in the types of technologies deployed and the size of the venture capital deals offered.

I invoke the construct of strategic agendas, the issues most prescient to top managers and, thus, the issues that consume the organization's attention (Bundy et al., 2013; Dutt & Joseph, 2019), and use a novel application of topic modelling to study shifts in strategic agendas over time. I then deploy a multivariate, mixed-effects Beta regression in a Bayesian framework to uncover two important contributions to the attention-based view and the onset of adaptation. First, organizations are more likely to prioritize *technological* compared to *market* innovations, suggesting that the propensity for organizations to overlook novel demand environments is cognitive in nature and can prolong or delay the

adaptation process for specific types of innovation. A stimulus-oriented bias in how executives examine their technological environments is, therefore, uncovered.

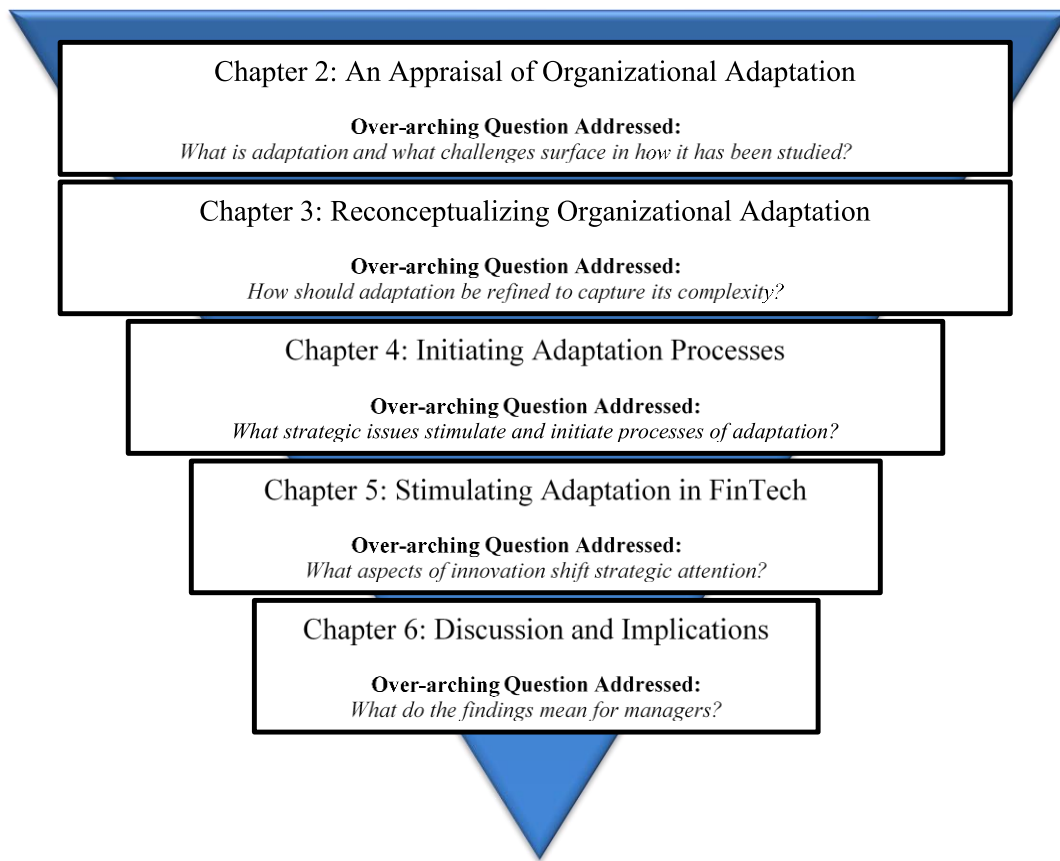
Second, I elaborate upon the principle of situated attention in the attention-based view and identify the countervailing effects of stimuli on executive experience in channelling organizational attention. Stimuli can amplify both experience as an enabler and experience as a hindrance to innovation (Ener, 2019), suggesting a complication for organizations that seek to pursue innovation by bolstering technological experience in their executive teams.

I address the implications of my findings in Chapter 6 with a discussion of the practical and theoretical significance of studying the onset of organizational adaptation.

Theoretically, a refined concept of adaptation opens up exciting lines of research. For instance, maladaptation may procure higher rents than adaptation in some cases since value capture (e.g., performance) is conceptually distinguished from aligning to the needs of the external environment. Scholars are given a more precise launchpad from which to study adaptation as a result.

Practically, managers interested in transforming their organizations (perhaps with an increased digital focus) are given reason to question some long-held practices. Executives with specific experience or expertise are often brought in to move organizations in a specific direction (Diestre, Rajagopalan, & Dutta, 2015). Generally, this approach results in the desired outcome; however, when signals of novelty, salience, and vividness are present in the environment, the adaptation provoking nature of experience may turn skeptical. Experienced executives may be more adept at searching, yet skeptical when evaluating signals from the environment. In some instances, experience protects organizations from taking on risky change. Simultaneously, classifying true signals as noise only serves to delay the adaptation process and potentially compresses the timeframe in which adaptation needs to take place.

Figure 1 lays out a visual of the structure for this dissertation, making it easier to navigate between sections.

Figure 1: Dissertation Structure

Chapter 2

2 An Appraisal of Organizational Adaptation

This chapter draws heavily on Sarta, Durand, and Vergne (2021) and succinctly identifies the findings presented. Large portions of the tables and text are reproduced in this chapter to establish a literature review of organizational adaptation.

Adaptation is, perhaps, one of the most pervasive and important concepts in organizational theory. Since the early 20th century and the emergence of scientific management (Taylor, 1911) and industrial administration (Fayol, 1916, 1949) until the 1970s and the various models at the interface of organizations and their environments (Aldrich, 1979; Hannan & Freeman, 1989; McKelvey, 1982), multiple perspectives have underscored the role of adaptation in explaining organizational success (Aldrich & Ruef, 2006; Durand, 2006). Today, the notion of *adaptation* is ubiquitous in organizational theory, strategic management, and evolutionary economics.

However, adaptation has developed under the guise of a variety of labels, constructs, and measurements that operate at different levels in response to different mechanisms. As a result, substantial ambiguity has burdened researchers and hindered the progression of research in adaptation. For example, three factors often remain unclear: whether adaptation is a state or a process, at which level adaptation can be observed, and to what exactly an organization is supposed to adapt (Durand, 2006). At times, this lack of clarity gives the impression that adaptation is but a loose analogy imported from the field of biology to characterize organizations that survived some turbulence and thereafter generated a certain level of profitability (Vergne & Depeyre, 2016).

Because of the ubiquity and ambiguity associated with *adaptation*, the primary purpose of this chapter is to propose definitional clarity that demonstrates the explanatory power of adaptation in addressing contemporary topics in management. This chapter will review and corral the divergent paths of organizational adaptation while identifying (1) the pitfalls of extant understandings and empirical works and (2) opportunities to cross-fertilize the existing approaches without falling victims to those pitfalls. Throughout the review, scholars will gain answers to questions such as: at what level does adaptation

take place? What promotes adaptation? What constrains adaptation? Is it always beneficial for organizations to be well adapted to the environments in which they reside?

2.1 What is Organizational Adaptation? A Thematic Review

The conceptual roots of adaptation emanate from a natural integration of organizational theory and strategic management, most prominent in the work of Chandler (1962), which layered the ideas of strategic decision-making and functional efficiency onto the concept of adaptation. Classical works such as *A Behavioral Theory of the Firm* (Cyert & March, 1963) and *Differentiation and Integration in Complex Organizations* (Lawrence & Lorsch, 1967) influenced and explicitly elaborated on the related notions of “adaptation” and “fit.” Cyert and March (1963) identified the adaptation of decision rules as a critical element in the learning process, whereby organizations evaluate feedback received from the environment and attempt to reconcile misalignments. Concurrently, Lawrence and Lorsch (1967) elaborated on the strategy-structure relationship by identifying the optimal configurations of differentiation and integration that catalyzed research in structural contingency theory. The appropriate fit between internal structures and external sub-environments facilitated superior performance for organizations (Lawrence & Lorsch, 1967).

Both seminal works established an association between adaptation and fit as notions describing the interface between organizations and environments. In fact, Merriam-Webster explicitly relates these two terms by defining adaptation as the noun form of the verb “adapt”, which means “to make fit (as for a new use) often by modification” (Merriam-Webster, 2020). Yet, nuanced interpretations of what it means to adapt developed over time with prominent works emphasizing different aspects of fit, fitness, ability, and modification to varying degrees (Chakravarthy, 1982; Hrebiniak & Joyce, 1985; Levinthal, 1997; Miles et al., 1978; Starbuck, 1971).

Following Podsakoff et al (2016) and in order to align around a common definition, the core aspects of adaptation were derived from 18 seminal works. Table 1 describes the inductive process leading to defining adaptation as *intentional decision-making*

undertaken by organizational members, leading to observable actions that aim to reduce the distance between an organization and its economic and institutional environments. More specifically, this refined definition conceptualizes adaptation as (1) *intentional*, that is, rooted in organizational members' awareness of their environment, resulting in a choice to react to, anticipate, or ignore changes in the environment; (2) *relational*, whereby organizations and environments influence one another; (3) *conditioned*, since environmental characteristics also depend on, and evolve with other organizations' actions; and (4) *convergent*, in that organizations seeking to adapt are attempting to move closer to a set of environmental characteristics. Table 1 also details how these four attributes make adaptation different from related constructs such as “fitness” or “strategic change.”

Armed with this definition, an exhaustive search of the *Web of Science* library was conducted, principled on the advice of Short (2009) in preparing high-quality review papers. We searched for “adapt*” and associated terms “fit*”, “congrue*”, and “renewal” in the title, abstracts, and keywords of *Academy of Management Journal*, *Academy of Management Review*, *Strategic Management Journal*, *Administrative Science Quarterly*, *Journal of Management*, *Journal of Management Studies*, *Organization Science*, *American Journal of Sociology*, and *American Sociological Review* from 1967 to the present day.¹ In total, 1,274 manuscripts were retrieved with the initial search parameters. The large number of manuscripts were analyzed through a mixed-method approach that combines the computational method of topic modelling and manual hand-coding to verify each paper's conformity with the definition of adaptation. A detailed account of the methodology and results can be found in Sarta, Durand, and Vergne (2021).

A thorough review of the literature, structured in a visual representation of the topic model produced, neatly maps the adaptation literature into 16 topics classified under 4 themes. Figure 2 displays the results as a visual map of the major themes present in studies of organizational adaptation.

¹ The latter two journals were added to capture sociological perspectives that have been influential in organizational theory and 1967 was chosen based on the publication year for Lawrence & Lorsch's (1967) seminal work.

Table 1: Common Themes²

Main Features in Definitions	Core Attribute
Purposeful or intentional decision-making	A1 [Intentional]: purposeful decision-making Whether an action is taken or not Characterized by motivations of organizational decision-makers
Decision-oriented (as a response to stimuli or expectations) that can result in action or inaction	
Decisions occur at observable states that reveal preferences	A2 [Relational]: organizations interfacing with one or more environments Through deployments of organizational abilities and resources
An organizational skill, ability, or capability	
Relational to an environment	
Partially driven by environmental factors that cannot be fully determined or anticipated by organizations	A3 [Conditioned]: decision-making is catered to environmental conditions The environment is changing over time Each environment has unique conditions that must be catered to
Occurs at multiple levels of analysis	
Changing environments are consequential for organizational existence and/or performance	
Environments bear conditions partially independent of organizational decisions	
Organizations are motivated to reduce the distance to a set of dimensions in their environment due to the inferred benefits of doing so	A4 [Convergent]: an organization attempts to move closer to its environment(s) Convergence does not fully determine outcomes or consequences
Reduced distance between organizations and environments does not fully determine consequences (performance or survival)	

Necessary and Sufficient Attribute Analysis Against Related Constructs

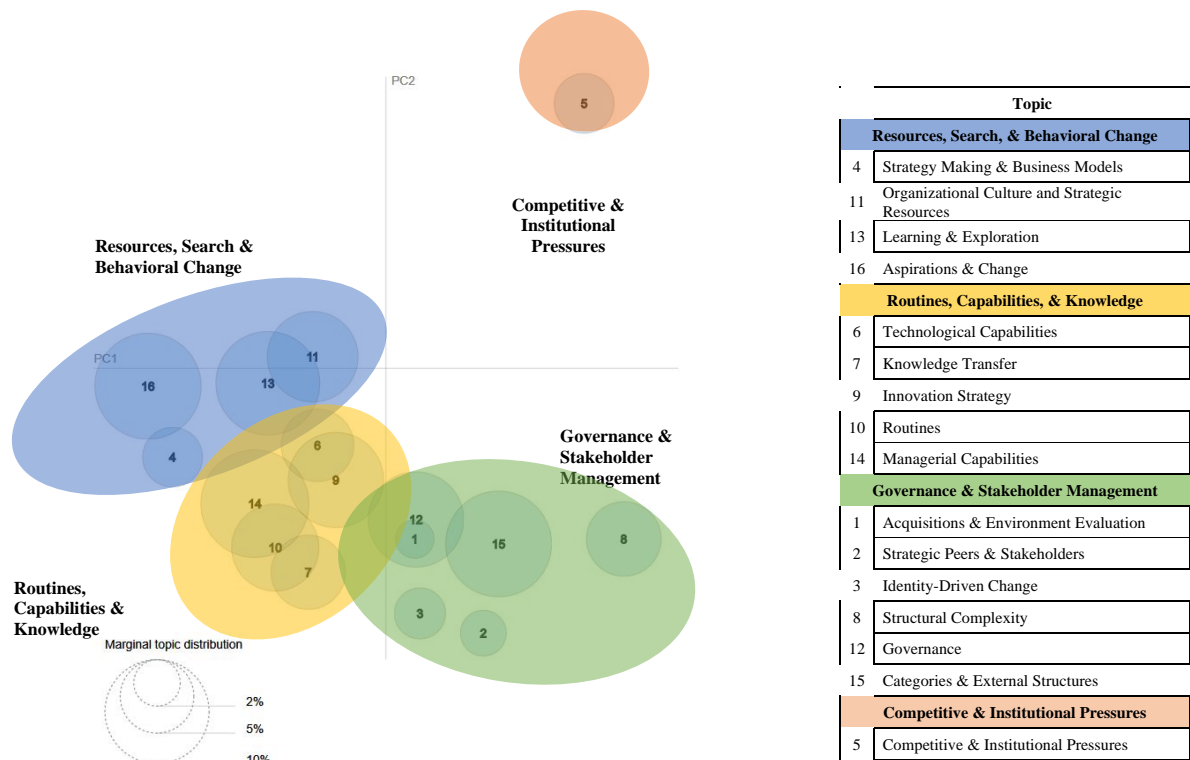
Core Attribute	Adaptation	Fitness	Strategic Change	Survival	Performance	Growth	(N) Necessary and/or (S) Sufficient
A1: Intentional	Present	Absent	Present	Absent	Sometimes	Sometimes	(N) not (S)
A2: Relational	Present	Present	Present	Present	Present	Present	(N) not (S)
A3: Conditioned	Present	Absent	Absent	Sometimes	Sometimes	Sometimes	(N) not (S)
A4: Convergent	Present	Present	Absent	Absent	Absent	Absent	(N) not (S)
A1 and A2 and A3 and A4 are (N) and jointly (S)							

Constructs at Odds with Adaptation

Attribute	Adaptation	Inertia	Selection	Maladaptation
A1: Intentional	Present	Absent	Absent	Sometimes
A2: Relational	Present	Absent	Present	Present
A3: Conditioned	Present	Absent	Absent	Present
A4: Convergent	Present	Absent	Absent	Absent

² To produce the attributes identified, 18 seminal works were consulted along with the dictionary definition for the terms adapt and adaptation (Barnard, 1938; Baum & Singh, 1994; Burgelman, 1991; Chakravarthy, 1982; Chandler, 1962; Cyert & March, 1963, 1992; Hannan & Freeman, 1977; Hayek, 1945; Hrebiniak & Joyce, 1985; Levinthal, 1997; March & Simon, 1958; Merriam-Webster, 2020; Meyer & Rowan, 1977; Miles et al., 1978; Miller & Friesen, 1980; Nelson & Winter, 1982; Schumpeter, 1947; Starbuck, 1971; Teece et al., 1997)

Figure 2 Themes Based on InterTopic Distance³



2.2 Synthesizing the Adaptation Literature around Three Areas of Inquiry

By hand-coding each of the 443 papers deemed relevant to our literature review, we uncovered six theoretical streams that study adaptation: behavioural theory, resource-based view (RBV), evolutionary economics, contingency perspectives, organizational sociology, and variation-selection-retention (VSR) models.⁴ By mapping the six literature streams against the four themes from the topic model three areas of inquiry in adaptation

³ Circles represent projection in a 2-dimension space of the position of the 16 topics in n-space. Ovals regroup topics in larger clusters based on inter-topic distance. We colored and labeled groupings according to themes. Note that overlapping circles is not indicative of an actual overlap in topics but results from the projection in a 2-dimension space of topics in n-dimension space.

⁴ Behavioral theory encompasses learning, aspirations, and cognition; resource-based theory includes work on dynamic capabilities and asset complementarities; evolutionary economics includes related literature elaborating on routines; contingency perspectives include literature on structural contingency theory, business models, and ideal-type organizational configurations; organizational sociology encompasses population ecology, neo-institutionalism, categories, resource dependence, and network approaches; and variation-selection-retention models capture additional evolutionary models distinct from population ecology.

scholarship are uncovered: (1) why organizations pursue adaptation, (2) what internal factors preclude or enable adaptation, and (3) what environmental factors urge adaptation (Sarta et al., 2021).

2.3 Thematic Review of the Three Areas of Inquiry in Adaptation Research

To gain a complete picture of how adaptation has been studied, each of the three areas of inquiry is now reviewed from the perspective of each stream in terms of the main constructs invoked to explain adaptation, the theoretical mechanisms leveraged, and the measures used to capture constructs and mechanisms. Table 2 provides a systematic review of adaptation research, alongside representative sets of published manuscripts. As each area of inquiry is reviewed, potential theoretical and empirical difficulties that surface in adaptation research are flagged.

2.3.1 Area of Inquiry (1/3): Why Organizations Pursue Adaptation

The pursuit of adaptation is addressed with perspectives associated with the RBV, behavioural theory, and evolutionary economics. The main focus within this area of inquiry is on adaptation as a decision-making outcome, which emanates directly from the dominant theories leveraged (Cyert & March, 1963; Nelson & Winter, 1982).

Resources, search, and behavioural change as a theme often evokes organizations relating to their environments through the pursuit of new opportunities. In this respect, organizations as action generators (Starbuck, 1983) pursue adaptation by developing resources and capabilities through evolutionary processes (Ahuja & Katila, 2004) or accumulated experiences that promote opportunity recognition and action (Eggers, 2012a). Likewise, search initiatives are particularly important to pursuits of adaptation since they exhibit learning capabilities that produce stronger performance (Walter, Lechner, & Kellermanns, 2016). Case in point, Ahuja and Katila (2004) illustrate how organizations develop innovative search processes that lead to resource creation by intentionally acting on situational triggers (technology exhaustion and international expansion).

In the behavioural stream, opportunity recognition implies a learning orientation based on balancing the “exploitation of old certainties” with the “exploration of new possibilities” (March, 1991: 71). In addition, cognitive schema direct managerial attention to particular aspects of the environment in order to spot innovative opportunities (Li et al., 2013).

Evolutionary economics adds a modest element of constraint to this discussion by highlighting the internal challenges of overcoming past histories to find new opportunities (Denrell & March, 2001). In this respect, Salvato and Rerup (2018) expose the regulatory actions that individuals mobilize within organizations to enact flexible routines when two conflicting goals constrain organizational adaptation.

Related research on *routines, capabilities, and knowledge* expands upon notions of opportunity recognition and focuses on the competitive benefits of adaptation through enhanced resource positions or improved strategic decisions. It is within this theme that strategy scholars elaborate upon the microfoundations of competitive advantage (Helfat & Martin, 2015; Teece, 2007) and how cognitive capabilities allow organizations to move quickly into new markets to pursue new technologies. Eggers and Kaplan (2009) demonstrate that the focus of attention not only helps an incumbent organization to seize technological opportunities but its interaction with organizational characteristics also determines the speed of entry in a novel sector. For them, “managerial cognition is a dynamic capability that can shape adaptation by established firms” (Eggers & Kaplan, 2009: 461). Behavioural perspectives rely on the assumptions of bounded rationality and satisficing behaviour in search of adaptation (Cyert & March, 1963). Building on this tradition, subsequent research suggests that the careful management of communication channels that structure attention (Ocasio, 1997) and the ambidextrous structures that balance exploration and exploitation (Benner & Tushman, 2002) can improve decision-making and facilitate adaptation. Additionally, evolutionary theories expand upon notions of overcoming internal routines to discuss how knowledge can be reproduced to translate an advantage from one setting to another (Amburgey & Miner, 1992). In the franchisor-franchisee context, Winter, Szulanski, Ringov, & Jensen (2012: 681) studied how a franchisee, by adjusting its routines to non-standard products, increased its odds of failure, providing a counterintuitive example of a setting where strict routine replication

provides a survival advantage, thus encouraging scholars to “revisit [...] prevalent normative advice that favours ex-ante adaptation.”

Taken together, studies within these first two themes emphasize the intentional and relational aspects of adaptation but at times come accompanied with a view of organizations as having the agency to adapt to their environments without much resistance (which potentially presumes pre-ordained effectiveness in decision-making—raising a difficulty stemming from a “Functionalist Adaptation Fallacy”). This hyper-agentic view results in organizational convergence often being inferred through either the presence of strong performance (an assumption that performance equates to adaptation, raising a difficulty in accounting for “Adaptation without Strong Performance”) or the observation of consistent iterative adjustments (a difficulty being that routine, “Continuous Change” is not always indicative of adaptation).

As studies of the pursuit of adaptation move to higher levels of analysis, the emphasis shifts toward adaptation as conditioned by both internal and external factors. In studies under the theme *governance and stakeholder management*, constraints on the adaptation process emerge from boundedly rational actors that interpret their decision environments heterogeneously (Gavetti & Levinthal, 2000). Along these lines, strategy scholars found that adaptation through strategic alliances is highly conditioned by initial successes (Doz, 1996) or that strong internal belief systems may crowd out the capabilities needed to pursue new technologies. Tripsas & Gavetti (2000) showed that Polaroid, despite possessing the knowledge and resources (e.g., patents on digital imaging), could neither innovate nor react to the digitization of the photo industry (note, however, this kind of research on the antecedents of *non*-adaptation cannot generalize to explaining adaptation; pointing at a difficulty of “Asymmetric Causality”). Furthermore, whether or not organizations pursue new opportunities also depends on the ability to integrate managers’ attention across hierarchies (Joseph & Ocasio, 2012) and on the appropriate identification of environmental changes as opportunities or threats (Barr, Stimpert, & Huff, 1992; Gilbert, 2006). Barr (1998: 660), in a study of the pharmaceutical industry, shows that familiarity with an event shapes managerial interpretations and that strategic responses are “not undertaken until the stimuli is interpreted as having a direct impact on the

performance or well-being of the organization.” In this way, the agency of organizations becomes increasingly influenced by the (perceived) dynamics in the environment (raising a difficulty as “Adaptation Depends on Environments”).

In addressing why adaptation is pursued, the heavy emphasis on decision-making and agency has pushed the examination of *competitive and institutional pressures* into the background. External triggers for change that induce varied responses are emphasized by strategy scholars—for example, in hostile financial environments subject to intense international competition, organizations that are triggered by extra-organizational factors but respond by incremental breaks with past behaviours were able to sustain superior performance (Stopford & Baden-Fuller, 1994). Likewise in Vergne and Depeyre (2016), configurations of cognition and capabilities conditioned adaptive responses of U.S. defense organizations responding to the 9/11 attacks but adaptation and performance, although positively correlated in their study (Pearson’s $r=0.53$, $p<.05$), form distinct constructs (with such distinction potentially circumventing the difficulty of “Adaptation without Strong Performance”). Simultaneously, the authors identify that diversified defense organizations intentionally avoided adaptation toward military endeavours in favour of alternative lines of business such as commercial information technology (the difficulty here being that organizations can engage in “Strategic Non-Adaptation”).

2.3.2 Area of Inquiry (2/3): What Internal Factors Preclude or Enable Adaptation

Whether adaptation is pursued relates to the strategic intent of organizations and their ability to change; however, streams most closely linked to organizational theory interpret adaptation differently, often with an emphasis on adaptation as an outcome. That’s why the theoretical shift to contingency theory and organizational sociology conceptualizes adaptation as either performance (Lawrence & Lorsch, 1967), legitimacy (Meyer & Rowan, 1977), or survival (Hannan & Freeman, 1977), with a corresponding focus on what organizations can modify internally to achieve these outcomes under constraints.

The theme of *resources, search, and behavioural change* approached from a contingency perspective emphasizes the search for the appropriate structural fit between an

organization and its environment. For instance, Hill and colleagues (1992) use the concept of fit as a critical moderator explaining the classical relationship between (related and unrelated) diversification and financial performance. Contingency research underscores the functionality of fit and describes organizations as adapting their structures to gain and regain fit (Donaldson, 1987). As such, “regaining” fit emphasizes adaptation as both relational and conditioned in that alignment to environments produces stronger performance only under certain circumstances (Cardinal, Turner, Fern, & Burton, 2011). In these cases, adaptation is implied by performance, again potentially conflating the two (difficulty: “Adaptation without Strong Performance”).

Sociologists specify how internal factors connect the organization with external demands. Neo-institutionalists demonstrate that organizations seek conformance with stakeholder expectations (DiMaggio & Powell, 1983) while network perspectives emphasize the role of embeddedness in social ties that both enables and constrains the flow of information (Uzzi, 1997). Resource dependence perspectives describe survival as an adaptive response that results from mutual dependence, which Xia (2011) outlines through a study of cross-border alliances that have greater survival odds when cross-border trading between countries is stronger. In contrast, while organizational ecologists initially downplayed the role of agency in favour of the accountability and reliability of organizational forms (Hannan & Freeman, 1984), more recent studies suggest that organizations have some capacity to search and learn in order to reinforce survival odds (Le Mens, Hannan, & Pólos, 2011), with survival itself serving as a proxy for convergence between organizations and their environment (Dobrev, Ozdemir, & Teo, 2006). If survival can at times reflect adaptation, it can also reflect the absence or multiplicity of selection pressures that apply to organizations. In an integration of neo-institutional and resource dependence perspectives, Durand and Jourdan (2012) highlight how organizations in the film industry adapt their behaviour to minority players’ demands in an effort to rebalance power relationships with dominant players (thereby revealing the difficulty that “Adaptation Depends on Competition”).

The theme of *routines, capabilities, and knowledge* emphasizes adaptation as intentional and conditioned, with a focus on the deployment of environment-specific organizational

templates. For instance, contingency perspectives highlight the superior performance achieved when particular export strategies are deployed in suitable markets (Aulakh, Rotate, & Teege, 2000) or through appropriate uses of managerial discretion (Peteraf & Reed, 2007). Siggelkow's (2002) in-depth case study of Vanguard exposes important processes around the organization's core competencies and their interdependencies, suggesting that an organization's ability to adapt may not be observable until opportunities present themselves (difficulty: "Unobservable Adaptive Ability"). Organizational sociologists within this theme demonstrate the benefits of developing capabilities by maintaining social ties (McEvily & Zaheer, 1999) or by deploying internationalization strategies to specific institutional contexts (Meyer, Estrin, Bhaumik, & Peng, 2009). In addition, categorization scholars demonstrate that organizational templates and identities can be strategically targeted to various and specific audiences to impart value (Lo & Kennedy, 2014; Paoletta & Durand, 2016; Wry, Lounsbury, & Jennings, 2014). VSR models also depict organizations as agents of change in contexts where distinct selective environments pull organizations in contrarian directions (Henderson & Stern, 2004). In these lines of work, performance, positive evaluations, and survival are used to indicate adaptation in response to demands emanating from multiple environments or audiences. Clearly, the assumption that organizations are adapting, at any given point in time, to one single environment is quite problematic (difficulty: "Environmental Multiplicity").

The theme of *governance and stakeholder management* further emphasizes the role of environments on adaptation. Contingency perspectives focus on enablers of adaptation by elaborating on the importance of deploying appropriate business models in specific environments (Zott & Amit, 2008), theorizing on the importance of congruence between organizations and environments (Priem, 1994; Randolph & Dess, 1984), and identifying the benefits of alignment for competitive advantage (Powell, 1992). Conversely, the institutional perspective, while predominantly focused on organizational fields, examines the ways in which organizations struggle to make internal changes and deal with mimetic, coercive, and normative isomorphic pressures (DiMaggio & Powell, 1983). Examples are reflected in interactions between organizational identities and regulatory compliance that may constrain adaptation (Fiss & Zajac, 2006; Fox-Wolfgramm et al., 1998) and in

mimicry for organizations seeking legitimacy when entering new markets (Haveman, 1993). Along this vein, neo-institutionalists see adaptation as conditioned by the evaluations of stakeholders with its convergent character coming from constrained choices to conform to institutional contexts (Greenwood & Hinings, 1996). Murillo-Luna et al (2008) specifically show that proactive organizational behaviour is influenced by external pressures in the context of sustainability initiatives. Conformity and isomorphism, dictated by institutional logics, both underpin convergence toward organizational templates (Greenwood, Díaz, Li, & Lorente, 2010), again indicating that some decisions (acts of conformity) reflect adaptation (difficulty: “Functionalist Adaptation Fallacy”). VSR models emphasize convergence through homeostasis, where internal and external selection pressures regulate strategic change, which can ultimately manifest in co-evolutionary lock-in, as Burgelman (2002) outlines in his study of Intel (difficulty stems from the likely presence of “Co-evolution Across Levels”).

2.3.3 Area of Inquiry (3/3): What Environmental Factors Urge Adaptation

As external pressures compel organizations to adapt, the agentic perspectives prominent in accounts discussed previously fade and wane. Contingency theory, organizational sociology, and VSR models again feature prominently in this area of inquiry; however, the focus of attention shifts to accounts of the forces in the environment that kickstart the adaptation process.

Competitive and institutional pressures characterize environmental factors urging adaptation, with fit leveraged as a primary construct in contingency theories, albeit through multiple definitions. Venkatraman (1989) identified six distinct forms of fit: as mediation, moderation, matching, gestalt, deviance, and consistency. The inclusion of deviance in this list opens opportunities to analyze economic and institutional environments as potential rejectors of organizational change. Along the line of change being rejected, Chung and Beamish (2010) discuss the ineffectiveness of continuous ownership changes among international joint ventures, which produce instability and poor performance among partners.

For neo-institutionalists, organizations have limited agency due to social norms and expectations. Haveman & Rao (1997) track the evolution of the early thrift industry through a study of entries, exits, and organizational form changes to demonstrate the interplay between selection forces in the technical environment and adaptation within institutional constraints. Their key finding is that “over time, the effect of form change became beneficial” (Haveman & Rao, 1997: 1633), thereby pointing to a difficulty in modelling “Adaptation as Transitory” and dynamic, as opposed to stable and discrete, in extant research. VSR models provide similar depictions, although in many cases strategic choice and environmental selection are seen as interrelated (Levinthal, 1991; Lewin & Volberda, 1999). Such views suggest that as organizations change, they simultaneously influence the economic and institutional environments in which they reside, adding pressure to neighbouring peer organizations (Durand, 2001; Lewin & Volberda, 1999; Spisak, O’Brien, Nicholson, & van Vugt, 2015) and bringing to bear the idea that organizations and environments influence one another (difficulty: “Co-evolution Across Levels”).

Table 2: Conceptual and Empirical Review of Adaptation⁵

Theme	When studied with...	By leveraging the mechanisms of...	And measured as...	Emphasizes...	Representative Works
<i>Area of Inquiry 1: Why organizations pursue adaptation</i>					
Resources, Search & Behavioral Change	Strategy (RBV)	Causal ambiguity that creates superior sensing, seizing, and reconfiguring capabilities	Change; Performance	Skill in pursuing opportunities with performance used as evidence of convergence	Afuah (2000); Ahuja & Katila (2004); Eggers (2012a); Kapoor (2013); Walter et al (2016)
	Behavioural Theory	Iterative environmental feedback (learning); search	Change	Experience in relating to opportunities with feedback used as evidence of convergence	Meyer (1982); March (1991); Huber (1991); Lant et al (1992); Greve (2008); Henderson et al (2006); Li et al (2013)
	Evolutionary Economics	Routinized opportunity evaluation; internal alignment	Change; Congruence	Stability in pursuing opportunities with alignment used as evidence of convergence	Denrell & March (2001); Cusamano et al (2008); Salvato & Rerup (2018)
Routines, Capabilities & Knowledge	Strategy (RBV)	Valuable and inimitable sensing, seizing, and reconfiguring capabilities	Change; Congruence; Performance	Intentionally deploying capabilities in reconfiguration with performance used as evidence of convergence	Zollo & Winter (2002); Garud et al (2006); Teece (2007); Eggers & Kaplan (2009); Helfat & Martin (2015); Helfat & Peteraf (2015); Salvato & Vassolo (2018)
	Behavioural Theory	Iterative environmental feedback (learning); Interpretive schemas that provoke (or prevent) action	Change; Congruence	Schemas and structures that guide intentional decisions with feedback used as evidence of convergence	Dutton & Dukerich (1991); Ocasio (1997); Winter & Szulanski (2001); Benner & Tushman (2002); Kaplan (2008a); Garud et al (2011)
	Evolutionary Economics	Routinized deployments of resources; iterative feedback	Change; Congruence	Replication in decision-making with alignment used as evidence of convergence	Amburgey & Miner (1992); Zbaracki & Bergen (2010); Winter et al (2012); Levinthal & Marino (2015)
Governance & Stakeholder Management	Strategy (RBV)	Acquisition of valuable and inimitable resources; Interpretive schemas that provoke (or prevent) action	Change (incl. constraints); Performance	The benefits and drawbacks of schemas and resources that condition decisions with performance used as evidence of convergence	Doz (1996); Tripsas & Gavetti (2000); Rothaermel & Boeker (2008); Dorobantu et al (2017)
	Behavioural Theory	Iterative feedback; Interpretive schemas that provoke (or prevent) action	Change; Performance	That schemas invoke unique behaviour that conditions opportunities and threats with feedback used as evidence of convergence	Barr et al (1992); Eisenhardt & Tabrizi (1995); Barr (1998); Gioia et al (2000); Gilbert (2006); Joseph & Ocasio (2012); Kiss & Barr (2015); Joseph et al (2016)
	Evolutionary Economics	Routinized decision-making; iterative feedback	Change; Survival	The benefits and drawbacks of replication in conditioning decision-making with alignment used as evidence of convergence	Miller & Friesen (1980); Bruderer & Singh (1996); Feldman & Pentland (2003); Stieglitz et al (2016)
Competitive & Institutional Pressures	Strategy (RBV)	Valuable and inimitable sensing, seizing, and reconfiguring capabilities	Change; Congruence	That combinations of capabilities work in conjunction with external events to condition adaptation	Stopford et al (1994); Vergne & Depeyre (2016)
	Behavioural Theory	Iterative environmental feedback (learning)	Change	That learning and feedback from environments may be conditioned by shortsightedness	Levinthal & March (1993); March (1996); Shinkle (2012)

⁵ The references for all 443 manuscripts are available in the supplementary file in the online appendix of Sarta, Durand, and Vergne (2021)

Theme	When studied with...	By leveraging the mechanisms of...	And measured as...	Emphasizes...	Representative Works
<i>Area of Inquiry 2. What internal factors preclude or enable adaptation</i>					
Resources, Search & Behavioral Change	Contingency Theory	Functionalism; Harmony with environments (Fit)	Fit (Ideal-type, matching, or moderation); Performance	Structural design is used to relate to unique environments with performance used as evidence of convergence	Donaldson (1987); Hill et al (1992); Zajac & Kraatz (1993); Miller (1996); Gulati et al (2005); Westerman et al (2006); Cardinal et al (2011); Shin et al (2017)
	Organizational Sociology	Internal changes informed by mimetic, normative, and coercive forces; accountability and reliability that maximizes survival	Change (Adoption); Isomorphism; Survival	That structural templates conform and relate to external stakeholder expectations with isomorphism and survival used as evidence of convergence	Amburgey et al (1993); Uzzi (1997); Voss et al (2000); Boiral (2007); Xia (2011); Le Mens, Hannan, & Polos (2011)
Routines, Capabilities & Knowledge	Contingency Theory	Functionalism; Harmony with environments (Fit)	Fit; Performance	Intentional investments are conditioned by applications to particular environments with performance used as evidence of convergence	Aulakh et al (2000); Subramanian & Venkatraman (2001); Mezas (2002); Siggelkow (2002); Peteraf & Reed (2007); Castañer, et al (2014); Shen et al (2014)
	Organizational Sociology	Socio-cognitive coherence; Embeddedness	Positive Evaluation; Change (Acquired Resources)	That social networks or audiences can be intentionally constructed to enable or constrain adaptation with positive evaluation or change used as evidence of convergence	McEvily & Zaheer (1999); Zimmerman & Zeitz (2002); Kennedy (2008); Meyer et al (2009); Hsu et al (2009); Benner (2010) Dowell et al (2011); Amezcua et al (2013); Wry et al (2014); Lo & Kennedy (2014); Levy et al (2016);
	Variation-Selection-Retention Models	Dual-process of internally generated variation with external selection	Change; Survival	Intentional organizational changes are constrained and conditioned by acceptance from the environment with survival used as evidence of convergence	Henderson & Stern (2004); MacKay et al (2013)
Governance & Stakeholder Management	Contingency Theory	Functionalism; Gestalt	Change; Congruence; Fit; Performance	That business units and strategies are intentionally altered to capitalize on the sub-environments that condition structures with superior performance used as evidence of convergence	Randolph & Dess (1984); Powell (1992); Doty et al (1993); Priem (Priem, 1994); Zajac et al (2000); Nickerson et al (2001); Siggelkow (2002); Yin & Zajac (2004); Zott & Amit (2008); Siggelkow & Rivkin (2005); Davis et al (2009); Siggelkow (2011); Boumgarden et al (2012)
	Organizational Sociology	External pressure informed by mimetic, normative, and coercive forces; Socio-cognitive coherence; Embeddedness	Change (Adoption); Isomorphism; Legitimacy	That organizational templates are altered to relate to stakeholders and external evaluators with legitimacy used as evidence of convergence	Greenwood & Hinings (1996); Sanchez & Mahoney (1996); Westphal et al (2001); Ruef (1997); Fox-Wolfgramm et al (1998); Murillo-Luna et al (2008); Dobrev & Kim (2006); Durand & Paoella (2013); Voronov et al (2013); Edman (2016)
	Variation-Selection-Retention Models	Dual-process of internally generated variation with external selection	Congruence; Survival	The effectiveness change efforts are conditioned by specific environments with survived changes used as evidence of convergence	Hrebieniak & Joyce (1985); Zammuto (1988); Burgelman (1991, 2002); Koza & Lewin (1998); Farjoun (2002); Levinthal & Posen (2007)

Theme	When studied with...	By leveraging the mechanisms of...	And measured as...	Emphasizes...	Representative Works
<i>Area of Inquiry 3: What environmental factors urge adaptation</i>					
Competitive & Institutional Pressures	Contingency Theory	Functionalism; Harmony with environments (Fit)	Fit; Survival	That economic pressures may render intentional actions inappropriate and condition their effectiveness	Venkatraman (1989); Chung & Beamish (2010); Bowers et al (2014)
	Organizational Sociology	External pressure informed by mimetic, normative, and coercive forces	Change (Adoption or Conformity); Legitimacy; Mimicry	That institutional pressures mitigate, condition, and prompt change efforts with isomorphism used as evidence of convergence	Judge & Zeithaml (1992); Greening & Gray (1994); Haveman & Rao (1997)
	Variation-Selection-Retention Models	Functionalism; Matching structure to environments	Change; Survival	That organizations are capable of intentionally influencing their environments with survival used as evidence of convergence	Levinthal (1991); Usher & Evans (1996); Lewin et al (1999); Flier et al (2003); Spisak et al (2015)

2.4 Adaptation Across Disciplines: Complementarities and Issues

As we systematically reviewed the literature, potential difficulties surfaced in association with specific theoretical frameworks, mechanisms, and construct measurements. Table 3 below, which expands on Vergne and Depeyre (2016), lists and describes each difficulty in general terms. We thus move from reviewing the literature to integrating it based on consistent guidelines for scholars that can pave the way for a flourishing research agenda going forward. In Table 3, we present each grouping of difficulties and tentative approaches in rows.

2.4.1 Difficulties Stemming from Conflation of Antecedents and Consequences

The first set of difficulties associated with adaptation relates to the trouble in distinguishing adaptation from its antecedents and consequences. Adaptation is at times equated with change, congruence, strong performance, or survival (while strong performance and survival can be seen as consequences of change, hence the conflation). As a result, intended actions are often assumed to produce desired outcomes and the meaning of convergence is often skewed to represent constructs not necessarily indicative of reduced distance between organizations and their environment(s). Three distinct difficulties are present in this grouping.

Functionalist Adaptation Fallacy. This difficulty stems from the presumption that organizational decisions work toward the proper functioning of the organization as a whole. Our review identifies such a presumption in the multiple streams that theorize organizational action as largely unrestricted or in the sociological stream that weighs heavily on what constrains actions. For instance, resource-based scholars predict that organizations possessing unique capabilities will be at a competitive advantage compared with their peers (Teece, 2007), although the literature does not clearly specify the conditions of either capability development or success (Vergne & Durand, 2011). Empirically, in these cases, organizational adaptation is often described as symptomatic of organizations that are able to enact change through new product introduction (Salvato,

2009), risk-taking in the executive suite (Rosenbloom, 2000), or special cognitive capabilities (Eggers & Kaplan, 2009). The RBV, therefore, imported the tendency to measure adaptation as organizational change in a manner consistent with behavioural theory (Cohen & Levinthal, 1990; Zahra & George, 2002) while relating this change to competitive advantage—often measured as (strong) performance (Adner & Helfat, 2003; Drnevich & Kriauciunas, 2011; Powell, 2001; Rothaermel, 2001). In combination, clubbing these constructs together presumes the change made was appropriately “fit” or convergent with the environment due to the presence of capabilities, albeit with no validation that the change implemented was successful in reducing distance vis-à-vis the environment(s).

Adaptation without Strong Performance. The conceptual and logical association between fit (loosely understood as adaptation) and strong performance represents a weakness in extant research. Many studies are based on intuitive relationships that may not be as generalizable as one might believe at first. For instance, the claim that the greater the fit with one’s environment, the greater the rent potential, has been debunked by the argument that rents, once created by an organization, may be appropriated by others (Coff, 1999). A few studies avoid this pitfall by specifying mechanisms, such as economies of scope that develop from structural alignment (Hill et al., 1992) or the coordination between buyers and suppliers that generate rent (Gulati et al., 2005). Clarity is critical to avoid conjectures that the performance or mere survival of an organization that underwent a change is indicative of “fit” or of being “well adapted.” On this ground, Durand (2006: 110) warns that adaptation studied in this manner “is past-oriented and does not convey a causal determination of future odds of success.”

Adaptation Depends on Competition. The fact that multiple organizations respond to one another suggests that adaptation is partly dependent on the actions of peer organizations and should not be assumed as independent (Pfeffer & Salancik, 1978). For example, two organizations may independently pursue dominant designs (possibly resulting in population-level adaptation through technological adoption); however, only one will win (Rosenbloom & Cusumano, 1987) as engaging in new standards increases selection pressure on all organizations participating (Durand, 2001). Scholars could be misled into

believing that the adoption of initiatives (such as responding to institutional pressure or adopting new technology) reduces the distance between an organization and its environment(s) when such initiatives are considered independently of peers and broader conformity pressures. Conforming symbolically or partially to norms and regulations may, in fact, reflect poorly on organizations at the institutional level (Fiss & Zajac, 2006; Greenwood et al., 2010). Jourdan, Durand, and Thornton (2017) describe and measure such a trade-off between social acceptance and financial performance—the latter can be reduced by efforts to defer and adjust to dominant social norms. Moreover, such contingencies have specific implications for the value of adaptation when considering adaptation and performance as distinct. For instance, many organizations adopting technology within close proximity to one another may be seen as “adapting” (in terms of meeting audience demands) but the performance benefits may depend on the interaction between organizations (Henderson & Mitchell, 1997). Thus, the value captured from adaptation cannot be assumed as positive in itself and depends on what rivals do within their institutional and competitive environments.

2.4.2 Difficulties Stemming from Unobservability

A second set of difficulties that arise empirically are concerns in observing adaptation’s presence in phenomena, manifesting in the following considerations for researchers.

Continuous Change. Organizations change continuously as they hire and promote employees, upgrade equipment and software, and routinely innovate to improve their products and services. Distinguishing between this baseline rate of change and strategic responses to identifiable market or institutional shifts is thus paramount to identifying adaptive changes. Moreover, since strong interdependencies exist within organizations, changing one characteristic (e.g., of an organization’s strategy) may create momentum that triggers subsequent changes, resulting in interdependencies across time (Miller & Friesen, 1980). Therefore, it is essential to consider the intentions and internal factors that condition organizational change when studying adaptation.

Asymmetric Causality. Asymmetric causality challenges the notion that adaptation and non-adaptation are explained by the same conditions (e.g., the presence or absence of a

condition could play a moderate role in explaining adaptation but play no role at all in explaining non-adaptation). Studies that emphasize the inability to change (e.g., Tripsas & Gavetti, 2000) at times identify as causal a condition (e.g., belief systems within Polaroid causing inertia) without examining counterfactual scenarios, thereby implying the benefits of strategic change when in fact we cannot know what the outcome would have been had the condition been absent, or just different.

Strategic Non-Adaptation. Opposite to situations of intentional change is a scenario of intentional inertia that holds the potential to produce positive organizational outcomes. Empirically, this phenomenon of “strategic non-adaptation” (Vergne & Depeyre, 2016) can occur when managers gauge that converging toward a shifting environment could hurt the organization’s prospects (e.g., maybe divesting assets to refocus on more stable business segments is preferable). Strategic non-adaptation can be observed only when cross-level datasets document both top managerial awareness of environmental changes (at the organizational level) and value-creation opportunities (at the interface of the organization’s resources and the multiple markets they can serve).

Unobserved Adaptive Ability. In resource-based theories, adaptation tends to be implied by the deployment of capabilities that allow organizations to uniquely relate to their environments versus less capable peers. Capabilities, however, are difficult to observe independently of their effect on the world. Three questions should be tackled by adaptation scholars to address this epistemological limitation: (1) are organizations aware of the capabilities they possess? (2) can organizations have the appropriate capabilities but are unable to exercise them at the appropriate time? and (3) how do organizations update their capabilities as their environments change to alter the value of organizational assets? (Easterby-Smith, Lyles, & Peteraf, 2009; Vergne & Durand, 2011).

2.4.3 Difficulties Stemming from Interdependent Levels of Analysis

Finally, the third set of difficulties emerges from the fact that three interdependent levels of analysis are present in the literature: the internal level, drawn from the resource-based, behavioural, and contingency traditions; the market level, drawn from evolutionary

economics and organizational ecology; and the institutional level, drawn primarily from neo-institutionalism.

Adaptation Depends on Environments. Nothing precludes external environments from moving toward organizations, yet an assumption that environments are perpetually being chased by organizations underlies much of the literature on adaptation. Organizations are continually exploring and seeking feedback from environments (Levinthal, 1997; March, 1991) and scholars need to better specify the directions in which environments move. Major organizational change may not be necessary or appropriate in adaptive decision-making depending upon the environmental dynamics. For instance, to adapt, organizations may simply need to unearth initiatives previously abandoned (Cattani, 2005). Characteristics of organizations and environments must be conjointly considered with specific attention to the environmental conditions that preclude or enable convergence.

Environmental Multiplicity. Another concern emerging from our review is that each theoretical stream imposes a specific level of analysis—predominantly within organizations for behavioural and resource-based theories, and at the population or field level for organizational sociology—whereas adaptation, by definition, transcends boundaries between organizations and their environments. Therefore, considering one without the other makes the environment appear monolithic, implying that decision-making deals with one environment at a time (e.g., market adaptation to the economic environment only). More realistically though, organizations likely intend to adapt to multiple environments simultaneously and each level of analysis conditions decision-making (Burgelman, 1991; Levinthal, 1991; Zammuto, 1988).

Co-evolution Across Levels. Relatedly, particularly prominent, large, or influential organizations have the capacity to shape their environments and the resulting co-evolutionary processes need to be specified (Lewin & Volberda, 1999). The absence of such an analysis may provide an illusion of adaptation when alternative constructs, including power dynamics (Casciaro & Piskorski, 2005; Pfeffer & Salancik, 1978), could adequately account for observed phenomena. Is it really adaptation that is taking place

when the reduction in distance to the environment is entirely explained by an organization's influence on that environment? Presumably, no.

Adaptation as Transitory. Not acknowledging the existence of co-evolutionary processes can lead to a mistaken assumption of stability in adaptation, when in fact adaptation is transitory. For instance, internal structures may be designed to fit sub-environments in the short-term and a strong fit today may not persist tomorrow (Marquis & Tilcsik, 2013). The notion of “residual fit,” where capabilities retain alignment with portions of a changing environment (Gilbert, 2006), reinforces the view that, if various environments change at different rates, then adaptation should be examined dynamically.

Table 3: Difficulties Emerging from a Review of Adaptation Research⁶

	Difficulty stemming from	Difficulty Description	Proposed Approach
Conflation of Antecedents and Consequences	Functionalist Adaptation Fallacy	The functionalist adaptation fallacy attributes “a priori to any organizational alteration a high degree of functionality” (Durand, 2006: 24). This fallacy posits <i>ex-ante</i> a form of equivalence between modifications (often as decision outcomes or responses to environmental change) and “fit”	Distinct construct/ measure for adaptation: Theory that adheres to conceptual definition
	Adaptation without Strong Performance	Adaptation is equated to performance-based outcomes on <i>ex-post</i> evaluations, without measuring adaptation directly.	Measures that match the construct
	Adaptation Depends on Competition	The performance implications of adaptation depend on competitiveness (which depends on the simultaneous actions of peer organizations; e.g., Barnett, Greve, & Park, 1994; Durand & Jourdan, 2012).	Competitors' response captured separately to account for moderating influence
Unobservability	Continuous Change	Organizational change cannot be assumed to occur in response to environmental change when, in fact, organizations make changes continuously (e.g., regular resource upgrades, monthly recruiting). Not every organizational change represents an <i>adaptation to something</i> (Arend & Bromiley, 2009)	Analyze adaptation through multiple longitudinal analyses: Examine multiple strategic responses that are more or less adaptive
	Asymmetric Causality	Adaptation and non-adaptation can be caused by different sets of factors. Examining only successful adaptation or only unsuccessful adaptation infers causality without examining counterfactual situations.	Identify intentionality and its relationship to convergence against a baseline rate of change under normal circumstances
	Strategic Non-Adaptation	Organizations may have competing goals and priorities leading to strategic decisions of non-adaptation (e.g., not reconfiguring assets in one business unit due to the prioritization of another)—that is, intentional maladaptation (Vergne & Depeyre, 2016)	Analyze environmental opportunities independently of stated organizational goals Examine counterfactuals across cases
	Unobservable Adaptive Ability	A capability may be present but not exercised, and thus can remain unobservable (Easterby-Smith et al., 2009).	

⁶ This table expands upon a set of difficulties identified in Vergne and Depeyre (2016)

Multiple Interdependent Levels	Adaptation Depends on Environments	Environments evolve at varying velocities (Nadkarni & Narayanan, 2007), such that environments may move <i>toward</i> or <i>away from</i> organizations; organization-initiated changes may (or may not) be congruent, depending on the environment's evolution.	Multilevel conceptualization of adaptation: Qualitative studies that explore the interaction across levels
	Environmental Multiplicity	Organizational strategies may depend on adapting to specific environments while not adapting to others. Adaptation is better understood when considering <i>multiple</i> environments (internal, market, institutional) instead of considering only <i>the</i> environment.	Configurational analysis of adaptation across levels (e.g., use fsQCA) Multilevel studies of adaptation (e.g., mixed-effects modelling, historical narratives across levels, simulations) capturing equifinal outcomes
	Co-evolution Across Levels	Organizations are claimed to have adapted to environments that they themselves are shaping endogenously (Lewin & Volberda, 1999)	
	Adaptation as Transitory	Organizations may appear well "fitted" to their environments today, but organizational changes may render organizations as maladapted in the future (Marquis & Tilcsik, 2013). Maximizing "fit" today may result in decreased survival odds tomorrow.	

2.5 Recasting Adaptation as a Process Across Levels of Analysis

On the one hand, the independent growth and development of several lineages explain the existence of critical issues that become apparent primarily when researchers cross theoretical boundaries—a move that reveals inconsistencies across lineages and levels of analysis. On the other hand, working across such boundaries is needed, both to revive the adaptation research agenda and to facilitate knowledge accumulation in a field that has become increasingly fragmented. For instance, by working across the lineages of behavioural theory and resource-based theory, scholars can theorize about resource deployment opportunities that managers are aware of and yet decide to forgo. Empirically, this phenomenon, coined “strategic non-adaptation,” can occur when, “despite awareness of shifting conditions, managers gauge that change is not a priority given the firm’s current revenue profile” (Vergne & Depeyre, 2016: 1654). Strategic non-adaptation can be observed only when cross-level datasets document both top managerial awareness (at the firm level) and value-creation opportunities (at the interface of resources and the market). To the extent that new mechanisms affecting adaptation thus become identifiable, studies across lineages and levels of analysis hold scholarly value.

Accounting for multiple levels of analysis can also shed light on outcome heterogeneity in situations where organizations implement simultaneous moves. Take, for example,

Uber and its main competitor, Lyft, which, as a close follower, has been emulating many of Uber's decisions. While Lyft's implied valuation as of late 2018 is only one-eighth of Uber's (\$15 billion versus \$120 billion), suggesting a potentially lower-market congruence, unlike Uber, Lyft has had to deal with comparatively fewer protests, limited regulatory drawbacks, and a smaller number of legal disputes. Lyft's relatively less volatile reception could suggest a higher institutional congruence, which in the long run may confer an advantage to Lyft, depending on evolutions at the interface between consumer demand and regulatory oversight.

In any event, by looking at both internal resources and institutional influences that establish legitimacy, scholars could provide a richer perspective on adaptation in industries where competitors make tactical moves simultaneously (Eggers & Park, 2018). The refined and holistic definition of adaptation derived in reviewing the literature accomplishes this objective and focuses on the conceptual attributes of adaptation. More importantly, a review of the adaptation literature also points to conceiving of adaptation as a process across levels of analysis that embraces the conjunct effects of deterministic forces (e.g., selection pressures) and agentic effects (e.g., strategic choices).

Chapter 3

3 Reconceptualizing Adaptation in a Multilevel Framework

The ideas developed in this chapter are drawn partly from a collaboration with Professor Jean-Philippe Vergne and Professor Rodolphe Durand; however, the development of the propositions put forth, and any associated errors, are solely my own.

Notionally, the lack of a clear definition for adaptation demonstrates a drift in how the concept has been used in management scholarship. In a sense, theoretical silos emerged across the six primary lineages that study adaptation and the resulting lack of cross-fertilization promotes further ambiguity in adaptation (McMahan & Evans, 2018). The resulting 11 challenges clearly depict a concept that, without several underlying assumptions of functionality and independence, lacks a foundation on which to allow future research to cumulate. The focus of this chapter is to integrate and unite the literature under a framework that respects the attributes of adaptation while avoiding the overarching pitfalls of (1) conflating adaptation with antecedents and consequences, (2) assuming observability, and (3) failing to incorporate dependence across levels of analysis.

As a starting point, I focus on the attributes of adaptation that are common across literature streams as a set of binding agents. Doing so integrates literature streams on common ground (Durand, Grant, & Madsen, 2017) and facilitates connections through a framework focused on *both* “the forest” *and* “the trees.”

3.1 Emphasizing the Convergent Attribute to Demarcate Antecedents and Consequences

The difficulties in adaptation research from Chapter 2 highlights the tendency for researchers to include some, but not all, of the attributes of adaptation. Particularly salient is the attribute of convergence (or congruence). At issue are the fallacies that strategic change automatically leads to adaptation and that adaptation automatically results in higher performance or survival. The assumption by scholars is that convergence has

taken place without necessarily measuring convergence specifically. Despite the empirical challenges of measuring convergence, it is important to conceptually distinguish decisions (e.g., a strategic change to enter a new market of consumers or a decision to launch a new product) from whether that market entry decision or new product meets (or improves upon) a set of needs in the market. Google, as an example, met several consumer needs when it initially launched its search engine in 1996. Its simplicity, speed, and accuracy solved many pain points that users were experiencing while using the dominant search engines of Yahoo and Altavista. Alternatively, Google's entry into the smartphone hardware and wearables segments have suffered from weak adoption, including a very prominent failure with Google Glasses. Suffice to say that market entry is not created equal—or that the act of making a strategic decision does not predetermine whether the decision serves a purpose, such as delivering on a marketplace need. Refocusing adaptation on its core attribute of convergence begins to resolve these challenges.

Convergence does not assume ex-ante “success” or “survival,” or any of the mechanisms from evolutionary biology that do not readily translate to an organizational context (e.g., natural selection). Organizations are conceived of as producers of actions (Starbuck, 1983) that may or may not be adaptive to their internal, market, and institutional environments.⁷ By applying the attribute of convergence, adaptation arrives at a central place amid its related constructs, separating itself from antecedents and consequences. The problematic assumptions along the causal chain from *strategic change* → *adaptation* → *performance* are minimized as a result (Vergne & Depeyre, 2016).

3.2 Integrating Adaptation Across Levels

An emphasis on convergence pulls adaptation apart from its related constructs of decision-making, performance, and survival, introducing a host of potentially underexplored mechanisms between constructs. Likewise, the set of challenges

⁷ When evaluated in this manner, processes can be viewed as contributing toward a degree of *adaptedness* or *fitness* that holds predictive power and can inform causal mechanisms to a greater degree (Durand, 2006).

associated with the interdependence to multiple levels of analysis adds a layer of complexity to integrating adaptation. If convergence *pulls apart* adaptation from its antecedents and consequences, interdependencies *bring together* the multiple literature streams that independently study adaptation. Figure 3 offers a visual depiction of adaptation distinguished from its antecedents and consequences vertically while remaining integrated horizontally across its primary levels of analysis. As Figure 3 neatly depicts, adaptation becomes a compound that can be reduced to 3 distinct forms.

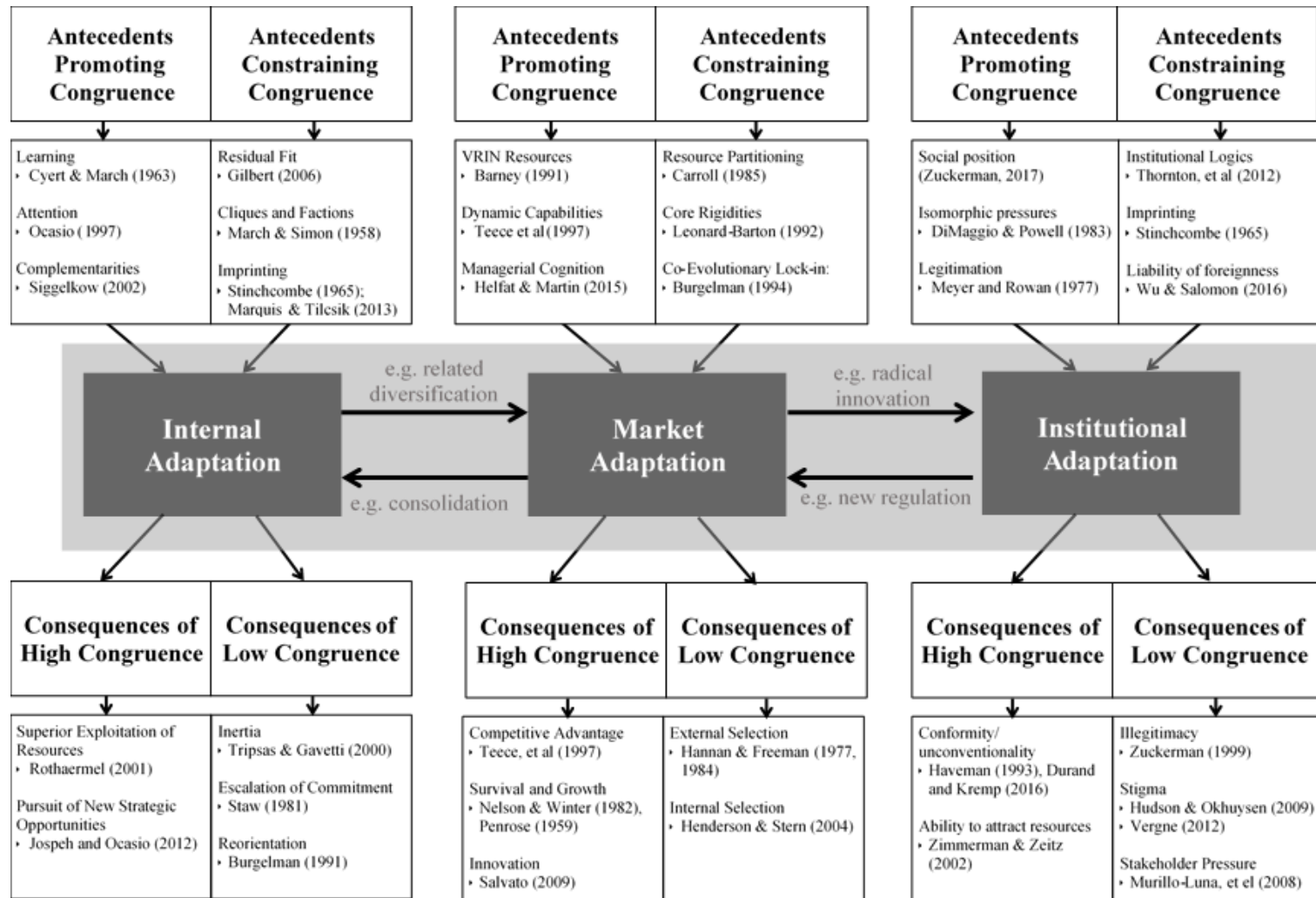
Internal Adaptation captures the degree to which organizations align their resources, competencies, structures, and goals (Baumann, Eggers, & Stieglitz, 2019; Siggelkow, 2002) and draws heavily from research traditions in decision-making, capabilities, and contingency theory. *Market Adaptation* evaluates the degree to which organizations align to customers' needs over time (Christensen & Bower, 1996), drawing implications from resource-based theory, evolutionary economics, and population ecology. Finally, *Institutional Adaptation* evaluates the alignment between organizations and the social norms within their institutional environments, which may manifest as conformity (DiMaggio & Powell, 1983), mimicry (Haveman, 1993), or as the adoption—symbolic or actual—of practices, guidelines, and templates (Greenwood et al., 2010; Jourdan et al., 2017).

A multilevel approach opens up the notion that organizations do not solely adapt to a *single* environment, suggesting that actions in one environment have implications for both adaptation and outcomes in another environment. Note that the three dimensions of adaptation can at times influence each other as indicated in Figure 3, such as when a dominant player engages in related diversification (to leverage internal adaptation) and ends up reshaping customer expectations in its primary industry (which can also affect market adaptation for other players). For example, to reduce its dependence on Hollywood, Canada's largest movie theatre chain, Cineplex, engaged in related diversification by opening bars, restaurants, and gaming venues within its theatre facilities, in an effort to create integrated entertainment complexes.

Organizations can also converge on the market level yet be unable, due to a lack of convergence at the internal level, to convert that adaptation to performance. Tesla's initial manufacturing struggles with its Model 3, despite high consumer demand, offers a contemporary example of an organization that appealed to consumer needs but was unable to deliver vehicles to wait-listed consumers. Additional factors may influence the degree to which organizations can convert market adaptation into performance. Multiple organizations can converge with consumer needs simultaneously, which may erode profitability for all competing organizations. Apple and Samsung simultaneously increasing the resolution of mobile phone cameras likely does more to reinforce each organization's existing position than it does to increase profitability since both product changes occur (nearly) at the same time.

The market and institutional contexts in which organizations are situated may, therefore, moderate the relationship between adaptation and performance—highly commoditized product markets may allow for mimicry and competitive intensity that will erode profitability while winning competitions for dominant designs may insulate profitability from alternative designs that are also convergent with consumer needs (Hiatt, Sine, & Tolbert, 2009; Rosa, Porac, Runser-Spanjol, & Saxon, 1999). Organizations may also be able to distinguish themselves from competitors that are comparably convergent with consumer needs by appealing to more extreme or broader social norms (Navis & Glynn, 2010; Smith, 2011). A deeper understanding of these relationships is likely to emerge when analyzing adaptation at both the market and institutional levels. Hence, a better specification of explanatory mechanisms emerges when considering adaptation as distinct from performance at multiple levels of analysis.

Figure 3: Antecedents and Consequences of Adaptation



Reframing adaptation across levels of analysis clearly addresses the challenges associated with conceptual conflation and interdependence outlined in Chapter 2, but it also offers potential to reveal adaptation to a greater degree (addressing the challenges associated with unobservability). At an empirical level, integrating the literature calls for clarifying which data and measures are best used to capture convergence at each of the three different levels. Each component (internal, market, and institutional adaptation) can be measured separately; the three components can then be aggregated to form a three-dimensional vector. A composite measure of organizational adaptation can be derived, for instance, by normalizing and summing each component's score, possibly after applying weights. To guide future scholarship, exemplar measures for each dimension, inspired by prior adaptation research, are captured in Table 4.

Exemplar empirical measures centred around a consistent framework across levels of analysis and the core attributes of adaptation begin to resolve study design issues that lead to unobservability. The integrated framework also helps scholars consider (and potentially control for) the alternative paths to causation from interrelated lineages, constructs, and levels of analysis.

Table 4: Guidelines for Measure Adaptation

	Internal Adaptation	Market Adaptation	Institutional Adaptation
Data Sources (non-exhaustive)	Managerial Cognition	Resources & Capabilities	Isomorphism
	<ul style="list-style-type: none"> ▸ Annual reports & internal company documents ▸ (Joseph & Ocasio, 2012) ▸ Historical & archival data combined with interviews ▸ (Tripsas & Gavetti, 2000) ▸ Minutes of meetings ▸ (Huy, 2002) 	<ul style="list-style-type: none"> ▸ Annual reports (Eggers & Kaplan, 2009) ▸ Publicly available survey data (Kraatz & Zajac, 2001) ▸ Industry & analyst reports (Rothaermel, 2001) 	<ul style="list-style-type: none"> ▸ Government & public filings (Haveman, 1993) ▸ Annual reports ▸ Industry reports
	Learning	Alignment Strategy-Environment	Legitimacy and related social evaluations
	<ul style="list-style-type: none"> ▸ Interviews and field observation ▸ (Edmondson, Bohmer, & Pisano, 2001) 	<ul style="list-style-type: none"> ▸ Accounting data sourced from organizations and industry sources (Zajac et al., 2000) ▸ Reports outlining customer needs (Vergne and Depeyre, 2016) 	<ul style="list-style-type: none"> ▸ Court documents (McPherson & Sauder, 2013) ▸ Internal interviews regarding compliance (Boiral, 2007) ▸ Expert opinions (Hsu, 2006) ▸ Media coverage (Vergne, 2011)
	Routines	External raters	Reputation databases (King, 2008)
<ul style="list-style-type: none"> ▸ Field observation ▸ (Zbaracki & Bergen, 2010) 	<ul style="list-style-type: none"> ▸ (Chatterji, Findley, Jensen, Meier, & Nielson, 2016) 	<ul style="list-style-type: none"> ▸ Government compliance filings (Barnett & King, 2008) 	
	Structural Alignment		
	<ul style="list-style-type: none"> ▸ Archival data (Yin & Zajac, 2004) 		
Methodological Approaches	<i>Applicable Across Levels of Analysis</i>		
<i>Amenable to Qualitative, Set-Theoretic, or Quantitative Studies</i>	<ul style="list-style-type: none"> ▸ Internal survey emphasizing learning (Szulanski, 1996), routines (Eisenhardt & Tabrizi, 1995), structural ambidexterity (Gibson & Birkinshaw, 2004), or compliance to regulatory standards (Murillo-Luna et al., 2008) ▸ Longitudinal case study to examine internal fit (Siggelkow, 2002); competitiveness (Burgelman, 1991; Danneels, 2011); or social evaluations (Dutton & Dukerich, 1991) ▸ Narrative analysis of historical events to capture multiple processes (Mary Tripsas, 1997) 		
Measurement Approaches	<ul style="list-style-type: none"> ▸ Heterogeneity as a measure of diversity (Blau, 1977) ▸ Misalignment as deviation from optimal reference point (Nickerson & Silverman, 2003) 	<ul style="list-style-type: none"> ▸ Misalignment as deviation from optimal reference point (Nickerson & Silverman, 2003) ▸ Distinction between misalignment and conventionality (Durand & Kremp, 2016) 	<ul style="list-style-type: none"> ▸ Jaccard's similarity (Ruef, 1997) ▸ Dice coefficient (Smith, 2011) ▸ Rank ordering of features (Kim & Jensen, 2011)
<i>Amenable primarily to Set-Theoretic, or Quantitative Studies</i>	<i>Applicable Across Levels of Analysis</i>		
	<ul style="list-style-type: none"> ▸ Deviation scores as a measure of congruence (Deephouse, 1999; Durand & Kremp, 2016; Powell, 1992) ▸ Expert survey with a direct measure of adaptation (Vergne & Depeyre, 2016) 		

3.3 A Multilevel Adaptation Framework and Value Creation

If the primary purpose of strategic management is adaptation (Chakravarthy, 1982), an explicit link to strategy is necessary. A multilevel adaptation framework offers potential to specify and extend an element that is core to strategy: the concept of value. Prior to corraling adaptation under a broader framework, I will first discuss the links between adaptation and value to identify consistencies between adaptation and value creation.

Strategic management is largely predicated on organizations that create and capture value relative to peer organizations (Barney, 1991; Brandenburger & Stuart, 1996; Teece, Pisano, & Shuen, 1997). Often, strategy scholars emphasize the importance of capturing value through increased performance (Gans & Ryall, 2017; March & Sutton, 1997). While organizations ultimately survive or fail on the ability to capture value, a more fulsome understanding of value creation is essential to understanding whether excess value is latent and uncaptured, whether it needs to be created, or whether it needs to be stolen from competitors. Understanding value creation separately from value capture is underexplored conceptually, particularly since Coff (1999) directed attention to the fact that value created is not always captured by organizations—internal or competitive stakeholders may capture value away from the organization. It is also entirely plausible that value created may not easily translate into value that can be captured.

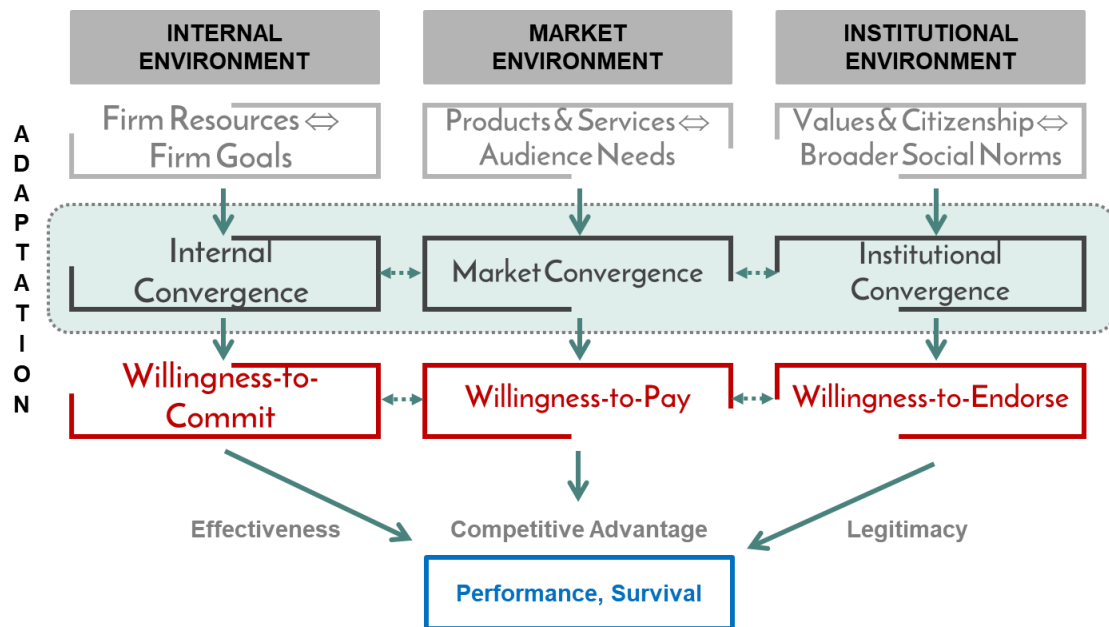
Value creation, much like adaptation, is sourced from multiple levels that closely resemble the three levels identified in adaptation research (Lepak, Smith, & Taylor, 2007), making adaptation a suitable concept to extend our understanding of value creation. Notably, the distinction between adaptation and performance is akin to the separation of value capture, as increased financial performance, and value creation, as increased *willingness-to-pay* (Brandenburger & Stuart, 1996). Value creation, or *willingness-to-pay*, is defined as “the relative amount of value that is subjectively realized by a target user (or buyer)...[that] translate[s] into the user’s willingness to exchange a monetary amount for the value received” (Lepak et al., 2007: 182). Realizing value in this instance reflects well on the attribute of convergence, leading to an initial

proposition that measuring adaptation separately from performance notionally becomes consistent with willingness-to-pay and value creation (i.e. increased market adaptation).

Proposition 1: Market adaptation results from firm products and services converging (diverging) to consumer needs and leads to increased (decreased) willingness-to-pay and value creation (destruction).

Interactions across levels of analysis offer a more involved depiction of value creation that extends beyond willingness-to-pay models. For instance, abiding by social norms and values can play a crucial role in enabling subsequent increases in performance (i.e. value capture). Value creation and value capture are, therefore, linked to resources and legitimacy in ways beyond those provided by the market level of analysis (Barney, 2018; Mitchell, Agle, & Wood, 1997). If performance ultimately reflects value captured by the organization, a more in-depth framework of value creation (that incorporates resources and legitimacy) appears necessary. To better reflect the complexity across levels of analysis, a multilevel framework of adaptation begins to extend dyadic theories of organization-stakeholder fit (Bundy, Vogel, & Zachary, 2018) and considers how value is created in multiple changing environments. Three ways whereby adaptation creates value are identified in each level of analysis to specify points of convergence: internal stakeholders' *willingness-to-commit*, customers' *willingness-to-pay*, and external stakeholders' *willingness-to-endorse*. These three "willingness" co-evolve and potentially conflict as environments change. A summary of the conceptual model linking adaptation, value creation, and stakeholder theory can be found in Figure 4.

Figure 4: Multilevel Framework of Adaptation



Organizations must consider aligning resources to multiple conflicting goals as a means of value creation (Gaba & Greve, 2019) while also acting in a manner beneficial to society (Deephouse & Suchman, 2008; Meyer & Rowan, 1977). The ability for organizations to create value rests on similar interconnected levels of analysis. Organizations that reconfigure or divest resources, determine the products to offer or discontinue, and choose the social issues with which to engage are *intentionally relating* to one of their environments in an adaptive sense. The definition of value creation from Lepak et al (2007) suggests that these very decisions are conditioned by what consumers are willing to exchange for meeting their needs. Limiting this logic to the consumer exchange transaction appears incomplete, however, since internally aligned organizations and socially aligned organizations also play a role in the exchange relationship (Deephouse, 1999; Flammer & Bansal, 2017; Joseph & Ocasio, 2012). Incorporating the value generated at each level of analysis serves as the basis for including *willingness-to-commit* and *willingness-to-endorse* into a multilevel adaptation framework.

Willingness-to-commit is defined as an organization commitment to aligning its resources to its goals. Commitment can come in the form of supplying or acquiring additional resources (e.g., physical plant capacity), aligning the goals of employees to the goals of

the organization (e.g., equitable career advancement prospects, enhanced workplace safety), or altering the goals of the organization based on restricted resources (e.g., downgraded production goals due to COVID-19 plant closures). Willingness-to-commit clearly supports the critical attributes of adaptation as organizations intentionally take actions and relate goals to resources to align the two. Simultaneously, resources and goals are both conditioned by broader environments. Case in point, emerging societal concerns over business model practices in the gig economy calls into question the need for rideshare companies to offer benefits to their drivers (Vallas & Schor, 2020).

Likewise, *willingness-to-endorse* represents the propensity of external stakeholders to judge the actions of an entity as “desirable, proper, and appropriate within some socially constructed system of norms, values, beliefs, and definitions” (Suchman, 1995: 574). There is no need to complicate the notion of willingness-to-endorse; its principles are consistent with the definition of legitimacy put forth by Suchman (1995). The reasons for this are four-fold and in line with the attributes of adaptation: (1) actions reflect the intentionality of organizations, (2) organizations are relating to broader organizational fields, (3) norms, values, and beliefs condition the judgement of actions, and (4) “congruence [or convergence] with such norms lies at the heart of legitimacy” (Deephouse & Suchman, 2008: 53).

Each level of adaptation is clearly linked for without the appropriate resources or legitimacy, creating and capturing value becomes less likely (Barney, 1991; Meyer & Rowan, 1977; Mitchell et al., 1997). Considering this interdependence, two additional propositions can be established that link internal and institutional adaptation to value creation more explicitly.

Proposition 2: Firm resources converging (diverging) to firm goals leads to increasing (decreasing) willingness-to-commit and ultimately value creation (destruction).

Proposition 3: Firm values and citizenship converging (diverging) to broader social norms reflect increasing (decreasing) willingness-to-endorse and ultimately value creation (destruction).

3.4 Dynamism in the Framework

Studies of adaptation are ideally longitudinal, prompting consideration for how a multilevel framework of adaptation moves through time. By asking, *how convergent is the organization at the outset of the study?*, researchers are able to evaluate the elements of change at subsequent time periods for the different levels of adaptation (internal, market, and institutional). This evaluation enables precision in identifying the levels of analysis that are evolving, the components within levels that are coming together or moving apart, and the interactions that may occur across levels. By emphasizing the interaction across the three “willingness “dimensions, subsequent adaptive behaviour of organizations begins to emerge that identifies 8 typologies of organizations and how convergence may increase or decrease. Table 5 outlines the typology along with real-world examples of how a well-adapted organization may become locked into specific strategies (Staw, 1981; Tripsas & Gavetti, 2000) or how the preservation of converging to consumer needs may provoke lobbying behaviour, which is best exemplified by Uber’s challenging of legislation in multiple markets (Uzunca, Rigtering, & Ozcan, 2018).

Table 5: Adaptation Typology

	W to Commit		W to Pay		W to Endorse	Nature of Adaptive Behavior
Adapting Organizations	↗	↔	↗	↔	↗	Myopic: Positive environmental signals escalate commitment to existing strategies <i>Risk:</i> Innovation is mostly incremental to preserve convergence (Future ↘ in W-to-Pay?) <i>Example.: Apple reinforces security in the period after the Cambridge Analytica scandal</i>
	↗	↔	↗	↔	↘	Norm Drifting: Positive rent appropriation validates challenging existing social norms <i>Risk:</i> Disenfranchised employees (Future ↘ in W-to-Commit?) <i>Example: Uber employees reveal internal treatment as market entry violates local taxi regulations</i>
	↗	↔	↘	↔	↗	Need-Drifting: Positive social endorsement justifies complacency in innovation <i>Risk:</i> Loss of internal resources (Future ↘ in W-to-Commit?) <i>Example: JP Morgan struggles to acquire tech talent after dismissing cryptocurrency post-2008</i>
	↘	↔	↗	↔	↗	Resource Drifting: Internal resources partitioned from adaptive decision-making <i>Risk:</i> Whistleblower activity (Future ↘ in W-to-Endorse?) <i>Example: Google whistleblowers surface prominently in the media amidst unionization</i>
Maladapting Organizations	↗	↔	↘	↔	↘	Resource Leveraging: Internal alignment complements rent appropriation <i>Opportunity:</i> Market congruence resulting from internal alignment (Future ↗ in W-to-Pay?) <i>Example: Microsoft realigns around cloud computing and gaming after saturating the PC market</i>
	↘	↔	↘	↔	↗	Norm-Leveraging: Positive social endorsement is leveraged for resource acquisition <i>Opportunity:</i> Institutional congruence leveraged internally (Future ↗ in W-to-Commit?) <i>Example: The Honest Company leverages eco-friendliness to gain funding after settling lawsuits</i>
	↘	↔	↗	↔	↘	Need-Leveraging: Positive market endorsement is leveraged for resource acquisition <i>Opportunity:</i> Market congruence leveraged internally (Future ↗ in W-to-Commit?) <i>Example: Suspected of inertia, Visa seeks to acquire Plaid to position itself in the booming API economy</i>
	↘	↔	↘	↔	↘	Risk Taking: Negative environmental signals lead to survival-oriented risk-taking that resemble large bets with unpredictable interactions <i>Example: Blackberry shifts to licensing software after divesting its core smartphone business</i>

By identifying initial states of adaptation at each level, the predictive power of the framework begins to emerge for subsequent time periods. Table 5 provides an initial characterization of the 8 typologies and presents an initial indication of likely adaptive behaviour to follow. Broadly, the evolutionary nature of the typology depicts well-adapted organization as prone to divergence and maladapted organizations as prone to convergence. The typology assists in characterizing organizations that oscillate between success and failure that commonly characterizes research in adaptation (Eggers & Park, 2018). More importantly, the notion of multiple paths to success and failure begins to emerge in a dynamic analysis of a multilevel adaptation framework. Organizations, therefore, are in a constant process where movement passes from one state of adaptation to another. It should be noted that the 8 tendencies of adaptive behaviour refer to the average organization. Outliers may emerge against the predictions depicted. Table 5 is divided horizontally by adapting organizations in the top 4 rows (those that are converging on at least 2 levels) and maladapting organizations in the bottom 4 rows. To analyze each row, two primary influences were considered as determinants of adaptive behaviour: the relative influence of environmental forces and the relative influence of organizational forces (Hrebiniak & Joyce, 1985).

Adapting organizations are more likely to receive positive signals from the environment, which ultimately reinforce existing behaviours in the organization and reduce the likelihood of strategic change (Cyert & March, 1963). As a result, the relative influence of the environment is stronger than the relative influence of organizational forces. Potential for drift (or divergence) increases, as a result, placing maladaptive pressures on adapting organizations. Put differently, it becomes more likely that organizations ratchet down the very behaviours that promote adaptation as environments emit positive signals. In these instances, organizations become more likely to view themselves as converging, removing the need for further change. When these behaviours are sticky and environments continue to move, the likelihood for future divergence along a particular dimension increases leading to the potential for future maladaptation. In each of the 4 rows for adapting organization, the future tendency is toward maladaptation as a result.

Conversely, the bottom 4 rows demonstrate the opposite tendency. Maladapting organizations receive primarily negative signals from the environment, increasing the propensity to engage in problemistic search for solutions (Cyert & March, 1963). The relative strength of organizational forces outstrips the strength of environmental forces and strategic choice guides most of the predicted adaptive behaviour. Tendency move from drifting behaviour to leveraging behaviour across each level of analysis as organizations rely on areas of strength to regain alignment with environments (Donaldson, 1987).

Each of the 8 typologies identified is supported with a real-world example to relate theoretical notions to potential empirical outcomes. The dynamic framework emphasizes the interactions that occur across levels of analysis while also aligning with the empirical notion that the largest incumbent organizations tend to fall from grace (Eggers & Park, 2018).

3.5 What Does Multilevel Adaptation Contribute?

At a theoretical level, the multilevel adaptation framework offers interesting properties. Because of a non-automatic association between adaptation and positive performance outcomes, the multilevel approach to adaptation opens wide possibilities that more precisely align organizational theory and strategic management through value creation. In addition, disentangling adaptation from its antecedents and consequences suggests that, in certain conditions, maladaptation may procure higher returns than adaptation, which must be explored.

Moreover, when combined with the lineages of behavioural theory and resource-based theory, the possibility looms large that learning and strategic change decisions can result from unintentional surprises—i.e., consequences following the absence of choices and vicarious learning from rivals' unexpected behaviour. While most of our theories of organizational adaptation focus on intentional decisions, past research has obscured the worth of unintentionality for explaining different levels of congruence and subsequent organizational decisions. With new methodologies enabling the ability to better capture both the positive differences across organizations and the absence of specific factors

(e.g., instrumented methods, and matching and causal identification techniques), the explanatory power of unintentional surprises for internal, market, and institutional congruence promises to deeply renew our knowledge.

Finally, at a theoretical level, adaptation as a compound across three levels has the ability to produce new mechanisms. Two organizations, for instance, may be equally adapted in the aggregate (a composite adaptation measure across all levels is identical) and yet correspond to distinct *configurations* of adaptation (congruence is distributed differently across the three levels). Heterogeneity can emerge from within organizations' adaptation profiles, thereby leaving room for a diversity of strategic goals. The existence of configurations should prompt scholars to use different tools to study adaptation as convergence (e.g., fuzzy-set qualitative comparative analysis is well suited to examine configurations).

Chapter 4

4 Initiating Adaptation Processes

Understanding adaptation provides a foundation to answer an alternative question that plagues scholars of strategic management and organization theory: what initiates the adaptation process? The identified antecedents partly address this question, but a deeper analysis can reveal new explanations for age-old issues. After all, tales of incumbent organizations struggling to adapt to their environments are common in strategic management. I will focus specifically on how organizations relate to their technological environment in this chapter, given the pervasiveness of research in this area.

Prototypically, an upstart new entrant displaces a lumbering incumbent by deploying cutting-edge technologies that the incumbent fails to adequately understand (Bergek, Berggren, Magnusson, & Hobday, 2013; Christensen, McDonald, Altman, & Palmer, 2018; Cohen & Tripsas, 2018). Conversely, far less is understood about the incumbents, faced with the same technological pressures, that withstand the forces of technological innovation and adapt (Eggers & Park, 2018).

Incumbents struggle to adapt for several well-documented reasons: (1) they become victims of their own success and reinforce existing competencies (Leonard-Barton, 1992; Tripsas & Gavetti, 2000), (2) they become overly focused on existing customers at the expense of shifting market conditions (Christensen, 1997; Christensen & Bower, 1996), or their resources are destroyed by emerging technological discontinuities (Tushman & Anderson, 1986). Naturally, organizations that overcome these challenges and adopt technological innovation are viewed as more likely to adapt since they effectively recreate value and avoid the perils of creative destruction (Schumpeter, 1947).

4.1 Why Examine the Initiation of Adaptation Processes?

The point of adoption only partly explains adaptation. When novel technologies change at an exponential rate, as we have witnessed in the postwar era (Adner et al., 2019), processes of adaptation become increasingly strained. The time horizon between the adoption of technology and the consequences of inertia shrinks, inflating the rate of

adoption that needs to take place within a given time—a known challenge for incumbents that struggle to assimilate prior experiences with new environmental conditions (Cohen & Tripsas, 2018; Eggers, 2012a; Eisenhardt et al., 2010). Moreover, management scholars also document, at great length, the stickiness of early decisions in processes of adaptation. Strategies for market entry are formulated very early in a technology's lifecycle (Klingebiel & Joseph, 2016) and early strategies are often consequential to subsequent outcomes. Eggers (2012b) specifically demonstrates commitments to initial strategies and subsequent successes and failures in a study of the flat panel television market. Organizations frequently build routines and competencies associated with initial strategies that generate subsequent routines, imprints, and escalations of commitment (Marquis & Tilcsik, 2013; Nelson & Winter, 1982; Staw, 1981). Taken together, the importance of initial decisions and the difficulties associated with large incumbents *suddenly* adapting to technological change tilts the importance away from the point of adoption itself and towards either faster or earlier decision-making.

In environments that change at greater rates, one potential solution to the problem of adaptation is fast and frugal decision-making (Eisenhardt, 1989; Eisenhardt & Tabrizi, 1995; Luan, Reb, & Gigerenzer, 2019). Fast decision-making is predicated on waiting for more information to be obtained from the environment before acting, allowing for a more precise diagnosis of the changes occurring in the technological environment (Cyert & March, 1963; March, 1991). The onus is then placed on the manager to interpret the environment quickly and respond in short order—often described as holding dynamic managerial capabilities (Eisenhardt & Martin, 2000; Helfat & Martin, 2015). The problem with such conceptions are two-fold: how can one determine a dynamic capability *ex-ante* (Vergne & Depeyre, 2016) and what precludes such fast decision-making from falling into speed traps where decisions are made too quickly with dire consequences for organizations (Perlow, Okhuysen, & Repenning, 2002)? While fast decision-making relieves some pressure on organizations in fast-changing technological environments, overcoming the challenges of detecting *effective* fast decisions are difficult to determine without focusing solely on the few instances of successes.

An alternative approach is to understand the triggers of earlier adaptation. Beginning the process of adaptation earlier allows larger incumbent organizations to spread out processes of adaptation over longer periods of time, which may include slow and gradual divestments of outdated business units or tweaking supply chains for sustainability purposes (Vergne & Depeyre, 2016). The gradual reconfiguration allows organizations to maintain internal congruence while rethinking strategies and business models associated with changing technological conditions (Christensen et al., 2018). Of course, the affordance of time is only possible if the end of the decision process, the adoption of change, remains aligned to the technological environment. Put differently, starting the strategic process earlier provides organizations with more time to contemplate and implement change without necessarily *adopting* changes “too late” since the time gained is at the start of the process.

Critical to understanding early adaptive decisions is, perhaps, the most important mechanism in decision-making—managerial attention (Cyert & March, 1992; Ocasio, 1997). March and Simon (1993: 4) allude to as much in the preface to the second edition of *Organizations* stating that “although the central construct is decision making, much of the theory developed in the book is less a theory of choice than a theory of attention.”

Cognition scholars frequently demonstrate the explanatory power of organizational attention as a predictor of subsequent decisions (Cho & Hambrick, 2006; Eggers & Kaplan, 2009; Kaplan, 2008b; Nadkarni & Barr, 2008; Ocasio, 2011; Vergne & Depeyre, 2016; Zhong, Ma, Tong, Zhang, & Xie, 2020). Unfortunately, little scholarly research focuses specifically on the shifts in attention that kickstart the adaptation process (Joseph & Gaba, 2019). How and why organizations shift attention toward technological changes are even more elusive despite the potential for pursuits of novel technologies to increase performance relative to competitors (Rosenkopf & McGrath, 2011). A thorough examination of shifts in strategic attention, therefore, seems warranted to understand the onset of adaptation as a release valve to “sudden” adaptation.

4.2 The Onset of Adaptation and the Attention-Based View

The attention-based view is a theoretical perspective with the intentions of explaining organizational adaptation (Ocasio, 1997). Attention simplifies organizational environments and regulates the decisions of the organization, including changes in strategy, toward potentially risky and novel endeavours such as technological innovation (Gavetti, Greve, Levinthal, & Ocasio, 2012; Greve, 1998). To ground arguments, I adopt the definition of organizational attention from Ocasio (1997: 189) as the “focusing of time and effort by organizational decision-makers on both (a) issues; the available repertoire of categories for making sense of the environment: problems, opportunities, and threats; and (b) answers: the available repertoire of action alternatives.”

The relevant construct to capture the strategic attention of the organization is the strategic agenda, which represents the outcome of attentional processes that elevate only those prioritized (or ranked) issues that do not exceed the limited attentional capacity of managers (Bundy et al., 2013: 361; Dutt & Joseph, 2019; Ocasio, 2011; Ocasio & Joseph, 2005). In this way, strategic agendas become observable outside of the organization after issues have been sorted and ranked internally. I use strategic attention and strategic agendas as synonymous constructs.

Shifts in strategic attention are primarily driven by two factors: attention-directing structures or attention-drawing stimuli (Ocasio, 1997). Organizations often structure themselves to attend to particular aspects of the environment by creating business units, identifying goals, or including specific decision-makers (with propensities for specific actions) in the process. For this reason, attention-directing structures are often referred to as top-down (or motivational) aspects of the process (Ocasio, 2011). Strategic attention can also be attracted to stimulating aspects of the environment, causing organizational decision-makers to evaluate issues (as stimuli that emerges) and respond accordingly (Ocasio, 1997). Attention-drawing aspects of stimuli are often referred to as bottom-up attentional processes (Ocasio, 2011; Shepherd et al., 2017).

Research in cognition largely focuses on the structural aspects of strategic attention, which served to dispute the prevailing notion of rational decision-making processes (as complete attention to all alternatives) in economic-based theories of strategy (Kaplan, 2011; Porac, Thomas, & Baden-Fuller, 1989). Behavioural approaches, pinned on the principle of bounded rationality (or limited attention), highlights the cognitive processes that favour some alternatives over others. Given the rich history of attention structures, I will first establish the prevailing explanations for early shifts in strategic attention based on what organizations do to direct attention toward aspects of the environment. I will then highlight some challenges associated with structural approaches to strategic attention, particularly as it pertains to technological innovation.

4.2.1 Structures Orienting Organizational Attention

Two primary branches of research emphasize the attention-directing structures *within* the organization: (1) the representational cognition of decision-makers, which tends to reflect the cognitive capabilities of managers, and (2) the micro, meso, and macro integration of channels that orient attention.

Representation-based cognition that drives attention to adaptive decision-making emphasizes the ability of managers to infer and recombine aspects of the environment in order to generate novel strategies, business models, and opportunities. Analogical reasoning by skilled executives highlights the primary explanation within this branch of research. Executives traverse novel and complex domains with the benefit of prior experience and merge these prior experiences with opportunities that are witnessed in distant aspects of the environment (Gavetti, 2012; Gavetti et al., 2005). Gavetti and Menon (2016) offer the example of Charles Merrill's introduction of the financial supermarket business model to asset management, in which he recombined experience in retail grocery with a future opportunity to house many financial services under one roof. Success, in this case, involves an executive that can simplify a complex environment (or merge multiple environments) to create an accurate mental representation of a new environment. Put differently, unique mental representations allow decision-makers to see parts of the environment that others do not and, as a result, attention is unique to those with specific mental representations. Prior experiences play a large role in developing

these unique mental representations, which distinguishes how attention is allocated, how strategies are formed, and how adaptation occurs (Csaszar & Laureiro-Martínez, 2018; Gavetti & Levinthal, 2000). In many ways, the representational approach describes how executives of incumbent organizations shape the future of their industries (Gavetti et al., 2017).

Likewise, a sub-branch of the representational approach focuses on the capabilities of managers and that certain managers house the ability to sense particular changes in their environments and act accordingly (Helfat & Martin, 2015; Teece, 2007). Often, these capabilities are sourced from prior experience but they do not necessarily rely on recombination or analogical reasoning. The seasoned executive is better suited to act upon trends that may appear similar to a prior experience simply because they have a proximity advantage (i.e. they have seen a similar trend before). Because technological innovation is often ambiguous initially, without a clear utility for markets (Kaplan & Tripsas, 2008), experienced managers are advantaged in the ability to decipher signals from noise. Experience thus channels attention toward opportunities in the environment. Evidence in this domain focuses on functional backgrounds of executives that enable the launch of new products or a move to entrepreneurial strategies (Cho & Hambrick, 2006; Ener, 2019; Tuggle, Schnatterly, & Johnson, 2010).

The third primary branch of structuring attention emphasizes the rules that tend to govern communication channels inside organizations. These rules can pertain to organizational aspirations where organizations allocate attention to innovation as a way to solve problems of not achieving profit goals (Cyert & March, 1963; Greve, 1998, 2003). Alternatively, organizations may explicitly construct channels that direct or coordinate organizational attention in a meaningful way for adaptation. Joseph and Ocasio (2012) uncover the coordinating mechanisms of joint meetings that tied General Electric together through decades, allowing it to adapt to various changes taking place over time. Similarly, Fu et al (2019) highlight the power of specific roles, such as Chief Sustainability Officers, in directing attention toward sustainability initiatives that are pertinent to adaptation.

Each of these branches emphasizes an inward-out approach to strategic attention—the organization, or its members, possess a unique adaptive ability that is largely predicated on unique prior experiences (Chakravarthy, 1982; Cyert & March, 1963). This adaptive ability is difficult to determine ex-ante, however, resulting in several ex-post studies of attention-directing structures. As a result, research on the attention-orienting structures tread closely toward asymmetric causality and infer the mechanism of attention (and adaptation) as experience-based. Nevertheless, there is much value in the structural approach to attention and adaptation as motivational aspects of organizational adaptation are brought into view. The approach encapsulates the reality that strategic decisions are primarily endogenous and that scholars of strategy benefit by assuming this premise (March & Sutton, 1997).

An important challenge emerges when studies focus solely on structural determinants of attention—large incumbent organizations are often not the determinants of changes occurring in their environments, they are known to struggle with new challenges that emerge, and they are prone to missing shifts in market preferences (Bergek et al., 2013; Christensen & Bower, 1996; Eggers & Park, 2018; Hannan & Freeman, 1977; Maula et al., 2013). As a result, organizations are unlikely to direct attention to parts of the environment without some stimuli that suggest environmental change is occurring—a logic embedded in sensing change from the environment (Helfat & Peteraf, 2015; Teece, 2007). Examining how attention-directing structures interact with attention-drawing issues plausibly resolves some of the challenges since the *relational* aspects of decision-making are foregrounded, giving a stronger notion of how organizational intentions meet external stimuli in the initiation of adaptation.

4.2.2 Issues Drawing Strategic Attention

Issues that draw strategic attention has received far less focus in the management literature. Environmental stimuli that trigger adaptation are prominent in the principle of situated attention within the attention-based view, yet few studies examine the interaction of attention-directing structures and attention-drawing stimuli (Ocasio, 1997, 2011). Empirical studies have either focused on the broader field-level factors that drive institutional change (Hoffman & Ocasio, 2001; Nigam & Ocasio, 2010) or factors at the

micro-level, namely focused and vivid documentation that attracts the attention of decision-makers (Hansen & Haas, 2001).

A notable study by Li et al (2013) brings clarity to three particular attributes of issues that draw attention: novelty, salience, and vividness. The authors subsequently relate attention to the search behaviour through the application of attention selection theory and intertwine search and attention to predict how executives discover and launch new products. Ultimately, the emphasis on search serves to add depth to structural accounts of attention (i.e. searching is an act of directing attention) as opposed to the issue-related attributes that draw the attention of decision-makers. Connecting novelty, salience, and vividness to issues themselves can become a powerful complement to understand the onset of adaptation, which operates through the principle of situated attention, since it simultaneously accounts for the motivationally-based structures put in place by organizations and the environmental contexts that supply stimuli. The attention-drawing attributes of issues are a long-neglected aspect of organizational behaviour and a critical component of the innovation strategies for organizations—or, as March and Simon (1993: 219) declare, innovation programs depend on “what matters attract attention.” Given that incumbents tend to lock-in to initial innovation strategies (Burgelman, 2002; Eggers, 2012b; Klingebiel & Joseph, 2016), examining the novelty, salience, and vividness of environmental issues as potential triggers of innovation is pertinent.

For clarity, I adopt the definition of novelty as the characteristics of an issue that, either partly or wholly, deviate from the prior experiences or knowledge bases of a set of peer organizations (Barto et al., 2013; Li et al., 2013; March, 2010). Important in this regard is that novelty applies to groups of organizations (e.g., competitors within an industry)—neither novelty to the local organization nor novelty to the global set of all organizations are at issue (March, 2010). Novelty, when applied to peer organizations, implies competition for innovation and the possibility that some organizations *could* differentiate themselves based on novelty. If an issue were only novel to a single organization, it is likely meaningless to other organizations in the set. Additionally, I adopt the definition of salience as the degree to which an “issue resonates with and is prioritized by management” (Bundy et al., 2013: 353) and vividness as the distinctiveness of an issue

relative to other issues occurring simultaneously (Li et al., 2013). Each of these attributes is related to one another in the attention literature and are developed from prior work in social psychology (Kahneman, 1973; Ocasio, 2011); however, novelty plays a particularly important role in the development of strategic attention for organizations.

As outlined in Chapter 3, adaptation and strategy are related primarily through the concept of value creation. Of the three attention-seeking attributes, novelty is particularly linked to value creation since novelty can generate perceived value in products and services (Hargadon & Douglas, 2001; Rindova & Petkova, 2007) and allows organizations to distinguish themselves competitively due to the difficulty associated with recognizing novelty in distant terrains (Gavetti, 2012; Gavetti et al., 2005; Rosenkopf & McGrath, 2011). Novelty is, therefore, the attribute within stimuli that presents strategic opportunities for organizations to gain initial temporal advantages relative to other organizations (Shepherd et al., 2017). If an issue is closely tied to prior expectations or experiences (i.e. it is not novel), then the ability to generate new value from the issue diminishes regardless of the salience or vividness associated with the issue (Rindova & Petkova, 2007). For this reason, scholars often emphasize the critical importance of novelty in exploration and long-run adaptation, since novelty generates value that drives future performance benefits (Kaplan & Vakili, 2015; March, 1991; Rosenkopf & McGrath, 2011). While issues that are too novel may not generate value (Hargadon & Douglas, 2001), moderate degrees of novelty appears to be a pre-condition for value creation and a necessary trigger to warrant initiating adaptation processes. Novelty can be either generated by incumbents or generated by the environment. Regardless, novelty is the driving force behind producing information that alters the stability of an environment. Without novel information, environments remain stable and adaptation is (typically) unnecessary. The dynamism produced by novelty, therefore, influences convergence or divergence in adaptation and triggers the onset of adaptation.

Proposition 4: Organizations are unlikely to begin the adaptation process in the absence of novelty, regardless of the salience and vividness of issues.

If novelty becomes the precondition for initiating processes of adaptation, salience and vividness become subsequent conditions that enable managers to (1) recognize signals from noise and (2) prioritize issues for organizational strategy more broadly (Dutt & Joseph, 2019; Starbuck & Milliken, 1988). As a result, strategic attention to novel issues is moderated by both salience and vividness to determine the relative strength of environmental stimuli versus attentional structures.

4.2.3 Structures Meet Novel Environmental Issues

Under the assumption that novelty serves as a precondition for adaptation, I turn to an examination of salience and vividness as moderating factors. Given the motivation at the outset of this chapter to further develop the principle of situated attention, I add the assumption that attention directing structures (e.g., representations, capabilities, and communication) are present to demonstrate the interaction with attention-drawing issues.

Novel issues that are salient are more likely to draw strategic attention for fairly obvious reasons—these issues resonate with managers by definition and offer value-creating potential. Vividness compounds this effect as the high visibility in the environment makes issues easier to spot. However, consider the interaction between the compounded presence of novelty, salience, and vividness on organizations with structures in place that direct attention toward novel issues. High levels of interaction between structures and stimuli depend greatly on the degrees of salience and vividness tied to issues. Novel and vivid issues (with low salience) are easily recognizable but more likely to be classified as fads since managers are unlikely to resonate with such issues (Abrahamson, 1991).

Broadly, salience becomes more likely to draw attention while vividness may detract attention in some circumstances. Table 6 summarizes four likely interactions that take place to identify whether structural- or issue-related attributes work in conjunction or in conflict to alter strategic attention. Embedded in Table 6 are two assumptions: (1) attention directing structures are present and (2) novelty resides in repositories where signals and noise are both present (Maslach et al., 2018).

Prior experiences or communication mechanisms are examples of attention-directing structures (Ocasio, 2011). In the case of prior experiences, enabling and hindering effects

on strategic attention are present (Ener, 2019). For instance, experience initially enables innovation as familiarity leads to efficient search yet, at very high levels, experience can hinder innovation as executives focus attention on prior successes (Ener, 2019; Starbuck & Milliken, 1988). By embedding the assumption of structures in Table 6, the enabling and hindering effects of structures (where applicable) are adopted as well. Likewise, an example of a repository of novelty is the venture capital community where discontinuous innovations emerge to draw strategic attention (Maula et al., 2013). Within repositories of novelty, signals emerge based on salience and vividness that allow novel issues to enter strategic agendas.

Table 6: Salience and Vividness Effects on Relationship Between Attention-Directing Structures and Strategic Attention to Novel Issues

	High Salience <i>Increased Likelihood of Strategic Attention</i>	Low Salience <i>Decreased Likelihood of Strategic Attention</i>
High Vividness <i>Increased Influence of Attention-Drawing Stimuli</i>	High Interaction Stimulus amplifies the structural effects on strategic attention <i>Impact on Structures:</i> <ul style="list-style-type: none"> • <i>Salience and vividness combine to amplify both enabling and hindering effects on strategic attention</i> 	Dismissive Attention Stimulus crowds out the structural effects on strategic attention <i>Impact on Structures:</i> <ul style="list-style-type: none"> • <i>Vividness with low salience amplifies hindering effects</i>
Low Vividness <i>Increased Influence of Attention-Directing Structures</i>	Attention as Search Structural effects crowd out stimulus effects on strategic attention <i>Impact on Structures:</i> <ul style="list-style-type: none"> • <i>Structures search among novel issues, high salience enables efficient search</i> 	Ambivalent Attention Structural effects crowd out stimulus effects on strategic attention <i>Impact on Structures:</i> <ul style="list-style-type: none"> • <i>Structures search among novel issues, high salience precludes efficient search</i>

Note: Embedded Assumptions in Cells:

- *Attention-directing structures with enabling and hindering effects on strategic attention*
- *Issues are sourced from repositories of novelty*

Since all 3 attention-drawing attributes of stimuli are present in the upper left quadrant, a high level of interaction occurs between stimuli and structures. Stimuli, therefore, amplifies both the enabling and disabling structural relationships. In a sense, attention-drawing attributes place perceptive pressures on managers and effectively increase the levels of *both* signals and noise in the stimuli. If hindering effects are present among attentional structures (as they are with prior experience), both enabling and hindering effects are likely to be amplified. As a result, I propose the following:

Proposition 5: High degrees of salience and vividness amplify both the enabling and hindering effects of attention-directing structures on strategic attention to novel issues.

Moving clockwise to the upper-right quadrant of the table builds on prior arguments albeit with lower degrees of salience. Strong signals are noticed in the environment (issues are vivid and visible); however, the immediate application to the organization is unclear. As a result, the enabling effects of structures are likely to be altered. The high visibility generated by the novel issue reinforces the hindering effects of attention-directing structures (if present in the same way as prior experience), which ultimately seeds doubt that the issue is of value to the organization. The result is a dismissive form of strategic attention that moves to alternative issues of salience. High vividness with low salience becomes emblematic of fads that organizations overlook.

Proposition 6: High degrees of vividness combined with low degrees of salience amplify the hindering effects of attention-directing structures on strategic attention to novel issues, reducing strategic attention.

The absence of vividness, conversely, downplays the observability of novel issues and reduces the attention-drawing effects. Novel issues remain largely hidden from view in the bottom-most rows of Table 6, allowing attention-directing structures to play a larger role in driving strategic attention for organizations. The efficiency of attention-directing structures, therefore, dominates and search activity promotes strategic attention to novel issues (Kor, 2003; Li et al., 2013).

While vividness enhances signals in the environment, it can simultaneously enhance the presence of noise for novel issues. Low vividness, therefore, removes both signals and noise from the environment, allowing the organization to rely heavily on structures in pursuing novel issues. Under the assumption that attention-directing structures are in place, search processes drive attention to novel issues in two different ways. Search processes favour strategic attention when salience is present (e.g., prior experience leverages familiarity to find novel issues) and generates inattention when salience is absent. The latter effect points to unresolved search processes that do not detect issues that resonate with organizations. Because organizations disclose strategic issues deemed legitimate by external stakeholders (Benner, 2010), reporting issues with low levels of salience is unlikely regardless of the attention directing structures that are in place. As a result, I argue for the following two propositions.

Proposition 7: High degrees of salience combined with low degrees of vividness favours the effect of attention-directing structures on strategic attention to novel issues, which enables increased strategic attention with efficient search.

Proposition 8: Low degrees of salience and vividness favours the effect of attention-directing structures on strategic attention to novel issues, yet unresolved search processes generate ambivalent or unobserved strategic attention.

In the next chapter, I turn to an empirical study on the initiation of adaptation processes by exploring the interrelationship between the three attributes of stimuli and attention-directing prior executive experiences. Empirically, I focus on the impact of discontinuous innovation in the financial sector through the emergence of financial technologies (FinTech) and the prior technological experiences of banking executives in 35 incumbent banks over a 12-year period.

Chapter 5

5 The Salience Dialectic: A Bayesian Perspective on Attention-Drawing FinTech Innovation in Banking

“Silicon Valley is coming.” Chief Executive Officer Jamie Dimon astutely recognizes the looming potential of financial technology start-ups and assures shareholders that JP Morgan Chase is prepared (JP Morgan Chase, 2014). Strategic attention directed toward changes in the technological environment is a well-known precondition for incumbent adaptation (Eggers & Park, 2018). When innovation enters the strategic agenda, “the set of issues commanding managerial attention [based on the] limited capacity for the number of issues that can be prioritized,” organizations adopt new technologies earlier and adapt more readily (Bundy et al., 2013: 361; Dutt & Joseph, 2019; Eggers & Kaplan, 2009). What triggers shifts in strategic attention given that innovation, particularly discontinuous innovation, is multifaceted?

Discontinuous innovations are technologies that chart new trajectories in industries and exists as two types: *technological discontinuities* supplied to organizations and *market discontinuities* that combine technologies to serve consumers (Aggarwal & Wu, 2015; Benner & Tripsas, 2012; Shepherd et al., 2017). In general, executive technological experience channels attention toward innovation to facilitate adoption (Cho & Hambrick, 2006; Fox, Simsek, & Heavey, 2021). What remains unclear is whether technological and market discontinuities are similarly affected by technological experience. Discontinuous innovations uniquely impact organizational knowledge (Eggers & Park, 2018), suggesting that organizations may attend to types of innovation differently. Moreover, unrecognized market discontinuities can spell doom for organizations (Christensen & Bower, 1996; Henderson & Clark, 1990), thus explaining attentional shifts that trigger adaptation for each type of discontinuous innovation is critical.

Organizations may also be less likely to channel valuable strategic attention to discontinuous innovation since they often emerge in distant terrains, such as start-up communities with high failure rates (Maula, Keil, & Zahra, 2013). Alternatively, innovation is more likely to stimulate and *draw* strategic attention to changes in the

environment (Ocasio, 1997; Shepherd et al., 2017). In these cases, the technological experience used to seek change instead acts to evaluate opportunities as they emerge, posing an interesting puzzle. Prior experience is considered to be “a poor teacher” of evaluating novelty (March, 2010), so it may channel attention toward discontinuous innovation and simultaneously misdiagnose novelty and diminish attention. As a result, I ask *what draws strategic attention to discontinuous innovations and what is the subsequent impact on the relationship between executive technological experience and strategic attention?*

I draw on signal detection theory to elaborate on the principle of situated attention, where *attention-drawing* attributes of stimuli interact with *attention-directing* effects of experience (Kahneman, 1973; Ocasio, 2011). I then demonstrate the complementary and contradictory effects of novelty, salience, and vividness as attention-drawing attributes on strategic agendas, a construct of strategic attention (Li, Maggitti, Smith, Tesluk, & Katila, 2013). I find that organizations are more likely to shift strategic agendas to *technological* versus *market discontinuities*, independent of executive technological experience, due to salience effects.

Simultaneously, the attention-drawing attributes of *technological discontinuities* amplify the effects of executive technological experience in channelling attention toward discontinuous innovation. Novel, salient, and vivid innovations initially enhance the effect of experience to increase strategic attention; however, a tipping point is reached where the increased familiarity dismisses the attention-drawing attributes of innovation, thus decreasing strategic attention to innovation. The result is a delicate balancing act for organizations—technological experience walks a fine between salience and skepticism when evaluating discontinuous innovation.

Empirically, I study the emergence of financial technologies (FinTech) and their inclusion in the strategic agendas of incumbent banks in the United States from 2007 to 2018. The rise of FinTech in the wake of the global financial crisis posed substantial challenges for incumbent banks that faced a threat of disintermediation as start-ups leveraged new technologies to circumvent banks and service client banking needs directly. I use a unique application of topic modelling on 1,400 earnings call transcripts to

proxy the strategic agendas for 35 incumbent banks and subsequently examine the prioritization of FinTech from its onset. I then deploy a multivariate mixed-effects beta regression in a Bayesian framework to model the impact of early-stage venture capital investments, an important repository of innovation signals, and executive technological experience on strategic attention to FinTech (Kruschke, Aguinis, & Joo, 2012).

I make three important contributions to the literature on adaptation to technological innovation and the attention-based view. First, I find support for my hypothesis that organizations are more likely to prioritize *technological* compared to *market discontinuities*, suggesting that the propensity for organizations to overlook novel demand environments is cognitive in nature and can prolong or delay the adaptation process for specific types of innovation. A stimulus-oriented bias in how executives examine their technological environments is, therefore, uncovered.

Second, I elaborate upon the principle of situated attention in the attention-based view and identify the countervailing effects of stimuli on executive experience in channelling strategic attention. Stimuli can amplify both experience as an enabler and experience as a hindrance to innovation (Ener, 2019), suggesting a complication for organizations that seek to pursue innovation by bolstering technological experience in their executive teams.

Finally, the methodological use of Bayesian regression in cognitive research enables modeling for complex distributions relevant to behavioral strategy while also generating the entire distributions of coefficient estimates. The latter facilitates a continuous form of inference relevant to understanding organizational behavior.

5.1 Strategic Agendas and Adaptation to Discontinuous Innovation

Strategic agendas are core to the attention-based view and represent the highest priority issues attended to by top managers in the organization (Ocasio, 1997; Ocasio & Joseph, 2005). Issues, here, refer to the “problems, opportunities, and threats that make up the agenda of the firm, which are then available to organizational decision-makers to respond to or ignore” (Ocasio, 1997: 194). To reach the strategic agenda, issues must pass through the strategic filter of the top management team (TMT), whose responsibility is to

determine priorities (Ocasio & Joseph, 2005). Issues are carried through two primary vehicles: (1) the attention-directing structures put in place by the organization and (2) the environmental stimuli that draw the attention of decision-makers (Dutton & Jackson, 1987; Ocasio, 2011). The relationship between attention-directing structures and attention-drawing stimuli fall firmly within the principle of situated attention in the attention-based view; a principle this paper seeks to develop by exploring the initiation of adaptation through updates to the strategic agenda (Bundy et al., 2013; Dutt & Joseph, 2019).

Discontinuous innovations frequently act as issues that provoke strategic agenda shifts as decision-makers consider the need to update uses of technology to match the conditions in the technological environment (Bourgeois & Eisenhardt, 1988; Eggers & Park, 2018; Maula et al., 2013). The phrase “discontinuous innovation” is used in a manner consistent with Shepherd et al (2017) to represent new trajectories in technologies or configurations of technologies that chart different trajectories from prior configurations. Recognizing discontinuous innovation and shifting strategic agendas accordingly drives organizations to adopt innovation earlier and ultimately adapt (Eggers & Kaplan, 2009; Kaplan, 2008b; Nadkarni & Barr, 2008).

Organizations often struggle to prioritize discontinuous innovations since they surface in distant and unfamiliar terrains without clear use cases (Gavetti, 2012; Gavetti et al., 2005; Li et al., 2013). Moreover, discontinuous innovations come in at least two types: *technological discontinuities* that are supplied to organizations and *market discontinuities* that reconfigure multiple technologies to serve market needs (Aggarwal & Wu, 2015; Benner & Tripsas, 2012; Clark, 1985). The ambiguity of locating innovation in distant terrains and classifying innovation as technological or market strains strategic filtering. As a result, cognitive processes feature prominently in distinguishing the discontinuous innovations to pursue as opportunities from those to avoid as risks to legitimacy (Benner, 2010; Dutt & Joseph, 2019; Kaplan & Tripsas, 2008).

Attention directing structures facilitate and enable prioritization, primarily through the presence of prior experience in the TMT. Prior technological experience eases the filtering process since executives are likely to search among issues familiar to their

experiences in order to discover opportunities for recombination (Li et al., 2013; Starbuck & Milliken, 1988). Technological experience, here, refers to procedural knowledge in the domain of technologies (Mackey, Molloy, & Morris, 2014). Prior executive technological experiences are, therefore, likely to channel attention toward discontinuous innovation, which facilitates recognition and prioritization in strategic agendas (Gavetti & Levinthal, 2000; Tuggle et al., 2010) while providing decision-makers with much-needed legitimacy to appease stakeholders (Higgins & Gulati, 2006).

Organizations with prior technological experience leverage familiarity to understand complex technological environments and create simpler cognitive representations that focus managerial attention on opportunities versus the inherent uncertainty tied to discontinuous innovation (Gavetti et al., 2005; Gavetti & Rivkin, 2007; Ocasio, 1997). With a greater propensity to recognize opportunities, strategic filters widen and enable discontinuous innovations to be prioritized since market uncertainty is reduced (Diestre et al., 2015). Simplifying complex environments is consistent with the capabilities literature and executives' ability to sense innovation and seize opportunities (Adner & Helfat, 2003; Helfat & Martin, 2015; Kor, 2003).

Accounts of the attention-directing effects of prior experience as an enabler do not fully capture pursuits of discontinuous innovation, however. Organizations tend to dismiss innovation that does not fit with prior technological mental models (Kaplan, 2003; Tripsas & Gavetti, 2000). Ener (2019), in a study of biotechnology organizations, identifies an inverted U-shape relationship between prior experience and new market entry, accounting for both the enabling and hindering effects of prior experience. Strategic filtering through the lens of prior experience, therefore, involves both “looking for the familiar” and “overlooking the familiar” (Starbuck & Milliken, 1988: 44).

Moreover, the ambiguous presence of both technological and market discontinuities begs the question of whether attention is uniquely impacted by one or both forms—a largely overlooked aspect of the attention literature. Given that attention relies on noticing (Ocasio, 1997) and that “noticing is an act of classifying stimuli as signals or noise” (Starbuck & Milliken, 1988: 43), a stimulus-driven account of attention to discontinuous innovation is warranted to complement attention-directing structures in adaptation.

Identifying the attention-drawing attributes of stimuli and its impact on attention-directing prior experience foregrounds the understudied principle of situated attention in adaptation processes (Ocasio, 1997, 2011).

5.2 Attention-Drawing Discontinuous Innovation as Signal Detection

Executive attention is drawn to issues that are novel, salient, and vivid, although management scholars predominantly leverage these attributes to describe the search for innovation through new product deployments (Li et al., 2013). The focus on search behaviour adds depth to attention-directing structures that drive innovation, yet says less about how novelty, salience, and vividness draw the attention of decision-makers. Research on attention-drawing issues focuses on institutional field-level change (Hoffman & Ocasio, 2001; Nigam & Ocasio, 2010) or micro-level factors that allow documents to attain the attention of decision-makers (Hansen & Haas, 2001).

In building a theoretical framework of attention-drawing discontinuous innovation as an impetus for strategic agenda shifts, I incorporate signal detection theory through the attributes of novelty, vividness, and salience to elaborate on the principle of situated attention. Attention selection features prominently in signal detection theory with a focus on the likelihood of classifying stimuli as signal versus noise (Broadbent, 1971; Kahneman, 1973). Signal detection theory, therefore, aligns well with the primary function of executives as they contemplate pursuits of discontinuous innovation by determining the issues to respond to or ignore (Ocasio, 1997; Starbuck & Milliken, 1988).

The two primary parameters of signal detection theory are the criterion function, the threshold for detecting a signal, and the sensitivity parameter, the strength of the signal itself (Kahneman, 1973). Treating the criterion function as organization-specific, the attributes of novelty, salience, and vividness will be applied to the sensitivity parameter to determine the likelihood of strategic agenda shifts to technological and market discontinuities. The sensitivity parameter is conceptualized as the perceptible distance

between signals and noise in the environment where increased sensitivity translates to higher signal detection, holding the criterion function constant.

Applying the attribute of novelty provides a logical starting point. By novelty, I mean the characteristics of an issue that, either partly or wholly, deviate from the prior experiences or knowledge bases for a set of incumbent organizations (Barto et al., 2013; Li et al., 2013; March, 2010). The deviation from prior expectation is what increases the sensitivity parameter, disrupts attentional processes, and allows issues to be recognized as signals (Kahneman, 1973). Particularly important is that novelty applies to a set of incumbent organizations in adaptation processes (March, 2010). Take, for example, the long history of artificial intelligence, a series of technologies that began in the 1950s intending to replicate human thought (Simon, 1995). Despite being around for 70 years, modern applications of artificial intelligence are novel to organizations in financial services, healthcare, and agriculture alike (Adner et al., 2019; von Krogh, 2018). Discontinuous innovations are novel by definition (Shepherd et al., 2017). More importantly, novelty is what distinguishes innovations as strategic since it holds the potential to create value in consumer markets (Rindova & Petkova, 2007) or generate higher performance from difficult-to-navigate terrains (Gavetti, 2012; Rosenkopf & McGrath, 2011).

Because of the aforementioned challenges, namely that discontinuous innovation emerges in unfamiliar terrains and comes in multiple forms, executives are likely to rely on repositories of novelty to determine whether novel changes are occurring in the technological environment (Maslach et al., 2018). Maula et al (2013) describe the venture capital community as a repository of discontinuous signals and a source of novelty relevant to strategic agendas in the internet and wireless technology industry.

Repositories for novelty simplify environments for executives yet the noise associated with novelty (i.e. novelty is prone to high failure rates) remains present (March, 2010). Executives, therefore, seek signals within repositories of novelty that are vivid and easy-to-detect (Starbuck & Milliken, 1988). I adopt a definition of vividness as the distinctiveness of an issue relative to other issues (Gardner, 1983; Li et al., 2013). Novelty and vividness together increase the sensitivity parameter in a manner that is

more likely to be detected as a signal of change by incumbent organizations. The effect is akin to sudden jolts that provoke the initiation of adaptation processes (Meyer, 1982). In the context of venture capital, Ant Financials' major capital raise of \$14 billion in 2018 stands out as a recognizable signal that mobile wallets may achieve the scale necessary to challenge incumbent payment systems, which traditionally rely on physical credit cards⁸.

Novelty and vividness together enhance the sensitivity of stimuli by making distant terrains appear visible; however, they do not necessarily resolve the ambiguity associated with noisy failure rates within repositories of novelty. The final attribute, salience, becomes relevant when applied *within* repositories of novelty. I leverage the definition of salience as the degree to which an "issue resonates with and is prioritized by management" (Bundy et al., 2013: 353). Salience is linked primarily to an organization's perceived instrumental value in that it best serves to reinforce the existing actions of the organization (Dutton & Dukerich, 1991; Dutton & Jackson, 1987). Technological and market discontinuities differ along this dimension according to prior research.

Technological discontinuities are often referred to as supply-side technologies that focus specifically on the trajectories of technological artifacts (Benner & Tripsas, 2012; Clark, 1985; Kaplan & Tripsas, 2008). Technological discontinuities can be both beneficial and detrimental to organizational competencies, which is difficult for incumbents to determine ex-ante (Tushman & Anderson, 1986). However, A series of studies in the digital photography, typesetter, and digital print industries suggest that incumbents at least attempt to incorporate new technologies into strategic agendas, highlighting the beneficial aspects of technological discontinuities at the point of strategic agenda shifts (Cohen & Tripsas, 2018; Gilbert, 2006; M. Tripsas, 1997; Tripsas & Gavetti, 2000).

In contrast, market discontinuities reflect changes in technological trajectories associated with reconfigurations of technologies to better service shifts in consumer demand (Benner & Tripsas, 2012; Christensen & Bower, 1996; Henderson & Clark, 1990; Wang,

⁸ Ant Financial is the parent company to the popular mobile wallet and payments application Alipay. The company also offers several other digital financial services.

Aggarwal, & Wu, 2020). Incumbents are challenged with demand-side change largely due to observability and prioritization issues. Reconfigured technological components can appear to service the same needs as prior technologies, thus the immediate benefit of change is unclear (Henderson & Clark, 1990). Additionally, organizations may favour the needs of existing markets rather than the needs of new markets served by market discontinuities (Christensen & Bower, 1996).

Taken together, the potential to incorporate technological discontinuities into existing strategic agendas is more likely to resonate with incumbent organizations due to increased salience and “perceived instrumental value” (Bundy et al., 2013). Simply put, technologies can be incorporated into existing strategies while market discontinuities require entirely new strategies. Returning to signal detection theory, the sensitivity parameter is enhanced by novelty and vividness for both discontinuities yet the salience effect favors technological versus market discontinuities, which increases the attentional effect (Kahneman, 1973). Case in point, Polaroid developed several patents in digital imaging and prioritized technological changes in its strategic agenda but failed to attend to shifts in the demand environment (Tripsas & Gavetti, 2000). As a result, I propose a relative hypothesis between the two types of discontinuous innovation.

Hypothesis 1 (H1): Technological discontinuities are more likely than market discontinuities to be attended to within strategic agendas.

5.2.1 The Salience Dialectic on Technological Experience and Strategic Agenda Shifts

The principle of situated attention emphasizes the conjoint effects of attention-directing structures and environmental stimuli, suggesting that salience effects on technological discontinuities are likely to alter the experience-related structures that direct attention toward technological discontinuities. The baseline hypothesis that I adopt is an inverted U-shaped relationship between prior technological experience and strategic attention to technological discontinuities (Ener, 2019; Starbuck & Milliken, 1988; Walsh, 1995).

Recall that technological experience is known to have both enabling and hindering effects on new product launches (Ener, 2019). Cho & Hambrick (2006) demonstrate that the

relationship between prior technological experience and entrepreneurial activity is mediated by strategic attention, suggesting that strategic agendas hold a similar curvilinear relationship. In repositories of novelty, salient and vivid technological discontinuities are likely to exacerbate the enabling effects of prior technological experience on strategic agendas. The reasons for this are two-fold. First, prior technological experience is initially efficient in searching through repositories of technological discontinuities due to a partial familiarity with technologies in general (Kor, 2003; Li et al., 2013). Vivid signals simultaneously draw attention, which experienced organizations are more likely to recognize as salient since they hold knowledge of prior technological use cases, further enhancing the likelihood of prioritization (Cho & Hambrick, 2006). Strategic agendas shift as the salience effects associated with technological discontinuities protect the legitimacy of the organization and propel disclosures that depict the organization as innovative (Benner & Ranganathan, 2012).

As prior technological experience grows, however, propensities toward myopic behaviors emerge (Ener, 2019). The impact on strategic agendas manifests through novelty and vividness, which reframes salience. Novelty relies on deviations from prior experience by definition (Barto et al., 2013). As technological experience increases, it becomes less likely that organizations deem a technological discontinuity as novel since there is a greater likelihood of associating any novel technological discontinuity with some prior technology. For example, experienced organizations may (perhaps incorrectly) relate the decades-old SWIFT electronic funds transfer system to the advent of blockchain technology. The perceived lack of novelty reframes vivid technological discontinuities as technological fads that are risky and less salient to organizations (i.e. some technological discontinuities are extremely successful but most fail miserably). Theoretically, vivid technological discontinuities introduce a perception of noise for experienced organizations, which reduces the sensitivity parameter and signal detection (Kahneman, 1973; March, 2010). The lock-in effects that hinder technological experience from shifting strategic agendas are exacerbated as a result and technological discontinuities are deprioritized.

Hypothesis 2a (H2a): Saliency and vividness amplify the enabling effects in the curvilinear relationship between technological experience and strategic attention to technological discontinuities.

Hypothesis 2b (H2b): Saliency and vividness amplify the hindering effects in the curvilinear relationship between technological experience and strategic attention to technological discontinuities.

5.2.2 The Diminishing Effect of Market Discontinuities on Technological Experience and Strategic Agenda Shifts

Market discontinuities present a different challenge for organizations due to multiple technological components changing simultaneously that typically serve different consumer needs than incumbents. The diminished saliency associated with these challenges induces dismissive behavior in organizations that reduces the likelihood of market discontinuities being prioritized in strategic agendas (Bundy et al., 2013).

Nonetheless, vividness draws strategic attention to market discontinuities and allows innovation to stand out in plain view for organizations to evaluate (Gardner, 1983; Li et al., 2013). Facebook's 2019 announcement of the cryptocurrency Libra⁹, an application of blockchain technology to demand environments, exemplifies a potential market discontinuity. Facebook's involvement draws attention to cryptocurrencies as an innovation that potentially disintermediates incumbent financial services organizations in the payment subsector. Market discontinuities that target unique demand environments invoke different cognitive mechanisms when vivid.

Building upon the curvilinear relationship associated with prior experience and attention (Ener, 2019), vividness uniquely intervenes in the relationship when saliency is diminished. The enabling effects of familiarity as an efficient search mechanism are also diminished since market discontinuities require new business models and new priorities (Christensen, McDonald, Altman, & Palmer, 2018). The lack of congruence between current business models and vivid market discontinuities offsets the enabling effects of

⁹ Facebook has since rebranded Libra as Diem

technological experience, producing skepticism and reduced strategic attention relative to alternative issues. Vergne and Depeyre (2016) demonstrate that organizations with alternative priorities intentionally divert strategic attention elsewhere, supporting the notion of skepticism. The hindering effects of experience and lock-in are similarly reinforced, effectively producing a “flattening” effect. Since the positive effects of technological experience on strategic attention are diminished, experienced organizations do not benefit from efficient search and largely deprioritize market discontinuities in strategic agendas.

Hypothesis 3 (H3): Vividness combined with diminished salience offsets the enabling effects in the curvilinear relationship between prior technological experience and strategic attention to market discontinuities, producing a flattening effect.

A summary of the theoretical relationships is provided in Table 7 to organize the expected relationships.

Table 7: Theoretical Framing and Hypotheses

← Increasing Salience of Discontinuous Innovation ←		
<i>Hypothesis 1</i>		
	Technological Discontinuities	Market Discontinuities
	Issues enhance structural effects	Issues reverse structural effects
	<i>Steepening of the curvilinear relationship between tech experience and strategic agendas</i>	<i>Flattening of the curvilinear relationship between tech experience and strategic agendas</i>
Heightened Vividness <i>Issue is prominent among novel issues</i>	<p><i>Hypothesis 2a and 2b</i> <i>Visual Representation</i></p> <p style="text-align: center;">— Interaction ···· Main Effect</p>	<p><i>Hypothesis 3</i> <i>Visual Representation</i></p> <p style="text-align: center;">— Interaction ···· Main Effect</p>
<i>Visuals Adopted from Haans et al (2016)</i>		

5.3 Data and Methods

5.3.1 Industry Context and Sample Selection

Discontinuous innovation and its impact on organizations is best analyzed when technological discontinuities and market discontinuities emerge simultaneously at the fringes of industries to stimulate incumbent adaptation. The financial services industry during the period of 2007 to 2018 offers such a context as incumbent banks in the United States were challenged by a series of innovations in the wake of the 2008 financial crisis. Financial technologies, known as FinTech, refers to both technologies (e.g., blockchains, artificial intelligence) and technological applications to banking services (e.g., robo-advisors that automate wealth management, peer-2-peer payments that enable money transfers) (Chen, Wu, & Yang, 2019). While financial services and technologies have co-evolved for decades, mostly in non-threatening ways to incumbents, the onset of the 2008 financial crisis initiated a new genre of FinTech—one where start-up organizations leveraged technology to displace the services of incumbents (Arner et al., 2016). The multifaceted service offerings of incumbents (banks simultaneously offered services of lending, insurance, payment processing, wealth management, etc.) meant that many business units were under attack simultaneously, by both technological and market discontinuities, at a time when priorities were distinctly centred on liquidity issues associated with a troublesome subprime mortgage crisis.

Given the emphasis of start-ups on disintermediating financial services, the innovations impacting U.S. banks beginning in 2008 can be classified as novel and emerging from a specific repository (the start-up community), providing an ideal setting to examine strategic agenda shifts for incumbents. Additionally, the presence of liquidity concerns suggests that incumbents cautiously prioritized innovation, allowing for a conservative research context in which incumbents would not haphazardly pursue risky technologies. As such, I selected an initial sample of 37 incumbent banks that exceeded a registered

deposit threshold of \$50 billion in 2018 within the United States¹⁰. Holding registered deposits of greater than \$50 billion triggers regulations in the Dodd-Frank Wall Street Reform and Consumer Protection Act imposing increased reporting requirements on banks above the threshold (Congressional Research Service, 2017); therefore, the initial sample is constrained to the same regulatory environment, ruling out potential institutional factors that may alter strategic agendas.

Data were then sourced for the 37 incumbent banks beginning from 2007 to 2018 to capture the year before the onset of FinTech. Following the lead of strategic cognition scholars, strategic agendas were drawn from public archival documents where TMTs disclose strategic intentions (Kaplan, 2011; Ocasio, 2011). Earnings call transcripts were chosen as the primary data source to capture strategic agendas for two reasons: (1) they offer a granular depiction of strategic agendas at a quarterly level where shifts can be pinpointed to a greater degree and (2) they exist in a contested forum whereby statements made by TMTs are subjected to questioning by security analysts, thus reducing the likelihood of symbolic rhetoric that may never result in adaptive behaviour (Benner, 2010; Bundy et al., 2013). Earnings call transcripts were collected longitudinally for each incumbent and sourced from the S&P Capital IQ database. Insufficient data were available for the United States Automobile Association, a private organization focused on military veterans, and MUFG Americas Holding Corporation, a subsidiary of Mitsubishi Financial Group. Both organizations were excluded from the analysis. The retained sample of 35 incumbent banks represented a total of 1,400 organization-quarter observations.

5.3.2 Measures and Variables of Interest

To capture the incumbents' strategic agendas, earnings call transcripts were first split into its three primary components: the presentation portion, questions asked by security analysts, and answers provided by executives. Given that the presentation portion

¹⁰ I subsequently reviewed the entire timeframe from 2007 to 2018 to avoid a survivorship bias. NatWest, a subsidiary of the Royal Bank of Scotland, was the only bank to drop out of the sample. Assets were divested due to a refocusing on alternative geographies and not due to bankruptcy.

represents the voluntary disclosure of strategic intentions and analyses of performance prior to any influence from the questions asked by security analysts, the presentation portion was leveraged as a more granular depiction of the 10-K forms and letters to shareholders commonly used to measure strategic agendas (Dutt & Joseph, 2019; Kaplan, 2011; Ocasio, 2011).

Tech Agenda and *Market Agenda*. I use advanced computational techniques to both uncover the strategic agendas of organizations and establish the prioritization of novel technologies. More specifically, I leverage Latent Dirichlet Allocation (LDA), a topic modelling method that probabilistically determines words appearing together in a corpus of documents to resemble broader topics discussed (Hannigan et al., 2019; Wilson & Joseph, 2015). Prior to applying the topic model, I rendered the corpus by following the recommendations of Hannigan et al (2019), using topic coherence as a guide for the most appropriate model. Given the importance of selecting an appropriate number of topics, I validated the model by first deploying the method of Croidieu & Kim (2018) to generate a computationally derived range of 50-100 plausible topics¹¹. I then produced seven different topic models before determining that a topic model of 75 topics (representing the number of topics present throughout the period under study) best suited the data. In each quarter, an incumbent discussed 6.26 topics on average, which are interpreted as the highest priority topics (or issues) that make up the strategic agenda. Topic modelling, therefore, provides the advantage of proxying the entire strategic agenda compared to word count approaches that focus on singular issues. In addition, topic modelling outputs a percentage of discourse allocated to a topic, which I interpret as the degree to which topics are prioritized based on attention allocated.

LDA is particularly advantageous to studying forms of innovation since words are permitted to fit within multiple topics (Blei, Ng, & Jordan, 2003). A congregation of technological words can then be distinguished from technological words that co-occur with market applications. As a result, second-order coding was conducted on all 75 topics

¹¹ The wide ranged resulted from some multiple maximization peaks in the computational algorithm. As a result, I leveraged multiple points of qualitative validation for the dependent variable

to group and identify topics pertaining to technological discontinuities and market discontinuities separately. In total, 3 topics were classified as technological discontinuities and summed to reflect the dependent variable of *Tech Agenda* and 3 topics were classified as market discontinuities and summed to reflect the dependent variable of *Market Agenda*. Keywords associated with each of the 6 technological topics and details regarding second-order coding are outlined in Table 8.

Table 8: Topic Model Results and Key Terms

Second-Order Theme	Topic Number	Topic Label	Representative Terms Among the Top 40 Most Prevalent Words
Tech Agenda	5	Technological and Mobile Efficiencies	digit, cost, transform, profit, app, mobil
	25	Emerging Technologies	tech, platform, autom, scale, digit, cloud, tool, blockchain, capabl, integr, api, robot, effici, softwar, transform, cost, product
	43	Technological Investing ¹²	beta, tax, reform, digit, tech, outlook, expans, optim,
Market Agenda	22	Client-based Mobile Banking ¹³	custom, mobil, improv, card, devic, user, atm, digit
	45	Payment Platforms	Paypal, mobil, program, amazon, renew, platform, onlin, card, loyalti, launch, app
	48	Robo-Advisors	Monei, etf, intellig, fund, robo, advis, broke, web, advic, flexibl, competitor, solut, competit, product

9 Additional Second-Order Themes Identified: Investing & Wealth (6 Topics); Strategic Assessment & Performance (11 Topics); Regulatory (5 Topics); Capital, Commodity, & Stock Markets (11 Topics); Lending & Finance (10 Topics); Payments & Cards (8 Topics); Investor Guidance (8 Topics); Housing Market (7 Topics); and International Business Units (3 Topics)

Given the qualitative nature of the coding analysis, three alternative validation checks were conducted on each dependent variable. Following the procedure of both Andrevski et al (2014) and Fox et al (2021) to ensure the reliability of the coding, two independent raters classified the keywords from the topic model to identify technological discontinuities, market discontinuities, and non-tech topics. I then calculated Perrault and

¹² Included in the second order theme *Tech Agenda* since the topic ranked 2nd among all topics for prevalence of the word “tech” (as a cross-validation with representative keywords)

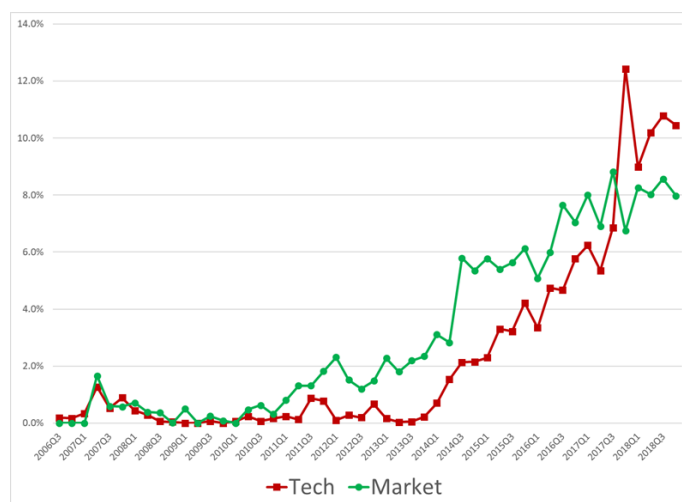
¹³ Included in the second order theme *Market Agenda* since the topic ranked 2nd among all topics for prevalence of the term “mobil” (as a cross-validation with the top 15 keywords)

Leigh's (1989) reliability index at 0.93, which scores well above the 0.70 threshold (Andrevski et al., 2014). Second, I cross-validated the summed topic proportions with a computer-aided text analysis that leveraged a lexicon of FinTech terms associated with both technological and market discontinuities. Significant and positive zero-order correlations of 0.42 and 0.37 were calculated for technological and market discontinuities respectively. Finally, to ensure that each respective topic proportion reflects substantive attention, two research assistants independently collected all press releases for the incumbent organizations in the study. Press releases were then independently coded and manually verified to reflect true incumbent actions in FinTech along both the technological and market dimensions¹⁴. Simple logistic regressions with errors clustered at the organization level indicate that every percentage increase in *Tech Agenda* and *Market Agenda* increased the likelihood that adoption would occur within the subsequent 4 quarters by 13% and 7% respectively¹⁵. The combination of procedures validates the topic model as a measure of strategic agendas.

Figure 5 displays the time trend of the dependent variable to validate that the measure captures the onset of strategic agenda shifts for both technological and market discontinuities in financial services. The trend is distinctly upward sloped and reflective of a wave of change occurring across financial services.

¹⁴ The coding procedure involved both web scraping based on a lexicon of FinTech terms and manual classification to ensure conformity with scraped press releases

¹⁵ Results are consistent with prior studies of strategic agendas that validate a significantly positive relationship between strategic agendas and subsequent action (Eggers & Kaplan, 2009; Kaplan, 2008b; Nadkarni & Barr, 2008; Ocasio, 2011)

Figure 5: Aggregated Strategic Agenda Trends

Independent variables. Prior to establishing measures for discontinuous innovation, I first sought relevant data sources that reflect repositories of novelty relevant to strategic agenda setting. Given that start-up FinTech organizations initiated the technological changes taking place in the banking sector (Arner et al., 2016), I adopt the approach of Maula et al (2013) and leverage the venture capital community as a repository of discontinuous innovation where novelty emerges. I leverage the Pitchbook database as a primary data source that specifically tracks equity-based venture capital deals in FinTech. To ensure the *novel* aspect of technologies is measured, I trimmed all venture capital deals in FinTech to include only Angel, Seed, Series A, and Series B funding to capture the newest, most novel start-ups. By excluding late-stage deals, I focus on start-up ventures that are not yet profitable, thus enhancing uncertainty that is typically associated with novelty (Kaplan & Tripsas, 2008; Rindova & Petkova, 2007). In total, 3,290 early-stage deals in FinTech took place from 2007 to 2018 (out of 3,708 total FinTech deals). As outlined in hypothesis development, the salience dimension of attention-drawing issues is reflected in the classification of technological versus market discontinuities; therefore, I focus measurement specifically on vividness within each classification.

Vivid tech and Vivid markets. To delineate technological discontinuities from market discontinuities, I focused on the prevailing definitions that align to theory. Technological discontinuities were coded based on start-ups supplying technologies alone (primarily to

incumbent organizations) in accordance with “supply-side” notions and market discontinuities were coded based on applications of technologies to new markets in accordance with “demand-side” notions (Wang et al., 2020). I then manually read and coded the business descriptions, keywords, and targeted verticals for each deal and classified the deals as *tech*, *market*, or *other* (to validate Pitchbook’s classification of FinTech deals). To ensure reliability, two research assistants independently coded a sample of 300 venture capital deals (approximately 10% of all deals) with the same definitions. I again computed Perrault and Leigh’s (1989) reliability index as 0.76, surpassing the threshold of 0.70. The coding procedure resulted in a final sample of 1,175 early-stage *tech* deals and 1,650 early-stage *market* deals in FinTech from 2007 to 2018.

Within the repository of novel venture capital deals, I then coded vivid deals based on instances of high-intensity investments that stand out. Industry reports notably capture and report on “mega-deals” of \$100M or more as significant events (CB Insights, 2018). With an average deal size of \$8.8M, a mega-deal plausibly demarcates vivid events that are multiple standard deviations above the norm. In total, 3 early-stage *tech* mega-deals and 13 early-stage *market* deals were recorded in the sample (out of 59 total mega deals). I coded the presence of a mega-deal in any of the trailing four quarters as 1 and the absence of a mega-deal in any of the trailing four quarters as 0 to reflect *Vivid tech* and *Vivid market* in each dimension.

Tech experience. Prior technological experience is measured in a manner consistent with upper echelons research by first identifying “Named Executive Officers” listed in the DEF 14A, 20-F, and 40-F regulatory filings for each quarter being analyzed, which resulted in the identification of 643 unique executives (Carpenter, Geletkanycz, & Sanders, 2004). Once each officer was identified, two prominent databases were used to construct *Tech experience*: Capital IQ S&P Market Intelligence was leveraged to extract biographical information for each executive and BoardEx was cross-referenced to obtain executive histories and durations of experience. Within the Capital IQ database, each executive biography was carefully read and coded to identify executives with technological experience using explicit mentions of past functional responsibility for technology, expertise with technology, or industry accolades for technology. To validate

the coding procedure, two research assistants independently coded a sample of 150 executives (approximately 25% of the sample) with the same definition. Perrault and Leigh's (1989) reliability index was computed as 0.91, surpassing the threshold of 0.70 and ensuring reliability.

Executives with technological experience were then analyzed in the BoardEx database to determine the total years of technological experience based on career histories, allowing for a cumulative technological experience measure to be constructed. Given that experience is susceptible to decay (experience several years out-of-date can be less relevant), a decay measure of experience was constructed for each executive based on the following formula:

$$E_{ijt} = (X_{ijt} - X_{ij(t-1)}) + E_{ij(t-1)}(1 - \lambda)$$

Where X refers to the cumulative years of technological experience and λ is a decay rate¹⁶ for executive i in organization j for quarter t . To obtain an organizational measure, the mean of the experience decay measure was taken for named executive officers in a given quarter following the approach of Cho and Hambrick (2006). A limitation to this approach is that regulatory documents identifying named executive officers are reported annually rather than quarterly; therefore, annual measures are applied equally to the corresponding quarters within a given year. A quadratic term was also created to capture the curvilinear relationship between *Tech experience* and each dependent variable.

Control Variables. To strengthen the identification of the independent variables that predict *Tech agendas* and *Market agendas*, 12 controls variables relevant to strategic agenda setting were added to the analysis. At the level of population, two variables account for the general emergence of technological change in the environment: *Time* captures any variation associated with the quarterly progression of technology. *Patents tech* and *Patents market* each capture the aggregate of FinTech patents granted in a given

¹⁶ Traditional decay formulas were tested, but were deemed to be overly punitive as any prior accumulation of experience was decayed at the same rate (i.e. an executive with 23 years of technological experience would decay 22 years of prior experience at the same rate rather than decaying one year at a time). The decay rate that best fit the data was 0.5

quarter¹⁷. Each patent variable was divided by 100 for purposes of interpretation and comparability across measures.

Organization-specific variables are also likely to influence the prioritization of FinTech among incumbents. Both performance below *Historical aspirations* and *Social aspirations* have been linked to risky organizational change and innovation (Greve, 1998, 2003); therefore, both variables were included as controls and modelled as spline functions¹⁸. Also, changes to the Chief Executive Officer position can significantly alter strategic discourse (Eggers & Kaplan, 2009); therefore, a dummy variable for *CEO change* was added. Attentional capacity, or the number of topics attended to by an organization simultaneously, may indicate how much incumbents can attend to at a given time (Ocasio, 1997). Including both the count of *Topics* present from the topic model and the count of *Executives* intends to control for attentional capacity. Attentional structures not related to experience may also impact strategic agendas. As a result, I control for corporate venture capital in each dimension with *CVC Tech* and *CVC Market* by adding a dummy variable for any incumbent participating in a FinTech deal within the prior four quarters (Maula et al., 2013). Similarly, capabilities are closely tied to sensing future opportunities, thus *Cumulative tech patents* and *Cumulative market patents* owned by an organization in each quarter was included to proxy for organizations that are more technologically adept in each dimension of discontinuous innovation. Finally, the diffusion of innovation is susceptible to isomorphic pressures from competition (DiMaggio & Powell, 1983; Haveman, 1993); as a result, prior competitive attention influence peer organizations. To account for isomorphic pressures, I construct *Lag competitive Tech* and *Lag competitive Market* by taking the mean of *Tech agendas* and *Market Agendas* from the previous quarter for self-reported primary competitors (identified in DEF 14A filings). Thus, within the 35 incumbent banks exist clusters of

¹⁷ Patents were sourced from the USPTO using the search terms *finance*, *technology*, *tech*, and *fintech* in the business-method art unit within the 3600 technology center. A research assistant was used to narrow and classify the patents granted as patents pertaining to technological and market discontinuities using the same definition in the venture capital classification.

¹⁸ Splines model different slopes above and below a threshold (above and below 0 in this case)

competitors more likely to influence one another based on disclosures of technological prioritization in earnings call presentations.

Correlation tables and descriptive statistics for the variables in question are reported in Tables 9 and 10 respectively.

Table 9: Descriptive Statistics

	<i>N</i>	<i>Mean</i>	<i>St.Dev.</i>	<i>Min</i>	<i>Max</i>
(1) <i>Tech Agenda</i>	1,400	0.028	0.104	0.00	0.99
(2) <i>Market Agenda</i>	1,400	0.038	0.138	0.00	0.94
(3) <i>Time</i>	1,400	27.66	12.65	2	48
(4) <i>Patents Tech (quarterly count)</i>	1,400	49.1	32.6	3	121
(5) <i>Patents Market (quarterly count)</i>	1,400	95.1	69.7	5	265
(6) <i>Historical Aspirations (\$ millions)</i>	1,400	22.17	1,518.73	-22,793.20	13,728.00
(7) <i>Social Aspirations (\$ millions)</i>	1,400	-236.53	1,784.64	-20,217.00	6,859.10
(8) <i>Topics</i>	1,400	6.26	2.55	1	17
(9) <i>Executives</i>	1,400	6.95	4.12	2	30
(10) <i>CEO Change</i>	1,400	0.10	0.30	0	1
(11) <i>Cumulative Patents Tech (count)</i>	1,400	6.71	17.52	0	107
(12) <i>Cumulative Patents Market (count)</i>	1,400	2.44	7.52	0	70
(13) <i>CVC Tech</i>	1,400	0.09	0.28	0	1
(14) <i>CVC Market</i>	1,400	0.16	0.36	0	1
(15) <i>Lag Competitive Tech</i>	1,400	0.019	0.032	0.00	0.233
(16) <i>Lag Competitive Market</i>	1,400	0.043	0.054	0.00	0.274
(17) <i>Tech Experience</i>	1,400	0.26	0.25	0	1.2
(18) <i>Tech Experience Squared</i>	1,400	0.13	0.20	0	1.4
(19) <i>Vivid Tech</i>	1,400	0.23	0.42	0	1
(20) <i>Vivid Market</i>	1,400	0.79	1.94	0	1

Table 10: Bi-Variate Zero-Order Correlation Tables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	
(1) Tech Agenda																				
(2) Market Agenda	-0.03																			
(3) Time	0.24	0.14																		
(4) Patents Tech	0.04	0.01	0.29																	
(5) Patents Market	-0.01	-0.02	0.17	0.96																
(6) Historical Aspirations	-0.01	0.03	0.05	0.03	0.01															
(7) Social Aspirations	-0.03	0.08	-0.03	-0.02	-0.01	0.65														
(8) Topics	0.07	0.01	-0.16	-0.12	-0.12	-0.03	-0.05													
(9) Executives	0.10	0.01	-0.06	-0.02	-0.01	0.00	-0.01	0.09												
(10) CEO Change	0.07	-0.01	-0.05	-0.03	-0.05	-0.02	-0.04	0.16	0.34											
(11) Cumulative Patent Tech	0.05	0.24	0.45	0.15	0.11	0.05	0.07	-0.08	-0.02	-0.02										
(12) Cumulative Patent Market	0.05	0.32	0.40	0.14	0.10	0.07	0.15	-0.08	-0.01	-0.03	0.92									
(13) CVC Tech	0.04	0.17	0.34	-0.03	-0.08	0.02	-0.06	0.03	-0.09	-0.05	0.30	0.26								
(14) CVC Market	0.26	0.07	0.42	0.07	-0.01	0.00	0.00	0.00	-0.08	0.00	0.33	0.28	0.43							
(15) Lag Competitive Tech	0.26	0.09	0.57	0.11	-0.03	0.06	-0.04	0.01	-0.17	0.05	0.18	0.18	0.35	0.41						
(16) Lag Competitive Market	0.30	0.09	0.68	0.13	0.04	0.01	-0.07	-0.04	-0.10	-0.01	0.45	0.36	0.37	0.42	0.00					
(17) Tech Experience	0.05	-0.01	-0.04	0.01	0.02	-0.02	-0.02	-0.11	-0.09	-0.06	-0.13	-0.10	0.05	0.01	0.00	0.00				
(18) Vivid Tech	0.25	0.12	0.56	0.24	0.13	0.00	0.00	0.02	-0.05	0.05	0.19	0.19	0.19	0.32	0.65	0.44	0.00			
(19) Vivid Market	0.23	0.17	0.79	0.19	0.11	0.01	-0.02	-0.11	-0.04	-0.03	0.35	0.30	0.27	0.33	0.45	0.58	-0.04	0.45		

5.3.3 Bayesian Estimation for Behavioral Outcomes

The nature of the research question is one of organizations exposed to stimuli, which subsequently results in prioritizing discontinuous innovation to varying degrees. Pragmatically, organizations effectively update prior beliefs as they are exposed to stimuli to determine subsequent behaviour. A Bayesian approach to estimation best describes the nature of the research question and data in that models are not fully determined by a causal structure but can be inferred probabilistically (Gelman et al., 2014). Bayesian estimation contains three elements: a set of prior distributions for the parameters estimated, a likelihood function (the model in traditional frequentist regression), and a posterior distribution. The posterior distribution is a compromise between prior distributions and the likelihood function where the likelihood function tends to crowd out prior distributions evidence, or data collected, increases (Kruschke, 2014). Posterior distributions have been historically intractable in closed form equations; however, advances in computational power allow for Markov Chain Monte Carlo (MCMC) methods to accurately approximate stable posterior distributions once the likelihood and priors are specified (Gelman et al., 2014).

Bayesian estimation was chosen based on the ability to (1) handle complex distributional forms and (2) model the entire distribution of parameter estimates (Kruschke et al., 2012). The power of MCMC in Bayesian estimation allows for models that are largely intractable in maximum likelihood estimations. In this study, the dependent variables are correlated to one another, proportional, and hierarchical (repeated observations of organizations over time). Multilevel mixed-effects beta regressions are recommended for proportional dependent variables (Figueroa-Zúñiga, Arellano-Valle, & Ferrari, 2013). Bayesian regression also allows for multivariate specifications in multilevel structures to account for relationships between dependent variables (Kruschke, 2014). Consequently, I attempted frequentist models with the collected data, although the model specification was intractable. Bayesian modeling proved superior in convergence, thus validating Bayesian regression as beneficial to the distributional form in this study.

A second advantage is that Bayesian estimation answers the true interest of researchers—the probability that parameter x impacts the dependent variable or $Pr(\theta|Data)$, where θ is a parameter of interest. By conditioning on the data, inference is *continuous* and is made on the entire distributions of parameters (i.e. where the bulk of the data lies) to produce probabilistic statements about future outcomes (Kruschke et al., 2012). Frequentist approaches that model $Pr(Data|\theta)$ identify the likelihood that the data contains a point estimate (typically the mean), relying on the central limit theorem to generate an interval of possibilities, which is then accepted or rejected in a dichotomous manner (Denrell, Fang, & Zhao, 2013; Kruschke, 2014).

A potential criticism of Bayesian analysis is the setting of priors, which is often deemed to be “subjective” (Kruschke et al., 2012). These contentions are largely misplaced. The use of priors is more aptly labeled as *transparent* where researchers explicitly reveal model assumptions rather than leaving assumptions implicit (e.g., normality is assumed for the error term in frequentist models and acts as an implicit prior). Priors are not arbitrary and are based on sound prior research, which is then subjected to peer review for validation (Kruschke et al., 2012). In striving toward scientific transparency, the following table of prior distributions for each parameter relevant to estimating *Tech agendas* and *Market agendas* is outlined in Table 11.

Table 11: Parameter Prior Specifications

	Variable	Prior Distribution ¹⁹	Justification
Independent Variables	<i>Vivid Tech</i>	<i>Normal</i> (0.4, 2)	Weakly informed by Nadkarni & Barr (2008), which identified a 0.51 unit increase in centrality for attention to the task sector for every 1 unit increase in industry velocity and Ener (2019), which showed a steeping impact of 40% from dynamic markets.
	<i>Vivid Market</i>	<i>Normal</i> (0.4, 2)	
	<i>Tech Experience</i>	<i>Normal</i> (0.07, 1)	Informed by Cho & Hambrick (2006), which identified a 0.07 unit increase in the ratio of entrepreneurial attention to engineering attention, and Ener (2019) which identified a symmetrical curvilinear relationship
	<i>Tech Experience^{sq}</i>	<i>Normal</i> (-0.07, 1)	
Control Variable	<i>Time Patents (Tech & Market)</i>	<i>Normal</i> (0.05, 1)	Informed by Kaplan (2008b) & Nadkarni & Barr (2008) based on the logic of increased technological progression over time leading to positive attention
	<i>CEO Change</i>	<i>Normal</i> (0, 1)	Informed by Eggers & Kaplan (2009), which identified CEOs as influential to strategic agendas. Set as 0 since the direction is difficult to infer <i>a priori</i>
	<i>Historical Aspirations</i>	<i>Normal</i> (-0.07, 1)	Informed by Greve (1998), which identified -0.07 and -0.12 changes in log-odds for historical and social aspirations respectively. Priors were specified at -0.07 for both variables to remain conservative
	<i>Social Aspirations</i>	<i>Normal</i> (-0.07, 1)	
	<i>Topics</i>	<i>Normal</i> (0.05, 1)	Informed by Ocasio (1997) in that, theoretically, greater attentional capacity facilitates attention to a greater number of issues
	<i>Executives</i>	<i>Normal</i> (0, 1)	Informed by Cho & Hambrick (2006), which identified a non-significant impact of TMT size on organizational attention
	<i>Cumulative Patents (Tech & Market)</i>	<i>Normal</i> (0.10, 1)	Informed by Kaplan (2008b), inferring a positive relationship between strategic agendas and patent development combined with the theoretical notion that prior behaviour influences subsequent cognition (Gavetti & Levinthal, 2000).
	<i>CVC (Tech & Market)</i>	<i>Normal</i> (0.05, 1)	Informed by Maula et al (2013), inferring a positive relationship between corporate venture capital and strategic agendas
	<i>Lag Competitive (Tech & Market)</i>	<i>Normal</i> (0.07, 1)	Informed by DiMaggio & Powell (1983) and Haveman (1993), the latter of which estimated positive hazard rates of mimetic isomorphism ranging from 0.365 to 0.688. Because the model does not translate directly, a prior of 0.07 was used to reflect a positive impact.
	Model Parameters	<i>Intercept (Tech & Market)</i>	<i>student t</i> (3, 0, 5)
<i>Standard Deviations</i>		<i>student t</i> (3, 0, 5)	Specified as a half student t that is strictly positive
<i>Phi (Precision Parameter)</i>		<i>gamma</i> (0.01,0.01)	Recommended default prior to minimize the influence on the data

¹⁹ Priors are specified in the form of the likelihood, which for a Beta regression, are represented as log-odds. A prior distribution specified as *Normal*(0.05,1), therefore, specifies a mean odds ratio of 1.05 indicating increased odds of the parameter effect on the dependent variable. Standard deviations are set as weakly informative—tighter standard deviations increase the influence of the prior distribution on the posterior distribution.

Taken together, the proposed Bayesian regression takes the form:

$$\begin{aligned}
 y_t &\sim \text{Beta}(\mu\phi_t, (1 - \mu)\phi_t) \\
 y_m &\sim \text{Beta}(\mu\phi_m, (1 - \mu)\phi_m) \\
 f(\beta_t, \beta_m, \Sigma_\beta, \phi_t, \phi_m | y_t, y_m) &\propto \\
 f(y_t, y_m | \beta_t, \beta_m, \Sigma_\beta, \phi_t, \phi_m) &f(\beta_t, \beta_m) f(\Sigma_\beta) f(\phi_t, \phi_m)
 \end{aligned}$$

Where:

μ is reflected by a vector of X covariates and a vector of β coefficients,
 Σ is a vector of standard deviations,
 ϕ is a precision parameter that specifies the shape of the beta distribution
the subscripts t and m refer to tech and market respectively

The likelihood function, defined by $f(y_t, y_m | \beta_t, \beta_m, \Sigma_\beta, \phi_t, \phi_m)$, is specified as multilevel with results clustered at the organizational level. The model coefficients represent population-level fixed effects that can be interpreted as the *within* organization log odds of a change in the proportion for each dependent variable (compared to unobserved changes in the proportion) for a one-unit increase in the covariate. To ensure unbiasedness of the coefficient estimates, all covariates were centred within organizations except for the contextual variables of *Vivid tech*, *Vivid market*, *Patent tech*, and *Patent market*, which were centred across the population of organizations (Enders & Tofighi, 2007). Following best practices, multilevel models were built up from a null model with covariates and random effects added systematically based on model fit (Aguinis, Gottfredson, & Culpepper, 2013). All models were run with the brms package in R, which interfaces with Stan—a prominent software used to estimate Bayesian models (Bürkner, 2018; Gelman et al., 2014). Before assessing the results, diagnostics were examined for the MCMC-derived posterior distribution using three distinct post-posterior checks. In addition, a leave-one-out cross-validation was conducted to determine the predictive power of the estimated model. The final validation yielded a leave-one-out adjusted R^2 estimate of 0.75 for the *Tech agenda* model and 0.93 for the *Market agenda* model, indicating strong predictive power. All posterior predictive checks can be found in Appendix A.

5.4 Results

The results of the main models are presented in columns (2) and (3) of Tables 12 and 13, with parameter estimates converted to odds ratios for interpretability. In addition, parameter densities and conditional effects are presented in Figure 2 to visually interpret the hypotheses. Figure 2 demonstrates the power of Bayesian analysis by revealing the entire distribution of each parameter estimate, allowing for a probable prediction that is conditioned by the data. Inference, therefore, moves beyond an analysis of the mean alone and examines what is observed across the entire dataset. Additionally, drawing data from a multivariate distribution allows for parameter estimates to be compared and relative hypotheses to be examined. Put differently, MCMC generates a stable, multivariate terrain of response variables that can be simultaneously conditioned by two parameters (Bürkner, 2018).

Table 12: Bayesian Regression Results (Tech Agenda)

<i>Predictors</i>	<i>Tech Agenda</i>							
	<i>Control (1)</i>		<i>Main Effects (2)</i>			<i>Interaction Effects (3)</i>		
	<i>Odds Ratio</i>	<i>Credibility Interval (95%)</i>	<i>Odds Ratio</i>	<i>Credibility Interval (95%)</i>	<i>Pr(θY)</i>	<i>Odds Ratio</i>	<i>Credibility Interval (95%)</i>	<i>Pr(θY)</i>
<i>Intercept</i>	0.01	0.01 – 0.02	0.01	0.01 – 0.02	~100% < 0	0.01	0.01 – 0.02	~100% < 0
<i>Time</i>	1.04	1.02 – 1.06	1.04	1.02 – 1.06	~100% > 0	1.04	1.02 – 1.06	~100% > 0
<i>Patents Tech</i>	0.93	0.78 – 1.11	0.89	0.75 – 1.07	89% < 0	0.89	0.75 – 1.07	89% < 0
<i>Historical Aspirations (>0)</i>	0.59	0.09 – 3.70	0.62	0.10 – 4.00	70% < 0	0.61	0.10 – 3.89	71% < 0
<i>Social Aspirations (>0)</i>	1.39	0.21 – 9.40	1.39	0.20 – 9.63	63% > 0	1.39	0.20 – 9.80	63% > 0
<i>Topics</i>	1.11	1.07 – 1.15	1.11	1.07 – 1.14	~100% > 0	1.11	1.07 – 1.15	~100% > 0
<i>Executives</i>	0.98	0.90 – 1.07	0.97	0.89 – 1.06	74% < 0	0.97	0.89 – 1.06	75% < 0
<i>CEO Change</i>	1.11	0.88 – 1.40	1.12	0.89 – 1.40	84% > 0	1.12	0.89 – 1.40	84% > 0
<i>Cumulative Patents Tech</i>	0.99	0.97 – 1.01	0.99	0.98 – 1.01	80% < 0	0.99	0.98 – 1.01	78% < 0
<i>CVC Tech</i>	0.89	0.64 – 1.21	0.93	0.67 – 1.28	67% < 0	0.94	0.67 – 1.29	65% < 0
<i>Lag Competitive Tech</i>	1.14	1.09 – 1.19	1.11	1.06 – 1.17	~100% > 0	1.11	1.06 – 1.16	~100% > 0
<i>Tech Experience</i>	1.34	0.80 – 2.20	1.28	0.79 – 2.06	84% > 0	1.29	0.77 – 2.11	84% > 0
<i>Tech Experience^{sq}</i>	0.58	0.16 – 2.16	0.51	0.14 – 1.80	84% < 0	0.54	0.15 – 1.96	82% < 0
<i>Vivid Tech (H1)</i>			1.41	1.14 – 1.74	~100% > 0	1.51	1.20 – 1.90	~100% > 0
<i>Tech Experience*Vivid Tech (H2a)</i>						0.82	0.36 – 1.95	~68% < 0
<i>Tech Experience^{sq}*Vivid Tech (H2b)</i>						0.26	0.03 – 2.37	~88% < 0
<i>Random Effects²⁰</i>								
<i>Intercept (τ_{00})</i>		0.58		0.58			0.58	
<i>Tech Experience (τ_{33})</i>		0.31		0.68			0.75	
Observations (Groups)		1400 (35)		1400 (35)			1400 (35)	
Conditional Bayes R^2		0.888		0.887			0.888	
Precision Parameter (φ)		20.78		20.90			21.04	

²⁰ Random effects were estimated but not reported for Time, Historical Aspirations, Social Aspirations, Topics, Executives, CEO Change, Cumulative Patents Tech, CVC Tech, and Lag Competitive Tech along with corresponding covariances for each random effect. Results are available upon request.

Table 13: Bayesian Regression Results (Market Agenda)

<i>Predictors</i>	<i>Market Agenda</i>							
	<i>Control (1)</i>		<i>Main Effects (2)</i>			<i>Interaction Effects (3)</i>		
	<i>Odds Ratio</i>	<i>Credibility Interval (95%)</i>	<i>Odds Ratio</i>	<i>Credibility Interval (95%)</i>	<i>Pr(θY)</i>	<i>Odds Ratio</i>	<i>Credibility Interval (95%)</i>	<i>Pr(θY)</i>
<i>Intercept</i>	0.01	0.01 – 0.02	0.01	0.01 – 0.02	~100% < 0	0.01	0.01 – 0.02	~100% < 0
<i>Time</i>	1.02	1.00 – 1.03	1.02	1.00 – 1.04	99% > 0	1.02	1.00 – 1.04	99% > 0
<i>Patents Market</i>	1.04	0.96 – 1.13	1.05	0.97 – 1.14	87% > 0	1.05	0.97 – 1.14	89% > 0
<i>Historical Aspirations (>0)</i>	1.25	0.20 – 7.28	1.23	0.19 – 7.03	60% > 0	1.22	0.20 – 7.02	60% > 0
<i>Social Aspirations (>0)</i>	0.75	0.13 – 4.60	0.75	0.13 – 4.71	62% < 0	0.76	0.12 – 4.90	62% < 0
<i>Topics</i>	1.04	1.00 – 1.08	1.04	1.00 – 1.08	~100% > 0	1.04	1.00 – 1.08	97% > 0
<i>Executives</i>	1.04	0.94 – 1.14	1.04	0.94 – 1.15	77% > 0	1.04	0.94 – 1.14	78% > 0
<i>CEO Change</i>	0.95	0.74 – 1.22	0.95	0.72 – 1.23	66% < 0	0.94	0.73 – 1.22	67% < 0
<i>Cumulative Patents Market</i>	1.05	0.94 – 1.21	1.05	0.94 – 1.22	79% > 0	1.05	0.94 – 1.21	78% > 0
<i>CVC Market</i>	0.95	0.74 – 1.23	0.95	0.74 – 1.23	66% < 0	0.95	0.74 – 1.23	67% < 0
<i>Lag Competitive Market</i>	1.00	0.97 – 1.03	1.00	0.97 – 1.03	51% < 0	1.00	0.97 – 1.03	50% < 0
<i>Tech Experience</i>	1.01	0.67 – 1.57	1.02	0.67 – 1.56	53% > 0	1.03	0.67 – 1.58	55% > 0
<i>Tech Experience^{sq}</i>	0.84	0.24 – 2.82	0.83	0.23 – 2.89	84% < 0	0.83	0.24 – 2.88	82% < 0
<i>Vivid Market (H1)</i>			0.95	0.81 – 1.13	71% < 0	0.96	0.81 – 1.13	68% < 0
<i>Tech Experience*Vivid Market (H3)</i>						0.79	0.36 – 1.71	72% < 0
<i>Tech Experience^{sq}*Vivid Market (H3)</i>						1.13	0.10 – 12.85	53% > 0
<i>Random Effects²¹</i>								
<i>Intercept (τ_{00})</i>		1.31		1.33			1.32	
<i>Tech Experience (τ_{33})</i>		0.31		0.31			0.32	
Observations (Groups)		1400 (35)		1400 (35)			1400 (35)	
Conditional Bayes R^2		0.949		0.949			0.949	
Precision Parameter (φ)		23.59		23.70			23.71	

²¹ Random effects were estimated but not reported for Time, Historical Aspirations, Social Aspirations, Topics, Executives, CEO Change, Cumulative Patents Market, CVC Market, and Lag Competitive Market along with corresponding covariances for each random effect. Results are available upon request.

Figure 6: Bayesian Estimation Visualizations

Figure 6a: Hypothesis 1 Evaluation

Comparing the relative effects of Vivid Tech and Vivid Market on Influencing Strategic Agendas

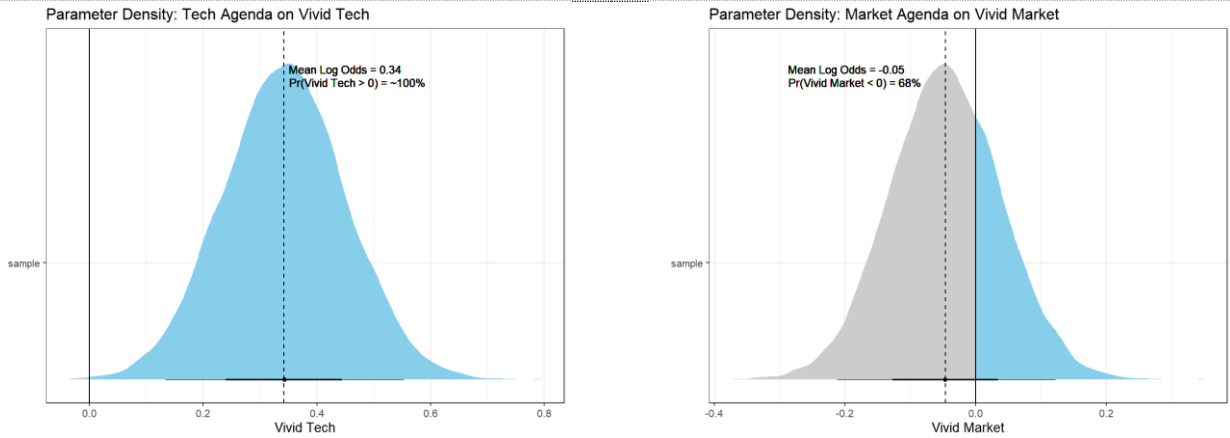


Figure 6b: Hypothesis 2a and 2b Evaluation

Comparing the impact of Vivid Tech on Prior Experience

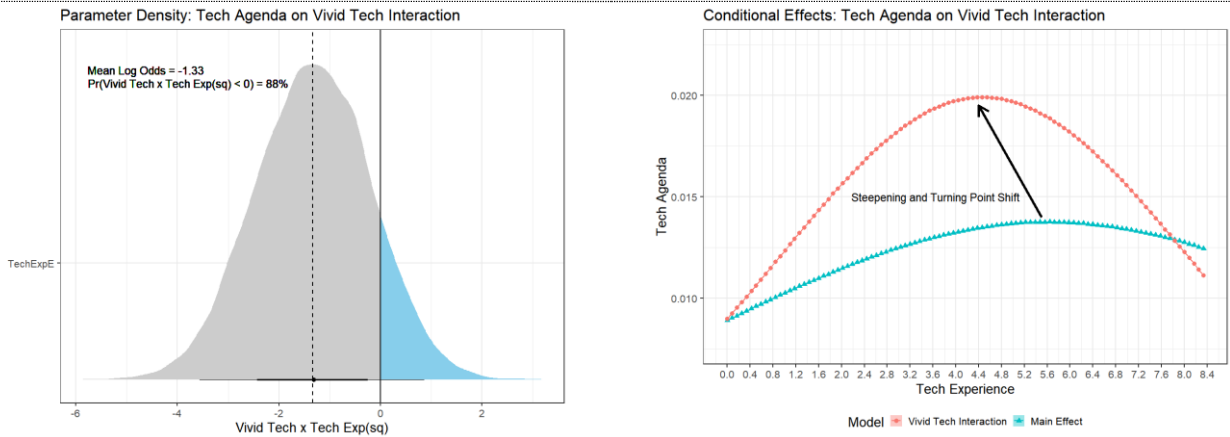
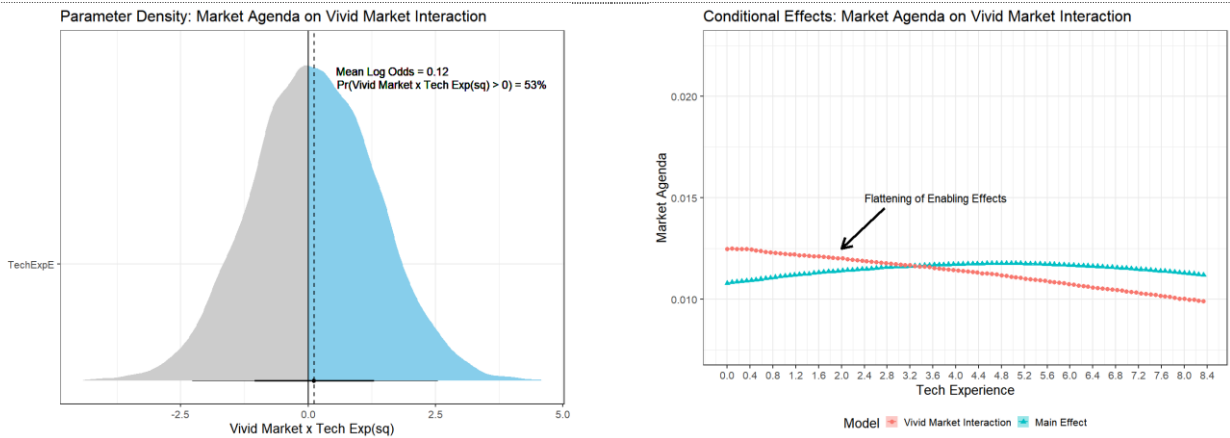


Figure 6c: Hypothesis 3 Evaluation

Comparing the impact of Vivid Market on Prior Experience



Turning to the results, H1 expected the impact of *Vivid tech* to be significantly larger than the impact of *Vivid market* on *Tech agenda* and *Market agenda* respectively. The main effect of *Vivid tech* has a near-certain predicted probability of a positive effect on *Tech agenda* (see column (2) in Table 12 and Figure 6a) while *Vivid market* has a 29% predicted probability of a positive effect on *Market agenda* (see column (2) in Table 13 with shows 71% probability of a negative effect). By using the hypothesis function in the brms package, I calculate the evidence ratio as the proportion of evidence favouring one parameter estimate compared to another and find a near-certain probability that the effect of *Vivid tech* on *Tech agenda* is larger than the effect of *Vivid market* on *Market agenda*. Strong support is, therefore, provided for H1. Concretely, when a technological mega-deal is present in one of the trailing 4 quarters, the proportion of technological discontinuities reflected in strategic agendas increases by 40%, an increase not witnessed for market discontinuities.

To evaluate the interaction effects presented in H2 and H3, I carefully follow the recommendations of Haans et al (2016) to assess moderation in curvilinear relationships. H2a and H2b predicted a steepening effect on both sides of the curvilinear relationship between *Tech experience* and *Tech agenda*. The results in Table 12 column (3) introduce the interaction of *Vivid tech* on both *Tech experience* and *Tech experience Squared*, as recommended, showing negative coefficients for both interactions. Coefficients alone do not necessarily provide evidence since coefficients in non-linear models potentially mask steepening or flattening effects due to shifts in turning points (Haans et al., 2016). As a result, I follow the recommended procedure to test a steeping effect in a non-linear model (Haans et al., 2016: 1195) and find clear support for an increasing positive slope and an increasing negative slope when *Vivid tech* is interacted with *Tech experience*. I graphically depict the results in Figure 6b. Notably, the turning point shifts significantly to the left as a result of the interaction. The main effect of *Tech experience* diminishes at approximately 5.8 decayed years of tech experience (cumulated for the executive team for interpretability) while the interacted curve begins to diminish at 4.5 decayed years of experience. The coefficient on the squared interaction term defines the steepness of the curve (Haans et al., 2016) and is predicted to be negative 88% of the time (see Figure 6b). The results support the notion that vivid and salient stimulus initially enhance the effect

of experience on strategic agendas (as efficient search) up to a point before a significant dismissive effect of experience takes hold, providing strong support for H2a and H2b.

Finally, H3 predicted a flattening of the curvilinear relationship between *Tech experience* and *Market agenda* when interacted with *Vivid market* due to an absence of salience effects that remove the efficiency of search. Following the same procedure as H2, I find support for a flattening effect (Haans et al., 2016). A visual depiction of flattening is presented in Figure 6c. Of note in the graphical depiction is a near-linear relationship as a result of the interaction. The predicted probability of the squared interaction term is positive in 53% of estimates (indicating a very small turning point and flattening). The negative predicted probability of 72% for the linear interaction term indicates an initial negative slope that maintains linearity as experience increases. Notable is a generally flatter curve in the main effect of *Tech experience* on *Market agenda*, which provides further evidence of lower salience effects for market discontinuities. The flatter main effect likely plays a role in diminishing the overall effect of *Vivid market*. I interpret the 72% probability of a negative linear slope as partial, but not full, support for H3.

To validate the results, I conducted five additional analyses. Given that priors can be somewhat contentious, two alternative tests were conducted: a flat prior specification (no influence from priors) and a prior specification centred at zero for the independent variables. Both models were then compared against the reported model and the data itself to ensure model fit—in all cases the reported model remained the model of best fit. Nevertheless, the direction and strength of the key variables of interest were robust to the alternative specifications, indicating minimal influence from priors in the final results.

Given the arbitrary nature of determining vividness through mega-deals, two additional analyses were also conducted to validate the results. First, rather than using a threshold of \$100M, a threshold of \$83M was used (calculated based on the average deal size plus two standard deviations). Second, rather than using large deals, the cumulative dollar value of early-stage deals in each quarter was used as a measure of vividness. The assumption in the latter is that large cumulative dollar values would drive vividness rather than single deals. In both cases, the results remained largely similar. The use of cumulative dollar values increased the predictive probability of a negative interaction

term marginally to 91% for H2b, creating a steeper curvilinearity effect. In both cases, the supplementary analysis was deemed to validate the main analyses.

Finally, the presence of longitudinal data potentially adds concerns about autocorrelation.

The brms package enables autocorrelation specifications, which I added to the analysis.

In all cases, autocorrelation did not improve model fit and did not alter the results. A

summary of the robustness checks is presented in Table 14.

Table 14: Robustness Checks

	<i>Tech Agenda Robustness Checks</i>			
	Direct Effect of Vivid Tech on Tech Agenda		Interaction Effect of Vivid Tech on Tech Exp ^{sq} on Tech Agenda	
	Odds Ratio	$Pr(\theta Y)$	Odds Ratio	$Pr(\theta Y)$
Main Results	1.41	~100% > 0	0.26	88% < 0
Flat Prior Model	1.40	~100% > 0	0.19	89% < 0
Zero Prior Model	1.53	~100% > 0	0.30	86% < 0
Vivid Tech (\$83M threshold)	1.41	~100% > 0	0.26	88% < 0
Vivid Tech (as total dollars)	1.50	99% > 0	0.12	91% < 0
AR[1] Process	1.40	~100% > 0	0.27	88% < 0

	<i>Market Agenda Robustness Checks</i>			
	Direct Effect of Vivid Market on Market Agenda		Interaction Effect of Vivid Market on Tech Exp ^{sq} on Market Agenda	
	Odds Ratio	$Pr(\theta Y)$	Odds Ratio	$Pr(\theta Y)$
Main Results	0.95	71% < 0	1.13	53% > 0
Flat Prior Model	0.96	70% < 0	1.68	63% > 0
Zero Prior Model	0.95	72% < 0	1.33	59% > 0
Vivid Market (\$83M threshold)	0.96	64% < 0	1.85	69% > 0
Vivid Market (as total dollars)	0.76	94% < 0	2.27	71% > 0
AR[1] Process	0.96	70% < 0	1.11	53% > 0

5.5 Study Conclusions

Although attention-directing structures that are experience-driven are often theorized as a particularly important vehicle through which adaptive processes are initiated, this study brings specific attention to the role of context in altering strategic agendas (Ocasio, 1997). The findings presented particularly implicate the interlocking attributes of novelty, salience, and vividness on shifting strategic agendas (Li et al., 2013). In particular, the findings presented shed new light on initiating adaptation and make three contributions. Prior research suggests that organizations struggle to detect market-based discontinuous innovations and attribute the challenges to arguments of resource dependence (Christensen & Bower, 1996). I demonstrate a propensity toward technological versus market discontinuities that occur very early in the adaptation process (at the point of initial strategic agenda shifts), which I ultimately attribute to salience effects. Technological discontinuities offer the potential to incorporate innovation into existing strategies and, therefore, increase perceived instrumental value. The resulting effect is cognitive in nature, residing within the executive team, as opposed to customer-driven. The result also highlights a cognitive bias toward control in that technological discontinuities are malleable to organizational strategies while market discontinuities tend to require entire new strategies altogether.

Second, highly attractive technological discontinuities play an important role in altering attention directing structures such as prior experience. Studies of attention rarely consider the principle of situated attention. By exploring the interaction of attention-drawing stimuli and attention-directing structures, I point to potential conflicts in the adaptation process. In particular, the salience dialectic describes opposing forces that both amplify the enabling and hindering effects of technological experience on shifting strategic attention simultaneously. A salience dialectic points to underexplored aspects of triggers in attention and adaptation where organizations can be highly flexible at low levels of experience and deeply analytical and dismissive at high levels of experience (Shepherd et al., 2017). The increasing steepness in the curvilinear relationship between technological experience and strategic agenda shifts suggests two potential conclusions that expand upon inconclusive findings in prior studies: (1) the curvilinear relationship is driven by

attention-drawing events in the environment versus and a general notion of environmental velocity (Ener, 2019; Nadkarni & Barr, 2008) and (2) there is a general tendency for prior experience to overlook innovation in similar domains due to skepticism (March, 2010; Starbuck & Milliken, 1988).

Importantly, no such claim is made regarding the benefit of such skepticism as it is entirely plausible that holding skepticism wisely prevents organizations from making costly errors. As a result, an important contribution is made to the literature on cognitive capabilities in that capabilities may not necessarily be reflected in adoptions of technological discontinuities (Eggers & Kaplan, 2009). Experience may, therefore, instil pauses in organizational behaviour. Whether such pauses in behaviour should be considered as capabilities warrants further investigation in that such pauses may be a bias that organizations need to overcome for prudent adaptation or that such pauses are beneficial to the effective use of resources (Helfat & Martin, 2015; Teece, 2007).

Regardless, the behavioural hesitations reported for prioritizing discontinuous innovation may have implications for adaptation. The very actions organizations often take to provoke adaptation may be holding them back and compressing the timeframe in which adaptation takes place (Cho & Hambrick, 2006; Fu et al., 2019; Sarta et al., 2021; Shepherd et al., 2017). As a result, contributions are made to the literature on incumbent adaptation to technological change by further specifying the conditions under which adaptation is initiated (Eggers & Park, 2018). Adaptation research is, therefore, expanded and understood as a process of change that is kick-started by attention-drawing stimulus in the environment. The results suggest that organizations detect stimuli more readily when novelty, salience, and vividness are all present, supporting a notion that adaptation to subtle cues is an understudied phenomenon (Vergne & Depeyre, 2016). Of particular note is that diminishing the attribute of salience alone markedly changes the adaptive behaviour of organizations.

Finally, I make important methodological contributions to research in the attention-based view and behavioral strategy. Bayesian regression allows researchers to model complex distributions that may be challenging in frequentist approaches. Additionally, Bayesian estimation reveals the full extent of parameter estimates and identifies behaviors for *both*

means and outliers, allowing inference to be continuous rather than dichotomous (Kruschke et al., 2012). By examining the probability that parameter estimates are positive or negative, inferences move closer to practical relevance with easily interpretable findings that act as priors for future research (Kruschke, 2014).

Additionally, applying topic modeling methods to research on attention reveals the full extent of strategic agendas, which can be modeled with jointly dependent variables, to assess competing issues in future attention-based research.

5.5.1 Limitations

Several limitations bound this study's findings; however, the most prominent is in the type of experience specified. Technological experience refers specifically to the procedural knowledge of TMTs that evaluate stimuli in the environment and set strategic agendas accordingly. The result is a cognitive embedding of experiences that influences subsequent attention (Gavetti & Levinthal, 2000). Alternative forms of experience, such as the organizational-level experience with specific technologies or technological applications may yield different results that stem from experiential learning or distinct capabilities more broadly. Furthermore, specifying the nature of TMT experience (e.g., as developing technology, as launching technology) is beyond the limits of available data for this study. Nevertheless, the findings invite deeper analyses that specify types of experience that may alter evaluations of stimuli and shift strategic agendas.

Additionally, innovation that emerges externally to incumbents bounds the theorizing. Incumbent banks tend to innovate slowly given the regulatory nature of the industry, allowing for innovation from start-ups to be evaluated as a pseudo-observer. The salience effects identified may not hold for innovation that is endogenous to incumbents, as was the case in digital imaging (Benner & Tripsas, 2012). The stimuli in this study are also one where third-party evaluators (venture capitalists) elevate and produce signals of innovation. Given that patents are also a source of innovation but do not hold similar signal-enhancing effects, it becomes difficult to generalize the findings to settings without similar signal enhancers present.

Ultimately, the findings point to the nature of strategic agenda setting as a meeting point of organizations and their environments, which are interdependent in producing behavioural change. Further uncovering the nuanced effects at the interface of organizations and their environments offer great potential to spawn continued research in organizational adaptation.

Chapter 6

6 General Discussion

At the outset of this dissertation, two primary questions were proposed: what constitutes organizational adaptation and how is it initiated? Through a thorough review of the scholarly literature, a refocusing on the attributes in implicit constructs, and a focus on understudied antecedents in the process, answers begin to emerge.

Adaptation is central to the most critical literature streams in organization theory and critically important to the study of strategy. Though the label “adaptation” is not always invoked, its presence is often assumed. A problem I sought to resolve was to not only uncover this implicit use but to also account for the multitude of labels that are often conflated with adaptation. In this respect, a refined definition of adaptation, inductively drawn from seminal works in organization theory, offers a distinct contribution in itself. By applying the attributes of adaptation, scholars and practitioners alike can pinpoint its presence distinctly from strategic change and performance. Moreover, the difficulties across levels of analysis further complicate identifying adaptation. The multilevel framework provides (at least) 3 distinct levels at which adaptation occurs to assist researchers, along with empirical approaches that offer concrete examples of measures to use in analyses.

Placing adaptation within a conceptual framework, with a concrete definition, enables the study of both the antecedents and consequences of adaptation. I focused specifically on the antecedents given the mounting pressure from stakeholders, markets, and societies to re-orient organizations toward prevailing issues occurring in the environment. In focusing on the antecedents, researchers heavily favour how organizations use agency to enact their environments and often invoke popular examples such as Apple reshaping the mobile phone industry with the launch of iPhone. Missing in these conceptions is a sound understanding of what is happening in the environment. Is it truly the case that Apple shaped its environment or did Apple merely uncover a latent consumer need for convenience and simplicity that frustrated users of Blackberry and Nokia phones? Of

course, the answer is not easy to uncover; however, I broach the subject of adaptation's onset by specifically examining the issues that stimulate strategic attention and how issues in the environment may alter well-known attention structures (such as prior experience) that tend to aid organizations in shaping their environments. I elaborate on 3 attention-drawing attributes and how they operate collectively to provoke or preclude strategic attention to issues. By examining the issues, we can infer some of the *relational* factors between organizations and environments that trigger the initiation of a process of adaptation. Analyses of this sort preview a broader research agenda that tracks the initiation of adaptation through to strategic action (say, launching FinTech products) and ultimately a measure of convergence toward market and institutional conditions (i.e. does the FinTech product actually improve upon traditional notions of banking from the eyes of the consumer?). The theoretical and practical implications hold much potential.

6.1 Theoretical Implications

Getting to the core of adaptation invokes several conversations in both organization theory and strategic management. For strategic management and phenomenological research in incumbent adaptation to technological change, this dissertation supports the notion of a more complex path to incumbent adaptation (Eggers & Park, 2018). By distinctly identifying the central concept in the *strategic change* → *adaptation* → *performance* causal chain, the mechanisms associated with each directional arrow can be uncovered to a larger degree. For instance, Vergne and Depeyre (2016) highlight the role of resource dependence in distinguishing when strategic change is likely to occur (with higher resource dependence generally leading to early strategic action). When considered in conjunction with the empirical study of FinTech, it becomes clear that issues in the environment play a specific role in provoking adaptation as well. The cognitive mechanisms associated with signal detection are, therefore, likely to operate alongside resource dependence arguments to provide a more fulsome view of strategic change in relation to adaptation. Theoretically important are the mechanisms of strategic change that lead to convergence, rather than the performance outcomes that occur further along the causal change.

As highlighted, adaptation is positively correlated to performance, but not perfectly so (Vergne & Depeyre, 2016). The implicit call is to examine the entirety of the adaptation process to determine (a) whether longer or shorter adaptation processes facilitate or inhibit strategic change, (b) whether the longer or shorter adaptation processes that lead to strategic change better enable adaptation (as convergence), and (c) what are the true mechanisms that drive adaptation and performance? The onset of adaptation begins to address the former points of studies in adaptation.

Organizations that act quickly are generally viewed favourably in studies of adaptation (Bourgeois & Eisenhardt, 1988; Eggers & Kaplan, 2009; Eisenhardt, 1989; Lieberman & Montgomery, 1988; Luan et al., 2019). Acting quickly does not necessarily distinguish those organizations that recognized change early with longer implementation timeframes from those organizations that recognized change late with shorter implementation timeframes. Each distinct approach has important implications for adaptation since initial strategies are often determined early in the process and sticky (Eggers, 2012b; Klingebiel & Joseph, 2016; Staw, 1981). Moreover, dynamic capabilities are often implicated as the drivers of early recognition (Helfat & Peteraf, 2015). I show that the onset of adaptation may not necessarily be driven by capability-oriented arguments and that stimuli in the environment both provokes adaptation and alters the effectiveness of prior experience in enacting strategic attention. By uncovering the initiation of the process, new questions surface regarding whether organizations are best served by waiting (i.e. prior experience is wise to not act) or whether prior experience delays adaptation (i.e. skepticism stalls the learning process and inhibits adaptation). The latter points to the understudied notion of “technologies of foolishness,” suggesting that playfulness (not expertise) is necessary for long-run adaptation (March, 2006, 2010; March & Olsen, 1979). The fact that organizations are prone to initiating adaptation at lower levels of executive experience points to a playfulness and experimentation in organizations as it pertains to adaptation. At a minimum, these organizations are given an opportunity to learn from early attention in a somewhat lengthened adaptation process. As a result, I establish an important building block that enables the study of *length* in the adaptation process, the triggers of *length*, and its potential implications for adaptation further down the causal chain.

It has been largely assumed that greater alignment with the environment drives performance; however, it is not necessarily clear why this is the case. I delve deeper into some of the potential mechanisms by relating adaptation to concepts of value creation to improve upon the link between adaptation and performance. If adapting organizations are those that create value (by converging on consumer needs and increasing willingness-to-pay), they potentially stand to benefit from capturing new value created in the form of performance. Since the link between value creation and value capture is underdeveloped at best and tenuous at worst, the theoretical framework developed in this dissertation assists in elaborating upon prior findings in management that suggest the need for further development (Coff, 1999; Vergne & Depeyre, 2016).

Laddering up to implications for organization theory more broadly is the notion that the market environment is not the sole environment of importance for organizations (Durand, 2006). The multilevel framework developed raises critical new questions for adaptation researchers beyond notions of performance and survival. Namely, organizations are simultaneously adapting to 3 environments that collectively determine organizational adaptation. As a result, organizations may be well-adapted in some ways and maladapted in others simultaneously. The broad implications of multilevel adaptation add more plausible paths and allow scholars to consider adaptation in the aggregate (i.e. does adaptation at one level offset adaptation at another level or do distinct configurations result in unique behaviour?) and adaptation as conflicting across levels of analysis. The presence of unique configurations of adaptation likely adds depth to the arguments of Eggers and Park (2018) that there is a multitude of ways in which organizations may survive or fail as a result of adaptation. Moreover, adaptation that conflicts across levels of analysis suggests that maladaptation may actually be a necessary component for long-run performance. If discontinuous innovations tend to rub up against societal norms (e.g., cryptocurrency), then challenging social norms potentially becomes a form of maladaptation that may procure higher long-run rents (Sarta et al., 2021). Similar arguments are plausible for organizations that have large reservoirs of societal trust (producing strong performance) that precludes the need to innovate and improve upon consumer needs (e.g., incumbent Canadian banks, Harley-Davidson). Value can be created through trust, which may be maladaptive to innovation and potentially beneficial

for the organization and society more broadly. By applying a multilevel framework to adaptation and linking it to value creation, a plausible relationship begins to emerge that broadens the notion of value beyond markets. Organizations create value in a multitude of ways, notably through a willingness-to-commit to stakeholders and a willingness for stakeholders to endorse organizational actions. Adaptation, therefore, considers both markets and societies collectively and suggests that strategic management does not solely concern financial performance.

6.2 Managerial Implications

How does the practicing manager benefit from this thesis? Strategic managers of organizations gain 3 primary learning points: (1) a clear understanding of what it means to adapt, (2) a framework that broadens perspectives of adaptation beyond performance, and (3) a practical example of how preconceived notions of prior experience may get in the way of adaptation. I briefly address each in turn.

Why is it important that managers have a sound and concrete definition of adaptation? Given the popularity of the term “adapt” in the business press, managers risk using adaptation as a loose term without fully understanding its implications. Often managers refer to adaptation solely as changing something about their organization. Perhaps this is the launch of a new product or perhaps it is an important initiative regarding diversity, inclusion, and equity. In either case, managers often stop short of fully evaluating the success of these initiatives in achieving their desired outcomes. Why launch a new product if it is not fulfilling a new need for consumers? Why launch a diversity initiative if the employees of your organization do not feel any improvements in equity and inclusion? The primary purpose of defining adaptation with specificity is, therefore, to avoid scenarios of “initiative launch” = “job done.” Managers need to understand what the organization is adapting to and how any initiative pursued achieves the objective of convergence. Adding both qualitative and quantitative measures that objectively help to understand whether an organization is converging will assist in superfluous uses of the term adaptation. Reducing any important initiative to a single metric is always challenging; therefore, managers should deploy a multitude of approaches to objectively determine whether adaptation is taking place. Organizations are awash with metrics and I

do not wish to suggest that internal metrics are not useful—I do, however, suggest that managers need to distinguish those metrics that identify converging on an aspect of the environment from those that indicate performance.

Relatedly, I provide a meaningful framework in this regard that identifies adaptation to multiple environments. All too often, managers are assumed to be laser-focused on performance by external observers. The role of the manager is far more complex and those in decision-making positions need to consider the multitude of stakeholders that they service, not solely shareholders. The multilevel framework provided in Chapter 3 hopes to assist managers as they encounter increasing pressure to adapt to multiple environments simultaneously. The framework organizes thinking and broadens conceptions of value creation beyond financial performance alone. While managers are likely already aware that value is not solely created through products sold and services rendered, the “3 willingness” framework offers a succinct and simple model to articulate the many ways that incumbent organizations create value through adaptation.

Finally, the study of FinTech’s emergence in financial services narrows in on a specific practical issue for managers: what drives their attention (and ultimately decision-making) in changing environments. By examining novelty, salience, and vividness (or new, perceived relevant, and prominent issues), I reveal potential blind spots for strategic managers. Strategic attention tends to flow to issues that managers can control to a greater degree. Technologies become more appealing because they can be folded into existing lines of business as opposed to servicing new consumer markets. The fact that this occurs so early in the adaptation process suggests that the power of existing customers may not drive the propensity to overlook market conditions and that it may be a cognitive tendency among managers (c.f. Christensen & Bower, 1996). Moreover, prevailing thought on managerial experience as a driver of change may be unfounded. High levels of prior experience may seed doubt in pursuing innovation. Whether this doubt is warranted is an open question; nonetheless, strategic managers should be aware of a potential bias that accompanies prior experience.

Chapter 7

7 Conclusion

Ultimately, strategic management and organization theory rely on the concept of adaptation yet fail to clearly invoke its primary attributes in empirical studies. After rigorously analyzing 60 years of adaptation research, developing a theoretical framework for multilevel adaptation, and delving deeper into the onset of adaptation processes, I provide clarity to the questions of what it means for organizations to adapt and how adaptation begins.

This thesis closes many previously unresolved challenges with adaptation research and hopes to provide a critical building block that enables a reinvigorated research agenda. As organizations continue to adapt to a combination of technological, social, and environmental changes in the coming decade, I can only hope that the scholarly community interested in adaptation is better served through this thesis.

While some issues are resolved, new issues in adaptation research emerge out of this thesis that only serves to validate the power of organizational adaptation as a concept. Identifying new mechanisms that pertain to adaptation, configurations that invoke organizational behaviour, or the length of the adaptation process only begin to scratch the surface of potential issues that better articulate organizational evolution. Only time will tell if these new issues increase our understanding of organizations that attempt some form of alignment to their environments and whether the individual pieces in the large tapestry of adaptation research adequately come together to improve our general understanding of organizations.

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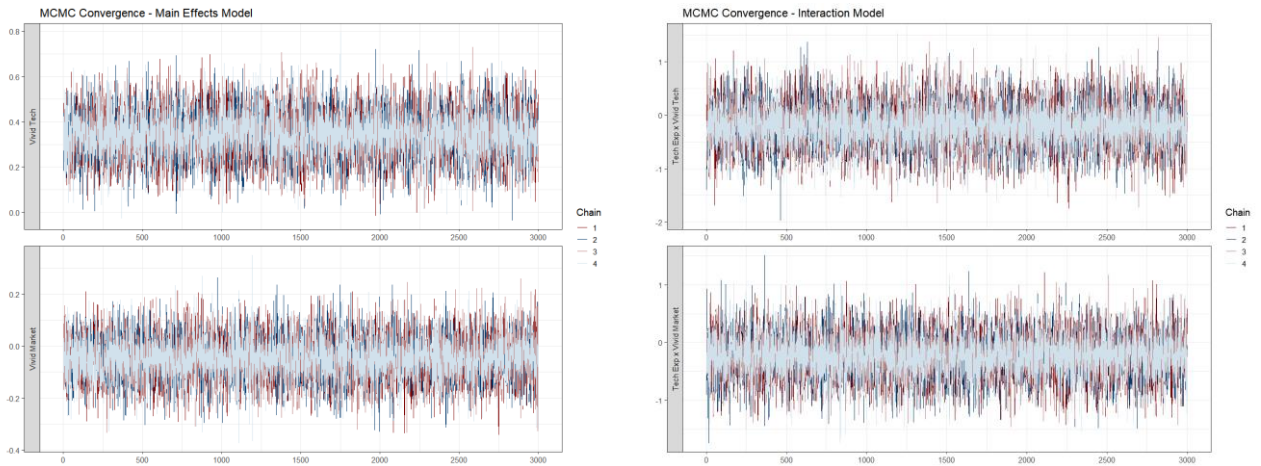
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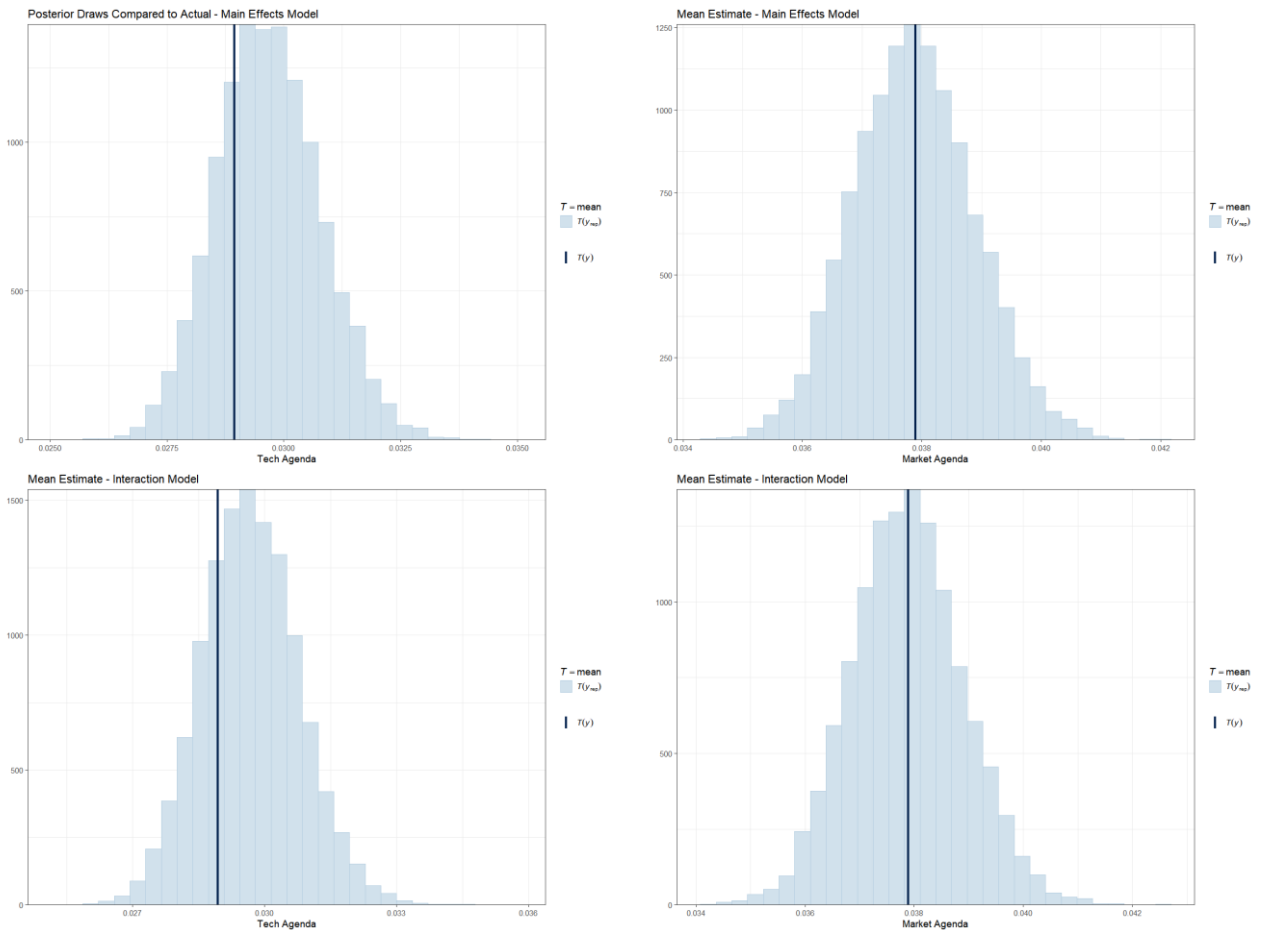
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Appendices

Appendix A: Bayesian Posterior Predictive Checks



Evaluates the mixing of the 4 MCMC chains. High degrees of mixing indicate agreement between separate MCMC chains and validates a stable posterior distribution



Evaluates whether draws from the posterior (y_{rep}) center around the mean in the data (y)

Curriculum Vitae

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- Grace, C., Sarta, A. (2020) “Next Generation Financial Advice: Reimagining Wealth Management in the Age of Technology”. *The Technological Revolution in Financial Services*. Ed. Michael King and Richard Nesbitt. Toronto: University of Toronto Press.
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