NEW HORIZONS IN MANAGERIAL
AND ORGANIZATIONAL COGNITION

BUSINESS MODELS AND COGNITION

EDITED BY
KRISTIAN J. SUND
ROBERT J. GALAVAN
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Exploring the Connections Between Business Models and Cognition: A Commentary

Kristian J. Sund, Robert J. Galavan and Marcel Bogers

Abstract

In this paper, we reflect on an expanding literature that links theories of cognition and business models. Managers hold in their mind perceptual constructs or schemas of the business model. These guide the process of distinguishing between options and making choices. Those familiar with business model development will easily recognise that the perceptual construct provides only a summary of the business model, and that a more complex conceptualisation of how business model elements interact is needed. The business model is then much more than a visualisation. It is a schematic model of theorised interaction that is created, shaped, and shared over time. The underlying processes of this creation, shaping, and sharing are cognitive activities taking place at individual, organisational, and inter-organisational levels. Theories of managerial and organisational cognition are thus critical to understanding the acts of business modelling and business model innovation. Here we suggest some of the ways that business model and cognition literatures can be connected, present existing literature, and reflect on future avenues of research to explore the cognitive foundations of business modelling.

Keywords: Business models; business model innovation; cognition; mental maps; open innovation; schema; sensemaking

Introduction

The business model construct has become very popular in the strategy and innovation literatures. The definition of a business model has remained an object of some degree of controversy among scholars, some calling it a description

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(e.g. Baden-Fuller & Morgan, 2010), some an activity system (e.g. Zott & Amit, 2010), some a template (e.g. Zott & Amit, 2008), and some a framework (e.g. Schneider & Spieth, 2013), among other similes. What seems to be agreed is that a business model should include not just a description of the model but also a description of how value is created, distributed, and appropriated by the organisation (Teece, 2010; Amit & Zott, 2001). This description can be a simple narrative (a recipe), a stylised archetype (a generic business model, or template, such as the bait-and-hook), or a framework of complementary components, such as found in the popular business model canvas (Osterwalder & Pigneur, 2010). An important point being that it describes not just the elements but also their interactions.

At its most superficial level a business model is a reified representation, a perceptual construct, of the activity system. Its more fulsome form includes a theory of how the business works and how the components of the activity system interact. This conceptualisation of how the constructs interact is the theory of the business model and incorporates 'stories that explain how enterprises work' (Magretta, 2002). Stories built with assumptions and hypotheses. Business modelling is not akin to modelling in any physical parallel. The building blocks (constructs) and the mortar (the interactions) exist only as concepts. The labour of building is an activity of the mind. This has led cognition scholars to explore the work of business modelling and business model scholars to seek a greater understanding of managerial and organisational cognition. For example, it has been suggested that the business model can be studied as a form of cognitive structure (Doz & Kosonen, 2010), mental map, or schema (Martins, Rindova, & Greenbaum, 2015; Narayan, Sidhu, Baden-Fuller, & Volberda, 2021 – this volume), of how the firm creates value. Recent studies have also highlighted how managers' cognitions and sensemaking influence business model design (Egfjord & Sund, 2020; Sosna, Trevinyo-Rodríguez, & Velamuri, 2010). Process studies of business model innovation (BMI) have highlighted the role of shared logics in enabling such innovation (Bogers, Sund, & Villarroel, 2015; Egfjord and Sund, 2020) and how the information and knowledge search behaviour of managers affects the type of BMI being pursued (Snihur & Wiklund, 2019).

While these recent studies are encouraging, reviews of the business model literature continue to emphasise the links between business models and cognition as an area in need of further research (Foss & Saebi, 2017, 2018; Martins et al., 2015; Massa, Tucci, & Afuah, 2017). The cognitive underpinnings of business model elements are often mentioned but explicitly studied far less frequently. In this paper, we explore some of the links between theories of cognition and business models. We integrate into this discussion some of the findings of papers published in the fourth volume of the Emerald book series *New Horizons in Managerial and Organizational Cognition*. We conclude by inviting business model and cognition scholars to jointly explore the open questions of business modelling and cognition.

Business Models and Cognition

A look at the domain statement of the Managerial and Organizational Cognition (MOC) division of the Academy of Management suggests just how wide the field

of MOC has become and how many theories of cognition there are. Topics (and associated theories) mentioned in this statement include attention, attribution, decision-making, identity, ideology, information processing, creativity, learning, memory, mental representations and images, categories, cognitive frames, perceptual and interpretive processes, social construction, social dilemmas, and change. All of these and more represent possible theoretical avenues that can inform research on business models and BMI, and that in turn can gain from the study of such business models (Sund, Galavan, & Brusoni, 2018).

First and foremost, there is an emerging cognitive view on business models, which suggests that the business model serves as a form of mental model, logic, or recipe, of how a business creates and appropriates value. For example, Doz and Kosonen (2010, p. 371) argue that

> business models stand as cognitive structures providing a theory of how to set boundaries to the firm, of how to create value, and how to organize its internal structure and governance.

This view of the business model as a cognitive knowledge structure (or knowledge structure *content*) is consistent with the more general cognitive view of strategy (Martins et al., 2015). A mental representation of a business model may indeed not be very different than a mental representation of similar constructs, such as a strategy, a market position, a vision, or any other construct representing how the organisation makes money, and how it relates to other actors, such as competitors, customers, or suppliers. The vast MOC literature concerned with such strategy-related knowledge structures can thus inform our study of business models. This literature hinges on the assumptions that such representations really do exist, and that managers create these mental structures to help process information and make decisions (Walsh, 1995). One difficulty is that scholars have thought up multiple competing theories (and labels) of what these structures are and how they develop. For example, mental models are models that are learned about how the world works, and that help managers solve problems (Kieras & Bovair, 1984), and make inferences, such as if-then predictions (Johnson-Laird, 2001). These mental models have by some been termed cognitive or mental maps (e.g. Fiol & Huff, 1992). Schema theory represents a similar approach, suggesting that knowledge structures take the form of schema, that are gradually learned, and are composed of components and their links, which grow stronger over time, as the individual gains experience within a domain of knowledge (Fiske & Dyer, 1985; Lurigio & Carroll, 1985).

Furnari (2015) argues that not just the content but the deeper causal structure of value creation and capture activities are important to the study of mental business models. One important observation from the MOC literature is that the complexity of mental maps within a domain is linked to job experience, and in the case of strategic knowledge, for example, of the business environment (Hodgkinson & Johnson, 1994), to the scope of a manager's job, such that a higher level manager can be expected to have broader and deeper knowledge. We can hypothesise this to be the case concerning a business model as well. In other words, we

can probably expect that a top manager will have a different and more complex cognitive representation of the business model than say a middle manager or a regular employee. In fact, some employees within larger organisations may not have much knowledge of the business model of the organisation at all. Or at least, they will not have framed this knowledge in terms of a business model.

Within the mental model literature, it is often assumed that such models can exist at the team level (Klimoski & Mohammed, 1994). It is also assumed that when such models are shared and aligned among team members, this will lead to superior performance (see e.g. the discussion of Mohammed, Klimoski, & Rentsch, 2000). The business model is regularly treated in the business model literature as a shared mental model within the organisation. Such a model would be the result of shared sensemaking processes within the organisation (Daft & Weick, 1984; Sund, 2013, 2015; Weick, 1995). However, managers throughout the organisation may not automatically fully share the mental business model. For example, Egfjord and Sund (2020) find that members of the core business and the innovation team within an incumbent have different perceptions of environmental changes, due to exposures to different information environments. The mental models of different teams within the incumbent are shaped by such differences in information and are thus not the same. Different mental models regarding the environment in turn lead to different views on what the business model is and should be (Bogers et al., 2015; Martins et al., 2015; Amit & Zott, 2015). Within the incumbent, it is mainly top management, as well as innovation teams within the organisation, who actively work on business model designs, and innovation, often employing standardised frameworks and visualisation tools (Täuscher & Abdelkafi, 2017). They are therefore the natural informants for studies on business (mental) models. There is an interesting line of research developing on the exact role of frameworks, visual tools, and innovation methods in shaping shared business model cognitions (Massa & Hacklin, 2021 – this volume). Henike and Hölzle (2021 – this volume) document that such frameworks have a significant effect on entrepreneurs' cognition too, stabilising such entrepreneurs' mental models. One could hypothesise that formal business model frameworks and business model development methods help entrepreneurs test their own presumptions and hypotheses, providing useful tools for accelerating learning (Ladd, 2021 – this volume). Over time, the impact of founder identity on the business model wanes (Van Boxstael and Denoo, 2021 – this volume). These findings may to some extent be transferable to the incumbent.

The business (mental) model can also be shared outside the firm, for example, with key stakeholders (Aspara, Lamberg, Laukia, & Tikkanen, 2013). For example, Wallnöfer and Hacklin (2013) suggest that the business model serves as a narrative device when new ventures pitch to business angels, who use this business model in their opportunity interpretation. Similarly, within one organisation, Podoynitsyna, Snihur, Thomas, and Grégoire (2021 – this volume) show how analogies and metaphors were used as narrative tools by Salesforce to construct a strong organisational identity. Storbacka and Nenonen (2011) suggest that market actors' mental representations of the business model are shared even more widely across organisational boundaries within the marketplace and can

be deliberately manipulated by individual actors. For example, Snihur, Thomas, and Burgelman (2018) examine how framing can constitute a strategic process that enables business model innovators to shape new ecosystems. Narayan et al. (2021 – this volume) demonstrate that industry insiders and outsiders may hold different schema of the business model. When there is incongruence with existing schemata, innovation originating outside the firm leads managers to search for information on opportunities or threats (Greve & Taylor, 2000).

BMI and Cognition

The innovation of business models has been a popular area of research for the past two decades. A shared understanding of the existing business model directs the way executives perceive new ideas for business models in incumbent firms (Sund, Villarroel, & Bogers, 2014; Sund, Bogers, Villarroel, & Foss, 2016). Indeed, process studies of BMI have highlighted the role of shared logics in hindering or enabling innovation (Bogers et al., 2015; Egfjord and Sund, 2020) and how the information and knowledge search behaviour of managers affects the type of BMI (Snihur & Wiklund, 2019). Similar to Daood, Calluso, and Giustiniano (2021 – this volume), who suggest that a strong shared schema of the current business model may in fact be detrimental to radical BMI, Bogers et al. (2015) demonstrate how a strong dominant logic around the existing business model prevented radical BMI in incumbents. BMI is thus largely about schema change (Martins et al., 2015). It is thought that organisational identity can act as a barrier in this context (Snihur, 2018), but efforts at better understanding such barriers have often looked at the innovation process.

The process of BMI is typically hypothesised to involve several stages. For example, Bogers et al. (2015) identify two stages of exploration and exploitation, whereas Jensen and Sund (2017) precede these with a first awareness stage. They suggest that the BMI process starts with managers becoming aware of the need to explore new business models (awareness stage), which are then searched for (exploration stage), before being gradually tested and implemented (exploitation stage). An area that deserves further research is that of what exact circumstances or capabilities lead some incumbents to successfully become aware of the need for radical BMI, while others do not. Teece (2018, 2020) proposes three underlying process-related capabilities of sensing, seizing, and reconfiguring that he views as important dynamic capabilities for BMI. He surmises about sensing that 'setting up an early-stage business model […] depends as much on art and intuition as on science and analysis' (Teece, 2018, p. 43). This is to some extent confirmed by Schneckenberg, Velamuri, and Comberg (2019) who find that both problem sensing and intuitional insights help form new business model design logics. In very general terms, sensemaking and learning capabilities seem important for BMI as well (Berends, Smits, Reymen, & Podoynitsyna, 2016; Loon, Otaye-Ebede, & Stewart, 2020). Finally, Bellini and Catellazzi (2021 – this volume) suggest that successful radical business model innovators can leverage the perception and control of their own cognition, i.e. possess what they call meta-cognition (cognition about cognition).

In the context of incumbent BMI, the stage of business model exploration appears particularly sensitive to competing logics between top management, middle management involved with the operations of the current business model, and innovators trying to explore and implement new business models (Bogers et al., 2015; Egfjord & Sund, 2020). Several studies have documented that such business model exploration may even result in tensions (Chesbrough, 2010; Kim & Min, 2015; Snihur and Tarzijan, 2018; Sund et al., 2016), at least some of which may be assumed to be due to cognitive differentiation, i.e. differences in mental models. According to Jensen and Sund (2017, p. 286),

> for the organisation, there is an element of both unlearning and new learning, as business logic changes and transforms during the BMI process […] The role of leadership moves from sense-making in the awareness stage to sense-giving in the business model exploration stage.

During the final stage of business model exploitation, focus moves away from experimentation and towards implementation and optimisation of the new business model (Jensen & Sund, 2017). At this stage, the perceived uncertainty surrounding the new business model lowers (Bogers et al., 2015), but a new set of dilemmas emerge. Managing a multi-business model organisation implies handling multiple business logics that may be complementary, neutral, or even substitutes in the marketplace (Sund et al., 2016). This leads to organisational complexity (Snihur & Tarzijan, 2018). Kim and Min (2015) point out the importance of complementary assets in determining how best to design the organisation after adding a new business model to the incumbent firm.

Open BMI and Cognition

As business models often focus on the network-level activities of an organisation (Foss & Saebi, 2017; Massa et al., 2017; Zott, Amit, & Massa, 2011), the sources and impact of BMI may also lie within networks, beyond the boundaries of a single organisation (Berglund & Sandström, 2013; Foss & Saebi, 2018; Vanhaverbeke & Chesbrough, 2014). In line with the literature on open innovation, it is therefore relevant to consider openness of BMI by exploring it as 'a distributed innovation process based on purposively managed knowledge flows across organisational boundaries' (Chesbrough & Bogers, 2014, p. 17). As such, the process of innovation can take place across organisational boundaries, which from a cognition point of view implies a need to consider how cognitive processes may span organisational boundaries. The MOC literature has documented shared thinking among strategic groups (Reger & Huff, 1993), referring to such groups as cognitive communities (Porac, Thomas, & Baden-Fuller, 1989). In the context of business models, it has been shown that they can be shared not just across business units but also with external stakeholders (Aspara et al., 2013). There is therefore

an obvious opportunity for the study of inter-organisational cognition in the context of BMI, or what we would call open BMI.

At the same time, given the intimate connection between open innovation and business models, for example, in terms of contingencies (Saebi & Foss, 2015), openness in business model development (or innovation) should be an integral part of how we consider BMI, in which cognition can help to shed light on some of the underpinnings. In an inter-organisational context, we may as such consider open BMI as the process of innovating a business model that spans organisational boundaries. On the one hand, we may better understand this notion by engaging the literature on cognition (as described earlier), and on the other hand, we may better understand it by drawing on what we know from the open innovation literature in relation to cognition.

As described by Bogers et al. (2017), research on open innovation behaviour and cognition not only focuses on individuals who are active in open innovation – often framed in an intra-organisational context – but to some extent also relates to organisational and boundary-crossing activities. Recent efforts have attempted to span across different levels of analysis in the context of open innovation, providing opportunities for integrating cognition and open innovation literature. More specifically, some of the MOC literature could inspire research on open BMI as it relates to cognitive limitations. These include barriers to integrating external knowledge (West & Bogers, 2014), barriers related to employees' cognitive style (Lowik, Kraaijenbrink, & Groen, 2017), search heuristics (Lopez-Vega, Tell, & Vanhaverbeke, 2016), and so-called syndromes, like the *Not-Invented-Here* or *Not-Sold-Here* syndrome (Burcharth, Knudsen, & Søndergaard, 2014). To this strand, Bez and Chesbrough (2021 – this volume) add the *Fear-of-Looking-Foolish* syndrome as a potential barrier to open BMI.

Concluding Remarks and an Invitation to Explore

The 'Business Models and Cognition' volume of *New Horizons in Managerial and Organizational Cognition* addresses a broad and challenging range of questions at the intersection of the business model, BMI, and MOC literatures. It is not, and could not be, a definitive range. We therefore extend an invitation to both the MOC and innovation management communities to embrace the theoretical and methodological opportunities that now exist for the study of cognition.

While research on the cognitive dimensions of business models and BMI has been increasing, there are numerous gaps in our knowledge. To illustrate these, it may be useful to consider the overviews of theoretical and methodological MOC advances presented in Galavan, Sund, and Hodgkinson (2018). Dual processing theory suggests that decision-making is subject to both conscious and nonconscious cognition. Furthermore, cognition can be 'cold' and rational, or it can be 'hot' and emotional (Hodgkinson & Healey, 2011; Hodgkinson, Sund, & Galavan, 2018). As discussed in this paper, existing BMI research has almost exclusively been concerned with conscious, cold, and rational cognition, inspired by classical MOC theories of mental mapping (Huff, 1990). The role of emotions

thus remains largely unexplored, although they have been acknowledged in the general innovation literature (Choi, Sung, Lee, & Cho, 2011). For example, Schneckenberg et al. (2019, p. 431) point out that

> in the case of business models, the emotional and affective bondages to long-established value-creating and value capturing activity configurations risks resulting in escalation of commitment and cognitive inertia of senior managers.

The role of emotions could help clarify and deepen our understanding of the cognitive barriers to BMI in incumbent firms, and there are early indications that this may be particularly relevant in the study of family firm BMI (Rau, 2013).

Research has also been limited by context. We noted the importance of business models transcending organisational boundaries as traditional partnerships and also through open innovation. One of these boundaries is across state and private actors, often termed public private partnerships (PPPs). This is an area rich in questions and scarce of answers. Given the need to have shared understanding of business models, how do those with a focus on public value perceive, engage, and build working relationships with those supporting an agenda of private value capture? How are the varying philosophies and objectives negotiated and how is the trust necessary for sharing built? How is innovation (with its inevitable failures) that is embraced by the private sector conceptualised in the public sector? Such questions are particularly important for the emerging strand of literature on sustainable business models, where wider objectives are considered than private profit (see e.g. Bocken, Short, Rana, & Evans, 2014; Geissdoerfer, Vladimirova, & Evans, 2018).

We also need to understand failures in BMI, particularly where the model succeeds in some cases and fails in others. Where the innovation fails, is this (simply) to do with differences in firm capabilities, or is it to do with failures in representation and cognition, failures in actioning the representation, or even deliberate misrepresentation of the reality? Business modelling brings with it the challenge that in order to be implemented the models must first be conceived (Chatterjee, 2013). It is in that sense a forward-looking activity with very different learning challenges to the backward-looking gaze of experiential learning (Berends et al., 2016).

Recent work has highlighted that managers involved in system dynamic business modelling develop more accurate representation of their business models (Moellers, von der Burg, Bansemir, Pretzyl, & Gassman, 2019). This brings with it a cognitive gap between the representation of those involved in the modelling and those outside the process. Moellers et al. (2019) describe this gap in terms of levels of model dimensionality, with those involved in the modelling understanding the complexity, and those outside becoming overwhelmed and treating the model as a black box. Using system dynamics holds great promise but brings with it enormous challenges of shared understanding and trust that we know little about.

Similarly, the role of nonconscious cognitive biases during both entrepreneurial and incumbent BMI remains unexplored. For example, what is the role

of heuristics in business modelling? How does overconfidence and the problem of positive illusions affect business model exploration? Such questions remain largely unexplored in the business model literature and could open a path for exploration.

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Examining CEOs' Business Model Schemas: A Cognitive Mapping of Differences Between Industry Insiders and Outsiders

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Abstract

At the level of a cognitive schema, a business model is a mental map of a firm's value-creating, value-delivering, and value-capturing activities and the linkages between them. An important question in the study of business models as cognitive schemas is whether and how schemas differ across industry actors and whether the differences are connected to the variation observed in actual business models in the industry. This chapter examines, in particular, the ways in which business model schemas of industry insiders differ from those of industry outsiders. Using data from interviews with chief executive officers (CEOs) of 30 legal-tech firms, we graphically construct and analyze the CEOs' schemas of important causal interdependencies between their firms' activities. The analysis shows systematic differences between insiders and outsider CEOs' schemas. We theorize that these differences underlie insider and outsider CEOs' distinct approaches to opportunity recognition, expertise perception, and value framing, and have consequences for actual business model evolution in the industry.

Keywords: Cognitive schemas; industry insiders and outsiders; opportunity recognition; value framing; business model evolution; dyadic and triadic business models

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Introduction

Research on business models (BMs) has provided important insights into the different components of BMs (Baden-Fuller & Haefliger, 2013; Casadesus-Masanell & Ricart, 2010; Rosca, Arnold, & Bendul, 2017; Smith, Binns, & Tushman, 2010; Teece, 2010; Zott, Amit, & Massa, 2011; Volberda, Van Den Bosch, Heij, 2018). Research has, furthermore, revealed that managerial cognition plays a crucial role in the conception of new BMs as well as the evolution and innovation in existing ones (Aspara, Lamberg, Laukia, & Tikkanen, 2013; Baden-Fuller & Morgan, 2010; Chesbrough, 2010; Martins, Rindova, & Greenbaum, 2015; Tikkanen, Lamberg, Parvinen, & Kallunki, 2005). However, we do not yet have much understanding of what influence managers' formative cognitive experiences (Sidhu, Heyden, Volberda, & Van Den Bosch, 2020), such as, experiences gained through one's professional background, have on their BM schemas.

Over time, managers develop a professional cognitive lens that they view the world through. The lens is molded by the effects of their education as well as their engagement with a specific industry (Sutcliffe, K. M., & Huber, G. P., 1998), and may thus reflect commonly held beliefs in the industry about relevant business activities, potential business opportunities, and networks of value creation (Helfat & Peteraf, 2015; Tikkanen et al., 2005). The lens functions as a perceptual filter, shaping a manager's understanding of industry recipes, relationships between pertinent concepts, and the expected payoffs from different actions. The lens's selective exposure to certain kinds of ideas and information contributes to the development of individual-level heuristic logics, that is, cognitive shortcuts that codify real-world business interdependencies into simplified mental maps of the business. These BM schemas encapsulate managers' theories regarding their business world (Fiske & Taylor, 2013; Martins et al., 2015).

In this chapter, we examine whether the BM schemas of managers from inside an industry differ from those of managers new to an industry. A priori, one would expect to observe differences, because as newcomers to an industry transfer, modify, and integrate knowledge across activity domains, using processes of generative cognition, they may organize their understandings about a firm's value-creating activities and exchanges in ways new to the focal industry (cf. Martins et al., 2015). To determine the extent and nature of differences between BM schemas of industry insiders and outsiders, we used data from interviews with chief executive officers (CEOs) of 30 legal-tech firms to construct and analyze graphical representations of their schemas. The examination revealed systematic differences in BM comprehensiveness, connectedness, focus, and depth of understanding. Furthermore, these differences appeared to find manifestation in CEOs' opportunity recognition, value framing, and expertise assessment processes.

This chapter discusses the variations in insider and outsider CEOs' BM schemas in detail. Notably, it highlights that outsiders' BM schemas incline them towards product-driven BMs, whereas insiders' partnership-centered schemas result in matchmaking or platform BMs. Furthermore, outsider CEOs show an inclination to focus more on value creation through broad offerings, while insiders focus on establishing competitive superiority in a niche market. While both

insiders and outsiders claim to simplify their customers' legal tasks and processes, the trajectories they adopt are distinct. Outsider executives are likely to prioritize innovation-driven and/or market-driven BMs, while executives with extensive legal experience tend to prioritize automation to replace repetitive human tasks. Outsiders also lay disproportionate focus on cost saving as a value proposition, when compared with industry insiders.

One important message conveyed by this chapter is that despite the shortcomings of being an outsider, such as lack of industry acumen and deficient social networks (Tibau & Debackere, 2008), outsider CEOs have comprehensive BM schemas. These comprehensive schemas, arising arguably from the incorporation of extra-industry knowledge to organize understanding of value creation in the focal industry, underlie observable BM evolution. Overall, by studying individual-level differences in the BM schemas of CEOs from inside and outside the industry, this chapter bridges research on strategic cognition with BM research (see also Martins et al., 2015). In this regard, it highlights the value of outsider executives for BM innovation.

The remainder of this chapter is organized as follows: We start by discussing the industry context, followed by a review of the relevant literature. We then discuss the data and methods we used for cognitive mapping of BM schemas. Next, we report the results of our analysis. We conclude by discussing the contributions of our research.

Research Context and the Literature

Many industries and professions, over the past decades, have had to contemplate and implement drastic BM change to compete in a business environment dominated by technological evolution. Constant access to a global marketplace of products, services, as well as information has transformed how both customers and businesses conceptualize themselves and their interaction with each other. Case in point, until recently, the legal industry had largely resisted major changes in their generations old BMs. However, recent industry reports indicate an emerging gap, with up to 55% of traditional law firms no longer meeting the expectations of their customers (Altman Weil, 2017; Deloitte, 2016). In 2016, while 28% of the investigated in-house legal teams already replaced some form of previously human tasks by technology, 77% had plans to either begin or increase the use of cutting-edge technology in their operations (Deloitte, 2016). The coming-of-age of artificial intelligence and the increasing pressure on lawyers to do more for less means that the top management in the legal industry face an imminent need to innovate their BMs (Altman Weil, 2017). Foremost, such changes in the central logic of long-standing industries and professions as a result of the digital revolution require a reconceptualization of managers' cognitive models of the value drivers in a firm's business environment and the interdependencies among them.

Business Models: Cognitive Representations of Complex Activity Systems

At their core, BMs are managerial cognitive schemas codifying the complex set of activities forming a firm's network of value creation, capture, and delivery into

simplified managerial heuristics (Schneckenberg, Velamuri, & Comberg, 2019; Teece, 2010). When viewed holistically, these schemas provide an insight into an individual's cognitive lens – his or her mind's eye (Furnari, 2015). Executives perceive their business environment through their own personal cognitive lenses, by categorizing real-life information (situational cases) into existing cognitive categories (concepts and relationships) (Aversa, Haefliger, & Rossi, 2015). From this cognitive perspective, a BM is a manager's mental representation of the complex system of real-life activities that interlink drivers of value creation (Baden-Fuller & Morgan, 2010).

These processes of perceptual cognition and conceptual categorization reduce cognitive load associated with decision-making by organizing learning processes and simplifying recall of existing knowledge (Martins et al., 2015). However, this reduction of cognitive load has significant cost in terms of loss of objectivity in decision-making (Grégoire, Barr, & Shepherd, 2010). As executives' perception as well as processing of new information are defined by their personal cognitive schema of their BM (Clarke & Mackaness, 2001; Furnari, 2015), so is the rationale underlying their executive decisions (Schneckenberg et al., 2019). As distinct executives have their own distinct perception of reality, their cognition has a deep impact on executive decisions and organizational performance (Thomas & Porac, 2002). Each individual has a unique view of reality based on their knowledge and beliefs regarding causal interdependencies in their environment (Tikkanen et al., 2005). In the context of BMs, this probably entails that managers conceptualize different schemas of interdependencies in their business environment, based on the understanding of cause–effect relationships between the different components, elements, and actors in their BM (Dutton & Jackson, 1987). First, the cognitive framework employed by an executive to understand and explain their business not only guides the search for opportunities and threats in the business environment but also provides a framework for the categorization of observed information (Grégoire et al., 2010). Second, an individual's mental understanding of his or her BM lends structure to their framing of the value propositions as well as influence the variety of value propositions in their pitch for their business (Baden-Fuller & Mangematin, 2013). Third, an individual's cognitive biases influence his or her perception of his or her own abilities and expertise as well as his or her assessment of organizational capabilities and the need for expertise acquisition (Das & Teng, 1999; Kaplan, 2011; Tripsas & Gavetti, 2000). Fourth, the drivers of change prioritized by an executive when evolving and redesigning his or her BM are a product of the individual's past professional experiences and his or her perception of extant business interdependencies (Eggers & Kaplan, 2009). Above factors taken together, an executive's cognition plays a crucial role in the development of a firm's BM value network.

Chesbrough and Rosenbloom (2002) state that BMs are "focusing device" that connect technological evolution with economic value. While both technological evolution and economic value creation are observable real-world activities, the focusing referred to in this definition takes place at the level of an individual executive's cognition, before being implemented tangibly (Baden-Fuller & Morgan, 2010). In their review of the BM literature, Tikkanen et al. (2005) differentiate

between the cognitive and material aspects of BMs. Building on this, Doz and Kosonen (2010) distinguish between the objective versus the subjective elements of BMs. Here, the objective elements represent the interdependent relation between the firm's BM and the internal as well as external actors engaged in it. This includes the firm, its internal units and departments, customers, external partners, as well as other stakeholders. However, the subjective elements of a BM are the nodes and links in its cognitive representation in the minds of managers. Teece (2010) proposes a purposive classification of these subjective elements in three categories, namely value creation, value capture, and value delivery.

At the core of these each of these BM elements, connecting them with each other, is the firm's value proposition. Martins et al. (2015) elaborate how managers develop novel value propositions using a combination of various processes of generative cognition. Their article highlights that managers use their existing cause–effect beliefs as ingredients in analogical and combinative cognitive processes while designing novel propositions of value. This idea is in accordance with Casadesus-Masanell and Ricart (2010) who view BMs as reflections of managerial interpretations and choices. More recently, Schneckenberg et al. (2019) have identified six cognitive processes that influence managerial reasoning in the development of their BM schemas. These include processes of dominant logic used for deductive reasoning – namely, analogical transfer, learned heuristics – as well as emerging logic (inductive reasoning), including problem sensing, considering adaptation, intuitional insights, integrating customer perceptions. In combination with these (and potentially more) cognitive processes, a manager's mental schema of their BM lends them a cognitive framework to develop heuristics for strategic activities. In the next section, we discusses the content and structure of the BM cognitive schemas (mental heuristics and biases as well as associated causal networks) and review the literature on the cognitive underpinnings of these crucial BM activities.

Heuristic Patterns and Network Structure in Cognitive Schemas

Cognitive mapping has been used by strategy scholars to plot the knowledge structures of executives engaged in decision-making (Axelrod, 1976; Clarke & Mackaness, 2001; Furnari, 2015; Nadkarni & Narayanan, 2007). Cognitive schemas, acting as frameworks for perception and interpretation of novel information, influence strategic outcomes in three ways (Dutton, Fahey, & Narayanan, 1983). First, an individual's cognition influences scanning, i.e. identifying new information and determining its relevance (Forbes, 1999; Thomas, Clark, & Gioia, 1993). Second, diagnosis, i.e., an individual's existing knowledge/belief regarding cause–effect relationships in the real-world influences his or her assessment and categorization of observed information (Dutton et al., 1983). And finally, an individual's cognitive schema is the base for his or her identification of and prioritization among choices of alternatives for any given strategic decision (Bromiley & Rau, 2016; Kaplan, 2011). In tandem, these three effects of differences among individual managerial cognition dictate variance in strategic action, such as customer identification and market opportunity recognition, framing of value

propositions, the perception of in-house expertise and knowledge acquisition, BM evolution, and the choice of BM type (dyadic product/dyadic solution/triadic matchmaking platform) (Baden-Fuller, Giudici, & Haefliger, 2017; Kaplan, 2011; Tikkanen et al., 2005; Vergne & Depeyre, 2016).

The structure of an individual's mental representation of his or her BM can be summarized and interpreted using four key network characteristics with precedent in literature, comprehensiveness – the size of their cognitive schema network (Calori, Johnson, & Sarnin, 1994; Clarke & Mackaness, 2001), complexity – the average degree of connectedness of the nodes for any given schema (Calori et al., 1994; Furnari, 2015), centrality– the extent to which the causal assertions in a cognitive schema are distributed across varied aspects of the business (Carley & Palmquist, 1992; Eden, Ackermann, & Cropper, 1992; Nadkarni & Narayanan, 2007), and causal network density – the ratio of causal links in a schematic network to the maximum possible links for the given number of nodes. These structural features of a cognitive representation have critical effects on heuristics and biases employed in individual-level decision-making.

For instance, the availability heuristic refers a cognitive shortcut that entails overvaluing the information conveniently available to oneself. Extant knowledge structures, thus, restricts the scope of top management executives' causal assertions in organizational settings. Rooted in the differences between objective reality and executives' perception of the reality, this bias is reduced as the variety and connectedness of concepts in cognitive maps increases. Increased comprehensiveness and complexity in cognitive maps enables managers to use a greater number of categories and relationships to categorize information extracted from real-world scenarios (Bogner and Barr, 2000). Comprehensive and complex cognitive schemas provide a greater initial set of causal assertions (Nadkarni & Narayanan, 2005) and thus reduce the negative effects of the availability heuristic on executive decision-making. Individuals engage in cognitive processes such as environmental scanning, diagnosis, and choice of alternatives using their individual cognitive representations of reality. An executive with a narrow view of the value independencies in his or her BM is likely to have limited perception of opportunities and threats in his or her business environment. Previous research has elaborated further upon the effect of a complex and comprehensive understanding of the BM on managers' performance. Complex cognitive maps have been found to enable rapid response to priority situations, greater flexibility in decision-making, increased creativity in BM design, and implementation of novel BM elements (Rodan & Galunic, 2004). Further, increased cognitive complexity also improves an executive's absorptive capacity, enhancing acquisition of industry acumen, resulting in a positive feedback loop (Cohen & Levinthal, 1990).

Further, executives' focus in their BM cognitive schema is an important determinant of executive decision-making and strategic action. A cognitive schema indicates a high degree of centrality (or monofocality) if the causal relations therein are structured around one central concept or are distributed along multiple key concepts (Nadkarni & Narayanan, 2007). Such a characteristic network of perceived causal links in the business environment is likely to have a bearing on the scanning of the business environment, diagnosis of the key issues, as well

as choices of alternatives to address these issues. Previous literature has made a distinction between core concepts and peripheral concepts in a cognitive schema. While both kinds of concepts are results of long-term learning, elaboration, and feedback processes (Prahalad & Bettis, 1986), they play distinct roles in managerial decision-making. In the processes of sensing opportunities, seizing them, and reconfiguring the firm's existing BM to achieve these goals, core (central) concepts play a more important role than peripheral concepts.

This emphasis on central concepts in a large number of cognitive processes is called perceptual salience. Perceptual salience is driven by the prominence of concepts and relations in an executive's past experiences. This creates a preference among executives for ideas and value chain linkages that are eye-catching and easy to discern for them (Kahneman & Tversky, 1982). When individuals have extensive experience in a context, they are more likely to have salient concepts that are associated with their specific role within the business ecosystem. While this ability to rapidly identify of opportunities and threats in an individual's surroundings is an essential cognitive mechanism useful for the allocation of attentional resources, in the context of decision-making, it may manifest in the form of the salience bias. Owing to the focus on a few central concepts, executives with focused cognitive schemas are susceptible to cognitive inertia (Carley & Palmquist, 1992). This cognitive inertia – a tendency for endurance of links in a cognitive schema once formed – may lead executives to unwittingly ignore viable business opportunities, limit the scope for the framing for value propositions, and restrict trajectories of BM evolution. A lower degree of focus on a manager's cognitive map of their BM makes it likely that the manager would consider a diverse perspective in executive search and decision-making processes. As managers routinely prioritize information which they consider most relevant and leave out other potentially fruitful information, they narrow down the firm's scope of business opportunity scanning as well as their choices of alternatives.

Further, densely mapped cognitive schemas reduce the cognitive inertia inherent in decision-making processes by facilitating a greater variety of alternatives (Dutton & Jackson, 1987). Firms led by executives with highly dense cognitive schemas have access to a greater depth of knowledge regarding a larger proportion of potential connection among the given concepts. These executives, characterized by greater extent of coverage of the causal network in a schema have experience with and are aware of deep and underlying issues in a domain. Such executives can identify potential market opportunities which address customers' key pain points. This also has a direct effect on strategic decision-making and actions of these executives. Dense cognitive schemas facilitate more targeted scanning of environmental opportunities and effective diagnosis leading to a bearing on the future trajectory of BM evolution. Dense cognitive representations reflect a variety among managerial perspectives and promote the consideration of new alternatives in the strategic decision-making process (Hodgkinson, 1997). Overall, owing to the increased likelihood that real-life information observed within the given domain has a suitable category to be employed in its interpretation, density of cognitive maps is helpful in environmental scanning within the domain. However, for scanning opportunities and threats beyond the domain, diagnosing

industry-spanning issues, and making the choice of action from a wide range of alternatives, a dense cognitive schema isn't helpful. The effects of the density of BM schemas are thus limited by their comprehensiveness.

Data and Methods

This chapter explores the cognitive differences among insider/outsider executives based on a series of interviews from the legal-tech ecosystem and other publicly available data, such as industry reports, media reports, and firm annual reports. The interviews were conducted by Mary Jutten of the legal innovation organization, "Evolve the Law" based in New York, United States. These interviews have been published as a part of a podcast series "Evolve Law" with the support of the legal media website "Above The Law." This study has no direct association with the interviewers or the interviewees. This chapter builds on an analysis of the transcripts of the publicly broadcasted interviews (podcast) under a copyright fair use doctrine. The dataset includes 30 interviews, conducted between March 2016 and February 2017, with CEO/Founders of firms operating in the legal-tech sector. As part of data preparation for this study, these interviews were transcribed, coded for causal assertions along a number of conceptual themes, and transformed into BM cognitive schemas. The resultant BM cognitive schemas were then analyzed along their structure (characteristics of the value network) and content (recurring patterns underlying value creation/capture/delivery) to identify cognitive differences among executives owing to their professional background. Information required for developing these BMs cognitive schemas can be retrieved from text or speech where top managers describe their BM. Thus, cognitive mapping has been used in a variety of fields as a simple yet reliable tool to understand the construction and accumulation of mental structures of knowledge and belief.

To improve internal validity, mapping and network analysis of executives' BM cognitive schemas is interpreted through thematic content analysis of the interview. As the aims of this chapter include the elucidation of the structure as well as content of cognitive differences among individuals owing to their professional experience, the data were coded for a two-pronged analytic approach. For a detailed evaluation of the research design, Table 1 enumerates the primary methodological concerns associated with the cognitive mapping methodology (Nelson, Nadkarni, Narayanan, & Ghods, 2000) and their treatment in this study.

Data on executives' individual-level characteristics were retrieved from company websites, media publications, and social networking sites. Information regarding executives' age, educational and background, domain and tenure of previous work experience, tenure at current firm was retrieved from LinkedIn, among other sources. Top managers' educational background is categorized into six categories, humanities, business, economics, engineering/science, formal legal education, and law-related humanities education. Similar to the measurement of educational background, executives' functional background is also categorized into five categories, namely engineering, finance, general management, law, marketing. Table 2 provides an overview of key characteristics of the interviewed

Table 1. Methodological Considerations and Research Design for Cognitive Mapping.

Methodological Concern Nelson et al., 2000)	**Criterion for Addressal**	**Treatment in this Study**
Research focus	To identify specific and measurable aims of cognitive mapping	To identify cognitive differences between industry insiders and outsiders
Choice of source	Interviewee selection by Industry Experts and Peers	Interviewees selection by members of the professional legal-innovation community
Sampling strategy – Incorporation of Research objectives	Interviewees must address myriad aspects of their business model	Interviews with Executives originally target their peers as audiences, ensuring specific, detailed, and verifiable communication
Construction of maps – • Theoretical and conceptual relevance of categories • Operationalization of constructs • Operationalization of linkages	Identifying causal statements from interview data Ensuring inter rater reliability of coding Interpreting of concepts and relationships using suitable existing theory	Two raters (the doctoral candidate and a master student familiar with the research) independently extracted causal statements from the interview data Existing theories of business model process elements, technological evolution, and generative cognitive were used to inform the coding process
Unit of analysis – Suitability for the investigated constructs	Ensuring a theoretically reasonable and empirically evidenced level of analysis to aggregate various constructs	Interpretation and investigation of the cognitive representation of team, organizational, and industry, level constructs at the executive level
Convergence – Consistency in insights from different sources	Use of auxiliary sources of information	Use of content analysis to support findings from cognitive schema analysis
Validity of findings – accuracy in representing the reality	Ensuring conceptual consistency in coding interpretation	Use of content analysis facilitates nuanced interpretation of cognitive schema analysis results

Table 2. Summary of Managerial and Firm Characteristics for the Sample.

Variable	Mean	Standard Deviation	Minimum	25th Percentile	75th Percentile	Maximum
Executive's age	41.77	7.42	30	37	46	62
Executive's work experience (in years)	14.84	7.12	2.30	10.81	18.19	33.28
Proportion of work experience at current firm	0.27	0.21	0.01	0.12	0.29	0.73
No. of previous employers	4.03	2.67	1	2	5.8	12
Firm age (in years)	7.77	10.01	0	2.2	8.2	45
Firm size (No. of employees)	60.93	158.34	1	3.5	18.5	800

executives' and their firms. Executives were categorized as industry insiders if they had previously directly worked for either a law firm or as/for an in-house general counsel. This categorization is regardless of an individual's formal legal education or qualifications.

Mapping of BM Cognitive Schemas

BM cognitive schemas are typically mapped using qualitative information gathered by observing top managers explaining their company's BMs (Furnari, 2015). Fig. 1 illustrates this process using an example from the dataset.

As Fig. 1 illustrates, using this process of mental mapping, the interview transcripts were transformed into a graphical schema of the BM in four steps (cf., Barr, Stimpert, & Huff, 1992; Calori et al., 1994; Furnari, 2015). The first step after transcribing the interview is identifying causal statements in the transcription. This includes identifying assertions that the researcher considers to have an effect on other things. In step 2, concepts based on the identified causal statements were codified into a table where each row consists of a cause concept, an effect concept, and the type of relationship. Next, the core concepts are organized into theoretical categories of BM elements (step 3). For this purpose, this study employs an BM conceptualization with its process elements categorized as value creation, value delivery, and value capture (Chesbrough & Rosenbloom, 2002; Teece, 2010). This study maps these three elements around the firm's value

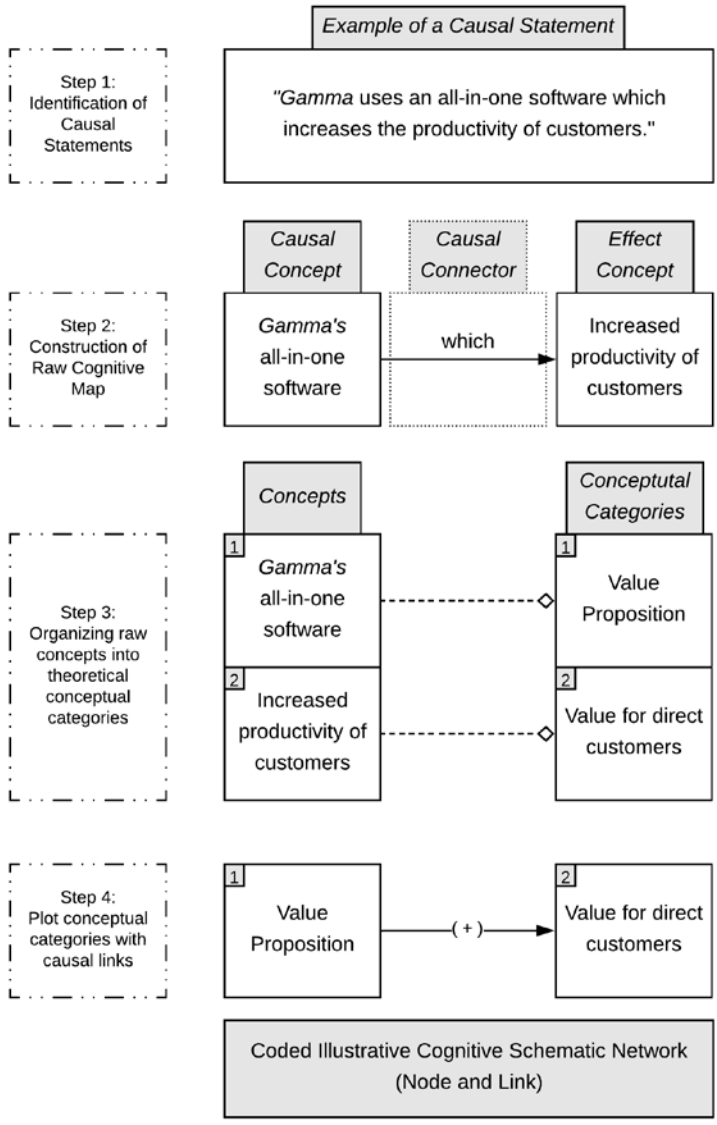

Fig. 1. Four-Step Procedure of Mapping a Cognitive Schema From Textual Assertions.

proposition. Moreover, we also distinguish between value creation for the direct client and value creation for the end user in the mapping. Thus, step 3 adds theoretical categorization to each conceptual relationship observed in the data. In the last step (step 4), the executive's cognitive map is developed using a network analysis software, UCINET. This software visualizes the cognitive schema as a network map. Every causal statement reflects a relation, the cause–effect relation,

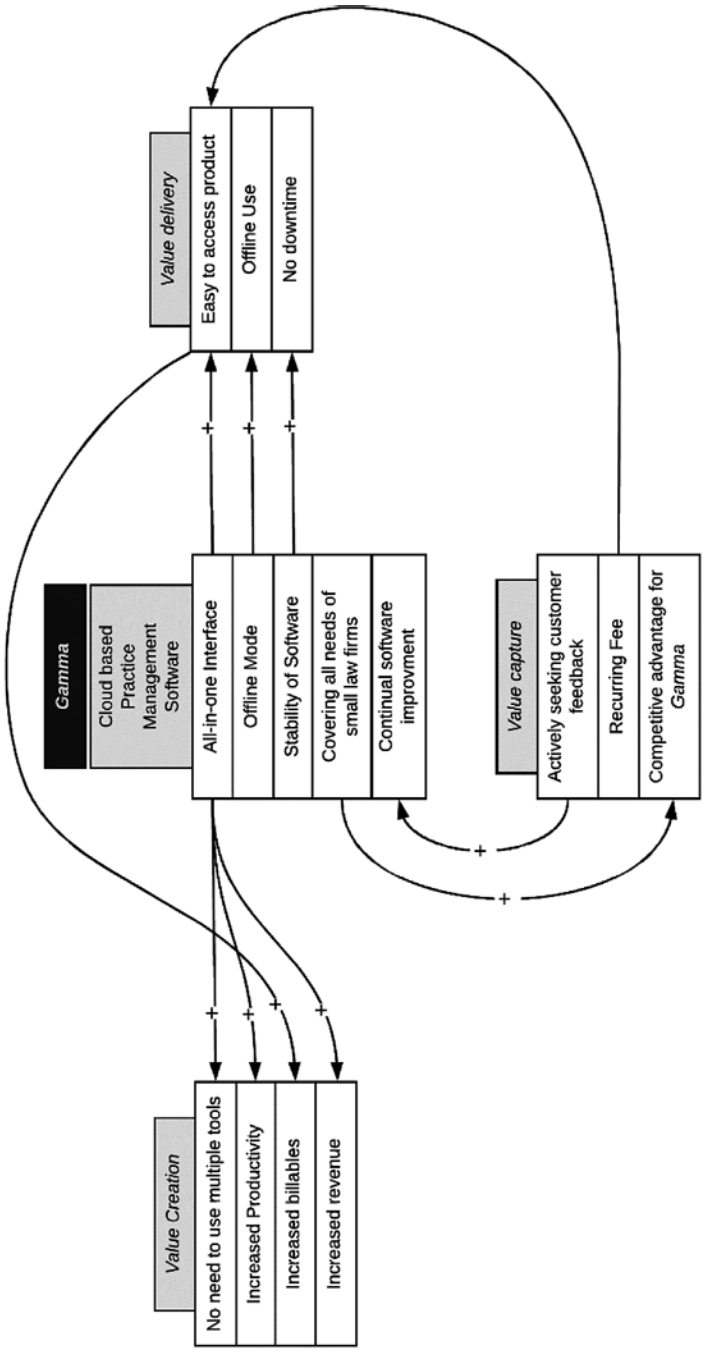

Fig. 2. Example Business Model Cognitive Map (Derived From the Interview With the CEO of Gamma).

which is visualized in the schematic network. Moreover, this visualization shows the organization of each concept into the conceptual BM categories.

Fig. 2 provides an illustration of a BM cognitive map. The BM cognitive map in Fig. 2 reflects the managers' understanding of their BM. Here, the circular nodes represent causal concepts, square nodes represent effect concepts, and consequently each relationship represents a causal assertion as perceived by the interviewed executive.

Network Analysis and Contextual Interpretation of Cognitive Schemas

The cognitive schemas mapped following the above-mentioned steps are subsequently analyzed as networks in order to reveal key insights regarding the structure of the BM. The results are interpreted with the context of the thematic analysis of the interview responses for improved internal validity.

The comprehensiveness, centrality, connectedness, and density of a cognitive map is calculated using methods commonly adopted in network science strategic cognition literature (Furnari, 2015; Nadkarni & Narayanan, 2007). Network comprehensiveness is measured as the number of nodes (N) in a network, i.e., the number of concepts in a given cognitive schema in relation to the other cognitive schemas in the sample (Nadkarni & Narayanan, 2007). Network connectedness is measured as the average number of edges connected to each node in a given network (E/N), i.e. the number of linkages in the map divided by the total number of concepts in the map (Nadkarni & Narayanan, 2007). This ratio reflects the connectedness of concepts in the cognitive schema and thus its degree of complexity (Calori et al., 1994). Density of the schematic network is a ratio of the number of edges to the maximum possible number of edges in a network with N nodes (E/E_{max}) (Carley & Palmquist, 1992). This can be calculated (in network analysis for simple graphs) using the following formula: $D = 2 * \frac{(E - N + 1)}{N(N-3)+2}$. The degree centrality of any node is the number of links incident upon it, i.e., the total number of relationships that a concept has (Valente, Coronges, Lakon, & Costenbader, 2008). As an indicator of the overall focus in a BM cognitive schema, this study takes the product of the number of nodes with degree centrality greater than three and the highest degree of any given node in the schema. This measure reflects the cognitive map's centralization and prioritization of one concept over others. Using the number of nodes with high degree centrality a certain concept is associated with, the cognitive maps were also classified into two categories: singular-focus BMs and distributed-focus BMs (Pokorny et al., 2018). For the analysis of the difference of means of the network characteristics among outsider and insider executives, this study uses Welch's two sample t-test as well as logistical regression using generalized linear models.

In interpreting the results of the network analysis, content analysis of the cognitive maps was used to compare and categorize a wide range of causal statements by insider and outsider along a number of themes. Subsequent to the identification of causal concepts and relationships in the interview data, the statement was

coded along theoretically salient themes at the individual case level. These themes are centered around four key executive processes of opportunity identification, value framing, expertise acquisition, and BM evolution. Further, the BMs in each of the schemas were coded based on the number of value creators and the direction of the value flow into core theoretical BM types including dyadic product, dyadic solutions, triadic matchmaking, triadic multisided (see Baden-Fuller et al., 2017). This was followed by a cross-case analysis, wherein the emerging patterns from the thematic analysis were used to summarize the main themes of differences between industry insiders and outsiders.

The reliability of the coding was ensured through independent rating of the interview data by the doctoral candidate as well as a master student familiar with the dataset. Both the coders engaged, in parallel, in the identification of causal statements, their cause and effect components, and the nature of the relationship between the concepts. While the final decisions on the coding approach and rating of empirical data were taken by the doctoral candidate, frequent discussions over the coding of causal statements occurred until the researchers reached consensus on the key codes.

Results and Discussion

The analysis of the executives' cognitive schemas resulted in the identification of key differences in the content as well as structure of the mental representations of their BMs. As the primary mode of analysis, the network characteristics of these BM cognitive schemas, such as comprehensiveness, complexity, centrality, and density, were compared across industry insider versus industry outsider executives. A summary of the findings of this schematic network analysis is provided in Table 3.

The results show that industry insider executives have a significantly lower network comprehensiveness in their BM cognitive schemas ($t = -1.96$, $b = -0.17$). This indicates a lower degree of differentiation among the concepts included in an insider executive's managerial cognitive schema. In other words, outsiders have

Table 3. Network Analysis Results for Business Model Cognitive Schema Network.

Network Characteristics	Conceptual Variable	Insider	Outsider	Welch t-test (t)	GLM (b)
(1) Size	Comprehensiveness	Low	High	−1.96*	−0.17*
(2) Complexity	Connectedness	Low	High	−2.11**	−0.16**
(3) Centrality	Focus Distribution	High	Low	1.82*	0.18*
(4) Linkage Density	Depth of Understanding	High	Low	2.52**	0.20**

*$p < 0.1$, **$p < 0.05$, ***$p < 0.005$

a larger number of nodes/concepts in their mental representation of their BMs due to their experience with a wider range of concepts beyond the legal industry.

In addition to this, the results show that industry outsider executives have a significantly higher network complexity in their BM cognitive schemas. As the comparison of means of the average degree of connectedness (E/N) of the network indicates, outsiders have better connected nodes in their mental representations of their BMs. They include a greater average number of links/relations connected to each node/concept in their BM cognitive schemas. Table 3 shows that there is a significantly lower average degree of connectedness of the concepts in an insider executive's managerial cognitive schema ($t = -2.11$, $b = -0.16$).

Further, the centrality in BM cognitive schema reflects the number of highly connected nodes in a cognitive schema. Results of the statistical analyses show that insiders have a higher number of nodes in their cognitive schemas which have a high degree of centrality compared to outsiders ($t = 1.82$, $b = 0.18$). This entails that outsiders are more likely to have multiple "central nodes" – nodes which are connected to three or more links – in their cognitive schemas than insiders. In the context of BM cognitive schemas, this means that industry insiders are more likely to have a unifocal BM cognitive schemas – focusing on a single idea or concept as causally connected with a wide range of other value creation, capture, and delivery concepts.

Lastly, the density of the BM cognitive schemas, that is the proportion of potential links in the value chain identified by the executive, is significantly higher among insider executives ($t = 2.52$, $b = 0.20$). This entails that insider executives are able to recognize a greater number of relational links within a given number of conceptual nodes. In the context of BM cognitive schemas, the density of the schematic network may be interpreted as the depth of knowledge in an individual's field of focus.

In summary, the analysis of managers' cognitive maps of their BM indicates significant differences in their structure. Outsider executives develop more comprehensive as well as more complex schemas of their BM compared to insiders. Next, although insiders' BM cognitive schemas are smaller in size, they reflect deeper and more focused knowledge structures.

Discussion and Implications

The results of the network analysis highlight that the schemas of industry insiders and outsiders differ along four dimensions – comprehensiveness, complexity, distribution of focus, and depth of understanding. In addition to the structure of their cognitive schemas of the interdependencies in their firm's BM, the following discussion interprets these systematic differences with regard to the content. In the following section, we discuss how owing to these differences, outsiders and insiders are likely to adopt different approaches to opportunity recognition, expertise assessment, value framing, and BM evolution.

Perception of Opportunities and Customer Identification. Substantiating the results of the network analysis of the BM cognitive maps, the content analysis of the cognitive maps also indicates a systematic difference between the primary customers that are at the center of insiders' and outsiders' mental representation.

Professional knowledge structures provide a framework for the cognitive processes of scanning, opportunity recognition, customer identification, and executives' understanding of their customers' specific needs. Content analysis of the BM cognitive schemas reveals that insiders' schemas are centered around personally experienced or observed problems, while outsiders use narratives built around the optimal utilization of technology.

Owing to their personal experience-driven BM schemas, insiders base their opportunity identification on potential customers and their needs. However, facing a lack of contextual knowledge, outsiders undergo a proactive exploration of their new industry of operation. Thus, outsider executives adopt a balanced approach, combining customers' needs, their solutions, and the facilitating technology. While the former leads to a narrow-focused, denser BM schema, the latter results in a broader, more comprehensive schema. Owing to these unique professional experiences and distinct cognitive schemas, outsiders identify potential links in the value chain unlike insiders. For instance, while insiders tend to overlook non-lawyers as customers of legal-tech firms, outsiders are able to prioritize a range of non-legal customers. Although an executive's previous industry experience facilitates targeting a wider range of customers within their professional domain.

Expertise and Knowledge. While managers' cognitive schema of their BM provides the basic framework for decision-making, they also indicate the nature and sources of value, in this case knowledge and expertise. The causal concepts in the links in the BM schema were analyzed to identify the sources of expertise and knowledge with reference to legal, technical, and cross-domain expertise of the executives' themselves, expertise available in-house at their firm, and the expertise that they acquired. Content analysis indicates that while systematic and planned acquisition of both legal and technical expertise is widely believed to be the ideal approach, it is seldom followed. Further, among the investigated firms, locus of expertise evident in the schemas is different for outsiders and insiders. Content analysis of the causal links in BM cognitive schemas shows how legal expertise is derived from reliance on executive's legal experience, executive's industry experience, external partnership for in legal expertise, in-house team of attorneys, or network of attorneys. Similarly, executives derive technical expertise from reliance on executive's technical expertise, reliance on executive's entrepreneurial experience, in-house technology teams, and partner executive's technical expertise.

Overall, while industry insiders predictably rely on their own legal expertise to drive their firm's BMs, outsiders rely on their own past experiences for technical and/or entrepreneurial acumen. However, while outsiders acknowledge the limits of their legal expertise, lawyer executives (insiders) are likely to underestimate the expertise required for the technical and entrepreneurial aspects of their business. Other emergent drivers of cross-domain expertise in legal-tech firms are the executive's own cross-domain expertise, executive's entrepreneurial acumen, technology-driven expertise acquisition, and technology hosted network of legal experts.

Framing of Value Proposition. The next theoretical theme along which the cognitive maps were coded is the executives' framing of their firm's value proposition – indicating their diagnosis of and addressal for the market opportunity.

There were four categories of value propositions emergent from the coding, task automation, cost saving, customer driven, workflow simplification. Among these, insiders predominantly propose automation of redundant legal tasks as the primary driver of value for the customer. This is in accordance with the insiders' personal approach to motivating their BM and is often shown to be a result of pain points identified by the executives themselves.

While outsiders consistently view value propositions from two different perspectives, encompassing customer-centric and task-centric value, insiders address their value propositions differently. Insider executives focus on only one form of value and build on the same to provide a narrow yet powerful narrative. However, outsider executives tend to focus on multiple forms of value simultaneously (customer centric, task centric, technology centric, cost centric).

An individual's depth of previous understanding of the industry and its business interdependencies facilitate triadic relations and bidirectional dyadic relations among business actors as opposed to unidirectional dyadic models driven by technology push. When interpreted in light of Baden-Fuller et al.'s (2017) theoretical classification of BM types, the cognitive maps show that insiders are more likely to adopt triadic (multi-party) matchmaking platform-type or dyadic (two-party) solution-type BMs. On the contrary, outsiders tend to perceive and explain their businesses in terms that signify a unidirectional dyadic product model.

Further, the analysis shows that insiders' and outsiders' BM cognitive schemas also evolve differently – revealing that in line with the preceding findings, insiders prioritize their personal motivation and experimentation as one of the main drivers of BM design. On the contrary, outsiders prioritize other outside-in factors in the evolution of their BMs like access to data and the potential applications of digital resources. Outsiders also tend to highlight their lack of initial industry expertise, their learning orientation, and focus on the role of technological evolution in bringing about their BM.

Conclusions

As the businesses are dynamic entities, undergoing continual reinterpretation and reconfiguration, these characteristics of the structure of executives' mental representation of the BM have an influence on the development of the content of the BM. Executives' generative processes of cognition simply work with the ingredients emergent as a result of their perception. With distinct mental schemas of their BM, insiders and outsiders focus on different concepts and relationships when attempting to visualize novel links in the value chain. Rooted in distinct approaches to opportunity identification and expertise assessment, the value framing developed by executives with past experience in a relevant professional context systematically differs from that developed by outsiders. Further, this managerial perception of outward and inward opportunities and threats influences a firm's trajectory of BM evolution (or BM renewal). A summary of these findings is provided in Table 4.

This analysis of an executive's cognitive schemas provides a response to Furnari's (2015) call for exploration of structural cognitive factors influencing the

Table 4. Thematic Content Analysis Results and Cognitive Differences Among Industry Insiders and Outsiders.

Thematic Content Analysis	**Insider**	**Outsider**
Opportunity recognition	Narratives centered around personally experienced or observed problems	Narratives built around the optimal utilization of technology and overall societal good
	Opportunity identification centered around potential customers and their needs	Balance of Customer-driven, solution-driven, and technology-driven opportunity identification
	Primarily targeting legal professionals as customers	Targeting non-lawyers as customers in addition to legal professionals
	Attention to law firms as well as in-house general counsels as customers	Focus on law firms as potential legal clients; likely to ignore in-house counsels
Value framing	Automation of redundant task as value driver	Cost saved by customers as a metric of value
	May rely on a single form of value driver such as resolving specific customer needs and pain points	Consistent addressal of both customers and task simplification as value drivers
Expertise perception	Expected reliance on executives' own legal expertise	Acquisition of team/ network of qualified attorneys
	Reliance on executive's assumed technical expertise	Expected reliance on executives' own technical expertise
Business model trajectory	Personal drive and experimentation as a main driver of changes in the business model	Access to digital resources as the main driver of changes in the business model
	Focus on customer feedback as other key drivers of change	Technology and partnerships are acknowledged as other key factors
Business model type	Depth of industry acumen facilitates both dyadic and triadic relationships among actors (solution- and matchmaking-type business models)	Predominantly, dyadic relationships among actors lead to inclination toward product-type business models

BM of a firm and Schneckenberg et al.'s (2019) appeal to identify cognitive processes of BM evolution in industry- and dynamism-specific contexts. This study both confirms and broadens the inquiry on how executives with distinct professional experiences differ in the way they perceive their firm's BMs. Further, this study builds on and extends Martins et al.'s (2015) explanation of the generative processes of cognition underlying design of new BMs. We see that industry insiders – executives with previous professional experience in the focal industry – have narrower, denser, and more centralized cognitive schemas of their BMs. This is opposed to outsiders perceiving their BMs in schematic networks that include a wider range of relatively sparsely connected concepts. To our surprise, we do not find any outlier executives who have both broad and dense schemas of their BM.

First, this study empirically confirms that, at its core, the process of opportunity recognition in organizations is of a cognitive nature (Zagorac-Uremović & Marxt, 2018). The findings resonate with previous research suggesting that previous knowledge among executives and selective exposure to certain situations has a pivotal effect on perception of opportunities in their business environment (Grégoire et al., 2010; Thomas et al., 1993). Further, in showing that the identification of the focal customer segments within as well as beyond a firm's industry of operation is contingent on the causal association in the top executives' perception of their BMs, this chapter contributes to the microfoundations of customer recognition and opportunity identification.

Second, the content analysis of BM cognitive maps supports that idea that the framing of a firm's value proposition is a reflection of the managerial diagnosis of the issue/market gap as well as the organizational response considered suitable (Dutton et al., 1983). Results show that as insiders and outsiders are different in the way they perceive and detect issues in the first place, the frameworks as well as the information used to develop their value propositions are also systematically distinct. Insiders use their own experience as well as a deep understanding of the pain points faced by actors in the industry to identify and frame the value proposition of their firm. This also entails that they are likely to focus on a narrower range of value propositions when compared with outsiders.

Third, we explore the managerial BM schemas with regard to the role of knowledge acquisition and cross-domain balancing of expertise in industry-spanning firms. We find that heuristics and cognitive biases play an important role in determining a manager's perceptions of their own expertise, the expertise available within the firm and the required expertise. Insiders' experience in the context of the legal industry leads to confidence in the firm's legal expertise and overconfidence in the firm's non-legal capabilities. This entails that an executive's industry experience has an influence on the firm's absorptive capacity by influencing the perception of available expertise and thus skewing the drivers of acquisition of new talent.

Fourth, we find that as the approach taken to opportunity recognition, perception of one's potential value offering, and the perception of expertise differs across insiders and outsiders, the way BMs evolve also reflects the structural differences in the cognitive schemas. Insiders prioritize subjective drivers of BM evolution, such as personal experimentation, executive's motivation, or customer feedback.

Outsiders, however, lacking in deep contextual knowledge of the domain, are driven by technological development, access to (digital) resources, and partnerships with legal partners in their firm's strategic renewal process.

Finally, we identify cognitive differences between outsider and insider executives and theorize its role in the evolution/renewal of BMs. In context of Baden-Fuller et al.'s (2017) theoretical classification of BM types, we find that insiders are more significantly more likely to adopt bidirectional dyadic (solution)-type or triadic (matchmaking)-type models. We submit that due to a deeper experiential understanding of the dynamics of the legal industry, insiders are able to form novel links in the BM connecting a greater variety of stakeholders and multiple directions of the flow of value. Contrarily, using the technological differential between the legal industry and other industries, outsiders are able to use causal concepts and links from a wider range of unrelated domains. Thus, they are more likely to adopt a unidirectional dyadic (product)-type BM.

In summary, this chapter illustrates systematic cognitive differences among industry insiders and industry outsiders in the way they approach opportunity identification, framing of value propositions, perception of available expertise, and their choice of trajectory for BM evolution. Insiders are shown to prioritize personally motivated opportunity identification narratives, task automation-based value propositions, exaggerated perception of the executive's expertise, and a customer feedback and personal experimentation-based BM evolution trajectory. On the contrary, it is found that outsiders attempt to compensate for their outsider-ness by proactively exploring the industry and consequently adopting a more balanced approach to their BM innovation. Outsiders prioritize technology-driven opportunity identification narratives, cost saving-based value propositions, and conscious legal and technical expertise management. Further, outsiders are likely to prioritize access to digital resources, and technological evolution as primary drivers of BM evolution.

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Unveiling the Dark Side of Business Models: A Novel Framework for Managerial Cognition and Decision-Making

Antonio Daood, Cinzia Calluso and Luca Giustiniano

Abstract

Decision-making has long been recognized as being at the core of organizational life. Yet, the cognitive mechanisms by which managers make decisions represent a critical field of exploration. In this context, business models (BMs) are cognitive representations of organizational architectures that managers use to orient their firms in the business environment. While BMs – as managerial schemas – have been extensively studied for their beneficial applications at the strategic level, scholarly attention has rarely focused on their *dark side*. In this chapter, we point out that BM thinking – that focuses excessively on established schemas – might narrow managerial cognition in the process of fine-tuning the current BM; in the process, opportunities for more radical BM innovation can be overlooked. We systematize March and Simon's contribution on managerial cognition into a more comprehensive conceptual framework by integrating the perspectives of Kahneman, Baron, and Gollwitzer. The result is an epistemologically coherent framework for managerial cognition and decision-making that focuses on how managers can overcome cognitive biases that derive from a reliance on established BMs as schemas. We close this chapter with directions for further research.

Keywords: Business models; cognitive schemas; cognitive limitations; cognitive reframing; managerial cognition; organizational decision-making

> If you change the way you look at things, the things you look at change. (Wayne Dyer)

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Introduction

The management literature commonly refers to the business model (hereinafter, BM) as an effective conceptualization of the way firms do business, although it lacks an agreed-upon definition (Foss & Saebi, 2017, 2018). Baden-Fuller and Morgan (2010) propose that BMs be viewed as recipes, wherein strategic elements (e.g., resources, technologies, capabilities) and organizational elements (e.g., structure, people, processes) are ingredients. These ingredients are then "cooked" through organization and integration, eventually resulting in a specific organizational architecture. Just as a recipe indicates how to cook a particular dish, a BM indicates how a firm does business (Baden-Fuller & Morgan, 2010).

BMs are useful to managers in effectively conceptualizing their firm's architecture, evaluating competitors' strategic positioning, and orienting their strategic decision-making processes. As cognitive representations that organize managerial understandings of their firms, BMs can be understood as managerial schemas (Chesbrough & Rosenbloom, 2002; Martins, Rindova, & Greenbaum, 2015; Massa, Tucci, & Afuah, 2017). Schemas, also known as frames of reference or knowledge structures, are simplified versions of the real world built through psychological and sociological processes by which individuals make decisions (March & Simon, 1993, p. 159). When referring to BMs as schemas, scholars emphasize their simplicity, as they can be extremely helpful to managers in making sense of the business world. Nevertheless, relatively little attention has been paid to the possible downsides associated with (excessive) reliance on schemas.

Indeed, although schemas can help individuals process information and make decisions, they might also lead to impoverished and inflexible understandings of the world (Walsh, 1995). Human rationality is always subjective, given the limitations imposed by decision-makers' knowledge – *ergo* by their schemas – and by information-processing capacities (Simon, 1997). An example of this mechanism is *selective attention*, which refers to the tendency of individuals to pay more attention to information consistent with their schemas and ignore that which contradicts them (March & Simon, 1958). Information discordant with the schema(s) is, indeed, subject to rationalization (i.e., reinterpretation) (Jarcho, Berkman, & Lieberman, 2011) or "filtered out before they reach consciousness" (March & Simon, 1958, 1993, p. 174).[1]

For this very reason, when employed as schemas, BMs might become sources of bias. More specifically, by simplifying reality into BMs, managers can easily spot gaps between their own firms' BMs and those of their competitors. Whenever a gap is found and is believed to favor competitors, the easiest way to improve the

[1]These issues have been consistently present in management theory involving cognition dynamics. For instance, upper echelon theory (Hambrick & Mason, 1984) understands organizational strategy as a reflection of top managers' values and cognitive base and considers managers' perceptual process as constrained by a limited field of vision, selective perception, and interpretation.

focal firm's competitive position is to bridge this gap.[2] For instance, in response to a successful change in a competitor's BM, a firm may tend to improve its current BM to match that of its competitor or replicate it and eventually refine it (Casadesus-Masanell & Zhu, 2013; Winter & Szulanski, 2001). Meanwhile, opportunities for radical change in that firm's BM might be overlooked on account of both the aforementioned filtering mechanism and their distance from the actual BM schema. In this regard, BM thinking might drive managerial cognition toward a narrow process of fine-tuning firms' current BMs on the basis of established industry recipes[3] and ultimately hinder more disruptive business model innovation (hereinafter, BMI). Continuing the analogy between the BM and a cooking recipe, a chef who excessively focuses on their usual recipe is more likely to look to perfect it through incremental changes, rather than rethink it anew. Likewise, should an incremental change to a chef's recipe prove successful, other chefs would try to replicate it and eventually perfect it through additional incremental changes, rather than rethink it anew.

In this chapter, we look to unveil the mechanisms by which BM thinking, through an excessive focus on existing schemas, might be detrimental to managerial cognition and decision-making, and to achieving superior BMI.

The remainder of this chapter is structured as follows. We first review the main theoretical background concerning decision-making and related underlying arguments. We then systematize March and Simon's contribution on managerial cognition into a more comprehensive conceptual framework by integrating Kahneman's perspective. Using the lens of the proposed framework, we then discuss the downsides of BM thinking. Finally, we discuss how managers can overcome cognitive bias deriving from an excessive reliance on BMs as schemas.

Cognitive Barriers to BMI

Over the last two decades, scholarly attention has focused on BMI as an effective way for firms to enhance their competitiveness (Casadesus-Masanell & Ricart, 2011; Chesbrough, 2007; Foss & Saebi, 2017, 2018; Markides, 2006; Massa et al., 2017; Spieth, Schneckenberg, & Ricart, 2014). BMI is a process that leads to the reconfiguration of an existing BM, through "designed, novel, and nontrivial changes" to the current configuration (Foss & Saebi, 2017, p. 216) or a process entailing the design, implementation, and validation of a radically new

[2]Decision-making is bounded by perception. Alternatives are not perceived a priori but must be sought, and it is difficult to estimate the consequences of each alternative (Simon, 1959, p. 272). Hence, a competitor's move (i.e., a change in the BM configuration) that reveals itself as successful is perceived by the decision-maker as an alternative (BM configuration) that has proved already to have positive consequences in similar conditions.

[3]Industry recipes are beliefs that relate to the logic by which business is done in a particular industry. According to Spender (1989), a "industry recipe" comprises the body of knowledge that experienced managers in a given industry consider common sense when running their businesses.

one (Massa & Tucci, 2014, p. 424). Like any type of innovation, it can be classified as incremental or radical: in the case of an incumbent, this depends on the distance from the current BM; in the case of a new venture, it depends on the BMs employed by incumbents. In particular, the degree of the radicalness of BM change is often used to distinguish among BM's *evolution*, *adaptation*, and *innovation*, which entail minor adjustments, alignments with the external environment, and disruptive changes, respectively (Saebi, 2015).

There exist several barriers to BMI (Chesbrough, 2010), and one of the most difficult to overcome (and detect) is represented by the constraining effect of established BMs on corporate decision-making processes (Chesbrough, 2010; Chesbrough & Rosenbloom, 2002). Indeed, when a BM reveals itself as successful, it is likely to become the firm's dominant logic (i.e., the mindset developed through experience in the business) (Prahalad, 2004; Prahalad & Bettis, 1986). As such, its entrenchment may hamper the firm's ability to identify radically different BMs (Chesbrough & Rosenbloom, 2002). Prahalad (2004) would agree, adding that

> The dominant logic of our companies, like blinders on a horse, allows organizations to perform well at their current task in the short term, […] focused on the road ahead, but also limits our peripheral vision. In a world in which many new opportunities are opening to the left and right of the beaten paths, we need to recognise the limitations of the dominant logic and look for ways to apply different logics to value creation and the organisation of our companies. (p. 178)

In the field of organization studies, this issue is often referred to as *organizational path dependence*, which arises from cognitive other than asset-based inflexibilities and eventually leads to a *lock-in* (Schreyögg & Sydow, 2011; Sydow, Schreyögg, & Koch, 2009). According to the theory proposed by Sydow et al. (2009), the formation of an organizational path spans three phases. In the initial phase (i.e., preformation) decision-making is totally unconstrained, and when a solution to a problem is found, it represents a *critical juncture*. During the second phase (i.e., formation), the solution triggers a regime of self-reinforcing feedback, and it progressively becomes the dominant solution.[4] From there, the third phase begins (i.e., lock-in), wherein alternative options are not even considered. This process is also valid in explaining BMI-related decisions – in what has also been referred to as BM *revision* (Cavalcante, Kesting, & Ulhøi, 2011) or *change*

[4]A solution that proved in the past to be successful becomes *salient* (Lewis, 1969) – in other words, it stands out from the rest of the alternatives as the "natural" or the "obvious" one (Bardsley & Sugden, 2006, pp. 739–740). This characteristic increases the tendency for it to be re-employed, unless there is a valid reason to do otherwise (Lewis, 1969, pp. 36–37).

(Santos, Spector, & Van der Heyden, 2015) – and highlighting the process of transition from the existing path.

In the preformation phase, a firm engages in BM exploration until a potentially valid one is found; this represents the critical juncture. During the formation phase, the firm engages in BM experimentation, wherein the alternate execution of BM implementation and design drives the firm toward a fairly successful BM. When this BM is consistently implemented over time, save for minor fine-tuning changes, the current BM becomes the dominant logic, and this drives BM thinking into a lock-in (i.e., business sense-making is constrained by the dominant BM logic) (Chesbrough & Rosenbloom, 2002). At innovation time, when searching for opportunities to change, constrained BM thinking drives the firm toward incremental innovation opportunities, thereby obscuring options for radical innovation. In other words, bearing in mind that the BMI process entails an initial and more uncertain exploration stage and a subsequent but more defined exploitation one (Bogers, Sund, & Villarroel, 2015; Sosna, Trevinyo-Rodríguez, & Velamuri, 2010), it can be said that the new exploration stage initiated at the innovation time is constrained by the extant dominant logic. Fig. 1 depicts the flow of such a process.

For instance, Polaroid's persist adherence to its original BM, even in the face of conflicting market conditions, is an example of self-reinforcing path-dependent BM thinking (Tripsas & Gavetti, 2000; Vergne & Durand, 2011). Along this line of thought, recent evidence shows that incumbents are more cognitively constrained than new entrants, given the need to remain close to the extant business logic brought about by path dependencies – something that only a few firms manage to break (Bohnsack, Pinkse, & Kolk, 2014; Laudien & Daxböck, 2016). One of the few exceptions in the car industry, as an example, is Daimler, which engaged in BM experimentation with its Smart brand and sought to offer car-sharing services; this eventually resulted in the successful establishment of car2go (Bohnsack et al., 2014). In this regard – that is, once the opportunity for BMI has already been envisioned – there is a plethora of literature that focuses on issues arising from the coexisting needs of developing and affirming the innovative BM under experimentation, on the one hand, and of pursuing efficient operations under the long-established BM, on the other hand (Bogers, Boyd, & Hollensen, 2015; Bogers, Sund et al., 2015; Markides, 2006, 2013; Markides & Charitou, 2004; Sund, Bogers, Villarroel, & Foss, 2016).

Other essential contributions on the matter focus on the "turning point" at which organizations manage to identify BMI opportunities. Some scholars have found that a severe crisis might trigger a reflection on the validity of the current BM logic, and that this reflection may be sufficiently deep to expand the search for "distant" options of reorientation (Sosna et al., 2010). In the case of Naturhouse, for instance, a crisis helped decision-makers understand that there were some options that could have not been conceived within the established logic; in this way, they became aware of opportunities for radical reorientation (Sosna et al., 2010). Similarly, in response to fierce competition following China's entry to the World Trade Organization, Portuguese footwear manufacturers were pushed to review their established individual BMs and rely more on a network orchestrator

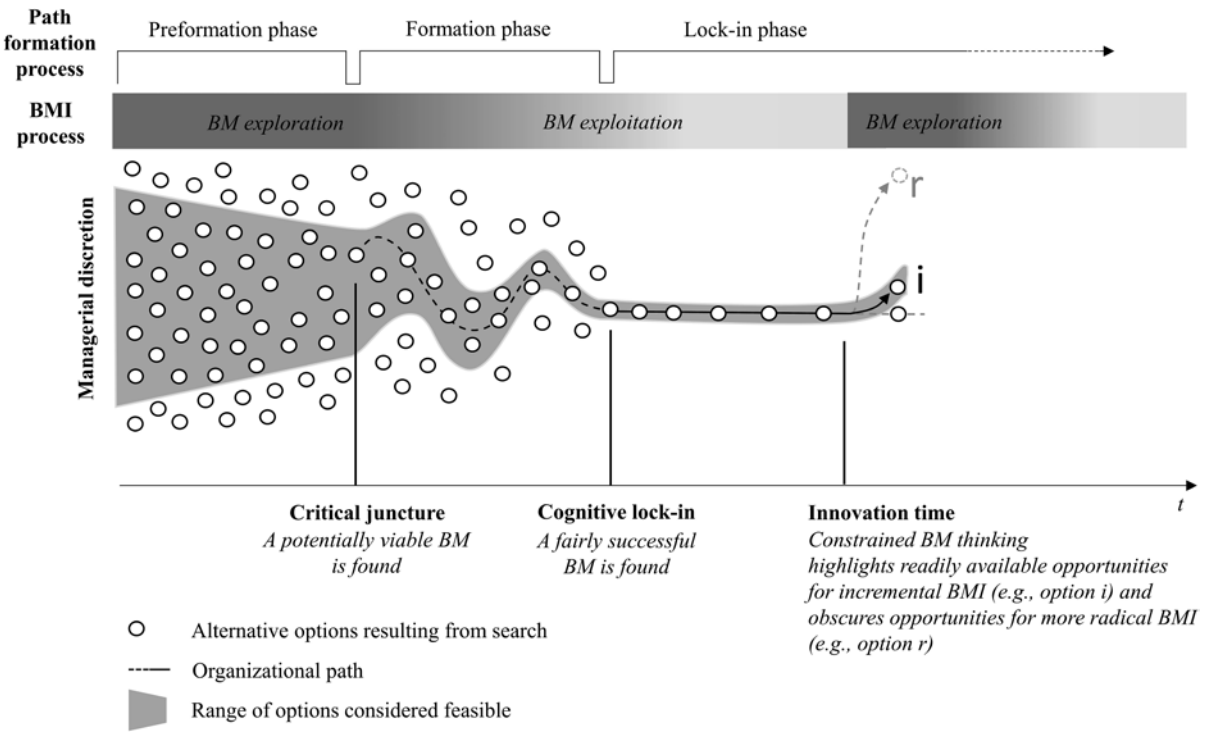

Fig. 1. Emerging Path in the BMI Process and Constrained BM Thinking. *Source*: Authors' elaboration based on "The Constitution of an Organizational Path" by Sydow et al. (2009, p. 692).

to remain competitive (Corbo, Pirolo, & Rodrigues, 2018). In these cases, exogenous shocks helped firms engage in an unusual search for solutions: due to inertial forces and high uncertainty concerning outcomes, firms typically do not even engage in BMI unless they have strong incentives to do so (Saebi, Lien, & Foss, 2017). Recalling that firms become more inclined toward risk-seeking under conditions of perceived threat (see Prospect theory, Kahneman, & Tversky, 1979; Tversky & Kahneman, 1992), a crisis – which is likely to be interpreted in terms of large losses – might represent a strong-enough incentive to take action (Sund, 2015). In other words, the perception of a performance-reducing threat is positively associated with the explorative adoption of an innovative BM (Osiyevskyy & Dewald, 2015).

Some other scholars have observed that business succession and customer initiatives act as two other path-breaking mechanisms that allow for the consideration of new opportunities for radical BMI (Laudien & Daxböck, 2016). In the case of business succession, a change in the decision-maker might act as a path-breaker when the new leader is not subject to the established dominant logic. Along this line of thinking, the inclusion of external professionals in the boards of family firms can inject fresh perspectives vis-à-vis BM development (Bogers, Boyd et al., 2015). In this case, putting clients at the very center of strategy – rather than adhering to a one-sided focus on value capture – might offer valuable inputs for BM development that help to question the established dominant logic (Priem, Wenzel, & Koch, 2018).

From the BMI literature that focuses on path-breaking mechanisms at the organizational level, it emerges that BMI entails socio-cognitive dynamics at the lower group level and cognitive processes at the individual level (see Sund, Galavan, & Brusoni, 2018). For instance, in their research on the postal industry, Bogers, Sund et al. (2015) note that for an organization to break the cognitive constraints of the dominant logic, the idea of a new BM, once it emerges, needs to be proliferate among individuals to "change their mind" (i.e., sense-giving). The roots of idea emergence (i.e., sense-making), instead, are found in what has been defined as the *awareness stage* (Jensen & Sund, 2017) – the third step in the BMI process and which precedes exploration, wherein individuals become initially aware of the need to change.

However, research has focused less on the awareness required to overcome the subtle downsides of BM thinking associated with path dependence and lock-in as described above. Our work looks to promote this "second-order" awareness, through which individuals become aware of the lock-in mechanism brought about by BM thinking and which constrains their search for radical innovation opportunities. Recent empirical evidence shows that BMI is typically associated with a broad external search for general rather than specific knowledge (Snihur & Wiklund, 2019), which is often found in different, distant industries and leads to extra-industry BM imitation (Frankenberger & Stam, in press). This evidence suggests that looking outside one's field is a natural way of escaping the rigidity of one's schemas.

BM is a cognitive mechanism, and its management process must be related to the management of perceptions (Tikkanen, Lamberg, Parvinen, & Kallunki,

2005). From here, it follows that increasing among individuals their awareness of cognitive dynamics is essential, if they are to go beyond the tunnel vision imposed by constrained BM thinking; this is especially the case when engaging in BMI. In the next section, we discuss the shortcomings of employing BMs as schemas at the individual level of analysis and systematize the literature in a framework for managerial cognition and decision-making.

Cognitive Dynamics at the Individual Level

Individuals understand and interpret phenomena through their own schemas. Among other things, schemas act as filters for any information that is dissonant with a certain view of the phenomena enforced by the mental template itself. At this point, according to Kahneman's theory of system 1 and system 2,[5] individuals can engage in automatic or deliberate decision-making. Even when decision-makers engage in system 2 thinking, when their rational process starts from biased information – or decisions are made under time pressures or with lack of resources – it might lead to suboptimal outcomes. However, while relying on automatic thinking (e.g., biases and heuristics) can be helpful in decision-making when time or resources are insufficient to engage in deliberate thinking (i.e., a time-demanding process), biased information-processing is likely to introduce systematic errors (or suboptimality) into decision mechanisms. Thus, to preclude cognitive dissonance, decision-makers should be cognizant of the subconscious selectivity exerted by their schemas in shaping their information-processing – and of how that selectivity can lead to the unintentional tendency to maintain a self-reinforcing relationship between the two.[6]

Having an awareness of these dynamics allows managers to enact *cognitive reframing*[7] (Beck, 1970, 1997). We borrow the term "cognitive reframing" from cognitive psychotherapy, to name the process through which individuals become aware of and intentionally modify their frame of reference in order to discover

[5]Kahneman identifies two modes of thinking, system 1 and system 2. The former relates to automatic, unintentional, and effortless thinking and the latter to an effortful mechanism rooted in a deliberate and conscious reasoning process. The pivotal difference between the two is the amount of attention and mental effort they demand. Although system 1 is quick and effortless, its capabilities are limited to detecting relations and integrating information about one thing at a time. Conversely, while system 2 can combine intuition with knowledge and deliberate decision-making, this mechanism appears to be more effortful and slower-going than system 1 (see Kahneman, 2003, 2011; Kahneman, Lovallo, & Sibony, 2011).

[6]There exists a self-reinforcing relationship between the schema (i.e., frame of reference) and information-processing (see Festinger, 1957; March & Simon, 1958; Shultz & Lepper, 1996).

[7]Introduced in the context of cognitive psychotherapy (see Beck, 1970, 1997), the term "cognitive reframing" indicates the process through which individuals make themselves aware of the shortcomings associated with their dysfunctional views of the world, with the aim of shifting to a more functional mindset.

new facets of a phenomenon or a completely novel understanding thereof. Along these very same lines, managers who become aware of their subconscious cognitive activity (i.e., biases) and of the circumstances under which it can lead them to a distorted or restricted understanding of phenomena may be able to question such biases and refrain from automatic reasoning each time such circumstances present themselves.[8]

Along this line of reasoning, Kahneman (2011, p. 418) suggests that recognizing situations wherein errors are likely to occur is similar to diagnosing diseases: "The name of a disease is a hook to which all that is known about the disease is attached, including vulnerabilities, environmental factors, prognosis, and care." Therefore, according to Kahneman (2011), individuals who are knowledgeable about cognitive biases can learn through experience the circumstances under which they are more likely to occur – in other words, circumstances that would then trigger system 2-type thinking (Fig. 2).

Hence, it might appear clear that automatic decision-making strategies are not detrimental per se: what makes them harmful is the extent to which they are consistently employed in the organization. In other words, when managers apply the same schema to interpret every situation or piece of information, thus resulting in the same decision strategy, they run the risk of ignoring potentially better business opportunities.

Becoming aware of bias is a necessary but not sufficient condition for making efficient decisions. According to Baron (2000), it is possible to define a set of rules by which to achieve so-called *good thinking* – namely, a decision strategy that allows one to refrain from systematic bias and cognitive distortions. Specifically, in his "pragmatic" or "bounded rationality" theory, Baron argues that the decision-making process is similar to the formulation of a series of hypotheses that need to be proved or rejected (Baron, 2000). To translate this concept into BMs, one can assimilate hypotheses investigation into the various BMI opportunities that managers need to evaluate (i.e., pros versus cons). Nevertheless, when schemas dominate information-processing, decision-making is constrained to the formulation of a single *dominant* hypothesis, in much the same way business sense-making is constrained by the dominant BM logic.

According to Baron, the first rule in achieving *good thinking* lies in one's ability to formulate several alternative hypotheses. In the BM logic, this concept can be translated into the process of *deliberatively* directing attention toward *several*

[8]It has been suggested that automatic reasoning relies on a system that entails a simple association between a certain situation (S) and a single action (a) to take within that situation ($S\ a\rightarrow$). The situation–recognition component integrates cues and context with the agent's memory to classify the situation: once a specific situation–action association has been learned to produce a certain outcome, the agent does not take into account any possible subsequent changes in the expected value, and this can result in a certain degree of inflexibility and resistance to change (De Wit et al., 2012; Faure, Haberland, & Massioui, 2005; Redish, Jensen, & Johnson, 2008).

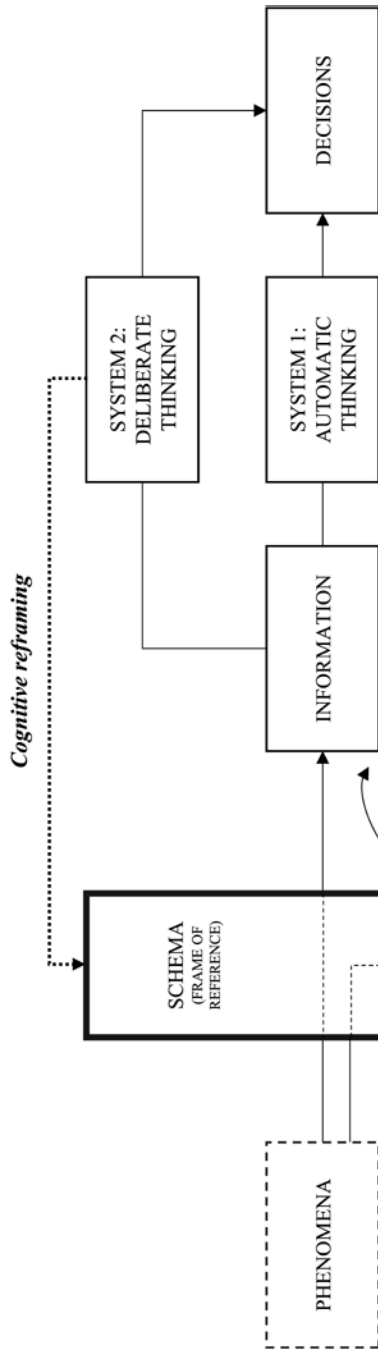

Fig. 2. A Framework for Managerial Cognition and Decision-Making. *Source:* Authors' elaboration.
Key: Gray box indicates the BM schema, as a frame of reference. Dotted line indicates the process of cognitive reframing that eventually leads to schema modification for limiting subconscious selectivity.

alternative BMs – rather than concentrating solely on the focal hypothesis, which is represented by the adoption of the dominant BM.

Following Baron's reasoning, however, this is not sufficient to achieving *good thinking*, as the formulation of hypotheses is naturally followed by the process of gathering information by which to prove or reject them. Although this may appear somewhat obvious, research has shown that schemas tend to direct information-gathering and -processing in a way that favors only the confirmation of the focal or dominant hypothesis; in this way, they may suppress the capacity to take into account information that may undermine it (i.e., confirmation bias) (Oswald & Grosjean, 2004). It is also important to note that this process takes place mostly subconsciously. Thus, when a manager considers BMI opportunities – as mentioned – they may be tempted to rely on dominant BMs that have proven useful or profitable in the past, without considering the possible pitfalls of the BM itself. In other words, managers, when relying on a schema, will gather information that is consistent with the focal hypothesis (i.e., "relying on the dominant BM is the best course of action"). Hence, in this phase, in order to be able to consider alternative BMs, one needs to carefully and *intentionally* look for and consider information that may prove the dominant BM unfit or otherwise inadequate relative to other available options. This process is likely to work as a path-breaker, as previously described.

As these two rules comprise time-consuming strategies, the third of Baron's recommendations for *good thinking* is to make optimal use of the time and resources employed in the first two phases. This is a particularly relevant aspect, as both searching for information and considering possible BMI opportunities are potentially never-ending processes. Thus, keeping in mind resource constraints with respect to individuals' information-processing – not to mention limitations on the time and resources available to the organization (i.e., "bite off more than we can chew") – it is essential that one knows the right time to end the process.

The rules described by Baron are often assumed (especially in cognitive psychotherapy) to be the first steps in *cognitive reframing* – namely, the process of discovering, challenging, modifying, or replacing cognitive distortions (i.e., biases) and thus improving decision-making processes.

A similar approach to decision-making strategies and their practical enactment is also offered by the Mindset Theory of Action phases (Gollwitzer, 1990, 2012; Gollwitzer & Keller, 2016). According to this view, it is possible to distinguish two phases of action: (1) a motivational phase characterized by a deliberative mindset and which pertains to the choice mechanism that allows one to decide among different courses of action and (2) a volitional phase characterized by an implemental mindset and which pertains to the practical enactment of the selected course of action. The first mindset mostly aligns with Baron's theory of *good thinking*, as it is marked by open-mindedness and allows one to process peripheral and incidental information (Fujita, Gollwitzer, & Oettingen, 2007), impartially process the pros and cons of each available option (Bayer & Gollwitzer, 2005), and make objective judgments regarding feasibility, difficulty, and the probability of success (Gollwitzer, 2012). Thus, while in Baron's theory a deliberative mindset is achieved through effortful and explicit reasoning, the mindset

theory takes deliberation almost "for granted," as part of the decision-making process.

Nevertheless, the mindset theory offers an additional contribution with respect to what happens once a certain decision is made (i.e., once a certain BMI has been adopted) – namely, when the volitional phase starts and the mindset has been diverted into the direction of implemental thinking. This phase is characterized by the pursuit of actions required to achieve the goal set in the previous phase. The corresponding implemental mindset is marked by optimistic judgments about feasibility and by an increased perception of control over the outcomes (Gollwitzer & Kinney, 1989); partial information-processing, with pros receiving more weight than cons (Taylor & Gollwitzer, 1995); and relative closed-mindedness that can determine that peripheral information is ignored (Bayer & Gollwitzer, 2005; Fujita et al., 2007). Finally, it has also been reported that an implemental mindset determines an increased tendency toward risk-prone decision-making and behavior (Keller & Gollwitzer, 2017). Nevertheless, it has also been suggested that these qualities are helpful and beneficial in the successful pursuit of a goal (Brandstätter & Frank, 2002; Brandstätter, Giesinger, Job, & Frank, 2015), as they impact not only dispositional attitudes toward the task but also translate into more effective performance and goal achievement (Armor & Taylor, 2003).

Hence, upon translating this additional contribution into the logic of BMs, the recommendation would be to become aware of the bias that can arise also *after* a decision has been made (i.e., after an alternative BM configuration has been chosen). Specifically, the findings in the mindset theory literature suggest that overconfidence, proneness to risk behavior, and ignorance of peripheral information are possible mechanisms that kick in once a specific course of action – in our case, a specific BMI process – has been adopted. Although these mechanisms can help focus managers' efforts and attitudes toward goal achievement, managers should also beware of the liabilities that can arise when the implemental mindset kicks in and explicitly strive to avoid their extreme consequences.

Discussion

When applying the same mechanisms in the context of BMs as schemas (Fig. 2), it is possible to gain insights into the shortcomings of BM thinking that might, in turn, hinder superior BMI. When adopting BMs as cognitive representations to make sense of the business environment, managers contextualize and interpret occurrences according to the BM schema and the industry recipe in which the latter is grounded. In other words, the BM schema filters managerial information-processing, making it consistent with the schema itself. Therefore, when it comes to pivotal strategic adjustments, managerial decision-making is based on such biases.

BM thinking has the virtue of effectively reducing occurrences to simple cognitive representations (i.e., BMs) that inform managerial decision-making. However, this merit carries the downside of restraining managerial cognition: because of its role in orienting the firm and identifying gaps with competitors, BM thinking accentuates incremental development trajectories at the expense of radical BM redesign.

Let's take the example of two firms, A and B, operating with the same BM at time T_1. Suppose that, at time T_2, firm A changes its BM in a particular direction that leads to better performance. Witnessing firm A's change in BM and the positive impact on its performance, at time T_3, firm B would tend to replicate firm A's BM (i.e., to improve its own BM in the same direction as firm A) to achieve similar results. Firm B's reaction is induced by its perception of change in firm A's BM; this highlights one opportunity for BM improvement that is readily available to firm B. However, firm B's biased focus obscures other possibilities for superior BMI.

Let's now observe this process in more specific contexts. When Barnes & Noble was transforming its traditional bookshops into its iconic multi-experience superstores, competitors with the resources to do so tried to replicate them. Then, Amazon entered the market with a radical BMI and conquered the industry within a short timeframe (Ghemawat, 2005; Ghemawat & Baird, 1998). One explanation for incumbents' inability to perform such radical change may be rooted, in the first place, in their heavy asset-based endowments and the increased costs of change. However, we cannot ignore that those incumbents were suffering from an obscuring effect stemming from established BM schemas and the related industry recipe. Amazon – which in our previous example would be a third firm (i.e., C) entering the market at T_3 – benefited from unconstrained BM thinking. Indeed, because of its different way of looking at the bookselling industry, Amazon managed to design and implement a radical BMI that superseded the BMI strategies employed by incumbents, thus ultimately changing that industry.

Even when innovative BMs are revealed by new entrants, constrained BM thinking might still compel incumbents to adhere to outdated business conceptions. For example, in 2019, we witnessed the emblematic bankruptcy case of Thomas Cook, which was operating with "an analogue business model in a digital world" (BBC, 2019). Despite the travel business having changed significantly with the advent of low-cost airlines and online travel companies, Thomas Cook continued to invest in its network of physical travel shops, which had in the past been one of the company's critical success factors. In other words, Thomas Cook's core strategy remained anchored to its historical model of the main street travel agency – with attendant large overheads costs and very thin margins – and this eventually led to the company's collapse.

Accordingly, we point out that managers should enhance conscious selectivity at the expense of subconscious selectivity, by engaging in cognitive reframing; in the process, they can overcome the "dark side" of BM schemas. In other words, by recognizing that BM thinking might serve as a possible source of bias, it would be possible for managers to engage in more deliberate forms of decision-making (i.e., similar to system 2), actively take advantage of the corpus of organizational memory[9] in their BMs, and thus avoid the inflexibility associated with schemas.

[9]Organizational memory represents the set of organizational knowledge, information, procedures, routines, and physical artifacts acquired through organizational learning and prior experience. Organizational memory is not centrally stored but distributed across members of the organization (see Moorman & Miner, 1997).

Final Remarks

This chapter systematized March and Simon's, Kahneman's, Baron's, and Gollwitzer's contributions vis-à-vis human cognition and decision-making into a simple framework, with the aim of providing managers with a clearer understanding of the shortcomings of BM schemas as well as insights into how to avoid them. Because awareness of the mechanisms that underlie managerial cognition is, doubtless, the starting point in overcoming its limitations, our study sought to trace the evolving dynamics inherent in decision-making processes. Questioning one's own schemas whenever cognitive biases are likely to distort information-processing might certainly help in developing better decision-making strategies. Indeed, managers who learn to mistrust their automatic biases are more likely to engage in cognitive reframing. In this way, they can enhance conscious selectivity and limit the subconscious one, for the sake of garnering more accurate evaluations of phenomena. In our work, we focused on cognitive limitations, although there exists an array of other organizational aspects that may also lead to inflexibilities relative to BMI (e.g., investment of resources into a certain BM, legitimacy issues).

This chapter focused on the quest of overcoming cognitive limitations at the individual level. However, examinations of BM schemas from an individual-centric perspective might find in group cognition the responses to individual cognitive limitations. For instance, there exists initial evidence showcasing cognitive misalignment between people working in a firm's innovation departments and those operating in its core business; this misalignment may stem from their different perceptions of salient environmental changes, and it might hinder radical BMI (Egfjord & Sund, 2020). In this direction, the literature on shared cognition might shed new light on how individuals engaging in a group-based decision-making process might reach cognitive consensus about a BM configuration that surpasses the mental constraints of a single individual (e.g., Klimoski & Mohammed, 1994; Mohammed & Ringseis, 2001). Therefore, we do believe that our work represents the first pillar of a more comprehensive conceptual framework that goes beyond the individual level of analysis and, in the process, aims to integrate group and organizational-level dimensions. Additionally, we believe that our work facilitates the building of a bridge between cognitive psychology models of individual cognition and behavior and their application in the fields of business and management. Cognition scholars might find in competitive strategy and related decision-making rich settings for future investigation.

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What Bounds Entrepreneurial Business Modelling? The Impacts of Visual Framing Effects and Cognitive Dispositions

Tassilo Henike and Katharina Hölzle

Abstract

Great uncertainty accompanies entrepreneurs' processes of designing promising business models (BMs). Therefore, stabilising factors act as important means in this process. In this study, we examined the impact of cognitive dispositions and visual BM frameworks on the BM process and outcomes. By using partial-least-square structural equation modelling (PLS-SEM) and an experimental setting, our results show that the stabilising function of BM frameworks depends on entrepreneurs' cognitive dispositions. This finding contributes to the cognitive BM perspective and explains how cognitive dispositions and visual framing effects act as boundary conditions for the theory of stabilising factors. This also has important implications for applying frameworks in practice.

Keywords: Business models; visual frameworks; cognition; entrepreneurship; framing effects; dual-process theory

Introduction

For establishing new ventures, designing a promising business model (BM) is a future-determining decision-making process characterised by high uncertainty and complexity. Uncertainty arises because entrepreneurs cannot determine ex ante what BM will be successful (Packard, Clark, & Klein, 2017). Further, resource constraints and liabilities of newness prohibit prolonged experimentation until finding a promising BM design (Nicholls-Nixon, Cooper, & Woo, 2000; Sosna, Trevinyo-Rodríguez, & Velamuri, 2010). By a BM design, we mean an entrepreneur's first cognitive structure of reasons why and mechanisms how various actors engage in business interactions organised by the focal new

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venture that should be implemented (Doz & Kosonen, 2010). Aligning these BM elements is a complex process, as several equally promising options exist (Massa & Tucci, 2014). In general, these options allow imitating successful BMs or creating atypical BMs by combining different elements into novel BMs (Baden-Fuller & Morgan, 2010; Casadesus-Masanell & Zhu, 2013). However, answering how entrepreneurs decide to either imitate or deviate is 'one of the most significant gaps' in entrepreneurship research (Matthews, Chalmers, & Fraser, 2018, p. 701).

Recent research has shown that entrepreneurs' power is a key factor to implement their BM designs (Snihur & Zott, in press), i.e., transforming their cognitive BMs into operated business logics. In contrast, researchers have explored a greater variety of factors to explain what affects BM implementation-anteceding design processes (e.g., Amit & Zott, 2015; Martins, Rindova, & Greenbaum, 2015; McDonald & Eisenhardt, 2020; Roessler, Velamuri, & Schneckenberg, in press; Snihur & Zott, in press). These stabilising factors include entrepreneurs identity (e.g., for-profit or social aspirations), socio-cognitive (e.g., co-founders' and investors' interests) as well as individual-cognitive factors (e.g., analogous problem-solving), and formal techniques (e.g., business plans or BM visualisations; Henike, 2019). Among them, entrepreneurs' cognition is the most crucial factor as their interpretations of environmental factors determine a new venture's course of action (Sosna et al., 2010).

By cognition, we mean a person's knowledge structures, context-independent cognitive disposition and context-dependent activities of information processing (Neisser, 1976; Walsh, 1995). Cognitive dispositions are supposed to be relatively stable preferences for how to process information (Stanovich & West, 2000). Persons either prefer to process information in a rational or an experiential way (Epstein, Pacini, Denes-Raj, & Heier, 1996; Evans & Stanovich, 2013). However, depending on contextual characteristics, persons can deviate from the preferred set of cognitive activities using characteristics of the other disposition instead (Epstein et al., 1996). Cognitive activities comprise of four activities: perception, attention, problem-solving, and reasoning (Helfat & Peteraf, 2015; Reed, 2006). Thus, persons with a rational disposition ought to be more inclined to pay careful attention, reason based on facts, and solve problems by logically combining elements. In contrast, persons with an experiential disposition ought to be more inclined to holistic information processing, reason based on their experiences as well as intuition, and use analogies to solve problems.

Relying on this dual-process theory (Epstein et al., 1996), recent BM research indicates that the decision to imitate or deviate from existing BMs depends on contextual characteristics and the match between cognitive dispositions and activities serving as stabilising factors (Henike, 2019). Accordingly, this match provides entrepreneurs with cognitive safety to accept atypical BMs in the uncertain situation of establishing a new venture. In contrast, a mismatch is more likely to result in BM imitation because copying successful examples provides then a source for feeling cognitively safe in decision-making.

However, current research has rarely investigated the boundary factors and the impact of other factors that can affect cognitive activities (cf. Henike, 2019;

McDonald & Eisenhardt, 2020; Roessler et al., in press; Snihur & Zott, in press). Increasing our understanding of these boundary factors is important because they are crucial hallmarks for generally explaining the phenomenon of designing BMs (cf. Foss & Saebi, 2017).

BM frameworks are one of these cognition-affecting factors that have become prevalent in practice. These frameworks – like the BM Canvas (Osterwalder & Pigneur, 2010) – can relieve tasks that go beyond what humans can easily process in their memories, i.e., reduce cognitive load (Larkin & Simon, 1987). The reduction of cognitive load is not neutral, yet BM frameworks unfold specific visual framing effects (Henike, Kamprath, & Hölzle, forthcoming) affecting entrepreneurs' cognition. For instance, BM frameworks can contain inspiring BM examples (e.g., Gassmann, Frankenberger, & Csik, 2014). However, we know so far very little about under what circumstances BM frameworks impact decision-making. Therefore, we ask in this study: How much do BM frameworks impact the decision-making process and BM outcomes of entrepreneurs with different cognitive dispositions?

Based on dual-process theory (Epstein et al., 1996), the concept of cognitive safety (Henike, 2019), and visual framing effects (Henike et al., forthcoming), we conceptualise cognitive dispositions and prior experiences as boundary conditions for the impacts of BM frameworks on cognitive activities and BM outcomes, i.e., BM typicality and the feeling of confidence. By using partial-least-square structural equation modelling (PLS-SEM), we analysed the impact of two BM frameworks – the BM Canvas (Osterwalder & Pigneur, 2010) and the 55 BM Pattern Cards (Gassmann et al., 2014) – on the BM design processes of 197 entrepreneurs in a role-playing experiment. Our results confirm the impact of the visual framing effects on the design process. Our results also show that the relationship between frameworks and cognitive dispositions has an impact on BM outcomes contributing to the cognitive BM perspective and the contingent applicability of BM frameworks.

Conceptual Framework

The questions of how and when new BMs emerge have received increasing interest in recent years (Foss & Saebi, 2017). New BMs can emerge in three different situations, each encompassing different degrees of cognitive and implementation challenges. First, new BMs can emerge as reconfigurations of existing BMs being mostly challenged by existing resources and cognitive imprints (Tripsas & Gavetti, 2000). Second, new BMs can emerge as additions to existing BM portfolios (Futterer, Schmidt, & Heidenreich, 2018). In this second situation, the most prevailing challenge is to align the new business with the existing core business (Snihur & Tarzijan, 2018). Third, new BMs can emerge as the first BM of a new venture in that extensive resources and cognitive imprints are missing prohibiting orientations on how to design a promising first BM (Massa & Tucci, 2014; Packard et al., 2017).

In this third situation, entrepreneurs' cognition 'provides the most important input into the initial business model design' (Sosna et al., 2010, p. 386).

From a cognitive-psychological perspective, cognition comprises of a person's knowledge structures, context-independent cognitive disposition, and context-dependent activities of information processing (Neisser, 1976; Walsh, 1995). Cognitive dispositions are preferences for how to process information (Stanovich & West, 2000). Persons either prefer a rational way, i.e., analytical, logical, and effortful, or an experiential way, i.e., holistic, associative, and effortless (Epstein et al., 1996; Evans & Stanovich, 2013). However, the use of a preferred way of information processing depends on contextual characteristics, pre-existing knowledge, and emotions. Thus, persons can deviate from their preferred cognitive activities (Epstein et al., 1996).

The cognitive activities comprise of perception, attention, problem-solving, and reasoning (Helfat & Peteraf, 2015; Reed, 2006). First, perception is the ability to mentally construct meaningful impressions out of information (Gazzaniga, Heatherton, & Halpern, 2015). In business contexts, mainly strategic orientations are references for constructing meaningful impressions (Gatignon & Xuereb, 1997). Second, attention intensity determines how much cognitive capacity is spent on processing particular information (Kahneman, 1973). Third, problem-solving is the process of finding a solution by using analogies or conceptual combinations (Martins et al., 2015). Finally, intuitive and factual reasoning provide sources of proof whether information processed is satisfying (Simon, 1955).

In explaining the emergence of new entrepreneurial BMs, Snihur and Zott (in press) have linked the emergence of novel, atypical BMs to entrepreneurs' distant searches in other industries and detailed knowledge of their industry structure and functioning. Other authors have explained the emergence of BMs because some entrepreneurs use analogical, while others use conceptual combinations (Roessler et al., in press). The focus on separate cognitive activities shows a highly fragmented picture of how cognitive activities determine BM outcomes. Further, for constituting a rigid theory of BM design emergence (cf. Foss & Saebi, 2017), current studies do not consider boundary conditions what limits our understanding of why for instance some entrepreneurs engage in distant searches and others do not.

Addressing these shortcomings, Henike (2019) introduced the concept of cognitive safety and empirically showed that a match between cognitive dispositions and activities encouraged novice entrepreneurs to recommend atypical BM designs. Accordingly, entrepreneurs with a rational disposition designed atypical BMs when they have paid intense attention to details, solved problems by logically combining elements, and reasoned based on facts. In contrast, experiential entrepreneurs designed atypical BMs when they have paid high to medium attention, used analogies, and reasoned based on their experiences as well as intuition. Thus, their decisions to deviate in the uncertain entrepreneurial process rested on stabilising factors. However, the impacts of other stabilising factors like market reactions from experimentations, investor influences, or formal techniques like BM frameworks are overall unexplored in the emerging cognitive BM field (cf. Amit & Zott, 2015; Henike, 2019; McDonald & Eisenhardt, 2020; Roessler et al., in press; Snihur & Zott, in press).

BM frameworks can be such a stabilising factor because they aim to support the structured simultaneous processing of information that cannot be easily

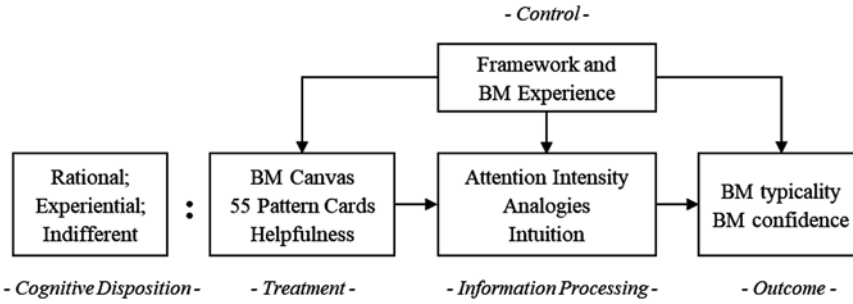

Fig. 1. Conceptual Framework of BM Frameworks' Impacts.

processed in working memories (cf. Larkin & Simon, 1987). By BM frameworks, we mean codified expressions of theoretical BM aspects like general BM patterns (e.g., Gassmann et al., 2014) or sets of BM elements (e.g., Osterwalder & Pigneur, 2010) that are meaningfully arranged within a restricted scheme (cf. Berinato, 2016; Tversky, 2004). They affect persons' cognition in promoting specific visual framing effects (Henike et al., forthcoming). These visual framing effects can encourage to pay more intense attention or to contrast different options. The outcomes of such processes are then treated as results of mainly cold cognition (March, 2006), i.e., independent of emotions and feelings (Sund, Galavan, & Brusoni, 2018).

According to this perspective, BM frameworks impact the BM process and outcomes. However, by considering the aspects of cognitive safety, we assume that the impacts on BM outcomes depend on entrepreneurs' cognitive disposition and prior experiences. We also assume that the quality is affected, BM typicality, as well as emotional aspects because some will feel more familiar with the way of thinking promoted by BM frameworks than others. Fig. 1 shows our conceptual framework that we will further explain in the following.

Visual Framing Effects

Since BM visualisations promote different framing effects, we expect different impacts of different BM frameworks on the cognitive activities and BM outcomes. The BM Canvas is a BM framework that promotes the easy recall of intuitive thoughts and, thus, an availability effect (Henike et al., forthcoming). This effect results from the decomposition of a BM into nine separated, open-ended dimensions (Osterwalder & Pigneur, 2010). Each block is displayed as a rectangle in a specific size and possesses a particular headline like value proposition or cost structure. As the Canvas does not provide further manifestations for each dimension, the BM Canvas is an open-ended framework. This openness helps to structure thoughts, yet does not inspire new or challenge existing thoughts as research has shown (Eppler, Hoffmann, & Bresciani, 2011; Snihur, Lamine, & Wright, in press). At the same time, the decomposition of a BM into nine dimensions with specifically sized rectangles promotes to pay attention to the varying dimensions.

Thus, users of the BM Canvas who greatly adhere to its structure ought to be inclined to pay more intense attention and to rely on intuitive thoughts. Thus, we hypothesise:

> *Hypothesis 1a* (*H1a*). If the BM Canvas is helpful, it leads to paying more intense attention and to increased intuitive reasoning.

In contrast, the 55 BM Pattern Cards are a collection of different abstract BM patterns (Gassmann et al., 2014). Each pattern is presented on a separate card with a unique label that also includes a verbal detailed description and prominent business examples operating according to this pattern. The detailed descriptions and the possibility to compare different BM patterns foster a contrasting effect and limit the availability effect (Henike et al., forthcoming). Thus, the presentation of different BM patterns encourages to pay intense attention to the differences across patterns. At the same time, the presentation provides analogies that can lead to 'a surprising boost in creativity' if BM Pattern Card users explore new information (Snihur et al., in press). Accordingly, we assume:

> *Hypothesis 1b* (*H1b*). If BM Pattern Cards are helpful, they lead to paying more intense attention and to increased analogous problem-solving.

Research has indicated that the primary boundary condition for the unfolding of framework effects is a great adherence of framework users to the framework characteristics (Jarzabkowski & Kaplan, 2015). The main value of frameworks is to support cognitive activities that are too complex for easy processing in human working memories (Larkin & Simon, 1987). However, the ease of processing can also be influenced by a person's experiences (Albarracín & Wyer, 2000). Possessing rich experience in designing BMs or working with BM frameworks will inevitably evoke the experiential thinking system because in situations of profound knowledge, this way of thinking is the most efficient (cf. Epstein et al., 1996). Arguably, users with great experiences in using the BM Canvas may have already internalised its structure so that they do not see value in recalling its visual characteristics and greatly adhering to them. Therefore, we assume in hypothesis *H1c* that experiences in designing BMs and working with BM frameworks are boundary conditions for the helpfulness of BM frameworks and, subsequently, their visual framing effects:

> *Hypothesis 1c* (*H1c*). High BM and framework experience lead to lower helpfulness of BM frameworks.

Cognitive Dispositions, Visual Framing Effects, and BM Outcomes

The unfolding of visual framing effects ought to be unrelated to entrepreneurs' cognitive disposition because the visual elements underlying the framing effects are codified and, thus, not subject to greatly varying interpretations – at least in the same culture (Meyer, Höllerer, Jancsary, & van Leeuwen, 2013). However, the

recent research on cognitive safety indicates that using the different visual framing effects will result in different outcomes for entrepreneurs with different cognitive dispositions (cf. Henike, 2019). Thus, the visual framing effects ought to determine when entrepreneurs with different cognitive dispositions, i.e., rational, experiential, or indifferent, are more likely to design atypical BMs as well as their confidence that their BM design will be successful in the future (cf. March, 2006).

The concept of cognitive safety assumes for rational entrepreneurs that they will be more likely to design atypical BMs when high levels of attention intensity, factual reasoning, and conceptual combination characterise their information processing. As the BM Canvas encourages paying intense attention and to conceptually combine elements within the nine building blocks, we assume that it is likely that rational entrepreneurs will be more inclined to recommend atypical BMs. The underlying reason is that rational entrepreneurs will use these visual framing effects to detect significant differences to other competing BMs (Martins et al., 2015). For the BM Pattern Cards, we expect no relationship to BM atypicality for rational participants. Although the BM Pattern Cards also encourage high levels of attention intensity, the provision of analogies will not encourage them to detect significant differences (Martins et al., 2015). However, we expect for both frameworks the same effects on the feeling of confidence, i.e., that their BM designs will be successful in the future. As March (2006) formulated, frameworks are 'technologies of rationality' providing analytical devices that help entrepreneurs making seemingly rational choices (cf. Jarzabkowski & Kaplan, 2015). Consequently, our hypotheses *H2a* and *H2b* are as follows:

> *Hypothesis 2a* (*H2a*). If rational participants use the BM Canvas' visual framing effects, they will be more confident about the success of atypical BM designs.

> *Hypothesis 2b* (*H2b*). If rational participants use the BM Pattern Cards' visual framing effects, they will be more confident of their BM designs independent of BM typicality.

In contrast, the concept of cognitive safety assumes that experiential entrepreneurs will be more likely to design atypical BMs when high to medium levels of attention intensity, intuitive reasoning, and analogic problem-solving characterise their information processing. In fact, both frameworks support two of these three crucial cognitive activities so that we expect for both frameworks an impact on BM atypicality. The BM Canvas supports attention intensity and intuitive reasoning that encourages experiential entrepreneurs to imagine the best possible solution based on their own situation. As each own situation includes wishes that might not be specifically respected in main-streamlined competing BMs, they will be able to detect differences (Sadler-Smith, 2016). We also assume a similar impact of the BM Pattern Cards. They promote attention intensity and analogous problem-solving so that it is likely that the BM designs will be atypical. Combining different possible solutions with their own experiences and wishes can encourage the design of atypical BMs (Sadler-Smith, 2016). Further, as experiential persons

are per se not strongly inclined to rational reasoning (Epstein et al., 1996), we expect no effect of both frameworks on confidence. Thus, we hypothesise:

Hypothesis 3a (*H3a*). If experiential participants use the BM Canvas' visual framing effects, they will derive more atypical BMs, yet without an impact on confidence.

Hypothesis 3b (*H3b*). If experiential participants use the BM Pattern Cards' visual framing effects, they will derive more atypical BMs, yet without an impact on confidence.

Lastly, the cognitive safety perspective assumes that the group of persons with indifferent thinking dispositions shows no general pattern of how BM typicality will be affected. We also expect that no general pattern on BM confidence will be detectable. The group of indifferent persons is a very heterogeneous group of people. Overall, this group does not show a clear preference for either the rational or experiential way of thinking. Therefore, deviations in the process from the disposition will not have strong effects on their cognitive safety and, thus, recommendations of typical or atypical BMs. Further, as for the experiential entrepreneurs, indifferent entrepreneurs are not strongly inclined to rational reasoning; that is why we expect no effect from using frameworks on BM confidence:

Hypothesis 4a (*H4a*). If indifferent participants use the BM Canvas' visual framing effects, neither typicality nor confidence will be affected.

Hypothesis 4b (*H4b*). If indifferent participants use the BM Pattern Cards' visual framing effects, neither typicality nor confidence will be affected.

Method

Since only a few studies have started to conceptually and empirically study cognitive impacts on BM development processes (e.g., Henike, 2019; McDonald & Eisenhardt, 2020; Snihur & Zott, in press), the current state of theory is weak. Although some explanations exist for how cognitive activities impact BM design outcomes, investigations of well-delineated boundary conditions are missing that are crucial hallmarks of good theory (cf. Foss & Saebi, 2017). Consequently, our research aims to explore the impact of boundary conditions on BM decision-making to enrich the theory about the emergence of entrepreneurial BM designs.

Given this state of research and the complex relationship in our conceptual framework, we decided for an experimental setting and to estimate our models with PLS-SEM. Our experimental setting was a randomised, role play, active participation field experiment (Hsu, Simmons, & Wieland, 2017). This kind of experiment has moderate to high internal validity and is more realistic than laboratory experiments (Podsakoff & Podsakoff, 2019). Participants are asked to behave

as themselves, increasing their involvement as well as the reliability of results (Hsu et al., 2017).

In our experiment, we asked experienced entrepreneurs to design a BM for an existing service that has no specific value proposition and value capture mechanism yet. The service is called Errorfarealerts and provides information about online error fares of flights. An algorithm crawls the Internet and informs registered people by e-mail free of charge. A possible error fare could be that a flight only costs $59 instead of $590.

Sample

To recruit entrepreneurs for this experiment, we used the crowdsourcing platform Prolific that 'is primarily geared towards researchers and startups' (Peer, Brandimarte, Samat, & Acquisti, 2017, p. 154). Participants receive a monetary reward for their participation after researchers' approval. In total, we collected data from 203 entrepreneurs. Our study consisted of two surveys created with the help of Typeform Pro. In one survey, we provided the participants with an online version of the BM Canvas used as a treatment. In the other survey, we used an online version of the 55 BM Pattern Cards. Prolific's system randomly invited 100 participants to the first survey and the other entrepreneurs to the second survey. Except for the treatment condition, both surveys had the same structure consisting of three survey parts and one experimental part. During data analysis, we calculated standard deviations (SDs) for each participant's responses in the surveys. This analysis revealed six outliers with a SD of zero that we excluded (Aguinis, Ramani, & Alabdujader, 2018).

Dependent Variables

The main part of our experiment was the design of a BM for the service Errorfarealerts. Therefore, we presented our 197 participants the main idea of the service via a short video and description. We then asked the participants to design one or two appropriate BM(s) and provided the respective BM frameworks. Participants also had the possibility to search for additional information online. In the end, the participants had to decide on one BM, and we asked them about how typical their recommended BM was for the flight advisory industry. The typical BM for this case would have been that private travellers are informed of cheap fares (value proposition) via their subscriptions to e-mails and explored by the algorithm (value creation), and revenues are collected by commission fees (value capture). We also asked them about how confident they were that their recommended BM would be successful.

For BM typicality and BM confidence, we used one item including a 5-point Likert scale ranging from '1 = totally disagree' to '5 = totally agree'. We also asked participants to describe their BMs verbally according to the three key BM dimensions: value proposition, creation, and capturing (Teece, 2010). During data analysis, we compared the BM descriptions with the typicality assessments. The comparison revealed considerable differences, and we aligned the assessments. Table A1 provides a detailed explanation.

Independent and Mediating Variables

Prior to the presentation of the case for our experiment, we asked participants about demographic characteristics, their BM experiences, and experiences with BM frameworks. For BM experiences, we asked the participants to provide a number for how often they had to design a BM in practice and for training. For experiences with BM frameworks, we presented visually six BM frameworks, including the BM Canvas and Pattern Cards. Participants had to indicate with what BM frameworks they have worked with. Participants had also the possibility to answer this question with none. The answers were transferred into a number ranging from zero (no experience) to six (experience with all presented BM frameworks).

Next, we used the 10-item version of Epstein et al.'s Rational-Experiential-Inventory (REI) for eliciting participants' cognitive dispositions (1996). The REI uses five items to measure rational and five items to measure experiential thinking dispositions based on 5-point Likert scales (cf. Table A1). We summed the answers for each item, creating an overall scale. Values below 2.75 indicated participants with an experiential (E) cognitive disposition. Values above 3.25 indicated participants with a rational disposition (R). Values in between these threshold values indicated participants with an indifferent disposition (I).

After the design process, we used 10 items and asked the participants to reflect on the framework's helpfulness, the impact of analogous problem-solving, intuitive reasoning, and attention intensity (cf. 0). We used again 5-point Likert scales. For measuring the last three concepts, we used reflective measures, each consisting of three items. We used the items developed by Li, Maggitti, Smith, Tesluk, and Katila (2013) to measure attention intensity. For measuring analogous problem-solving, we built own items based on the analogical process that includes a comparison and transfer between general schemas, i.e., abstract BM patterns, and concrete analogues, i.e., real-world instances (cf. Enkel & Gassmann, 2010; Gick & Holyoak, 1983; Osterwalder, Pigneur, & Tucci, 2005). For measuring intuitive reasoning, we relied on Sadler-Smith and Shefy's (2004) conceptualisation of intuition. Accordingly, intuition relies on expertise, feelings, and imagination. We used these characteristics to build three own items.

PLS-SEM

For data analysis, we decided to estimate our models with PLS-SEM using SmartPLS 3 (Ringle, Wende, & Becker, 2015). PLS-SEM is a variance-based and non-parametric approach allowing to analyse complex model structures and to develop theory based on quantitative data (Hair, Sarstedt, Ringle, & Mena, 2012; Wold, 1975). These characteristics distinguish PLS-SEM from covariance-based SEM (CB-SEM; Jöreskog & Wold, 1982). CB-SEM has stricter assumptions than PLS-SEM concerning multivariate normality, sample size, and model structure (Hair et al., 2012).

The relaxation of these assumptions in PLS-SEM has led to severe criticism on the usefulness of PLS-SEM (Rönkkö, McIntosh, & Antonakis, 2015; Rönkkö, McIntosh, Antonakis, & Edwards, 2016). Rigdon (2016) mainly attributed the

strong controversy between PLS-proponents and PLS-opponents to differences in their epistemological perspectives. PLS-opponents argue that latent constructs need to be modelled as common factors consisting of the common variance, i.e., the shared variance of indicators (Sarstedt, Hair, Ringle, Thiele, & Gudergan, 2016). In contrast, PLS-proponents argue that latent constructs need to be modelled as composite factors consisting of 'all of the variance (common, unique and error) that the exogenous variables have in common with the endogenous variables' (Sarstedt et al., 2016, p. 4003). Consequently, PLS-SEM minimises the amount of unexplained variance in dependent variables making PLS-SEM suitable for predicting relationships between constructs (Hair, Hult, Ringle, & Sarstedt, 2017; Henseler et al., 2014).

In total, we analysed data from 99 participants in the BM Canvas and 98 participants in the BM Pattern Card groups with the help of PLS-SEM. As PLS-SEM estimates partial model relationships in sequential computations of single ordinary least square (OLS) regressions, both data sets fulfil the commonly cited rule of thumb for data characteristics. Adequate sample size should be 10 times higher than the maximum number of arrowheads pointing to a latent variable (Hair et al., 2017). In our cases, the maximum number of arrowheads was seven.

As our interest was to examine the relationship between BM frameworks and cognitive dispositions, we executed individual PLS-SEM calculations for each group of cognitive disposition (rational, experiential, and indifferent) in each treatment cluster. The maximum number of arrowheads in these cases was three satisfying the rule of thumb for the groups R-Canvas (46), R-Patterns (37), and I-Patterns (32). The number of participants in the other groups, E-Patterns (29), E-Canvas (27), and I-Canvas (24), was slightly lower. Given our exploratory aim, we accepted these deviations, although they decrease the results' statistical power for these groups (Hair, Babin, Anderson, & Black, 2014; Henseler et al., 2014).

Results

Descriptive Statistics and Group Comparability

Before we analysed the impact of the two different BM frameworks, we began with analysing the comparability of our two clusters, i.e., the BM Canvas and the BM Pattern Cards sample. Therefore, we used mean *t*-tests and examined whether the mean values for BM experience, framework experience, REI-Score, framework helpfulness, BM typicality, and BM confidence differed statistically significant between both clusters. We used this method because using *t*-tests helps to find possible explanations for later result differences in our PLS-SEM analysis. Although some remarkable difference for BM experience existed (Canvas-Cluster: $M = 13.84$, SD = 34.99; Pattern-Cluster: $M = 24$, SD = 70.43), statistically significant differences did not exist for the six constructs among both clusters. The low number of framework experience is also remarkable. In both clusters, the entrepreneurs have not even used one BM framework on average in the past.

Table A2 shows the mean values, SDs, and mean *t*-test results for each of the six constructs in the two clusters. It also shows our further analysis of statistically significant differences between participants with different cognitive dispositions, i.e., rational, experiential, and indifferent, that we treated with the two BM frameworks. Overall, we found no statistically significant differences for BM and framework experience by comparing the six different groups. We found statistically significant differences in REI-Score between groups that covered participants with different cognitive dispositions. Interestingly, the *t*-test results point to a statistically significant difference in estimating the helpfulness of the BM Canvas between rational (M = 2.79, SD = 1.34) and indifferent participants (M = 3.41, SD = 1.1), $t(59) = -0.83$, $p = 0.07^{\dagger}$). Further, the *t*-test results show statistically significant differences in BM confidence and typicality, suggesting that the interplay between cognitive disposition and framework used impacts later results (cf. Table A2). With the help of PLS-SEM, we explored the underlying mechanisms driving the differences between groups.

Measurement Model

We follow Hair, Risher, Sarstedt, and Ringle's (2019) approach to report and analyse the PLS-SEM results. Accordingly, we first analysed our measurement models before we analysed our structural models. Like in our case, analysing reflective measurement models comprise of individual analyses of item reliabilities, internal consistency reliability (CR), convergent validity, and discriminant validity (see also Hulland, 1999; Mikalef & Pateli, 2017; Strauch, Pidun, & Knyphausen-Aufseß, 2019).

Item reliability expresses the shared variance between a construct and a measured indicator (Hulland, 1999). Thus, it represents how well an indicator measures a construct (Hair et al., 2014). To assess item reliability, the examination of indicator loadings are recommended, and these values should exceed the general threshold of 0.708 or 0.6 for exploratory investigations (Hair et al., 2019). We assessed loadings for our five reflective indicators (rational thinking disposition R, experiential thinking disposition E, analogical problem-solving ANA, intuitive reasoning INT, attention intensity A, cf. 0). All indicators in the BM Canvas-Cluster and 15 out of 19 indicators in the Pattern-Cluster exceed the general threshold of 0.708. All the remaining indicators exceed the threshold of 0.6, with 0.63 being the lowest loading for one item measuring experiential thinking dispositions (E5 in Table A1). As a result, or data set possesses acceptable item reliability for our research aim.

For assessing internal CR, we used Cronbach's α and composite reliability. Hair et al. (2019) recommend the complementary use as Cronbach's α threshold (0.7) is too conservative, and the composite reliability thresholds ($0.7 \leq CR \leq 0.95$) are too liberal. Except for intuitive reasoning in the BM Pattern-Cluster (Cronbach's $\alpha = 0.605$, cf. Tables A3 and A4), all values fulfil the requirements of internal CR. Thus, the set of indicators per construct sufficiently measure the constructs.

For assessing convergent validity, we compared the average variance extracted (AVE) with the suggested threshold of 0.5. This threshold suggests that a construct

explains 50% of the variance of the indicators that make up the construct (Hair et al., 2019). All our constructs fulfil this condition with again intuitive reasoning in the BM Pattern-Cluster possessing the lowest value (0.548, cf. Table A4).

At last, we assessed the measurement models' discriminant validity. Discriminant validity expresses the extent to which each construct is unique capturing phenomena that the other concepts do not capture (Hair et al., 2019). We assessed discriminant validity using the heterotrait–monotrait (HTMT) ratio of correlations. HTMT ratio is the suggested index when the indicator loadings differ only slightly (Henseler, Ringle, & Sarstedt, 2015). As constructs should be unique, HTMT ratios should be below the conservative threshold of 0.85 (Henseler et al., 2015). All construct's HTMT correlations were below the threshold with 0.768 between analogies and attention intensity in the Pattern-Cluster being the highest ratio (Table A4).

Structural Model

As our measurement models were satisfactory, we continued by analysing our structural models. Analysing structural models comprise of the coefficient of determination (R^2), the blindfolding-based cross-validated redundancy measure (Q^2), path coefficient, effect size, and collinearity assessments (Hair et al., 2019).

Collinearity assessment is an important step as PLS-SEM consists of a series of OLS regressions. High correlations between the independent constructs would bias the regression results. To test for collinearity, we calculated variance inflation factors (VIF) by including all constructs in regression with BM typicality (cf. Strauch et al., 2019). As a result, all constructs were well below the ideal VIF threshold of 3 or below (Hair et al., 2019, cf. Tables A3 and A4). Using the PLS algorithm provided in SmartPLS 3 (Ringle et al., 2015), we calculated the path coefficients. To calculate *t*-statistics and effect sizes f^2, we used the bootstrapping procedure provided in SmartPLS 3 with 3,000 subsamples. Table A8 summarises our settings for bootstrapping and the PLS algorithm.

Our first two hypotheses considered how the visual framing effects of the two BM frameworks impact the entrepreneurial BM design process. For the BM Canvas-Cluster, we find support for *H1a*, suggesting that if the BM Canvas is helpful, it leads to paying more intense attention and to increased intuitive reasoning. The standardised path coefficient for attention intensity is positive $\beta = 0.336$, statistically significant at the 1% level, and has a medium effect size $f^2 = 0.126$ (cf. Cohen, 2013). The standardised path coefficient for intuitive reasoning is positive $\beta = 0.373$, statistically significant at the 1% level, and has a medium effect size $f^2 = 0.163$ (cf. Cohen, 2013). We also find support for *H1b*, suggesting that if BM Pattern Cards are helpful, they lead to paying more intense attention and to increased analogous problem-solving. Both standardised path coefficients are positive, yet the effect size for analogous problem-solving ($\beta = 0.354$, $p < 0.01$, $f^2 = 0.151$) is considerably higher than for attention intensity ($\beta = 0.266$, $p < 0.01$, $f^2 = 0.082$). We also expected that the frameworks' helpfulness depends on entrepreneurs' experience (*H1c*). However, we do not find support for the hypothesis that BM experience and/or framework experience crowd-out the

helpfulness of the BM Canvas (BMExp: $\beta = 0.108$, $p > 0.1$; FExp: $\beta = -0.059$, $p > 0.01$) or of BM Pattern Cards (BMExp: $\beta = 0.048$, $p > 0.01$; FExp: $\beta = -0.064$, $p > 0.01$). The respective coefficients of determination R^2 and Stone Geisser's Q^2 values additionally confirm the predictive accuracy of our model underlying these hypotheses (cf. Table A5; Hair et al., 2017).

For the remaining hypotheses, we considered differences in cognitive disposition and how the frameworks' visual framing effects ought to affect the final outcomes within the six different groups. Table A6 covers the PLS-SEM results for the three cognitive disposition groups within the BM Canvas-Cluster. Table A7 covers the PLS-SEM results for the three cognitive disposition groups within the BM Pattern Cards-Cluster.

Hypothesis 2a assumes that the BM Canvas' visual framing effects affect rational entrepreneurs' confidence and the atypicality of their BM designs. For *H2a*, we find partially support in that higher helpfulness increased attention intensity ($\beta = 0.337$, $p < 0.1$, $f^2 = 0.129$), and attention intensity increased BM confidence ($\beta = 0.435$, $p < 0.01$, $f^2 = 0.189$). However, neither attention intensity nor intuition affected BM typicality. Only when entrepreneurs used analogous problem-solving – that the BM Canvas does not promote – BM typicality is affected statistically significantly. The path coefficient is negative, $\beta = -0.288$ ($p < 0.1$, $f^2 = 0.088$), so that using more analogies let to rather atypical BMs. We also find partial support for *H2b*, assuming the same effects on confidence and BM typicality. Higher helpfulness of BM Pattern Cards increased the use of analogies ($\beta = 0.329$, $p < 0.05$, $f^2 = 0.137$), and using more analogies let to more confidence ($\beta = 0.395$, $p < 0.05$, $f^2 = 0.169$). However, we do not find any statistically significant relationship between our process constructs and BM typicality.

In contrast to the rational entrepreneurs' groups, we suggested an impact of the BM Canvas and Pattern Cards on BM typicality, yet not BM confidence for experiential entrepreneurs. We find support for our hypothesis *H3a*. With increased helpfulness of the BM Canvas, experiential participants paid more intense attention ($\beta = 0.582$, $p < 0.01$, $f^2 = 0.509$). Further, attention intensity had a statistically significant, negative relationship with BM typicality ($\beta = -0.454$, $p < 0.05$, $f^2 = 0.221$). Consequently, paying more intense attention encouraged them to recommend atypical BMs. BM confidence was not affected statistically significant. Regarding *H3b*, we do not find support. First, greater helpfulness of BM Pattern Cards did not lead to using more or using less analogous problem-solving. Second, greater helpfulness did not affect BM confidence and typicality.

Lastly, we analysed the different impacts of the BM frameworks on indifferent entrepreneurs. Our hypotheses suggested that if they use the respective visual framing effects, neither BM typicality nor BM confidence will be affected. The results support *H4a*. In consequence, indifferent participants are the only group for that greater helpfulness of the BM Canvas had no impact on the process or outcome (cf. Table 1). In contrast, greater helpfulness of the BM Pattern Cards affected statistically significant the process of indifferent participants. Greater helpfulness increased attention intensity ($\beta = 0.736$, $p < 0.01$, $f^2 = 0.945$) and the use of analogous problem-solving ($\beta = 0.55$, $p < 0.01$, $f^2 = 0.4$). However, the

visual framing effects did not further impact BM confidence or BM typicality. Table 1 summarises the results and all statistically significant relationships per cluster and group.

Discussion

Our empirical analysis provides full support for five and partial support for two hypotheses. For the two other hypotheses, we have found no support. Table 2 provides an overview of our findings. These findings extend existing knowledge on the development of BMs from the cognitive perspective (e.g., Henike, 2019; McDonald & Eisenhardt, 2020; Snihur & Zott, in press). Specifically, they inform about how cognitive dispositions, prior experiences, and BM frameworks act as boundary conditions for the emerging theories of visual framing effects and stabilising factors in designing entrepreneurial BMs.

In sum, the findings suggest that visual framing effects are stable and independent of prior experiences and cognitive dispositions. Further, the results indicate that using frameworks affects rational entrepreneurs' emotions providing feelings of confidence independent of the BM's quality, i.e., their hot cognition (cf. Sund et al., 2018). In contrast, for experiential entrepreneurs, the quality of the outcome is affected by using the BM Canvas, i.e., their cold cognition (Sund et al., 2018). Indifferent entrepreneurs' outcomes are not affected at all. Thus, the cognitive disposition is a boundary condition for how much BM frameworks impact BM outcomes of entrepreneurs. In the following, we explain what the findings imply for the theory of stabilising factors in entrepreneurial business modelling and discuss limitations of our study as well as future research opportunities. We conclude by discussing what using BM frameworks implies for practice.

BM Frameworks as Stabilising Factors in Entrepreneurial Business Modellings

The theory of stabilising factors in entrepreneurial business modelling is closely related to Simon's argumentation that people look for good enough rather than the best solutions to their problems (Simon, 1947). In entrepreneurial situations, the acceptance of good enough, i.e., personally satisfying, solutions is oftentimes the only option as the great uncertainty prohibits calculations of the best solution (cf. Packard et al., 2017). Thus, the different factors that provide personal satisfaction determine whether typical or atypical BMs are designed.

Our study contributes to this cognitive perspective in showing that using BM frameworks provides such a stabilising function for rational participants. The frameworks call to rational participants' inclination for intense attention to varying information (BM Canvas) or enable the consideration of varying analogous alternatives (BM Pattern Cards). In this vein, these entrepreneurs can analyse the variety of information they need to feel confident in decision-making without constraining the quality of the BM design. With greater confidence, the designed BMs will be possibly implemented earlier, providing performance advantages for new ventures in dynamic environments (Eisenhardt, 1989).

Table 1. Statistically Significant Paths per Framework Cluster and Disposition Group.

	Statistically Significant Paths	Standard β	*t*-Value	f^2		Statistically Significant Paths	Standard β	*t*-Value	f^2
Total Canvas Cluster (*N* = 97)	Canvas Helpfulness → Attention Intensity	0.336	3.008**	0.126	**Rational participants (*N* = 46)**	Canvas Helpfulness → Attention Intensity	0.337	1.895†	0.129
	Canvas Helpfulness → Intuition	0.373	3.441**	0.163		Canvas Helpfulness → Intuition	0.413	2.327*	0.202
	Attention Intensity → BM confidence	0.334	2.699**	0.095		BM experience → Analogies	0.498	2.642**	0.227
	Analogies → BM typicality	−0.327	2.727**	0.098		Attention Intensity → BM confidence	0.435	2.808**	0.189
	Intuition → BM typicality	0.223	1.828†	0.045		Analogies → BM typicality	−0.288	1.682†	0.088
	BM experience → BM typicality	0.241	2.996**	0.064					
	Statistically Significant Paths	**Standard β**	***t*-Value**	**f^2**		**Statistically Significant Paths**	**Standard β**	***t*-Value**	**f^2**
Experiential participants (*N* = 27)	Canvas Helpfulness → Attention Intensity	0.582	3.827**	0.509	**Indifferent Participants (*N* = 24)**	Framework Experience → Canvas Helpfulness	−0.432	2.163*	0.229
	Attention Intensity → BM typicality	−0.454	2.121*	0.221		Analogies → BM confidence	0.484	1.963*	0.190
						Attention Intensity → BM typicality	0.520	1.764†	0.246
						Analogies → BM typicality	−0.840	2.944**	0.745
						Intuition → BM typicality	0.503	1.777†	0.290

	Statistically Significant Paths	Standard β	*t*-Value	f^2		Statistically Significant Paths	Standard β	*t*-Value	f^2
Total Patterns Cluster (*N* = 98)	Patterns Helpfulness → Attention Intensity	0.266	2.787**	0.082	**Rational Participants (*N* = 37)**	Patterns Helpfulness → Analogies	0.329	2.128*	0.137
	Framework Experience → Attention Intensity	0.269	2.946**	0.08		Framework Experience → Attention Intensity	0.27	1.672†	0.081
	BM experience → Analogies	0.089	1.758†	0.009		Framework Experience → Analogies	0.293	2.335*	0.106
	Patterns Helpfulness → Analogies	0.354	3.869**	0.151		Framework Experience → Intuition	0.441	3.220**	0.235
	Framework Experience → Analogies	0.203	2.251*	0.047		Analogies → BM confidence	0.395	2.047*	0.169
	Framework Experience → Intuition	0.313	3.677**	0.06		Intuition → BM confidence	0.447	2.916**	0.313
	Intuition → BM confidence	0.481	5.120**	0.265					
	Statistically Significant Paths	**Standard β**	***t*-Value**	**f^2**		**Statistically Significant Paths**	**std. β**	**t-value**	**f^2**
Experiential participants (*N* = 29)	Framework Experience → Attention Intensity	0.457	2.815**	0.198	**Indifferent Participants (*N* = 32)**	Patterns Helpfulness → Attention Intensity	0.736	6.988**	0.945
	Intuition → BM confidence	0.728	4.039**	0.495		Patterns Helpfulness → Analogies	0.55	3.369**	0.4

Note: Displayed are statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$.

Table 2. Overview of Results and Resulting Implications.

Hypotheses	Support	Implications
H1a: If the BM Canvas is helpful, it leads to paying more intense attention and to increased intuitive reasoning.	Yes	Independent of prior experience and cognitive disposition, adherence to both frameworks affect cognitive processes.
H1b: If BM Pattern Cards are helpful, they lead to paying more intense attention and to increased analogous problem-solving.	Yes	
H1c: High BM and framework experience lead to lower helpfulness of BM frameworks.	No	
H2a: If rational participants use the BM Canvas' visual framing effects, they will be more confident about the success of their BM independent of its typicality.	Partly	For rational entrepreneurs, framework adherence affects emotional outcomes.
H2b: If rational participants use the BM Pattern Cards' visual framing effects, they will be more confident about the success of their BM independent of its typicality.	Partly	
H3a: If experiential participants use the BM Canvas' visual framing effects, they will derive more atypical BMs, yet without an impact on confidence.	Yes	For experiential entrepreneurs, adherence to the BM Canvas affects qualitative BM outcome.
H3b: If experiential participants use the BM Pattern Cards' visual framing effects, they will derive more atypical BMs, yet without an impact on confidence.	No	
H4a: If indifferent participants use the BM Canvas' visual framing effects, neither typicality nor confidence will be affected.	Yes	For indifferent participants, both frameworks do not affect emotional and qualitative BM outcomes.
H4b: If indifferent participants use the BM Pattern Cards' visual framing effects, neither typicality nor confidence will be affected.	Yes	

However, serving as a stabilising factor is bounded to entrepreneurs' cognitive disposition. While indifferent participants are completely unaffected, experiential participants will be encouraged to design rather atypical BMs when using frameworks that detailly decompose BMs into many elements. The decomposition

into many elements opposes their inclination for holistic thinking (Epstein et al., 1996). In this situation, experiential entrepreneurs may fall into the trap of increased uncertainty. Without great confidence and newness challenges, doubts accompany the implementation of BMs, increasing the risk of delayed actions and hesitancy (Van Gelderen, Kautonen, & Fink, 2015). Thus, for experiential entrepreneurs, frameworks like the BM Canvas can act as destabilising factors affecting the outcomes, yet not their confidence. In sum, cognitive dispositions bound the question of how much BM frameworks impact the outcomes of entrepreneurial business modelling.

In contrast, the visual framing effects that unfold during the process are stable and independent of cognitive dispositions and experiences. Thus, users of BM frameworks can know what they get as long as they adhere to the frameworks' characteristics, and different frameworks unfold different impacts on cognitive activities. This finding substantiates our knowledge about visual framing effects (Henike et al., forthcoming). Extensive BM and framework experiences have not crowded-out the visual framing effects. However, we need to acknowledge the low number of prior experiences with BM frameworks in our sample prohibiting a too strong generalisation.

Limitations and Avenues for Future Research

Recognising and explaining the multitude of stabilising factors potentially affecting entrepreneurial business modelling needs to be a collective endeavour. Investor influences, market feedback, or entrepreneurs' aspirations are other stabilising factors that can also affect entrepreneurial BM decision-making (cf. Henike, 2019). While empirical studies of these processes are increasingly emerging (e.g., McDonald & Eisenhardt, 2020; Snihur & Zott, in press), we see further intriguing directions in studying the factors affecting cognitive activities and resulting consequences.

One limitation of our study is that we only used two BM frameworks and could provide a limited set of information sources, i.e., participants' knowledge and their web information searches. We used these frameworks because they unfold different framing effects that characteristically overlap with the rational and experiential cognitive disposition (cf. Henike et al., forthcoming). However, in particular, experiential entrepreneurs may feel more confident after hearing iconic success stories (e.g., Mikhalkina & Cabantous, 2015) and after own experimentation (e.g., Camuffo, Cordova, Gambardella, & Spina, 2019). As a consequence, we call for future research examining the factors that are related to seeking market feedback as stabilising factors. Further, other BM frameworks like Sinfield, Calder, McConnell, and Colson's (2013) BM development template that exist unfold other visual framing effects.

Another limitation results from our focus on individual processes. In most cases, a group of founders and other stakeholders, like investors, accompany the entrepreneurial process. Our results can help to better understand how socio-cognitive factors impact individual decision-making. In particular, entrepreneurs may see investors' experiences as a key stabilising factor overruling their

own decisions (e.g., Loock, 2012). Further, research has shown that groups of founders need to share the same values in successful new ventures (Leung, Zhang, Wong, & Foo, 2006). This dimension of conformity could be transferred to the question of how similarities in cognitive dispositions also provide a stabilising factor and how team dynamics impact BM decisions (cf. Shepherd, Williams, & Patzelt, 2015).

Managerial implications

As a tangible implication for entrepreneurship practice, we inform entrepreneurs about the effects associated with the application of BM frameworks. If entrepreneurs adhere to the characteristics of the BM Canvas, this BM framework will encourage entrepreneurs to pay intense attention and to express thoughts that easily come into their minds. If entrepreneurs adhere to the characteristics of the BM Pattern Cards, this BM framework will encourage entrepreneurs to use analogies and to compare them intensively. However, entrepreneurs should use these frameworks depending on their cognitive dispositions, as both frameworks have impacts on BM design outcomes. In sum, experiential and indifferent entrepreneurs do not much profit from using these frameworks. In contrast, rational entrepreneurs will be more confident when using these frameworks potentially accelerating BM implementation.

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Appendices

Table A1. Latent Constructs, Indicators, and Assessment.

Latent C.	Indicator	Description	Canvas Loading	VIF	Pattern Loading	VIF
R	R1	I like to have to do a lot of thinking.	0.742	1.644	0.842	2.654
	R2	I prefer to do something that challenges my thinking abilities rather than something that requires little thought.	0.785	1.939	0.755	2.068
	R3	I prefer complex to simple problems.	0.795	1.777	0.822	2.117
	R4	Thinking hard and for a long time about something gives me much satisfaction.	0.851	2.175	0.864	2.550
	R5 (negative)	I try to avoid situations that require thinking in depth about something.	–0.798	1.826	–0.684	1.425
E	E1	When it comes to trusting people, I can usually rely on my gut feelings.	0.760	1.926	0.686	1.722
	E2	My initial impressions of people are always almost right.	0.883	2.682	0.826	2.158
	E3	I trust my initial feelings about people.	0.877	2.764	0.860	2.158
	E4	I believe in trusting my instincts.	0.902	3.253	0.765	2.019
	E5	I can usually feel when a person is right or wrong, even if I cannot explain how I know.	0.709	1.709	0.630	1.231

Note: We used 5-point Likert scales to measure items as follows: 1 = totally disagree, 5 = totally agree.

Table A1. (*Continued*)

Latent C.	Indicator	Description	Canvas Loading	VIF	Patterns Loading	VIF
Intuition	INT1	My personal experiences told me to rely on my information sources.	0.785	1.481	0.782	1.132
	INT2	My feelings told me to rely on my information sources.	0.857	1.650	0.685	1.305
	INT3	My imagination told me to rely on my information sources.	0.799	1.419	0.751	1.268
Analogy	ANA1	To generate business model alternatives, I got inspired by other business model examples.	0.795	1.510	0.854	1.705
	ANA2	To generate alternative business models, I used general patterns and tried to apply them to the example's specific situation.	0.896	1.766	0.782	1.463
	ANA3	I thought carefully about causes and effects of a business model alternative.	0.801	1.658	0.862	1.820
Attention Intensity	A1	I invested a great deal of personal effort into gathering information.	0.871	2.152	0.783	1.567
	A2	I continued information searching until I was satisfied that I had identified all relevant information.	0.872	1.616	0.872	1.712
	A3	After finding a first solution, I continued searching assuming I could find a better solution.	0.790	1.774	0.783	1.978

Note: We used 5-Point-Likert Scales to measure items as follows "1 = totally disagree, 5 = totally agree".

Table A1. (*Continued*)

Latent C.	Indicator	Description
Framework Helpfulness	FH	The tool mentioned in the experiment helped me to design an appropriate business model.
BM typicality	BMTyp	My finally chosen business model is typical for online flight advisory services.
		(Note. For consistency in measurement, we compared all verbal descriptions of recommended BM designs, and we adjusted them as follows: 1=very atypical (different (B2B) customer group, pay what you want, data monetisation), 2=atypical (freemium, abonnements), 3=in between (advertising), 4=typical (offering-related advertising, affiliations), 5=very typical (commission fees).
BM confidence	BMCon	I am confident that the service will be profitable with my recommended business model.
BM experience	BMExp	How often did you have to design a new business model or to reconfigure an existing business model?
		(Note: This question encompasses practical as well as training experience. Please indicate your answer as a number.)
Framework Experience	FExp	With which of the following business model tools have you worked so far?
		(Note: We visually displayed each of the following answers):
		1) 55 Pattern Cards, 2) Business Model Canvas, 3) Loop Diagram, 4) Business Model Zoo, 5) Dynamic Business Model Framework or 6) none

Note: We used 5-Point-Likert Scales to measure indicators as follows "1=totally disagree, 5=totally agree". Last two indicators asked for a concrete number or was calculated as the sum of mentioned Frameworks, i.e. 0 = none experience to 5 = worked with all Frameworks.

Table A2. Descriptive statistics and t-tests

		BM exp.		Framework exp.		REI-Score		Framework helpf.		BM typicality		BM confidence	
groups		*Mean [SD; N]*	*F [t, sig.]*	*Mean [SD; N]*	*F [t, sig.]*	*Mean [SD; N]*	*F [t, sig.]*	*Mean [SD; N]*	*F [t, sig.]*	*Mean [SD; N]*	*F [t, sig.]*	*Mean [SD; N]*	*F [t, sig.]*
	Can	13.84 [34.99; 99]	6.24 [–1.28; 0.2]^{W}	0.64 [0.91; 99]	0.43 [–0.2; 0.84]	3.14 [0.52; 99]	0.16 [1.44; 0.15]	3.03 [1.25; 86]	0.02 [–0.17; 0.87]	3.46 [1.27; 99]	0.05 [1.43; 0.16]	3.38 [1.11; 99]	0 [–0.92; 0.36]
#	**Pat**	24 [70.43; 97]		0.66 [0.98; 98]		3.03 [0.51; 98]		3.07 [1.22; 91]		3.2 [1.29; 98]		3.53 [1.11; 98]	
1	**Can-R**	7.24 [11.24; 46]	10.74 [–1.6; 0.12]^{W}	0.65 [0.95; 46]	0.14 [0.02; 0.99]	3.59 [0.31; 46]	3.45 [1.39; 0.17]	2.79 [1.34; 39]	0.23 [–0.56; 0.58]	3.3 [1.35; 46]	0.01 [0.83; 0.41]	3.11 [1.14; 46]	0.68 [–1.16; 0.25]
2	**Pat-R**	26.86 [73.79; 37]		0.65 [1.09; 37]		3.51 [0.21; 37]		2.97 [1.44; 37]		3.05 [1.37; 37]		3.41 [1.19; 37]	
1	**Can-R**	7.24 [11.24; 46]	13.45 [–1.74; 0.09]^{W}	0.65 [0.95; 46]	0.01 [–0.52; 0.61]	3.59 [0.31; 46]	**3.54 [16.65; 0]****	2.79 [1.34; 39]	1.04 [–0.87; 0.39]	3.3 [1.35; 46]	1.67 [–1.18; 0.24]	3.11 [1.14; 46]	0.45 [–1.2; 0.24]
3	**Can-E**	27.7 [60.44; 27]		0.78 [1.09; 27]		2.51 [0.19; 27]		3.08 [1.19; 25]		3.67 [1.11; 27]		3.44 [1.19; 27]	
1	**Can-R**	7.24 [11.24; 46]	9.9 [–1.26; 0.22]^{W}	0.65 [0.95; 46]	0.27 [0.29; 0.77]	3.59 [0.31; 46]	**0.08 [15.4; 0]****	2.79 [1.34; 39]	3.26 [–0.67; 0.5]	3.3 [1.35; 46]	0.83 [0.87; 0.39]	3.11 [1.14; 46]	0.33 [–1.62; 0.11]
4	**Pat-E**	26.72 [82.58; 29]		0.59 [0.95; 29]		2.45 [0.33; 29]		3 [1.05; 28]		3.03 [1.24; 29]		3.55 [1.18; 29]	

1	**Can-R**	7.24 [11.24; 46]	5.29 [–0.98; 0.33]^{W}	0.65 [0.95; 46]	5.51 [0.82; 0.41]^{W}	3.59 [0.31; 46]	**13.52 [12.6; 0]**^{**,W}	2.79 [1.34; 39]	**1.98 [–1.83; 0.07]**†	3.3 [1.35; 46]	0.04 [–0.46; 0.65]	3.11 [1.14; 46]	**1.2 [–2.56; 0.01]***
5	**Can-I**	12.04 [22.54; 24]		0.5 [0.59; 24]		2.98 [0.09; 24]		3.41 [1.1; 22]		3.46 [1.32; 24]		3.79 [0.88; 24]	
1	**Can-R**	7.24 [11.24; 46]	4.68 [–1.04; 0.3]^{W}	0.65 [0.95; 46]	0.17 [–0.26; 0.8]	3.59 [0.31; 46]	**2.71 [8.76; 0]****	2.79 [1.34; 39]	3.33 [–1.52; 0.13]	3.3 [1.35; 46]	0.37 [–0.97; 0.33]	3.11 [1.14; 46]	**0.92 [–2.36; 0.02]***
6	**Pat-I**	16.94 [52.51; 33]		0.71 [0.91; 34]		3.03 [0.25; 34]		3.27 [1.04; 26]		3.59 [1.21; 34]		3.68 [0.94; 34]	
2	**Pat-R**	26.86 [73.79; 37]	0.06 [–0.05; 0.96]	0.65 [1.09; 37]	0.04 [–0.47; 0.64]	3.51 [0.21; 37]	**0.04 [19.55; 0]****	2.97 [1.44; 37]	1.88 [–0.31; 0.76]	3.05 [1.37; 37]	**1.22 [–1.91; 0.06]**†	3.41 [1.19; 37]	0.01 [–0.13; 0.9]
3	**Can-E**	27.7 [60.44; 27]		0.78 [1.09; 27]		2.51 [0.19; 27]		3.08 [1.19; 25]		3.67 [1.11; 27]		3.44 [1.19; 27]	
2	**Pat-R**	26.86 [73.79; 37]	0.03 [0.01; 0.99]	0.65 [1.09; 37]	0.52 [0.25; 0.81]	3.51 [0.21; 37]	**3.92 [16; 0]****	2.97 [1.44; 37]	4.56 [–0.09; .93]^{W}	3.05 [1.37; 37]	0.58 [0.06; 0.95]	3.41 [1.19; 37]	0.03 [–0.5; 0.62]
4	**Pat-E**	26.72 [82.58; 29]		0.59 [0.95; 29]		2.45 [0.33; 29]		3 [1.05; 28]		3.03 [1.24; 29]		3.55 [1.18; 29]	

Note: Marked values indicate statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$. Values with the superscript w indicate t-Tests with Welch-correction. Abbreviations are used as follows: Can=Canvas, Pat=Pattern Cards, R=rational, E=experiential, I=indifferent, exp.=experience, helpf.=helpfulness

Table A2. (*Continued*)

groups	BM exp.		Framework exp.		REI-Score		Framework helpf.		BM typicality		BM confidence	
	Mean [SD; N]	**F [t, sig.]**	**Mean [SD; N]**	**F [t, sig.]**	**Mean [SD; N]**	**F [t, sig.]**	**Mean [SD; N]**	**F [t, sig.]**	**Mean [SD; N]**	**F [t, sig.]**	**Mean [SD; N]**	**F [t, sig.]**
2 **Pat-R**	26.86 [73.79; 37]	3.24 [0.95; 0.34]	0.65 [1.09; 37]	4.49 [0.69; 0.49]^{W}	3.51 [0.21; 37]	**7.34 [13.47; 0]**^{**,W}	2.97 [1.44; 37]	2.96 [–1.22; 0.23]	3.05 [1.37; 37]	0.01 [–1.14; 0.26]	3.41 [1.19; 37]	3.92 [–1.36; 0.18]
5 **Can-I**	12.04 [22.54; 24]		0.5 [0.59; 24]		2.98 [0.09; 24]		3.41 [1.1; 22]		3.46 [1.32; 24]		3.79 [0.88; 24]	
2 **Pat-R**	26.86 [73.79; 37]	1.31 [0.64; 0.52]	0.65 [1.09; 37]	0.45 [-0.24; 0.81]	3.51 [0.21; 37]	**0 [8.76; 0]****	2.97 [1.44; 37]	4.58 [-0.95; 0.35]^{W}	3.05 [1.37; 37]	**0.23 [-1.73; 0.09]**†	3.41 [1.19; 37]	3.47 [–1.06; 0.29]
6 **Pat-I**	16.94 [52.51; 33]		0.71 [0.91; 34]		3.03 [0.25; 34]		3.27 [1.04; 26]		3.59 [1.21; 34]		3.68 [0.94; 34]	
3 **Can-E**	27.7 [60.44; 27]	0.14 [0.05; 0.96]	0.78 [1.09; 27]	0.21 [0.71; 0.48]	2.51 [0.19; 27]	4.11 [0.84; 0.41]^{W}	3.08 [1.19; 25]	0.43 [0.26; 0.8]	3.67 [1.11; 27]	**0.08 [2.01; 0.05]***	3.44 [1.19; 27]	0.01 [–0.34; 0.74]
4 **Pat-E**	26.72 [82.58; 29]		0.59 [0.95; 29]		2.45 [0.33; 29]		3 [1.05; 28]		3.03 [1.24; 29]		3.55 [1.18; 29]	
3 **Can-E**	27.7 [60.44; 27]	3.63 [1.2; 0.24]	0.78 [1.09; 27]	3.11 [1.11; 0.27]	2.51 [0.19; 27]	**8.76 [–11.49; 0]**^{**,W}	3.08 [1.19; 25]	0.14 [–0.98; 0.33]	3.67 [1.11; 27]	0.99 [0.61; 0.54]	3.44 [1.19; 27]	3.2 [–1.17; 0.25]
5 **Can-I**	12.04 [22.54; 24]		0.5 [0.59; 24]		2.98 [0.09; 24]		3.41 [1.1; 22]		3.46 [1.32; 24]		3.79 [0.88; 24]	

3	**Can-E**	27.7 [60.44; 27]	0.89 [0.74; 0.46]	0.78 [1.09; 27]	0.15 [0.28; 0.78]	2.51 [0.19; 27]	**0.02 [–9.15; 0]****	3.08 [1.19; 25]	0.48 [–0.61; 0.55]	3.67 [1.11; 27]	0.66 [0.26; 0.8]	3.44 [1.19; 27]	2.7 [–0.85; 0.4]
6	**Pat-I**	16.94 [52.51; 33]		0.71 [0.91; 34]		3.03 [0.25; 34]		3.27 [1.04; 26]		3.59 [1.21; 34]		3.68 [0.94; 34]	
4	**Pat-E**	26.72 [82.58; 29]	3.12 [0.84; 0.4]	0.59 [0.95; 29]	2.18 [0.39; 0.7]	2.45 [0.33; 29]	**14.16 [–8.38; 0]**^{**,W}	3 [1.05; 28]	0.07 [–1.34; 0.19]	3.03 [1.24; 29]	0.38 [–1.2; 0.23]	3.55 [1.18; 29]	2.79 [–0.82; 0.42]
5	**Can-I**	12.04 [22.54; 24]		0.5 [0.59; 24]		2.98 [0.09; 24]		3.41 [1.1; 22]		3.46 [1.32; 24]		3.79 [0.88; 24]	
4	**Pat-E**	26.72 [82.58; 29]	1.41 [0.56; 0.58]	0.59 [0.95; 29]	0.02 [–0.51; 0.61]	2.45 [0.33; 29]	2.95 [–8.11; 0]	3 [1.05; 28]	0 [–0.94; 0.35]	3.03 [1.24; 29]	**0.16 [–1.79; 0.08]**†	3.55 [1.18; 29]	2.35 [–0.47; 0.64]
6	**Pat-I**	16.94 [52.51; 33]		0.71 [0.91; 34]		3.03 [0.25; 34]		3.27 [1.04; 26]		3.59 [1.21; 34]		3.68 [0.94; 34]	
5	**Can-I**	12.04 [22.54; 24]	0.68 [–0.43; 0.67]	0.5 [0.59; 24]	3.7 [–0.98; 0.33]	2.98 [0.09; 24]	4.1 [–1.2; 0.24]^{W}	3.41 [1.1; 22]	0.09 [0.45; 0.65]	3.46 [1.32; 24]	0.12 [–0.39; 0.7]	3.79 [0.88; 24]	0.06 [0.47; 0.64]
6	**Pat-I**	16.94 [52.51; 33]		0.71 [0.91; 34]		3.03 [0.25; 34]		3.27 [1.04; 26]		3.59 [1.21; 34]		3.68 [0.94; 34]	

Note: Marked values indicate statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$. Values with the superscript w indicate *t*-tests with Welch-correction. Abbreviations are used as follows: Can = Canvas, Pat = Pattern Cards, R = rational, E = experiential, I = indifferent, exp. = experience, helpf. = helpfulness

Table A3. Reliability and Validity Measures for BM Canvas Cluster.

Latent Constructs	Cronbach's Alpha	Composite Reliability	AVE	VIF (BMTyp)	Heterotrait–Monotrait Ratio of Correlations (HTMT)						
					1	2	3	4	5	6	7
1 Analogies*	0.781	0.87	0.692	1.357							
2 Attention Intensity*	0.806	0.882	0.714	1.575	0.551						
3 BM Typicality	1	1	1	–	0.303	0.19					
4 BM confidence	1	1	1	1.216	0.267	0.423	0.128				
5 BM experience	1	1	1	1.149	0.124	0.061	0.211	0.142			
6 Canvas Helpfulness	1	1	1	1.266	0.097	0.347	0.078	0.132	0.092		
7 Intuition*	0.746	0.855	0.663	1.584	0.441	0.474	0.087	0.29	0.152	0.432	
8 Tool experience	1	1	1	1.116	0.171	0.08	0.048	0.091	0.266	0.031	0.167

Notes: An asterisk * marks reflective constructs. For HTMT values below 0.85, discriminant validity exists between two constructs. Convergent validity exists when the average variance extracted (AVE) is ≥ 0.5. Composite reliability exists when Cronbach's $\alpha \geq 0.7$.

Table A4. Reliability and Validity Measures for BM Pattern Cards Cluster.

Latent Constructs	Cronbach's Alpha	Composite Reliability	AVE	VIF (BMTyp)	Heterotrait–monotrait ratio of correlations (HTMT)						
					1	2	3	4	5	6	7
1 Analogies*	0.78	0.872	0.695	1.835							
2 Attention Intensity*	0.796	0.879	0.708	1.993	0.768						
3 BM typicality	1	1	1	–	0.057	0.078					
4 BM confidence	1	1	1	1.569	0.375	0.426	0.028				
5 BM experience	1	1	1	1.094	0.154	0.115	0.026	0.014			
6 Pattern helpfulness	1	1	1	1.165	0.337	0.628	0.069	0.675	0.123		
7 Intuition*	0.605	0.784	0.548	1.753	0.388	0.272	0.163	0.176	0.034	0.121	
8 Tool experience	1	1	1	1.212	0.225	0.29	0.065	0.225	0.214	0.334	0.068

Notes: An asterisk * marks reflective constructs. For HTMT values below 0.85, discriminant validity exists between two constructs. Convergent validity exists when the average variance extracted (AVE) is ≥ 0.5. Composite reliability exists when Cronbach's $\alpha \geq 0.7$.

Table A5. Path Coefficients, *t*-Values, and Effect Sizes Independent of Cognitive Disposition.

		Framework Helpfulness			Attention Intensity			Analogies			Intuition			BM confidence			BM typicality		
independent constructs	**Cluster**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**
Framework Helpfulness	**Canvas**				0.336	**3.008****	0.126	0.087	0.702	0.008	0.373	**3.441****	0.163	-0.032	0.272	0.001	–0.126	1.197	0.015
	Patterns				0.266	**2.787****	0.082	0.354	**3.869****	0.151	0.108	1.031	0.013	0.073	0.712	0.007	–0.158	1.398	0.022
BM experience	**Canvas**	0.108	1.157	0.011	–0.024	0.278	0.001	0.067	0.467	0.004	0.074	0.602	0.006	0.111	1.420	0.013	0.241	**2.996****	0.064
	Patterns	0.048	0.485	0.002	0.048	0.48	0.003	0.089	**1.758**†	0.009	–0.125	1.145	0.017	-0.03	0.389	0.001	–0.032	0.343	0.001
Framework experience	**Canvas**	–0.059	0.496	0.003	0.079	0.696	0.007	0.129	0.863	0.016	0.094	0.757	0.01	0.023	0.195	0.001	0.017	0.143	0
	Patterns	–0.064	0.723	0.004	0.269	**2.946****	0.08	0.203	**2.251***	0.047	0.313	**3.677****	0.104	0.06	0.695	0.005	0.071	0.54	0.004
Attention Intensity	**Canvas**													0.334	**2.699****	0.095	–0.041	0.269	0.001
	Patterns													0.026	0.212	0.001	–0.054	0.359	0.002
Analogies	**Canvas**													0.04	0.31	0.001	–0.327	**2.727****	0.098
	Patterns													0.169	1.294	0.026	0.008	0.054	0
Intuition	**Canvas**													0.107	0.766	0.01	0.223	**1.828**†	0.045
	Patterns													0.481	**5.120****	0.265	–0.048	0.327	0.001
BM confidence	**Canvas**																–0.11	0.893	0.012
	Patterns																0.084	0.659	0.005
adj. R^2	**Canvas**	–0.012			0.083			-0.002			0.129			0.115			0.114		
	Patterns	–0.018			0.114			0.147			0.073			0.315			–0.045		
Q^2	**Canvas**	–0.031			0.057			0.008			0.087			0.007			0.078		
	Patterns	–0.024			0.058			0.096			0.02			0.207			–0.117		

Note: Marked *t*-values indicate statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$.

Table A6. Path Coefficients, *t*-Values, and Effect Sizes With Cognitive Disposition and Canvas.

		Canvas Helpfulness			Attention Intensity			Analogies			Intuition			BM confidence			BM typicality		
independent constructs	**Cluster**	**std. β**	**t- value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**
Canvas Helpfulness	**R**				0.337	**1.895**†	0.129	0.084	0.506	0.009	0.413	**2.327***	0.202						
	E				0.582	**3.827****	0.509	0.145	0.619	0.024	0.208	0.855	0.047						
	I				0.115	0.332	0.012	0.047	0.151	0.002	0.342	1.056	0.126						
BM experience	**R**	0.225	0.98	0.04	0.155	0.582	0.02	0.498	**2.642****	0.227	-0.113	0.442	0.011						
	E	0.088	0.278	0.007	-0.123	0.611	0.021	0.045	0.134	0.002	-0.042	0.127	0.002						
	I	0.051	0.181	0.003	0.224	0.777	0.056	0.005	0.016	0	0.324	1.056	0.139						
Framework experience	**R**	–0.065	0.323	0.003	–0.008	0.034	0	–0.313	1.458	0.093	0.192	0.636	0.034						
	E	0.016	0.059	0	–0.03	0.13	0.001	0.326	0.998	0.111	0.229	0.75	0.052						
	I	–0.432	**2.163***	0.229	0.261	0.803	0.062	0.295	0.889	0.077	–0.056	0.151	0.003						
Attention Intensity	**R**													0.435	**2.808****	0.189	–0.231	1.121	0.053
	E													0.295	0.935	0.085	–0.454	**2.121***	0.221
	I													0.024	0.086	0.000	0.520	**1.764**†	0.246
Analogies	**R**													–0.085	0.464	0.008	–0.288	**1.682**†	0.088
	E													0.238	0.805	0.048	–0.255	1.124	0.061
	I													0.484	**1.963***	0.190	–0.840	**2.944****	0.745
Intuition	**R**													0.054	0.244	0.003	0.051	0.258	0.003
	E													–0.034	0.109	0.001	0.293	0.972	0.076
	I													0.146	0.584	0.019	0.503	**1.777**†	0.290

Table A6. (*Continued*)

		Canvas Helpfulness			Attention Intensity			Analogies			Intuition			BM confidence			BM typicality		
independent constructs	**Cluster**	**std. β**	**t- value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**
adj. R^2	**R**	–0.013			0.084			0.143			0.118			0.116			0.104		
	E	–0.081			0.248			0.022			–0.036			0.062			0.145		
	I	0.102			–0.037			–0.076			0.123			0.247			0.423		
Q^2	**R**	–0.046			0.026			0.077			0.021			0.032			0.013		
	E	–0.096			0.212			0.023			0.008			–0.078			0.043		
	I	0.049			0.021			0.002			0.065			0.271			0.208		

Note: Marked *t*-values indicate statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$.

Table A7. Path Coefficients, *t*-Values, and Effect Sizes With Cognitive Disposition and Patterns.

		Pattern Helpfulness			Attention Intensity			Analogies			Intuition			BM confidence			BM typicality		
independent constructs	**Cluster**	**std. β**	**t- value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	***t*-value**	**f^2**	**std. β**	***t*-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**
Pattern Helpfulness	**R**				0.155	0.925	0.027	0.329	**2.128***	0.137	0.077	0.465	0.007						
	E				0.124	0.659	0.018	0.296	1.400	0.098	0.192	1.008	0.038						
	I				0.736	**6.988****	0.945	0.55	**3.369****	0.4	0.297	0.662	0.091						
BM experience	**R**	–0.051	0.493	0.003	0.126	0.555	0.018	0.102	1.008	0.013	–0.055	0.269	0.004						
	E	0.087	0.429	0.007	0.027	0.135	0.001	–0.083	0.437	0.007	–0.157	0.649	0.022						
	I	0.325	1.115	0.115	–0.258	1.038	0.114	0.049	0.25	0.003	–0.285	1.008	0.082						
Framework experience	**R**	0.002	0.016	0	0.27	**1.672†**	0.081	0.293	**2.335***	0.106	0.441	**3.220****	0.235						
	E	–0.294	1.313	0.075	0.457	**2.815****	0.198	0.409	1.634	0.152	0.308	1.415	0.078						
	I	–0.024	0.105	0.001	0.066	0.408	0.008	–0.032	0.148	0.001	0.162	0.579	0.029						
Attention Intensity	**R**													–0.045	0.219	0.002	–0.267	1.280	0.049
	E													–0.038	0.431	0.006	–0.029	0.126	0.001
	I													0.244	0.988	0.032	–0.059	0.267	0.003
Analogies	**R**													0.395	**2.047***	0.169	–0.109	0.524	0.008
	E													0.184	0.803	0.052	0.088	0.137	0.002
	I													–0.363	0.688	0.032	0.222	0.235	0.003
Intuition	**R**													0.447	**2.916****	0.313	0.141	0.867	0.019
	E													0.728	**4.039****	0.495	0.312	0.505	0.011
	I													0.277	0.804	0.045	–0.333	0.730	0.037

Table A7. (*Continued*)

		Pattern Helpfulness			Attention Intensity			Analogies			Intuition			BM confidence			BM typicality		
independent constructs	**Cluster**	**std. β**	**t- value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	***t*-value**	**f^2**	**std. β**	***t*-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**
adj. R^2	**R**	–0.056			0.042			0.138			0.122			0.390			0.025		
	E	–0.002			0.107			0.068			–0.028			0.582			–0.109		
	I	0.023			0.414			0.225			0.005			–0.025			–0.078		
Q^2	**R**	–0.031			0.036			0.107			0.075			0.309			–0.084		
	E	0.003			0.118			0.063			–0.014			0.532			–0.143		
	I	–0.06			0.309			0.186			–0.108			–0.161			–0.266		

Note: Marked *t*-values indicate statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$.

Table A8. PLS Algorithm and Bootstrapping Settings.

PLS Algorithm Settings		**Bootstrapping Settings**	
Weighting scheme:	Path	Confidence interval method Bias-corrected and accelerated	
Maximum iterations:	3,000	Samples:	3,000
Stop criterion:	10^{-7}	Test type:	Two-tailed
Initial weights:	1.0	Omission distance (blindfolding):	6
Missing values:	Casewise deletion		

What Bounds Entrepreneurial Business Modelling? The Impacts of Visual Framing Effects and Cognitive Dispositions

Tassilo Henike and Katharina Hölzle

Abstract

Great uncertainty accompanies entrepreneurs' processes of designing promising business models (BMs). Therefore, stabilising factors act as important means in this process. In this study, we examined the impact of cognitive dispositions and visual BM frameworks on the BM process and outcomes. By using partial-least-square structural equation modelling (PLS-SEM) and an experimental setting, our results show that the stabilising function of BM frameworks depends on entrepreneurs' cognitive dispositions. This finding contributes to the cognitive BM perspective and explains how cognitive dispositions and visual framing effects act as boundary conditions for the theory of stabilising factors. This also has important implications for applying frameworks in practice.

Keywords: Business models; visual frameworks; cognition; entrepreneurship; framing effects; dual-process theory

Introduction

For establishing new ventures, designing a promising business model (BM) is a future-determining decision-making process characterised by high uncertainty and complexity. Uncertainty arises because entrepreneurs cannot determine ex ante what BM will be successful (Packard, Clark, & Klein, 2017). Further, resource constraints and liabilities of newness prohibit prolonged experimentation until finding a promising BM design (Nicholls-Nixon, Cooper, & Woo, 2000; Sosna, Trevinyo-Rodríguez, & Velamuri, 2010). By a BM design, we mean an entrepreneur's first cognitive structure of reasons why and mechanisms how various actors engage in business interactions organised by the focal new

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venture that should be implemented (Doz & Kosonen, 2010). Aligning these BM elements is a complex process, as several equally promising options exist (Massa & Tucci, 2014). In general, these options allow imitating successful BMs or creating atypical BMs by combining different elements into novel BMs (Baden-Fuller & Morgan, 2010; Casadesus-Masanell & Zhu, 2013). However, answering how entrepreneurs decide to either imitate or deviate is 'one of the most significant gaps' in entrepreneurship research (Matthews, Chalmers, & Fraser, 2018, p. 701).

Recent research has shown that entrepreneurs' power is a key factor to implement their BM designs (Snihur & Zott, in press), i.e., transforming their cognitive BMs into operated business logics. In contrast, researchers have explored a greater variety of factors to explain what affects BM implementation-anteceding design processes (e.g., Amit & Zott, 2015; Martins, Rindova, & Greenbaum, 2015; McDonald & Eisenhardt, 2020; Roessler, Velamuri, & Schneckenberg, in press; Snihur & Zott, in press). These stabilising factors include entrepreneurs identity (e.g., for-profit or social aspirations), socio-cognitive (e.g., co-founders' and investors' interests) as well as individual-cognitive factors (e.g., analogous problem-solving), and formal techniques (e.g., business plans or BM visualisations; Henike, 2019). Among them, entrepreneurs' cognition is the most crucial factor as their interpretations of environmental factors determine a new venture's course of action (Sosna et al., 2010).

By cognition, we mean a person's knowledge structures, context-independent cognitive disposition and context-dependent activities of information processing (Neisser, 1976; Walsh, 1995). Cognitive dispositions are supposed to be relatively stable preferences for how to process information (Stanovich & West, 2000). Persons either prefer to process information in a rational or an experiential way (Epstein, Pacini, Denes-Raj, & Heier, 1996; Evans & Stanovich, 2013). However, depending on contextual characteristics, persons can deviate from the preferred set of cognitive activities using characteristics of the other disposition instead (Epstein et al., 1996). Cognitive activities comprise of four activities: perception, attention, problem-solving, and reasoning (Helfat & Peteraf, 2015; Reed, 2006). Thus, persons with a rational disposition ought to be more inclined to pay careful attention, reason based on facts, and solve problems by logically combining elements. In contrast, persons with an experiential disposition ought to be more inclined to holistic information processing, reason based on their experiences as well as intuition, and use analogies to solve problems.

Relying on this dual-process theory (Epstein et al., 1996), recent BM research indicates that the decision to imitate or deviate from existing BMs depends on contextual characteristics and the match between cognitive dispositions and activities serving as stabilising factors (Henike, 2019). Accordingly, this match provides entrepreneurs with cognitive safety to accept atypical BMs in the uncertain situation of establishing a new venture. In contrast, a mismatch is more likely to result in BM imitation because copying successful examples provides then a source for feeling cognitively safe in decision-making.

However, current research has rarely investigated the boundary factors and the impact of other factors that can affect cognitive activities (cf. Henike, 2019;

McDonald & Eisenhardt, 2020; Roessler et al., in press; Snihur & Zott, in press). Increasing our understanding of these boundary factors is important because they are crucial hallmarks for generally explaining the phenomenon of designing BMs (cf. Foss & Saebi, 2017).

BM frameworks are one of these cognition-affecting factors that have become prevalent in practice. These frameworks – like the BM Canvas (Osterwalder & Pigneur, 2010) – can relieve tasks that go beyond what humans can easily process in their memories, i.e., reduce cognitive load (Larkin & Simon, 1987). The reduction of cognitive load is not neutral, yet BM frameworks unfold specific visual framing effects (Henike, Kamprath, & Hölzle, forthcoming) affecting entrepreneurs' cognition. For instance, BM frameworks can contain inspiring BM examples (e.g., Gassmann, Frankenberger, & Csik, 2014). However, we know so far very little about under what circumstances BM frameworks impact decision-making. Therefore, we ask in this study: How much do BM frameworks impact the decision-making process and BM outcomes of entrepreneurs with different cognitive dispositions?

Based on dual-process theory (Epstein et al., 1996), the concept of cognitive safety (Henike, 2019), and visual framing effects (Henike et al., forthcoming), we conceptualise cognitive dispositions and prior experiences as boundary conditions for the impacts of BM frameworks on cognitive activities and BM outcomes, i.e., BM typicality and the feeling of confidence. By using partial-least-square structural equation modelling (PLS-SEM), we analysed the impact of two BM frameworks – the BM Canvas (Osterwalder & Pigneur, 2010) and the 55 BM Pattern Cards (Gassmann et al., 2014) – on the BM design processes of 197 entrepreneurs in a role-playing experiment. Our results confirm the impact of the visual framing effects on the design process. Our results also show that the relationship between frameworks and cognitive dispositions has an impact on BM outcomes contributing to the cognitive BM perspective and the contingent applicability of BM frameworks.

Conceptual Framework

The questions of how and when new BMs emerge have received increasing interest in recent years (Foss & Saebi, 2017). New BMs can emerge in three different situations, each encompassing different degrees of cognitive and implementation challenges. First, new BMs can emerge as reconfigurations of existing BMs being mostly challenged by existing resources and cognitive imprints (Tripsas & Gavetti, 2000). Second, new BMs can emerge as additions to existing BM portfolios (Futterer, Schmidt, & Heidenreich, 2018). In this second situation, the most prevailing challenge is to align the new business with the existing core business (Snihur & Tarzijan, 2018). Third, new BMs can emerge as the first BM of a new venture in that extensive resources and cognitive imprints are missing prohibiting orientations on how to design a promising first BM (Massa & Tucci, 2014; Packard et al., 2017).

In this third situation, entrepreneurs' cognition 'provides the most important input into the initial business model design' (Sosna et al., 2010, p. 386).

From a cognitive-psychological perspective, cognition comprises of a person's knowledge structures, context-independent cognitive disposition, and context-dependent activities of information processing (Neisser, 1976; Walsh, 1995). Cognitive dispositions are preferences for how to process information (Stanovich & West, 2000). Persons either prefer a rational way, i.e., analytical, logical, and effortful, or an experiential way, i.e., holistic, associative, and effortless (Epstein et al., 1996; Evans & Stanovich, 2013). However, the use of a preferred way of information processing depends on contextual characteristics, pre-existing knowledge, and emotions. Thus, persons can deviate from their preferred cognitive activities (Epstein et al., 1996).

The cognitive activities comprise of perception, attention, problem-solving, and reasoning (Helfat & Peteraf, 2015; Reed, 2006). First, perception is the ability to mentally construct meaningful impressions out of information (Gazzaniga, Heatherton, & Halpern, 2015). In business contexts, mainly strategic orientations are references for constructing meaningful impressions (Gatignon & Xuereb, 1997). Second, attention intensity determines how much cognitive capacity is spent on processing particular information (Kahneman, 1973). Third, problem-solving is the process of finding a solution by using analogies or conceptual combinations (Martins et al., 2015). Finally, intuitive and factual reasoning provide sources of proof whether information processed is satisfying (Simon, 1955).

In explaining the emergence of new entrepreneurial BMs, Snihur and Zott (in press) have linked the emergence of novel, atypical BMs to entrepreneurs' distant searches in other industries and detailed knowledge of their industry structure and functioning. Other authors have explained the emergence of BMs because some entrepreneurs use analogical, while others use conceptual combinations (Roessler et al., in press). The focus on separate cognitive activities shows a highly fragmented picture of how cognitive activities determine BM outcomes. Further, for constituting a rigid theory of BM design emergence (cf. Foss & Saebi, 2017), current studies do not consider boundary conditions what limits our understanding of why for instance some entrepreneurs engage in distant searches and others do not.

Addressing these shortcomings, Henike (2019) introduced the concept of cognitive safety and empirically showed that a match between cognitive dispositions and activities encouraged novice entrepreneurs to recommend atypical BM designs. Accordingly, entrepreneurs with a rational disposition designed atypical BMs when they have paid intense attention to details, solved problems by logically combining elements, and reasoned based on facts. In contrast, experiential entrepreneurs designed atypical BMs when they have paid high to medium attention, used analogies, and reasoned based on their experiences as well as intuition. Thus, their decisions to deviate in the uncertain entrepreneurial process rested on stabilising factors. However, the impacts of other stabilising factors like market reactions from experimentations, investor influences, or formal techniques like BM frameworks are overall unexplored in the emerging cognitive BM field (cf. Amit & Zott, 2015; Henike, 2019; McDonald & Eisenhardt, 2020; Roessler et al., in press; Snihur & Zott, in press).

BM frameworks can be such a stabilising factor because they aim to support the structured simultaneous processing of information that cannot be easily

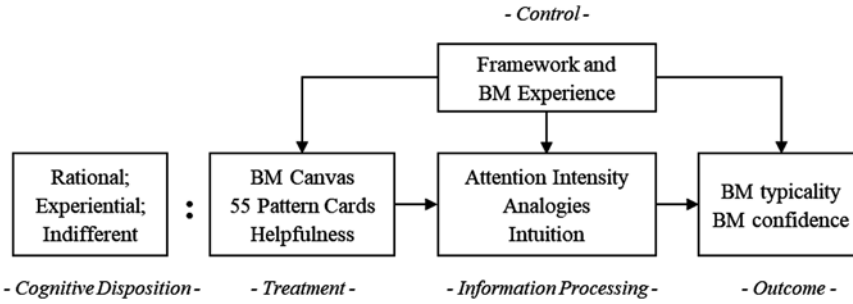

Fig. 1. Conceptual Framework of BM Frameworks' Impacts.

processed in working memories (cf. Larkin & Simon, 1987). By BM frameworks, we mean codified expressions of theoretical BM aspects like general BM patterns (e.g., Gassmann et al., 2014) or sets of BM elements (e.g., Osterwalder & Pigneur, 2010) that are meaningfully arranged within a restricted scheme (cf. Berinato, 2016; Tversky, 2004). They affect persons' cognition in promoting specific visual framing effects (Henike et al., forthcoming). These visual framing effects can encourage to pay more intense attention or to contrast different options. The outcomes of such processes are then treated as results of mainly cold cognition (March, 2006), i.e., independent of emotions and feelings (Sund, Galavan, & Brusoni, 2018).

According to this perspective, BM frameworks impact the BM process and outcomes. However, by considering the aspects of cognitive safety, we assume that the impacts on BM outcomes depend on entrepreneurs' cognitive disposition and prior experiences. We also assume that the quality is affected, BM typicality, as well as emotional aspects because some will feel more familiar with the way of thinking promoted by BM frameworks than others. Fig. 1 shows our conceptual framework that we will further explain in the following.

Visual Framing Effects

Since BM visualisations promote different framing effects, we expect different impacts of different BM frameworks on the cognitive activities and BM outcomes. The BM Canvas is a BM framework that promotes the easy recall of intuitive thoughts and, thus, an availability effect (Henike et al., forthcoming). This effect results from the decomposition of a BM into nine separated, open-ended dimensions (Osterwalder & Pigneur, 2010). Each block is displayed as a rectangle in a specific size and possesses a particular headline like value proposition or cost structure. As the Canvas does not provide further manifestations for each dimension, the BM Canvas is an open-ended framework. This openness helps to structure thoughts, yet does not inspire new or challenge existing thoughts as research has shown (Eppler, Hoffmann, & Bresciani, 2011; Snihur, Lamine, & Wright, in press). At the same time, the decomposition of a BM into nine dimensions with specifically sized rectangles promotes to pay attention to the varying dimensions.

Thus, users of the BM Canvas who greatly adhere to its structure ought to be inclined to pay more intense attention and to rely on intuitive thoughts. Thus, we hypothesise:

> *Hypothesis 1a* (*H1a*). If the BM Canvas is helpful, it leads to paying more intense attention and to increased intuitive reasoning.

In contrast, the 55 BM Pattern Cards are a collection of different abstract BM patterns (Gassmann et al., 2014). Each pattern is presented on a separate card with a unique label that also includes a verbal detailed description and prominent business examples operating according to this pattern. The detailed descriptions and the possibility to compare different BM patterns foster a contrasting effect and limit the availability effect (Henike et al., forthcoming). Thus, the presentation of different BM patterns encourages to pay intense attention to the differences across patterns. At the same time, the presentation provides analogies that can lead to 'a surprising boost in creativity' if BM Pattern Card users explore new information (Snihur et al., in press). Accordingly, we assume:

> *Hypothesis 1b* (*H1b*). If BM Pattern Cards are helpful, they lead to paying more intense attention and to increased analogous problem-solving.

Research has indicated that the primary boundary condition for the unfolding of framework effects is a great adherence of framework users to the framework characteristics (Jarzabkowski & Kaplan, 2015). The main value of frameworks is to support cognitive activities that are too complex for easy processing in human working memories (Larkin & Simon, 1987). However, the ease of processing can also be influenced by a person's experiences (Albarracín & Wyer, 2000). Possessing rich experience in designing BMs or working with BM frameworks will inevitably evoke the experiential thinking system because in situations of profound knowledge, this way of thinking is the most efficient (cf. Epstein et al., 1996). Arguably, users with great experiences in using the BM Canvas may have already internalised its structure so that they do not see value in recalling its visual characteristics and greatly adhering to them. Therefore, we assume in hypothesis *H1c* that experiences in designing BMs and working with BM frameworks are boundary conditions for the helpfulness of BM frameworks and, subsequently, their visual framing effects:

> *Hypothesis 1c* (*H1c*). High BM and framework experience lead to lower helpfulness of BM frameworks.

Cognitive Dispositions, Visual Framing Effects, and BM Outcomes

The unfolding of visual framing effects ought to be unrelated to entrepreneurs' cognitive disposition because the visual elements underlying the framing effects are codified and, thus, not subject to greatly varying interpretations – at least in the same culture (Meyer, Höllerer, Jancsary, & van Leeuwen, 2013). However, the

recent research on cognitive safety indicates that using the different visual framing effects will result in different outcomes for entrepreneurs with different cognitive dispositions (cf. Henike, 2019). Thus, the visual framing effects ought to determine when entrepreneurs with different cognitive dispositions, i.e., rational, experiential, or indifferent, are more likely to design atypical BMs as well as their confidence that their BM design will be successful in the future (cf. March, 2006).

The concept of cognitive safety assumes for rational entrepreneurs that they will be more likely to design atypical BMs when high levels of attention intensity, factual reasoning, and conceptual combination characterise their information processing. As the BM Canvas encourages paying intense attention and to conceptually combine elements within the nine building blocks, we assume that it is likely that rational entrepreneurs will be more inclined to recommend atypical BMs. The underlying reason is that rational entrepreneurs will use these visual framing effects to detect significant differences to other competing BMs (Martins et al., 2015). For the BM Pattern Cards, we expect no relationship to BM atypicality for rational participants. Although the BM Pattern Cards also encourage high levels of attention intensity, the provision of analogies will not encourage them to detect significant differences (Martins et al., 2015). However, we expect for both frameworks the same effects on the feeling of confidence, i.e., that their BM designs will be successful in the future. As March (2006) formulated, frameworks are 'technologies of rationality' providing analytical devices that help entrepreneurs making seemingly rational choices (cf. Jarzabkowski & Kaplan, 2015). Consequently, our hypotheses *H2a* and *H2b* are as follows:

> *Hypothesis 2a* (*H2a*). If rational participants use the BM Canvas' visual framing effects, they will be more confident about the success of atypical BM designs.

> *Hypothesis 2b* (*H2b*). If rational participants use the BM Pattern Cards' visual framing effects, they will be more confident of their BM designs independent of BM typicality.

In contrast, the concept of cognitive safety assumes that experiential entrepreneurs will be more likely to design atypical BMs when high to medium levels of attention intensity, intuitive reasoning, and analogic problem-solving characterise their information processing. In fact, both frameworks support two of these three crucial cognitive activities so that we expect for both frameworks an impact on BM atypicality. The BM Canvas supports attention intensity and intuitive reasoning that encourages experiential entrepreneurs to imagine the best possible solution based on their own situation. As each own situation includes wishes that might not be specifically respected in main-streamlined competing BMs, they will be able to detect differences (Sadler-Smith, 2016). We also assume a similar impact of the BM Pattern Cards. They promote attention intensity and analogous problem-solving so that it is likely that the BM designs will be atypical. Combining different possible solutions with their own experiences and wishes can encourage the design of atypical BMs (Sadler-Smith, 2016). Further, as experiential persons

are per se not strongly inclined to rational reasoning (Epstein et al., 1996), we expect no effect of both frameworks on confidence. Thus, we hypothesise:

Hypothesis 3a (*H3a*). If experiential participants use the BM Canvas' visual framing effects, they will derive more atypical BMs, yet without an impact on confidence.

Hypothesis 3b (*H3b*). If experiential participants use the BM Pattern Cards' visual framing effects, they will derive more atypical BMs, yet without an impact on confidence.

Lastly, the cognitive safety perspective assumes that the group of persons with indifferent thinking dispositions shows no general pattern of how BM typicality will be affected. We also expect that no general pattern on BM confidence will be detectable. The group of indifferent persons is a very heterogeneous group of people. Overall, this group does not show a clear preference for either the rational or experiential way of thinking. Therefore, deviations in the process from the disposition will not have strong effects on their cognitive safety and, thus, recommendations of typical or atypical BMs. Further, as for the experiential entrepreneurs, indifferent entrepreneurs are not strongly inclined to rational reasoning; that is why we expect no effect from using frameworks on BM confidence:

Hypothesis 4a (*H4a*). If indifferent participants use the BM Canvas' visual framing effects, neither typicality nor confidence will be affected.

Hypothesis 4b (*H4b*). If indifferent participants use the BM Pattern Cards' visual framing effects, neither typicality nor confidence will be affected.

Method

Since only a few studies have started to conceptually and empirically study cognitive impacts on BM development processes (e.g., Henike, 2019; McDonald & Eisenhardt, 2020; Snihur & Zott, in press), the current state of theory is weak. Although some explanations exist for how cognitive activities impact BM design outcomes, investigations of well-delineated boundary conditions are missing that are crucial hallmarks of good theory (cf. Foss & Saebi, 2017). Consequently, our research aims to explore the impact of boundary conditions on BM decision-making to enrich the theory about the emergence of entrepreneurial BM designs.

Given this state of research and the complex relationship in our conceptual framework, we decided for an experimental setting and to estimate our models with PLS-SEM. Our experimental setting was a randomised, role play, active participation field experiment (Hsu, Simmons, & Wieland, 2017). This kind of experiment has moderate to high internal validity and is more realistic than laboratory experiments (Podsakoff & Podsakoff, 2019). Participants are asked to behave

as themselves, increasing their involvement as well as the reliability of results (Hsu et al., 2017).

In our experiment, we asked experienced entrepreneurs to design a BM for an existing service that has no specific value proposition and value capture mechanism yet. The service is called Errorfarealerts and provides information about online error fares of flights. An algorithm crawls the Internet and informs registered people by e-mail free of charge. A possible error fare could be that a flight only costs $59 instead of $590.

Sample

To recruit entrepreneurs for this experiment, we used the crowdsourcing platform Prolific that 'is primarily geared towards researchers and startups' (Peer, Brandimarte, Samat, & Acquisti, 2017, p. 154). Participants receive a monetary reward for their participation after researchers' approval. In total, we collected data from 203 entrepreneurs. Our study consisted of two surveys created with the help of Typeform Pro. In one survey, we provided the participants with an online version of the BM Canvas used as a treatment. In the other survey, we used an online version of the 55 BM Pattern Cards. Prolific's system randomly invited 100 participants to the first survey and the other entrepreneurs to the second survey. Except for the treatment condition, both surveys had the same structure consisting of three survey parts and one experimental part. During data analysis, we calculated standard deviations (SDs) for each participant's responses in the surveys. This analysis revealed six outliers with a SD of zero that we excluded (Aguinis, Ramani, & Alabdujader, 2018).

Dependent Variables

The main part of our experiment was the design of a BM for the service Errorfarealerts. Therefore, we presented our 197 participants the main idea of the service via a short video and description. We then asked the participants to design one or two appropriate BM(s) and provided the respective BM frameworks. Participants also had the possibility to search for additional information online. In the end, the participants had to decide on one BM, and we asked them about how typical their recommended BM was for the flight advisory industry. The typical BM for this case would have been that private travellers are informed of cheap fares (value proposition) via their subscriptions to e-mails and explored by the algorithm (value creation), and revenues are collected by commission fees (value capture). We also asked them about how confident they were that their recommended BM would be successful.

For BM typicality and BM confidence, we used one item including a 5-point Likert scale ranging from '1 = totally disagree' to '5 = totally agree'. We also asked participants to describe their BMs verbally according to the three key BM dimensions: value proposition, creation, and capturing (Teece, 2010). During data analysis, we compared the BM descriptions with the typicality assessments. The comparison revealed considerable differences, and we aligned the assessments. Table A1 provides a detailed explanation.

Independent and Mediating Variables

Prior to the presentation of the case for our experiment, we asked participants about demographic characteristics, their BM experiences, and experiences with BM frameworks. For BM experiences, we asked the participants to provide a number for how often they had to design a BM in practice and for training. For experiences with BM frameworks, we presented visually six BM frameworks, including the BM Canvas and Pattern Cards. Participants had to indicate with what BM frameworks they have worked with. Participants had also the possibility to answer this question with none. The answers were transferred into a number ranging from zero (no experience) to six (experience with all presented BM frameworks).

Next, we used the 10-item version of Epstein et al.'s Rational-Experiential-Inventory (REI) for eliciting participants' cognitive dispositions (1996). The REI uses five items to measure rational and five items to measure experiential thinking dispositions based on 5-point Likert scales (cf. Table A1). We summed the answers for each item, creating an overall scale. Values below 2.75 indicated participants with an experiential (E) cognitive disposition. Values above 3.25 indicated participants with a rational disposition (R). Values in between these threshold values indicated participants with an indifferent disposition (I).

After the design process, we used 10 items and asked the participants to reflect on the framework's helpfulness, the impact of analogous problem-solving, intuitive reasoning, and attention intensity (cf. 0). We used again 5-point Likert scales. For measuring the last three concepts, we used reflective measures, each consisting of three items. We used the items developed by Li, Maggitti, Smith, Tesluk, and Katila (2013) to measure attention intensity. For measuring analogous problem-solving, we built own items based on the analogical process that includes a comparison and transfer between general schemas, i.e., abstract BM patterns, and concrete analogues, i.e., real-world instances (cf. Enkel & Gassmann, 2010; Gick & Holyoak, 1983; Osterwalder, Pigneur, & Tucci, 2005). For measuring intuitive reasoning, we relied on Sadler-Smith and Shefy's (2004) conceptualisation of intuition. Accordingly, intuition relies on expertise, feelings, and imagination. We used these characteristics to build three own items.

PLS-SEM

For data analysis, we decided to estimate our models with PLS-SEM using SmartPLS 3 (Ringle, Wende, & Becker, 2015). PLS-SEM is a variance-based and non-parametric approach allowing to analyse complex model structures and to develop theory based on quantitative data (Hair, Sarstedt, Ringle, & Mena, 2012; Wold, 1975). These characteristics distinguish PLS-SEM from covariance-based SEM (CB-SEM; Jöreskog & Wold, 1982). CB-SEM has stricter assumptions than PLS-SEM concerning multivariate normality, sample size, and model structure (Hair et al., 2012).

The relaxation of these assumptions in PLS-SEM has led to severe criticism on the usefulness of PLS-SEM (Rönkkö, McIntosh, & Antonakis, 2015; Rönkkö, McIntosh, Antonakis, & Edwards, 2016). Rigdon (2016) mainly attributed the

strong controversy between PLS-proponents and PLS-opponents to differences in their epistemological perspectives. PLS-opponents argue that latent constructs need to be modelled as common factors consisting of the common variance, i.e., the shared variance of indicators (Sarstedt, Hair, Ringle, Thiele, & Gudergan, 2016). In contrast, PLS-proponents argue that latent constructs need to be modelled as composite factors consisting of 'all of the variance (common, unique and error) that the exogenous variables have in common with the endogenous variables' (Sarstedt et al., 2016, p. 4003). Consequently, PLS-SEM minimises the amount of unexplained variance in dependent variables making PLS-SEM suitable for predicting relationships between constructs (Hair, Hult, Ringle, & Sarstedt, 2017; Henseler et al., 2014).

In total, we analysed data from 99 participants in the BM Canvas and 98 participants in the BM Pattern Card groups with the help of PLS-SEM. As PLS-SEM estimates partial model relationships in sequential computations of single ordinary least square (OLS) regressions, both data sets fulfil the commonly cited rule of thumb for data characteristics. Adequate sample size should be 10 times higher than the maximum number of arrowheads pointing to a latent variable (Hair et al., 2017). In our cases, the maximum number of arrowheads was seven.

As our interest was to examine the relationship between BM frameworks and cognitive dispositions, we executed individual PLS-SEM calculations for each group of cognitive disposition (rational, experiential, and indifferent) in each treatment cluster. The maximum number of arrowheads in these cases was three satisfying the rule of thumb for the groups R-Canvas (46), R-Patterns (37), and I-Patterns (32). The number of participants in the other groups, E-Patterns (29), E-Canvas (27), and I-Canvas (24), was slightly lower. Given our exploratory aim, we accepted these deviations, although they decrease the results' statistical power for these groups (Hair, Babin, Anderson, & Black, 2014; Henseler et al., 2014).

Results

Descriptive Statistics and Group Comparability

Before we analysed the impact of the two different BM frameworks, we began with analysing the comparability of our two clusters, i.e., the BM Canvas and the BM Pattern Cards sample. Therefore, we used mean *t*-tests and examined whether the mean values for BM experience, framework experience, REI-Score, framework helpfulness, BM typicality, and BM confidence differed statistically significant between both clusters. We used this method because using *t*-tests helps to find possible explanations for later result differences in our PLS-SEM analysis. Although some remarkable difference for BM experience existed (Canvas-Cluster: $M = 13.84$, SD = 34.99; Pattern-Cluster: $M = 24$, SD = 70.43), statistically significant differences did not exist for the six constructs among both clusters. The low number of framework experience is also remarkable. In both clusters, the entrepreneurs have not even used one BM framework on average in the past.

Table A2 shows the mean values, SDs, and mean *t*-test results for each of the six constructs in the two clusters. It also shows our further analysis of statistically significant differences between participants with different cognitive dispositions, i.e., rational, experiential, and indifferent, that we treated with the two BM frameworks. Overall, we found no statistically significant differences for BM and framework experience by comparing the six different groups. We found statistically significant differences in REI-Score between groups that covered participants with different cognitive dispositions. Interestingly, the *t*-test results point to a statistically significant difference in estimating the helpfulness of the BM Canvas between rational (M = 2.79, SD = 1.34) and indifferent participants (M = 3.41, SD = 1.1), $t(59) = -0.83$, $p = 0.07^{\dagger}$). Further, the *t*-test results show statistically significant differences in BM confidence and typicality, suggesting that the interplay between cognitive disposition and framework used impacts later results (cf. Table A2). With the help of PLS-SEM, we explored the underlying mechanisms driving the differences between groups.

Measurement Model

We follow Hair, Risher, Sarstedt, and Ringle's (2019) approach to report and analyse the PLS-SEM results. Accordingly, we first analysed our measurement models before we analysed our structural models. Like in our case, analysing reflective measurement models comprise of individual analyses of item reliabilities, internal consistency reliability (CR), convergent validity, and discriminant validity (see also Hulland, 1999; Mikalef & Pateli, 2017; Strauch, Pidun, & Knyphausen-Aufseß, 2019).

Item reliability expresses the shared variance between a construct and a measured indicator (Hulland, 1999). Thus, it represents how well an indicator measures a construct (Hair et al., 2014). To assess item reliability, the examination of indicator loadings are recommended, and these values should exceed the general threshold of 0.708 or 0.6 for exploratory investigations (Hair et al., 2019). We assessed loadings for our five reflective indicators (rational thinking disposition R, experiential thinking disposition E, analogical problem-solving ANA, intuitive reasoning INT, attention intensity A, cf. 0). All indicators in the BM Canvas-Cluster and 15 out of 19 indicators in the Pattern-Cluster exceed the general threshold of 0.708. All the remaining indicators exceed the threshold of 0.6, with 0.63 being the lowest loading for one item measuring experiential thinking dispositions (E5 in Table A1). As a result, or data set possesses acceptable item reliability for our research aim.

For assessing internal CR, we used Cronbach's α and composite reliability. Hair et al. (2019) recommend the complementary use as Cronbach's α threshold (0.7) is too conservative, and the composite reliability thresholds ($0.7 \leq CR \leq 0.95$) are too liberal. Except for intuitive reasoning in the BM Pattern-Cluster (Cronbach's $\alpha = 0.605$, cf. Tables A3 and A4), all values fulfil the requirements of internal CR. Thus, the set of indicators per construct sufficiently measure the constructs.

For assessing convergent validity, we compared the average variance extracted (AVE) with the suggested threshold of 0.5. This threshold suggests that a construct

explains 50% of the variance of the indicators that make up the construct (Hair et al., 2019). All our constructs fulfil this condition with again intuitive reasoning in the BM Pattern-Cluster possessing the lowest value (0.548, cf. Table A4).

At last, we assessed the measurement models' discriminant validity. Discriminant validity expresses the extent to which each construct is unique capturing phenomena that the other concepts do not capture (Hair et al., 2019). We assessed discriminant validity using the heterotrait–monotrait (HTMT) ratio of correlations. HTMT ratio is the suggested index when the indicator loadings differ only slightly (Henseler, Ringle, & Sarstedt, 2015). As constructs should be unique, HTMT ratios should be below the conservative threshold of 0.85 (Henseler et al., 2015). All construct's HTMT correlations were below the threshold with 0.768 between analogies and attention intensity in the Pattern-Cluster being the highest ratio (Table A4).

Structural Model

As our measurement models were satisfactory, we continued by analysing our structural models. Analysing structural models comprise of the coefficient of determination (R^2), the blindfolding-based cross-validated redundancy measure (Q^2), path coefficient, effect size, and collinearity assessments (Hair et al., 2019).

Collinearity assessment is an important step as PLS-SEM consists of a series of OLS regressions. High correlations between the independent constructs would bias the regression results. To test for collinearity, we calculated variance inflation factors (VIF) by including all constructs in regression with BM typicality (cf. Strauch et al., 2019). As a result, all constructs were well below the ideal VIF threshold of 3 or below (Hair et al., 2019, cf. Tables A3 and A4). Using the PLS algorithm provided in SmartPLS 3 (Ringle et al., 2015), we calculated the path coefficients. To calculate *t*-statistics and effect sizes f^2, we used the bootstrapping procedure provided in SmartPLS 3 with 3,000 subsamples. Table A8 summarises our settings for bootstrapping and the PLS algorithm.

Our first two hypotheses considered how the visual framing effects of the two BM frameworks impact the entrepreneurial BM design process. For the BM Canvas-Cluster, we find support for *H1a*, suggesting that if the BM Canvas is helpful, it leads to paying more intense attention and to increased intuitive reasoning. The standardised path coefficient for attention intensity is positive $\beta = 0.336$, statistically significant at the 1% level, and has a medium effect size $f^2 = 0.126$ (cf. Cohen, 2013). The standardised path coefficient for intuitive reasoning is positive $\beta = 0.373$, statistically significant at the 1% level, and has a medium effect size $f^2 = 0.163$ (cf. Cohen, 2013). We also find support for *H1b*, suggesting that if BM Pattern Cards are helpful, they lead to paying more intense attention and to increased analogous problem-solving. Both standardised path coefficients are positive, yet the effect size for analogous problem-solving ($\beta = 0.354$, $p < 0.01$, $f^2 = 0.151$) is considerably higher than for attention intensity ($\beta = 0.266$, $p < 0.01$, $f^2 = 0.082$). We also expected that the frameworks' helpfulness depends on entrepreneurs' experience (*H1c*). However, we do not find support for the hypothesis that BM experience and/or framework experience crowd-out the

helpfulness of the BM Canvas (BMExp: $\beta = 0.108$, $p > 0.1$; FExp: $\beta = -0.059$, $p > 0.01$) or of BM Pattern Cards (BMExp: $\beta = 0.048$, $p > 0.01$; FExp: $\beta = -0.064$, $p > 0.01$). The respective coefficients of determination R^2 and Stone Geisser's Q^2 values additionally confirm the predictive accuracy of our model underlying these hypotheses (cf. Table A5; Hair et al., 2017).

For the remaining hypotheses, we considered differences in cognitive disposition and how the frameworks' visual framing effects ought to affect the final outcomes within the six different groups. Table A6 covers the PLS-SEM results for the three cognitive disposition groups within the BM Canvas-Cluster. Table A7 covers the PLS-SEM results for the three cognitive disposition groups within the BM Pattern Cards-Cluster.

Hypothesis 2a assumes that the BM Canvas' visual framing effects affect rational entrepreneurs' confidence and the atypicality of their BM designs. For *H2a*, we find partially support in that higher helpfulness increased attention intensity ($\beta = 0.337$, $p < 0.1$, $f^2 = 0.129$), and attention intensity increased BM confidence ($\beta = 0.435$, $p < 0.01$, $f^2 = 0.189$). However, neither attention intensity nor intuition affected BM typicality. Only when entrepreneurs used analogous problem-solving – that the BM Canvas does not promote – BM typicality is affected statistically significantly. The path coefficient is negative, $\beta = -0.288$ ($p < 0.1$, $f^2 = 0.088$), so that using more analogies let to rather atypical BMs. We also find partial support for *H2b*, assuming the same effects on confidence and BM typicality. Higher helpfulness of BM Pattern Cards increased the use of analogies ($\beta = 0.329$, $p < 0.05$, $f^2 = 0.137$), and using more analogies let to more confidence ($\beta = 0.395$, $p < 0.05$, $f^2 = 0.169$). However, we do not find any statistically significant relationship between our process constructs and BM typicality.

In contrast to the rational entrepreneurs' groups, we suggested an impact of the BM Canvas and Pattern Cards on BM typicality, yet not BM confidence for experiential entrepreneurs. We find support for our hypothesis *H3a*. With increased helpfulness of the BM Canvas, experiential participants paid more intense attention ($\beta = 0.582$, $p < 0.01$, $f^2 = 0.509$). Further, attention intensity had a statistically significant, negative relationship with BM typicality ($\beta = -0.454$, $p < 0.05$, $f^2 = 0.221$). Consequently, paying more intense attention encouraged them to recommend atypical BMs. BM confidence was not affected statistically significant. Regarding *H3b*, we do not find support. First, greater helpfulness of BM Pattern Cards did not lead to using more or using less analogous problem-solving. Second, greater helpfulness did not affect BM confidence and typicality.

Lastly, we analysed the different impacts of the BM frameworks on indifferent entrepreneurs. Our hypotheses suggested that if they use the respective visual framing effects, neither BM typicality nor BM confidence will be affected. The results support *H4a*. In consequence, indifferent participants are the only group for that greater helpfulness of the BM Canvas had no impact on the process or outcome (cf. Table 1). In contrast, greater helpfulness of the BM Pattern Cards affected statistically significant the process of indifferent participants. Greater helpfulness increased attention intensity ($\beta = 0.736$, $p < 0.01$, $f^2 = 0.945$) and the use of analogous problem-solving ($\beta = 0.55$, $p < 0.01$, $f^2 = 0.4$). However, the

visual framing effects did not further impact BM confidence or BM typicality. Table 1 summarises the results and all statistically significant relationships per cluster and group.

Discussion

Our empirical analysis provides full support for five and partial support for two hypotheses. For the two other hypotheses, we have found no support. Table 2 provides an overview of our findings. These findings extend existing knowledge on the development of BMs from the cognitive perspective (e.g., Henike, 2019; McDonald & Eisenhardt, 2020; Snihur & Zott, in press). Specifically, they inform about how cognitive dispositions, prior experiences, and BM frameworks act as boundary conditions for the emerging theories of visual framing effects and stabilising factors in designing entrepreneurial BMs.

In sum, the findings suggest that visual framing effects are stable and independent of prior experiences and cognitive dispositions. Further, the results indicate that using frameworks affects rational entrepreneurs' emotions providing feelings of confidence independent of the BM's quality, i.e., their hot cognition (cf. Sund et al., 2018). In contrast, for experiential entrepreneurs, the quality of the outcome is affected by using the BM Canvas, i.e., their cold cognition (Sund et al., 2018). Indifferent entrepreneurs' outcomes are not affected at all. Thus, the cognitive disposition is a boundary condition for how much BM frameworks impact BM outcomes of entrepreneurs. In the following, we explain what the findings imply for the theory of stabilising factors in entrepreneurial business modelling and discuss limitations of our study as well as future research opportunities. We conclude by discussing what using BM frameworks implies for practice.

BM Frameworks as Stabilising Factors in Entrepreneurial Business Modellings

The theory of stabilising factors in entrepreneurial business modelling is closely related to Simon's argumentation that people look for good enough rather than the best solutions to their problems (Simon, 1947). In entrepreneurial situations, the acceptance of good enough, i.e., personally satisfying, solutions is oftentimes the only option as the great uncertainty prohibits calculations of the best solution (cf. Packard et al., 2017). Thus, the different factors that provide personal satisfaction determine whether typical or atypical BMs are designed.

Our study contributes to this cognitive perspective in showing that using BM frameworks provides such a stabilising function for rational participants. The frameworks call to rational participants' inclination for intense attention to varying information (BM Canvas) or enable the consideration of varying analogous alternatives (BM Pattern Cards). In this vein, these entrepreneurs can analyse the variety of information they need to feel confident in decision-making without constraining the quality of the BM design. With greater confidence, the designed BMs will be possibly implemented earlier, providing performance advantages for new ventures in dynamic environments (Eisenhardt, 1989).

Table 1. Statistically Significant Paths per Framework Cluster and Disposition Group.

	Statistically Significant Paths	Standard β	*t*-Value	f^2		Statistically Significant Paths	Standard β	*t*-Value	f^2
Total Canvas Cluster (*N* = 97)	Canvas Helpfulness → Attention Intensity	0.336	3.008**	0.126	**Rational participants (*N* = 46)**	Canvas Helpfulness → Attention Intensity	0.337	1.895†	0.129
	Canvas Helpfulness → Intuition	0.373	3.441**	0.163		Canvas Helpfulness → Intuition	0.413	2.327*	0.202
	Attention Intensity → BM confidence	0.334	2.699**	0.095		BM experience → Analogies	0.498	2.642**	0.227
	Analogies → BM typicality	−0.327	2.727**	0.098		Attention Intensity → BM confidence	0.435	2.808**	0.189
	Intuition → BM typicality	0.223	1.828†	0.045		Analogies → BM typicality	−0.288	1.682†	0.088
	BM experience → BM typicality	0.241	2.996**	0.064					
	Statistically Significant Paths	**Standard β**	***t*-Value**	**f^2**		**Statistically Significant Paths**	**Standard β**	***t*-Value**	**f^2**
Experiential participants (*N* = 27)	Canvas Helpfulness → Attention Intensity	0.582	3.827**	0.509	**Indifferent Participants (*N* = 24)**	Framework Experience → Canvas Helpfulness	−0.432	2.163*	0.229
	Attention Intensity → BM typicality	−0.454	2.121*	0.221		Analogies → BM confidence	0.484	1.963*	0.190
						Attention Intensity → BM typicality	0.520	1.764†	0.246
						Analogies → BM typicality	−0.840	2.944**	0.745
						Intuition → BM typicality	0.503	1.777†	0.290

	Statistically Significant Paths	Standard β	*t*-Value	f^2		Statistically Significant Paths	Standard β	*t*-Value	f^2
Total Patterns Cluster (*N* = 98)	Patterns Helpfulness → Attention Intensity	0.266	2.787**	0.082	**Rational Participants (*N* = 37)**	Patterns Helpfulness → Analogies	0.329	2.128*	0.137
	Framework Experience → Attention Intensity	0.269	2.946**	0.08		Framework Experience → Attention Intensity	0.27	1.672†	0.081
	BM experience → Analogies	0.089	1.758†	0.009		Framework Experience → Analogies	0.293	2.335*	0.106
	Patterns Helpfulness → Analogies	0.354	3.869**	0.151		Framework Experience → Intuition	0.441	3.220**	0.235
	Framework Experience → Analogies	0.203	2.251*	0.047		Analogies → BM confidence	0.395	2.047*	0.169
	Framework Experience → Intuition	0.313	3.677**	0.06		Intuition → BM confidence	0.447	2.916**	0.313
	Intuition → BM confidence	0.481	5.120**	0.265					
	Statistically Significant Paths	**Standard β**	***t*-Value**	**f^2**		**Statistically Significant Paths**	**std. β**	**t-value**	**f^2**
Experiential participants (*N* = 29)	Framework Experience → Attention Intensity	0.457	2.815**	0.198	**Indifferent Participants (*N* = 32)**	Patterns Helpfulness → Attention Intensity	0.736	6.988**	0.945
	Intuition → BM confidence	0.728	4.039**	0.495		Patterns Helpfulness → Analogies	0.55	3.369**	0.4

Note: Displayed are statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$.

Table 2. Overview of Results and Resulting Implications.

Hypotheses	Support	Implications
H1a: If the BM Canvas is helpful, it leads to paying more intense attention and to increased intuitive reasoning.	Yes	Independent of prior experience and cognitive disposition, adherence to both frameworks affect cognitive processes.
H1b: If BM Pattern Cards are helpful, they lead to paying more intense attention and to increased analogous problem-solving.	Yes	
H1c: High BM and framework experience lead to lower helpfulness of BM frameworks.	No	
H2a: If rational participants use the BM Canvas' visual framing effects, they will be more confident about the success of their BM independent of its typicality.	Partly	For rational entrepreneurs, framework adherence affects emotional outcomes.
H2b: If rational participants use the BM Pattern Cards' visual framing effects, they will be more confident about the success of their BM independent of its typicality.	Partly	
H3a: If experiential participants use the BM Canvas' visual framing effects, they will derive more atypical BMs, yet without an impact on confidence.	Yes	For experiential entrepreneurs, adherence to the BM Canvas affects qualitative BM outcome.
H3b: If experiential participants use the BM Pattern Cards' visual framing effects, they will derive more atypical BMs, yet without an impact on confidence.	No	
H4a: If indifferent participants use the BM Canvas' visual framing effects, neither typicality nor confidence will be affected.	Yes	For indifferent participants, both frameworks do not affect emotional and qualitative BM outcomes.
H4b: If indifferent participants use the BM Pattern Cards' visual framing effects, neither typicality nor confidence will be affected.	Yes	

However, serving as a stabilising factor is bounded to entrepreneurs' cognitive disposition. While indifferent participants are completely unaffected, experiential participants will be encouraged to design rather atypical BMs when using frameworks that detailly decompose BMs into many elements. The decomposition

into many elements opposes their inclination for holistic thinking (Epstein et al., 1996). In this situation, experiential entrepreneurs may fall into the trap of increased uncertainty. Without great confidence and newness challenges, doubts accompany the implementation of BMs, increasing the risk of delayed actions and hesitancy (Van Gelderen, Kautonen, & Fink, 2015). Thus, for experiential entrepreneurs, frameworks like the BM Canvas can act as destabilising factors affecting the outcomes, yet not their confidence. In sum, cognitive dispositions bound the question of how much BM frameworks impact the outcomes of entrepreneurial business modelling.

In contrast, the visual framing effects that unfold during the process are stable and independent of cognitive dispositions and experiences. Thus, users of BM frameworks can know what they get as long as they adhere to the frameworks' characteristics, and different frameworks unfold different impacts on cognitive activities. This finding substantiates our knowledge about visual framing effects (Henike et al., forthcoming). Extensive BM and framework experiences have not crowded-out the visual framing effects. However, we need to acknowledge the low number of prior experiences with BM frameworks in our sample prohibiting a too strong generalisation.

Limitations and Avenues for Future Research

Recognising and explaining the multitude of stabilising factors potentially affecting entrepreneurial business modelling needs to be a collective endeavour. Investor influences, market feedback, or entrepreneurs' aspirations are other stabilising factors that can also affect entrepreneurial BM decision-making (cf. Henike, 2019). While empirical studies of these processes are increasingly emerging (e.g., McDonald & Eisenhardt, 2020; Snihur & Zott, in press), we see further intriguing directions in studying the factors affecting cognitive activities and resulting consequences.

One limitation of our study is that we only used two BM frameworks and could provide a limited set of information sources, i.e., participants' knowledge and their web information searches. We used these frameworks because they unfold different framing effects that characteristically overlap with the rational and experiential cognitive disposition (cf. Henike et al., forthcoming). However, in particular, experiential entrepreneurs may feel more confident after hearing iconic success stories (e.g., Mikhalkina & Cabantous, 2015) and after own experimentation (e.g., Camuffo, Cordova, Gambardella, & Spina, 2019). As a consequence, we call for future research examining the factors that are related to seeking market feedback as stabilising factors. Further, other BM frameworks like Sinfield, Calder, McConnell, and Colson's (2013) BM development template that exist unfold other visual framing effects.

Another limitation results from our focus on individual processes. In most cases, a group of founders and other stakeholders, like investors, accompany the entrepreneurial process. Our results can help to better understand how socio-cognitive factors impact individual decision-making. In particular, entrepreneurs may see investors' experiences as a key stabilising factor overruling their

own decisions (e.g., Loock, 2012). Further, research has shown that groups of founders need to share the same values in successful new ventures (Leung, Zhang, Wong, & Foo, 2006). This dimension of conformity could be transferred to the question of how similarities in cognitive dispositions also provide a stabilising factor and how team dynamics impact BM decisions (cf. Shepherd, Williams, & Patzelt, 2015).

Managerial implications

As a tangible implication for entrepreneurship practice, we inform entrepreneurs about the effects associated with the application of BM frameworks. If entrepreneurs adhere to the characteristics of the BM Canvas, this BM framework will encourage entrepreneurs to pay intense attention and to express thoughts that easily come into their minds. If entrepreneurs adhere to the characteristics of the BM Pattern Cards, this BM framework will encourage entrepreneurs to use analogies and to compare them intensively. However, entrepreneurs should use these frameworks depending on their cognitive dispositions, as both frameworks have impacts on BM design outcomes. In sum, experiential and indifferent entrepreneurs do not much profit from using these frameworks. In contrast, rational entrepreneurs will be more confident when using these frameworks potentially accelerating BM implementation.

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Appendices

Table A1. Latent Constructs, Indicators, and Assessment.

Latent C.	Indicator	Description	Canvas Loading	VIF	Pattern Loading	VIF
R	R1	I like to have to do a lot of thinking.	0.742	1.644	0.842	2.654
	R2	I prefer to do something that challenges my thinking abilities rather than something that requires little thought.	0.785	1.939	0.755	2.068
	R3	I prefer complex to simple problems.	0.795	1.777	0.822	2.117
	R4	Thinking hard and for a long time about something gives me much satisfaction.	0.851	2.175	0.864	2.550
	R5 (negative)	I try to avoid situations that require thinking in depth about something.	–0.798	1.826	–0.684	1.425
E	E1	When it comes to trusting people, I can usually rely on my gut feelings.	0.760	1.926	0.686	1.722
	E2	My initial impressions of people are always almost right.	0.883	2.682	0.826	2.158
	E3	I trust my initial feelings about people.	0.877	2.764	0.860	2.158
	E4	I believe in trusting my instincts.	0.902	3.253	0.765	2.019
	E5	I can usually feel when a person is right or wrong, even if I cannot explain how I know.	0.709	1.709	0.630	1.231

Note: We used 5-point Likert scales to measure items as follows: 1 = totally disagree, 5 = totally agree.

Table A1. (*Continued*)

Latent C.	Indicator	Description	Canvas Loading	VIF	Patterns Loading	VIF
Intuition	INT1	My personal experiences told me to rely on my information sources.	0.785	1.481	0.782	1.132
	INT2	My feelings told me to rely on my information sources.	0.857	1.650	0.685	1.305
	INT3	My imagination told me to rely on my information sources.	0.799	1.419	0.751	1.268
Analogy	ANA1	To generate business model alternatives, I got inspired by other business model examples.	0.795	1.510	0.854	1.705
	ANA2	To generate alternative business models, I used general patterns and tried to apply them to the example's specific situation.	0.896	1.766	0.782	1.463
	ANA3	I thought carefully about causes and effects of a business model alternative.	0.801	1.658	0.862	1.820
Attention Intensity	A1	I invested a great deal of personal effort into gathering information.	0.871	2.152	0.783	1.567
	A2	I continued information searching until I was satisfied that I had identified all relevant information.	0.872	1.616	0.872	1.712
	A3	After finding a first solution, I continued searching assuming I could find a better solution.	0.790	1.774	0.783	1.978

Note: We used 5-Point-Likert Scales to measure items as follows "1 = totally disagree, 5 = totally agree".

Table A1. (*Continued*)

Latent C.	Indicator	Description
Framework Helpfulness	FH	The tool mentioned in the experiment helped me to design an appropriate business model.
BM typicality	BMTyp	My finally chosen business model is typical for online flight advisory services.
		(Note. For consistency in measurement, we compared all verbal descriptions of recommended BM designs, and we adjusted them as follows: 1=very atypical (different (B2B) customer group, pay what you want, data monetisation), 2=atypical (freemium, abonnements), 3=in between (advertising), 4=typical (offering-related advertising, affiliations), 5=very typical (commission fees).
BM confidence	BMCon	I am confident that the service will be profitable with my recommended business model.
BM experience	BMExp	How often did you have to design a new business model or to reconfigure an existing business model?
		(Note: This question encompasses practical as well as training experience. Please indicate your answer as a number.)
Framework Experience	FExp	With which of the following business model tools have you worked so far?
		(Note: We visually displayed each of the following answers):
		1) 55 Pattern Cards, 2) Business Model Canvas, 3) Loop Diagram, 4) Business Model Zoo, 5) Dynamic Business Model Framework or 6) none

Note: We used 5-Point-Likert Scales to measure indicators as follows "1=totally disagree, 5=totally agree". Last two indicators asked for a concrete number or was calculated as the sum of mentioned Frameworks, i.e. 0 = none experience to 5 = worked with all Frameworks.

Table A2. Descriptive statistics and t-tests

		BM exp.		Framework exp.		REI-Score		Framework helpf.		BM typicality		BM confidence	
groups		*Mean [SD; N]*	*F [t, sig.]*	*Mean [SD; N]*	*F [t, sig.]*	*Mean [SD; N]*	*F [t, sig.]*	*Mean [SD; N]*	*F [t, sig.]*	*Mean [SD; N]*	*F [t, sig.]*	*Mean [SD; N]*	*F [t, sig.]*
	Can	13.84 [34.99; 99]	6.24 [–1.28; 0.2]^{W}	0.64 [0.91; 99]	0.43 [–0.2; 0.84]	3.14 [0.52; 99]	0.16 [1.44; 0.15]	3.03 [1.25; 86]	0.02 [–0.17; 0.87]	3.46 [1.27; 99]	0.05 [1.43; 0.16]	3.38 [1.11; 99]	0 [–0.92; 0.36]
#	**Pat**	24 [70.43; 97]		0.66 [0.98; 98]		3.03 [0.51; 98]		3.07 [1.22; 91]		3.2 [1.29; 98]		3.53 [1.11; 98]	
1	**Can-R**	7.24 [11.24; 46]	10.74 [–1.6; 0.12]^{W}	0.65 [0.95; 46]	0.14 [0.02; 0.99]	3.59 [0.31; 46]	3.45 [1.39; 0.17]	2.79 [1.34; 39]	0.23 [–0.56; 0.58]	3.3 [1.35; 46]	0.01 [0.83; 0.41]	3.11 [1.14; 46]	0.68 [–1.16; 0.25]
2	**Pat-R**	26.86 [73.79; 37]		0.65 [1.09; 37]		3.51 [0.21; 37]		2.97 [1.44; 37]		3.05 [1.37; 37]		3.41 [1.19; 37]	
1	**Can-R**	7.24 [11.24; 46]	13.45 [–1.74; 0.09]^{W}	0.65 [0.95; 46]	0.01 [–0.52; 0.61]	3.59 [0.31; 46]	**3.54 [16.65; 0]****	2.79 [1.34; 39]	1.04 [–0.87; 0.39]	3.3 [1.35; 46]	1.67 [–1.18; 0.24]	3.11 [1.14; 46]	0.45 [–1.2; 0.24]
3	**Can-E**	27.7 [60.44; 27]		0.78 [1.09; 27]		2.51 [0.19; 27]		3.08 [1.19; 25]		3.67 [1.11; 27]		3.44 [1.19; 27]	
1	**Can-R**	7.24 [11.24; 46]	9.9 [–1.26; 0.22]^{W}	0.65 [0.95; 46]	0.27 [0.29; 0.77]	3.59 [0.31; 46]	**0.08 [15.4; 0]****	2.79 [1.34; 39]	3.26 [–0.67; 0.5]	3.3 [1.35; 46]	0.83 [0.87; 0.39]	3.11 [1.14; 46]	0.33 [–1.62; 0.11]
4	**Pat-E**	26.72 [82.58; 29]		0.59 [0.95; 29]		2.45 [0.33; 29]		3 [1.05; 28]		3.03 [1.24; 29]		3.55 [1.18; 29]	

1	**Can-R**	7.24 [11.24; 46]	5.29 [–0.98; 0.33]^{W}	0.65 [0.95; 46]	5.51 [0.82; 0.41]^{W}	3.59 [0.31; 46]	**13.52 [12.6; 0]**^{**,W}	2.79 [1.34; 39]	**1.98 [–1.83; 0.07]**†	3.3 [1.35; 46]	0.04 [–0.46; 0.65]	3.11 [1.14; 46]	**1.2 [–2.56; 0.01]***
5	**Can-I**	12.04 [22.54; 24]		0.5 [0.59; 24]		2.98 [0.09; 24]		3.41 [1.1; 22]		3.46 [1.32; 24]		3.79 [0.88; 24]	
1	**Can-R**	7.24 [11.24; 46]	4.68 [–1.04; 0.3]^{W}	0.65 [0.95; 46]	0.17 [–0.26; 0.8]	3.59 [0.31; 46]	**2.71 [8.76; 0]****	2.79 [1.34; 39]	3.33 [–1.52; 0.13]	3.3 [1.35; 46]	0.37 [–0.97; 0.33]	3.11 [1.14; 46]	**0.92 [–2.36; 0.02]***
6	**Pat-I**	16.94 [52.51; 33]		0.71 [0.91; 34]		3.03 [0.25; 34]		3.27 [1.04; 26]		3.59 [1.21; 34]		3.68 [0.94; 34]	
2	**Pat-R**	26.86 [73.79; 37]	0.06 [–0.05; 0.96]	0.65 [1.09; 37]	0.04 [–0.47; 0.64]	3.51 [0.21; 37]	**0.04 [19.55; 0]****	2.97 [1.44; 37]	1.88 [–0.31; 0.76]	3.05 [1.37; 37]	**1.22 [–1.91; 0.06]**†	3.41 [1.19; 37]	0.01 [–0.13; 0.9]
3	**Can-E**	27.7 [60.44; 27]		0.78 [1.09; 27]		2.51 [0.19; 27]		3.08 [1.19; 25]		3.67 [1.11; 27]		3.44 [1.19; 27]	
2	**Pat-R**	26.86 [73.79; 37]	0.03 [0.01; 0.99]	0.65 [1.09; 37]	0.52 [0.25; 0.81]	3.51 [0.21; 37]	**3.92 [16; 0]****	2.97 [1.44; 37]	4.56 [–0.09; .93]^{W}	3.05 [1.37; 37]	0.58 [0.06; 0.95]	3.41 [1.19; 37]	0.03 [–0.5; 0.62]
4	**Pat-E**	26.72 [82.58; 29]		0.59 [0.95; 29]		2.45 [0.33; 29]		3 [1.05; 28]		3.03 [1.24; 29]		3.55 [1.18; 29]	

Note: Marked values indicate statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$. Values with the superscript w indicate t-Tests with Welch-correction. Abbreviations are used as follows: Can=Canvas, Pat=Pattern Cards, R=rational, E=experiential, I=indifferent, exp.=experience, helpf.=helpfulness

Table A2. (*Continued*)

groups	BM exp.		Framework exp.		REI-Score		Framework helpf.		BM typicality		BM confidence	
	Mean [SD; N]	**F [t, sig.]**	**Mean [SD; N]**	**F [t, sig.]**	**Mean [SD; N]**	**F [t, sig.]**	**Mean [SD; N]**	**F [t, sig.]**	**Mean [SD; N]**	**F [t, sig.]**	**Mean [SD; N]**	**F [t, sig.]**
2 **Pat-R**	26.86 [73.79; 37]	3.24 [0.95; 0.34]	0.65 [1.09; 37]	4.49 [0.69; 0.49]^{W}	3.51 [0.21; 37]	**7.34 [13.47; 0]**^{**,W}	2.97 [1.44; 37]	2.96 [–1.22; 0.23]	3.05 [1.37; 37]	0.01 [–1.14; 0.26]	3.41 [1.19; 37]	3.92 [–1.36; 0.18]
5 **Can-I**	12.04 [22.54; 24]		0.5 [0.59; 24]		2.98 [0.09; 24]		3.41 [1.1; 22]		3.46 [1.32; 24]		3.79 [0.88; 24]	
2 **Pat-R**	26.86 [73.79; 37]	1.31 [0.64; 0.52]	0.65 [1.09; 37]	0.45 [-0.24; 0.81]	3.51 [0.21; 37]	**0 [8.76; 0]****	2.97 [1.44; 37]	4.58 [-0.95; 0.35]^{W}	3.05 [1.37; 37]	**0.23 [-1.73; 0.09]**†	3.41 [1.19; 37]	3.47 [–1.06; 0.29]
6 **Pat-I**	16.94 [52.51; 33]		0.71 [0.91; 34]		3.03 [0.25; 34]		3.27 [1.04; 26]		3.59 [1.21; 34]		3.68 [0.94; 34]	
3 **Can-E**	27.7 [60.44; 27]	0.14 [0.05; 0.96]	0.78 [1.09; 27]	0.21 [0.71; 0.48]	2.51 [0.19; 27]	4.11 [0.84; 0.41]^{W}	3.08 [1.19; 25]	0.43 [0.26; 0.8]	3.67 [1.11; 27]	**0.08 [2.01; 0.05]***	3.44 [1.19; 27]	0.01 [–0.34; 0.74]
4 **Pat-E**	26.72 [82.58; 29]		0.59 [0.95; 29]		2.45 [0.33; 29]		3 [1.05; 28]		3.03 [1.24; 29]		3.55 [1.18; 29]	
3 **Can-E**	27.7 [60.44; 27]	3.63 [1.2; 0.24]	0.78 [1.09; 27]	3.11 [1.11; 0.27]	2.51 [0.19; 27]	**8.76 [–11.49; 0]**^{**,W}	3.08 [1.19; 25]	0.14 [–0.98; 0.33]	3.67 [1.11; 27]	0.99 [0.61; 0.54]	3.44 [1.19; 27]	3.2 [–1.17; 0.25]
5 **Can-I**	12.04 [22.54; 24]		0.5 [0.59; 24]		2.98 [0.09; 24]		3.41 [1.1; 22]		3.46 [1.32; 24]		3.79 [0.88; 24]	

3	**Can-E**	27.7 [60.44; 27]	0.89 [0.74; 0.46]	0.78 [1.09; 27]	0.15 [0.28; 0.78]	2.51 [0.19; 27]	**0.02 [–9.15; 0]****	3.08 [1.19; 25]	0.48 [–0.61; 0.55]	3.67 [1.11; 27]	0.66 [0.26; 0.8]	3.44 [1.19; 27]	2.7 [–0.85; 0.4]
6	**Pat-I**	16.94 [52.51; 33]		0.71 [0.91; 34]		3.03 [0.25; 34]		3.27 [1.04; 26]		3.59 [1.21; 34]		3.68 [0.94; 34]	
4	**Pat-E**	26.72 [82.58; 29]	3.12 [0.84; 0.4]	0.59 [0.95; 29]	2.18 [0.39; 0.7]	2.45 [0.33; 29]	**14.16 [–8.38; 0]**^{**,W}	3 [1.05; 28]	0.07 [–1.34; 0.19]	3.03 [1.24; 29]	0.38 [–1.2; 0.23]	3.55 [1.18; 29]	2.79 [–0.82; 0.42]
5	**Can-I**	12.04 [22.54; 24]		0.5 [0.59; 24]		2.98 [0.09; 24]		3.41 [1.1; 22]		3.46 [1.32; 24]		3.79 [0.88; 24]	
4	**Pat-E**	26.72 [82.58; 29]	1.41 [0.56; 0.58]	0.59 [0.95; 29]	0.02 [–0.51; 0.61]	2.45 [0.33; 29]	2.95 [–8.11; 0]	3 [1.05; 28]	0 [–0.94; 0.35]	3.03 [1.24; 29]	**0.16 [–1.79; 0.08]**†	3.55 [1.18; 29]	2.35 [–0.47; 0.64]
6	**Pat-I**	16.94 [52.51; 33]		0.71 [0.91; 34]		3.03 [0.25; 34]		3.27 [1.04; 26]		3.59 [1.21; 34]		3.68 [0.94; 34]	
5	**Can-I**	12.04 [22.54; 24]	0.68 [–0.43; 0.67]	0.5 [0.59; 24]	3.7 [–0.98; 0.33]	2.98 [0.09; 24]	4.1 [–1.2; 0.24]^{W}	3.41 [1.1; 22]	0.09 [0.45; 0.65]	3.46 [1.32; 24]	0.12 [–0.39; 0.7]	3.79 [0.88; 24]	0.06 [0.47; 0.64]
6	**Pat-I**	16.94 [52.51; 33]		0.71 [0.91; 34]		3.03 [0.25; 34]		3.27 [1.04; 26]		3.59 [1.21; 34]		3.68 [0.94; 34]	

Note: Marked values indicate statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$. Values with the superscript w indicate *t*-tests with Welch-correction. Abbreviations are used as follows: Can = Canvas, Pat = Pattern Cards, R = rational, E = experiential, I = indifferent, exp. = experience, helpf. = helpfulness

Table A3. Reliability and Validity Measures for BM Canvas Cluster.

Latent Constructs	Cronbach's Alpha	Composite Reliability	AVE	VIF (BMTyp)	Heterotrait–Monotrait Ratio of Correlations (HTMT)						
					1	2	3	4	5	6	7
1 Analogies*	0.781	0.87	0.692	1.357							
2 Attention Intensity*	0.806	0.882	0.714	1.575	0.551						
3 BM Typicality	1	1	1	–	0.303	0.19					
4 BM confidence	1	1	1	1.216	0.267	0.423	0.128				
5 BM experience	1	1	1	1.149	0.124	0.061	0.211	0.142			
6 Canvas Helpfulness	1	1	1	1.266	0.097	0.347	0.078	0.132	0.092		
7 Intuition*	0.746	0.855	0.663	1.584	0.441	0.474	0.087	0.29	0.152	0.432	
8 Tool experience	1	1	1	1.116	0.171	0.08	0.048	0.091	0.266	0.031	0.167

Notes: An asterisk * marks reflective constructs. For HTMT values below 0.85, discriminant validity exists between two constructs. Convergent validity exists when the average variance extracted (AVE) is ≥ 0.5. Composite reliability exists when Cronbach's $\alpha \geq 0.7$.

Table A4. Reliability and Validity Measures for BM Pattern Cards Cluster.

Latent Constructs	Cronbach's Alpha	Composite Reliability	AVE	VIF (BMTyp)	Heterotrait–monotrait ratio of correlations (HTMT)						
					1	2	3	4	5	6	7
1 Analogies*	0.78	0.872	0.695	1.835							
2 Attention Intensity*	0.796	0.879	0.708	1.993	0.768						
3 BM typicality	1	1	1	–	0.057	0.078					
4 BM confidence	1	1	1	1.569	0.375	0.426	0.028				
5 BM experience	1	1	1	1.094	0.154	0.115	0.026	0.014			
6 Pattern helpfulness	1	1	1	1.165	0.337	0.628	0.069	0.675	0.123		
7 Intuition*	0.605	0.784	0.548	1.753	0.388	0.272	0.163	0.176	0.034	0.121	
8 Tool experience	1	1	1	1.212	0.225	0.29	0.065	0.225	0.214	0.334	0.068

Notes: An asterisk * marks reflective constructs. For HTMT values below 0.85, discriminant validity exists between two constructs. Convergent validity exists when the average variance extracted (AVE) is ≥ 0.5. Composite reliability exists when Cronbach's $\alpha \geq 0.7$.

Table A5. Path Coefficients, *t*-Values, and Effect Sizes Independent of Cognitive Disposition.

		Framework Helpfulness			Attention Intensity			Analogies			Intuition			BM confidence			BM typicality		
independent constructs	**Cluster**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**
Framework Helpfulness	**Canvas**				0.336	**3.008****	0.126	0.087	0.702	0.008	0.373	**3.441****	0.163	-0.032	0.272	0.001	–0.126	1.197	0.015
	Patterns				0.266	**2.787****	0.082	0.354	**3.869****	0.151	0.108	1.031	0.013	0.073	0.712	0.007	–0.158	1.398	0.022
BM experience	**Canvas**	0.108	1.157	0.011	–0.024	0.278	0.001	0.067	0.467	0.004	0.074	0.602	0.006	0.111	1.420	0.013	0.241	**2.996****	0.064
	Patterns	0.048	0.485	0.002	0.048	0.48	0.003	0.089	**1.758**†	0.009	–0.125	1.145	0.017	-0.03	0.389	0.001	–0.032	0.343	0.001
Framework experience	**Canvas**	–0.059	0.496	0.003	0.079	0.696	0.007	0.129	0.863	0.016	0.094	0.757	0.01	0.023	0.195	0.001	0.017	0.143	0
	Patterns	–0.064	0.723	0.004	0.269	**2.946****	0.08	0.203	**2.251***	0.047	0.313	**3.677****	0.104	0.06	0.695	0.005	0.071	0.54	0.004
Attention Intensity	**Canvas**													0.334	**2.699****	0.095	–0.041	0.269	0.001
	Patterns													0.026	0.212	0.001	–0.054	0.359	0.002
Analogies	**Canvas**													0.04	0.31	0.001	–0.327	**2.727****	0.098
	Patterns													0.169	1.294	0.026	0.008	0.054	0
Intuition	**Canvas**													0.107	0.766	0.01	0.223	**1.828**†	0.045
	Patterns													0.481	**5.120****	0.265	–0.048	0.327	0.001
BM confidence	**Canvas**																–0.11	0.893	0.012
	Patterns																0.084	0.659	0.005
adj. R^2	**Canvas**	–0.012			0.083			-0.002			0.129			0.115			0.114		
	Patterns	–0.018			0.114			0.147			0.073			0.315			–0.045		
Q^2	**Canvas**	–0.031			0.057			0.008			0.087			0.007			0.078		
	Patterns	–0.024			0.058			0.096			0.02			0.207			–0.117		

Note: Marked *t*-values indicate statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$.

Table A6. Path Coefficients, *t*-Values, and Effect Sizes With Cognitive Disposition and Canvas.

		Canvas Helpfulness			Attention Intensity			Analogies			Intuition			BM confidence			BM typicality		
independent constructs	**Cluster**	**std. β**	**t- value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**
Canvas Helpfulness	**R**				0.337	**1.895**†	0.129	0.084	0.506	0.009	0.413	**2.327***	0.202						
	E				0.582	**3.827****	0.509	0.145	0.619	0.024	0.208	0.855	0.047						
	I				0.115	0.332	0.012	0.047	0.151	0.002	0.342	1.056	0.126						
BM experience	**R**	0.225	0.98	0.04	0.155	0.582	0.02	0.498	**2.642****	0.227	-0.113	0.442	0.011						
	E	0.088	0.278	0.007	-0.123	0.611	0.021	0.045	0.134	0.002	-0.042	0.127	0.002						
	I	0.051	0.181	0.003	0.224	0.777	0.056	0.005	0.016	0	0.324	1.056	0.139						
Framework experience	**R**	–0.065	0.323	0.003	–0.008	0.034	0	–0.313	1.458	0.093	0.192	0.636	0.034						
	E	0.016	0.059	0	–0.03	0.13	0.001	0.326	0.998	0.111	0.229	0.75	0.052						
	I	–0.432	**2.163***	0.229	0.261	0.803	0.062	0.295	0.889	0.077	–0.056	0.151	0.003						
Attention Intensity	**R**													0.435	**2.808****	0.189	–0.231	1.121	0.053
	E													0.295	0.935	0.085	–0.454	**2.121***	0.221
	I													0.024	0.086	0.000	0.520	**1.764**†	0.246
Analogies	**R**													–0.085	0.464	0.008	–0.288	**1.682**†	0.088
	E													0.238	0.805	0.048	–0.255	1.124	0.061
	I													0.484	**1.963***	0.190	–0.840	**2.944****	0.745
Intuition	**R**													0.054	0.244	0.003	0.051	0.258	0.003
	E													–0.034	0.109	0.001	0.293	0.972	0.076
	I													0.146	0.584	0.019	0.503	**1.777**†	0.290

Table A6. (*Continued*)

		Canvas Helpfulness			Attention Intensity			Analogies			Intuition			BM confidence			BM typicality		
independent constructs	**Cluster**	**std. β**	**t- value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**
adj. R^2	**R**	–0.013			0.084			0.143			0.118			0.116			0.104		
	E	–0.081			0.248			0.022			–0.036			0.062			0.145		
	I	0.102			–0.037			–0.076			0.123			0.247			0.423		
Q^2	**R**	–0.046			0.026			0.077			0.021			0.032			0.013		
	E	–0.096			0.212			0.023			0.008			–0.078			0.043		
	I	0.049			0.021			0.002			0.065			0.271			0.208		

Note: Marked *t*-values indicate statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$.

Table A7. Path Coefficients, *t*-Values, and Effect Sizes With Cognitive Disposition and Patterns.

		Pattern Helpfulness			Attention Intensity			Analogies			Intuition			BM confidence			BM typicality		
independent constructs	**Cluster**	**std. β**	**t- value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	***t*-value**	**f^2**	**std. β**	***t*-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**
Pattern Helpfulness	**R**				0.155	0.925	0.027	0.329	**2.128***	0.137	0.077	0.465	0.007						
	E				0.124	0.659	0.018	0.296	1.400	0.098	0.192	1.008	0.038						
	I				0.736	**6.988****	0.945	0.55	**3.369****	0.4	0.297	0.662	0.091						
BM experience	**R**	–0.051	0.493	0.003	0.126	0.555	0.018	0.102	1.008	0.013	–0.055	0.269	0.004						
	E	0.087	0.429	0.007	0.027	0.135	0.001	–0.083	0.437	0.007	–0.157	0.649	0.022						
	I	0.325	1.115	0.115	–0.258	1.038	0.114	0.049	0.25	0.003	–0.285	1.008	0.082						
Framework experience	**R**	0.002	0.016	0	0.27	**1.672†**	0.081	0.293	**2.335***	0.106	0.441	**3.220****	0.235						
	E	–0.294	1.313	0.075	0.457	**2.815****	0.198	0.409	1.634	0.152	0.308	1.415	0.078						
	I	–0.024	0.105	0.001	0.066	0.408	0.008	–0.032	0.148	0.001	0.162	0.579	0.029						
Attention Intensity	**R**													–0.045	0.219	0.002	–0.267	1.280	0.049
	E													–0.038	0.431	0.006	–0.029	0.126	0.001
	I													0.244	0.988	0.032	–0.059	0.267	0.003
Analogies	**R**													0.395	**2.047***	0.169	–0.109	0.524	0.008
	E													0.184	0.803	0.052	0.088	0.137	0.002
	I													–0.363	0.688	0.032	0.222	0.235	0.003
Intuition	**R**													0.447	**2.916****	0.313	0.141	0.867	0.019
	E													0.728	**4.039****	0.495	0.312	0.505	0.011
	I													0.277	0.804	0.045	–0.333	0.730	0.037

Table A7. (*Continued*)

		Pattern Helpfulness			Attention Intensity			Analogies			Intuition			BM confidence			BM typicality		
independent constructs	**Cluster**	**std. β**	**t- value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	***t*-value**	**f^2**	**std. β**	***t*-value**	**f^2**	**std. β**	**t-value**	**f^2**	**std. β**	**t-value**	**f^2**
adj. R^2	**R**	–0.056			0.042			0.138			0.122			0.390			0.025		
	E	–0.002			0.107			0.068			–0.028			0.582			–0.109		
	I	0.023			0.414			0.225			0.005			–0.025			–0.078		
Q^2	**R**	–0.031			0.036			0.107			0.075			0.309			–0.084		
	E	0.003			0.118			0.063			–0.014			0.532			–0.143		
	I	–0.06			0.309			0.186			–0.108			–0.161			–0.266		

Note: Marked *t*-values indicate statistically significant paths: ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$.

Table A8. PLS Algorithm and Bootstrapping Settings.

PLS Algorithm Settings		**Bootstrapping Settings**	
Weighting scheme:	Path	Confidence interval method Bias-corrected and accelerated	
Maximum iterations:	3,000	Samples:	3,000
Stop criterion:	10^{-7}	Test type:	Two-tailed
Initial weights:	1.0	Omission distance (blindfolding):	6
Missing values:	Casewise deletion		

Creating Meta-Narratives: How Analogies and Metaphors Support Business Model Innovation

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Abstract

We investigate how Salesforce's key people used analogies and metaphors during the deployment of their (then) radical business model innovation. Our analysis shows how Salesforce's entrepreneurial team skillfully used a mix of analogies and metaphors to communicate its innovations and differentiate the company from its competitors. We also show how business model innovators can weave together analogies and metaphors to create distinct meta-narratives that elicited strong emotions and helped construct a memorable organizational identity that galvanized stakeholders around the firm's ecosystem appeal. We conclude by discussing the implications of our findings for business model and cognition research.

Keywords: Business model innovation; analogies; metaphors; meta-narratives; ecosystem; managerial and organizational cognition

Introduction

Scholars and practitioners have long sought to better understand the articulation and consequences of different "business models" (Foss & Saebi, 2017; Massa, Tucci, & Afuah, 2017; Zott, Amit, & Massa, 2011). A firm's business model represents its logic for value creation, delivery, and value capture (Amit & Zott, 2001; Foss & Saebi, 2017; Teece, 2010). Subsequent efforts to unpack what this "logic" entails conceived business models in terms of representations (Arend, 2013; Morris, Schindehutte, & Allen, 2005; Perkmann & Spicer, 2010), heuristics (Chesbrough & Rosenbloom, 2002), and cognitive instruments (Baden-Fuller & Mangematin, 2013) – thus acknowledging that business models are first and

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foremost "ideas" whose understanding could benefit from leveraging a cognitive perspective (Martins, Rindova, & Greenbaum, 2015; Tripsas & Gavetti, 2000).

Building on this cognitive perspective, a number of studies have highlighted the particular roles of analogies and metaphors in the creative ideation processes leading to the design of innovative business models (Glaser, Fiss, & Kennedy, 2016; Martins et al., 2015). The creative import of analogies and metaphors lies in their ability to reveal meaningful insights from the conjunction of seemingly disconnected ideas, objects, or situations. In studies of the origins of new strategic directions, for instance, Gavetti and Rivkin (2005) highlighted the power of analogies for enabling top-level managers at semiconductor giant Intel identify patterns of insightful strategic responses from among stories concerning firms operating in a completely different and unrelated industry: steel mills.

Curiously, the bulk of extant literature has paid scant attention to the power of analogies and metaphors beyond the initial phases of business model ideation (Grégoire, Barr, & Shepherd, 2010; Martins et al., 2015) – at least insofar as concerns the more immediate unfolding of an innovator's strategic actions (cf. Cornelissen, Holt, & Zundel, 2011). Focusing on the other end of the innovation-diffusion spectrum, a few studies contributed evidence suggesting that analogies and metaphors could provide useful vectors to help legitimize new industry categories and practices (cf. Etzion & Ferraro, 2010; Navis & Glynn, 2010; Santos & Eisenhardt, 2009). Yet, by virtue of their emphases on broad legitimation dynamics, these studies have tended to portray analogies and metaphors among an array of other narrative strategies (Lounsbury & Glynn, 2001).

As a result, current academic knowledge on the impact of analogies and metaphors on business model innovation appears somewhat incomplete: while there is mounting evidence that these cognitive tools can help generating creative business model ideas (early on) and legitimize new industry categories (much later), few studies considered the strategic use of analogies and metaphors to diffuse business model innovation(s) within organizational ecosystems. Because of this, it becomes difficult to establish whether the observations of legitimation scholars regarding analogies and metaphors are but superficial artifacts of other narrative strategies or whether analogies and metaphors actually form an integral part of business model innovators' strategic toolkit (Cornelissen et al., 2011). More practically, important questions remain about the manner how innovators mobilize analogies and metaphors to foster the adoption of their innovation. Are they primarily using analogies and metaphors as pedagogical devices to explain the nature of their business model innovations? Could they (also) use these as rhetorical tools to galvanize their innovations' adoption within the ecosystem? In short, how do business model innovators use analogies and metaphors – and to what effect?

To empirically examine these questions, we analyze the case of the cloud-based customer relationship management (CRM) software company Salesforce. At its founding in 1999, Salesforce introduced a new business model around a software-as-a-service (SaaS) value proposition. In this model, Salesforce provided online access to its cloud-based software through a low subscription fee: doing so enabled the company to host customer data and its software deployment and updates on the Internet ("the cloud"), rather than installing its software on

customers' premises and manage all issues through local customer service (as was customary at the time). By doing so, Salesforce managed in just a few years to disrupt deep-pocket incumbents such as Siebel and SAP, gaining substantial market share from these leaders and radically transforming its industry (Snihur, Thomas, & Burgelman, 2018a). Salesforce's early history (between founding in 1999 and attainment of market leadership in 2006) is thus particularly interesting to study how entrepreneurs can engage customers and partners in light of their innovations' high level of novelty – and what impact this may have for the innovators' successes.

By carefully analyzing the mobilization of analogies and metaphors during the firm's initial growth phase, we ultimately make three contributions. First, we develop the notion of *meta-narrative* – an overarching storytelling structure about a new business model that underpins the various analogies and metaphors mobilized by both founders and stakeholders. We find that such meta-narratives can elicit strong emotions that help construct a memorable and unique organizational identity. Our study shows that by weaving together analogies and metaphors within overarching meta-narratives that yield strong emotions, managers have at their disposal a powerful complementary tool to help explain and legitimize their new business model, thus overcoming important challenges of radical innovation.

Second, we introduce additional theoretical nuances regarding the role of analogies and metaphors in the diffusion of innovative business models. We observe that most analogies and metaphors used in the Salesforce case were focused on the value creation and delivery aspects of its innovative business model, with much less emphasis on value capture, a third important aspect of business models usually recognized in the literature (Massa et al., 2017; Teece, 2018; Zott et al., 2011). Interestingly, these observations point toward boundary conditions beyond which the power of analogies and metaphors in business model innovations might be more limited. Along this line, we offer that value capture (epitomized by how a company monetizes its offering) might be a more contested and difficult part of a novel business model to explain, necessitating other communication mechanisms than analogies and metaphors.

Third, our work advances an appreciation of the cognitive mechanisms and processes that can foster insightful business model innovation – and shows that these mechanisms and processes are active well beyond the ideation stage. By highlighting Salesforce's mobilization of analogies and metaphors throughout its business model implementation and growth phases, our study points toward new research avenues concerning the role of cognition in stimulating business model innovation and enabling its diffusion in a wider ecosystem. We elaborate on these questions in the discussion section.

Cognitive Research on Business Model Innovation

As the term suggests, business model innovation concerns the introduction of business models that are novel to the market space where a firm competes (Snihur & Zott, 2020). Examples of business model innovation include Amazon's online

retailing of books (Markides, 2006) and Airbnb's service for peer-to-peer sharing of accommodations (Mikhalkina & Cabantous, 2015). Amazon disrupted the traditional brick-and-mortar bookstore industry with its all-online retailing model, which not only allowed substantial price reductions but also gave buyers a much easier and faster access to an immense catalog of titles. For its part, Airbnb radically transformed the hospitality industry by introducing a new category of lodging options – peer-to-peer rental – and a complete system for these transactions to take place at a much cheaper pricepoint for customers.

Interestingly, cognition-inspired research on business model innovation initially tended to highlight the *negative* effects of cognitive factors and dynamics (Gilbert, 2005). For instance, Tripsas and Gavetti (2000) showed how difficult it was for Polaroid to adjust its profitable film-based business model to one that addressed the emergence of digital photography. Instead of developing a new business model, Polaroid never leveraged its investment into the new digital technology and lost its first-mover advantage by maintaining its analog-focused camera investments. In much the same vein, Mehrizi and Lashkarbolouki (2016) suggested that managers attempting to address "troubled" business models must first "unlearn" what they have come to take for granted about these models. Doing so, these authors highlighted that deeply entrenched business models could hinder creativity and innovation. Other studies magnified the constraining influence of managers' attention toward particular topics. In their study of Xerox Corporation's technology spin-offs, for instance, Chesbrough and Rosenbloom (2002, p. 550) showed that a company's successful business models can evolve into a "dominant logic" that can paradoxically "preclude identification of models that differ substantially from the firm's current business models." For their part, Snihur (2018) and Tripsas (2009) showed that existing organizational identity can undermine managerial recognition of ongoing industry changes and mounting challenges to their business models.

Despite the initial emphasis on the "negative" import of cognitive dynamics on innovation and other managerial phenomena (cf. Barnes, 1984; Das & Teng, 1999; Walsh, 1995), a number of more recent studies point to the pivotal importance of some cognitive feats in fueling the creative ideation processes at the basis of entrepreneurship and innovation. For instance, Dahl and Moreau (2002) provided evidence that reasoning by analogies could foster the development of more innovative ideas for new products, Baron and Ensley (2006) suggested the importance of pattern recognition mechanisms, whereas Grégoire et al. (2010) documented that entrepreneurs mobilized cognitive processes of structural alignment to identify promising business ideas that spanned different domains of applications (see also Grégoire & Shepherd, 2012). For their part, Martins et al. (2015) suggested that managers could foster business model innovations by proactively changing their cognitive schema regarding their firm's value-creating activities and exchanges.

Focusing more directly on the origins of new business models in both new and established firms, a number of studies drew increased attention to the importance of founder and managerial cognition (Bogers, Sund, & Villarroel, 2015; Martins et al., 2015). For instance, Sosna, Trevinyo-Rodriguez, and Velamuri (2010)

highlighted the important role of trial-and-error learning in fostering business model innovation. For their part, Berends, Smits, Reymen, and Podoynitsyna (2016) found that radical business model innovation can result from either a "drifting" process (which starts with an emphasis on experiential learning and shifts later to cognitive search) or a "leaping" process (which starts with an emphasis on cognitive search and shifts later to experiential learning). More recently, Snihur and Zott (2020) uncovered that through their mobilization of industry-spanning search, complex system thinking style, and powerful centralized decision-making, successful business model innovators were able to "cognitively imprint" the novelty of their business model innovations within their organization.

Beyond the challenges associated with the initial ideation phase, entrepreneurs and managers seeking to innovate with their business models also face the implementation challenges of garnering support from their customers, partners, and other stakeholders. By virtue of their very novelty, innovative business models are often surrounded with ambiguity about their functioning and implications (Aldrich & Fiol, 1994; Granqvist, Grodal, & Woolley, 2013) – not to mention the uncertainty characterizing their ultimate potential (Andries, Debackere, & Van Looy, 2013). For instance, Martins et al. (2015) describe the difficulties faced by the Israeli start-up Better Place when it attempted to introduce a new business model in the electric automobile space. It proved very challenging for Better Place to convince a variety of stakeholders, including customers, and various partners about how exactly the new business model would function, what it would entail, and what benefits it could bring.

To counter such challenges, innovators often rely on familiar cues to gain customers and partners, largely building on the notion that familiarity facilitates understanding and supports increased legitimacy (Bingham & Kahl, 2013; Hargadon & Douglas, 2001). For instance, Slager, Gond, and Moon (2012) describe how financial practices common in traditional investment indices, such as specific governance structure and rules regarding liquidity, were replicated to provide familiarity to the back-then radical idea of the responsible investment index FTSE4Good. But how can one make "familiar" a business model innovation that, by virtue of its novelty, will necessarily include several elements that will be "unfamiliar"? We suggest that one answer to this question involves the use of analogies and metaphors.

The Power of Analogies and Metaphors

The power of analogies and metaphors arises because they both draw attention to meaningful insights from the conjunction of seemingly disconnected ideas, objects, or situations. As such, they both form cognitive tools of powerful import. Because they draw attention to meaningful insights that may not be immediately obvious at first, analogies and metaphors can play important roles in problem-solving and creativity tasks. They can help generate ideas for new products and help solve customer problems (Dahl & Moreau, 2002; Franke, Poetz, & Schreier, 2014; Grégoire et al., 2010). Prior studies theorized that analogies and metaphors can help frame, communicate, and legitimize innovations (Cornelissen & Clarke, 2010; Lounsbury

& Glynn, 2001), yet empirical investigations of these dynamics remain largely anecdotal, with some exceptions examining the roles of metaphors (Navis & Glynn, 2010) or analogies (Etzion & Ferraro, 2010; Slager et al., 2012) separately.

From a cognitive standpoint, *analogy* is "an inductive mechanism based on structured comparisons of mental representations" (Holyoak, 2012, p. 234). At its core, analogy is thus a *reasoning process* where one implicitly tries to assess whether information from a familiar "source" (that is, a known idea, object, or situation) meaningfully applies to a potentially less familiar "target" (another idea, object, or situation of interest). In this sense, analogy is akin to case-based reasoning – with the important difference that analogy concerns the identification of meaningful similarity parallels even when source and target have few superficial features in common (cf. Gentner & Holyoak, 1997; Holland, Holyoak, Nisbett, & Thagard, 1986). In this regard, the "structured comparisons of mental process" in Holyoak's definition refers to the (intuitive) "mapping" of source and target that allows for identifying the ways in which the two are similar and dissimilar (cf. Gentner, 1983; Gentner & Markman, 1997). Even if it typically occurs at subconscious levels, this mapping allows for determining whether key pieces of information can adequately "transfer" from source to target, thus inductively yielding new interpretations and learnings.

Though cognitive scientists formally define analogy as a mental process of information mapping and transfer, typical manifestations of analogy in common language often take the form of more or less implicit *comparisons* meant to draw attention to a particular idea. For instance, economists have advanced that artificial intelligence (AI) (the target) is to the early twenty-first century what semiconductors (the source) were to the twentieth (Agrawal, Gans, & Goldfarb, 2018). Though both source and target are technologies at the frontier of their respective ages, the analogy's meaning proceeds from the mapping of similarities and differences between the two. This mapping reveals key differences in these technologies' constitutive elements: semiconductors are electric components that rely on the physical properties of particular materials to create logic gates that underpin the functioning of transistors and their miniaturization in micro-processors, thus enabling the functioning of modern computers and a host of other devices. By contrast, AI is a domain of knowledge concerned with the development and utilization of "intelligent agents" (Poole, Mackworth, & Goebel, 1998), in the sense of devices that use advances in computing algorithms to "correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation" (Kaplan & Haenlein, 2019). Semiconductor and AI technologies thus exhibit stark differences in what cognitive scientists label the *superficial elements* that describe each technology.[1]

Yet the key insights from the analogy proceed not from the superficial dissimilarities between semiconductor and AI technologies but from the argument that particularly salient *cause–effect relationships* from the source (that is, the fact

[1]From a cognitive standpoint, these *superficial elements* form the basic building blocks for constructing one's mental representations of each technology (see Gentner, 1983; Holland et al., 1986).

that and reasons why semiconductor technologies had the impact they had in the twentieth century) provide a model to predict AI's impact in the twenty-first century.[2] Agrawal et al. (2018) thus use this analogy to draw attention to a key insight: whereas the development of semiconductor technologies caused a radical drop in the cost of calculations/computations in the twentieth century, AI is bringing about a similarly transformational reduction in the cost of prediction. These authors use this insight to explain the nature and meaning of AI's likely import for today's business and society.

Consistent with Holyoak's (2012) definition, analogy is thus a *reasoning process* that mobilizes the comparison of similarities and dissimilarities between a familiar idea, object, or situation (the source) to a less familiar one (the target), with the intention that the comparison will yield new insights or learnings about the unfamiliar target. By extension, the term "analogy" came to represent the kind of frequently implicit comparison that one typically sees in day-to-day language when trying to explain something, make a point or draw attention to a particular idea. The key feature of such analogies is to put against one another seemingly dissimilar ideas, objects, or situation, only to draw attention to the deeper way(s) in which the two might be alike. To the extent they are similar, the comparison allows for "transferring" the key information from source to target, thus highlighting the new insights or learnings.

For its part, the notion of *metaphor* refers to "the use of language to describe one thing in terms of something else that is completely different" (Holyoak & Stamenković, 2018). By doing so, a metaphor draws attention to particular insight, albeit without stressing the comparison between the referent notions forming the metaphor and its application. Business examples include "low-hanging fruits" in reference to opportunities to act that are easy to seize, "time is money" to highlight that delaying action implies additional costs, or the sentence "this business is rubbish" to convey that a commercial activity has no value. As such, metaphors are figures of speech – communication devices meant to clarify, highlight, or sometimes obscure particular points.

In common parlance, then, analogies and metaphors often resemble one another. Like analogies and analogical reasoning, metaphors use the conjunction of different ideas, notions, objects, or situations to draw attention to a

[2]From a cognitive standpoint, such *cause–effect relationships* proceed from a hierarchy of higher-order *structural relationships* between the lower-order superficial elements forming one's mental representations of each technology. This notion of mental models made from hierarchical networks of structural relationships between superficial elements is foundational in the literature on analogical reasoning and similarity comparisons: it underpins theories that the mind uses different mental processes (and structures) to perceive and process basic superficial descriptors of objects and situations, versus more complex information like the manner how technologies operate, why they are able to do the particular things they do, and/or goal pursuits, ideals, and other cause–effect relationships (all of which are mentally represented as progressively higher-order networks for relationships between relationships) (cf. Gentner, 1983; Gentner & Markman, 1997; Holland et al., 1986; Markman & Gentner, 1993).

particularly meaningful conclusion about a target. Nevertheless, scholars have long debated the distinctions between the two (cf. Fauconnier & Turner, 2008; Gentner, Bowdle, Wolff, & Boronat, 2001). Among the most salient distinctions, scholars have noted that metaphors tend to come in more varied forms, to mobilize more figurative language, and to be more emotionally expressive than analogies (Cornelissen & Clarke, 2010; Cornelissen et al., 2011). From a cognitive science standpoint, the fundamental issues concern the underlying thought processes – and neurophysiological structures – that enable their respective generation, use, and interpretation (see Holyoak & Stamenković, 2018). In a nutshell, the debates concern whether the comprehension of metaphors necessarily relies on the kind of structural alignment mapping evidenced in analogical reasoning research (e.g., Gentner & Markman, 1997) or whether it can rely on cognitively less-demanding categorization processes (Costello & Keane, 2000, 2001; Glucksberg, McGlone, & Manfredi, 1997) or simpler linguistic mechanics of conceptual blending (see Lakoff, 1993, 2014). All in all, contemporary research suggests that the particular processes at play vary depending on a metaphor's simplicity and familiarity:

> as soon as we step back from the realm of simple nominal metaphor (…), there is near unanimity among theorists that *both* analogy (structural alignment) and categorization play a role, somehow, in metaphor comprehension. (Holyoak & Stamenković, 2018, p. 657)

These cognitive science distinctions notwithstanding, the manifest similarities between analogies and metaphors arguably have more pragmatic bearings on our chapter's purpose than subtle investigations of the underlying cognitive processes at play in explaining analogies' and metaphors' respective effects on the diffusion of business model innovations. In this chapter, our interest primarily lies in investigating the extent to which Salesforce's key people mobilized analogies and metaphors in their efforts to sustain the diffusion of their business model innovation. To this aim, we build on the notion that analogies and metaphors essentially "work" in a similar fashion: they leverage the conjunction between apparently dissimilar ideas, objects, or situations to reveal a deeper set parallels that can yield important new learnings (Gentner et al., 2001).

To advance academic understanding of the use of analogies and metaphors to foster the adoption, implementation, and management of new business models, we analyze the case of Salesforce's early efforts to establish its then novel SaaS model.

Method

We chose Salesforce as a revelatory case of successful business model innovation.[3] The firm quickly emerged as the leader of the on-demand CRM software industry,

[3]We reasoned that at this initial phase of explanatory research, investigating such cases would likely prove more informative than studying one or more cases of unsuccessful business model innovations. That said, we encourage future research to compare the prevalence and use of analogies and metaphors in cases exhibiting different levels of success.

introducing the concepts of SaaS and cloud-based ecosystems (Snihur et al., 2018a). Because Salesforce competes in a fast-moving software industry, the case allows us to document the unfolding of business model innovation processes over a relatively short period of time (relative to what cases from slower-moving industries would afford). In addition, a broad variety of media covered Salesforce during its launch and subsequent history: because decades have passed since Salesforce's business model innovation, we have been able to gather archival data free of retrospective bias. All these advantages and features allow us to examine the adoption of Salesforce's innovations among its target customers and key business partners.

Data Collection

To study Salesforce's early efforts to establish its SaaS business model, we conducted an extensive search of archival data that included press releases, annual reports, Salesforce's founder's memoirs about the venture's early years (Benioff & Adler, 2009), media articles, financial analysts' reports, as well as teaching cases. Table 1 lists the various sources we analyzed.

We collected Salesforce's press releases triangulating search results across the corporate website, Business Wire, and PR Newswire in Factiva database from December 6, 1999 (first Salesforce press release), to January 26, 2006, when Oracle acquired Siebel (Salesforce's main competitor). During that period, Salesforce released 535 press releases. Because their issuer carefully prepares them, press releases provide a rich source of data reflecting how a venture's top management want to portray different events and situations (Hiatt, Grundy, & Lee, 2015; Lounsbury & Glynn, 2001). Likewise, press releases contain succinct corporate descriptions designed to present the organization to both familiar and less familiar readers. This led to their frequent use to analyze entrepreneurs' communication strategies (Navis & Glynn, 2010; Rhee & Fiss, 2014; Snihur et al., 2018a).

Data Analysis

The first three authors independently content analyzed Salesforce's press releases (between 1999 and 2006) and the founder's book to identify relevant instances

Table 1. Data Sources, 1999–2006.

Data Source	**Count**
Internal	
Press releases	535
Annual reports	2
Book by founder	1
External	
Teaching cases (e.g., Harvard Business School, Stanford)	4

where the founder or other key people mobilized analogies or metaphors. Consistent with Gentner et al. (2001), Cornelissen and Clarke (2010), and Cornelissen et al. (2011), we identified analogies by their typical reliance on comparison language (focusing on markers like "as," "like," or "is to"). Similarly, we identified metaphors by their typical reliance on figurative language and emotional appeal. In both cases, we used references to examples and other circumstances and situations external to Salesforce as additional markers of analogy and metaphor candidates: in all cases, a closer look at these instances allowed for determining whether they were effectively relevant for our analyses. We compared the list of instances we each had independently identified, paying attention to cases that only one or two of us had identified to determine whether they should be included in subsequent analyses.

Having identified relevant cases, we used ground rules based on the definition of Cornelissen and Clarke (2010) to determine whether a particular instance was closer in spirit to an analogy or to a metaphor. According to these authors, analogies tend to exhibit comparisons articulated across related yet distinct domains of activities, such as comparisons between Salesforce and another company, market or industry, but still residing within the general business context. By contrast, metaphors tend to showcase comparisons across more varied domains, typically *outside* of the business context, and should be figurative in nature (Cornelissen et al., 2011). We discussed the few coding differences that arose and jointly compiled the final list of analogies and metaphors.

Next, we independently coded the listed analogies and metaphors to determine if they related to any one of the three dimensions of a business model suggested by Teece (2010): value creation, value delivery, and value capture. *Value creation* refers to how value is created by the business model to various stakeholders involved, such as customers or partners, through an appropriate value proposition. *Value delivery* refers to how value, is delivered to customers, usually in the form of a product or a service, online or through physical interactions. *Value capture* refers to how value is monetized through a revenue model, for instance, through a subscription or a transaction fee. We coded each analogy or metaphor as relating to *value creation* when it was used to explain how and what value was offered to customers or partners, as relating to *value delivery* when it was used to explain how value was to be delivered, and as relating to *value capture* when it was used to explain how the company made money. We compared each other's coding and resolved the few observed differences through discussion. As a relevant example of this coding, the Ghostbusters-inspired "NO SOFTWARE" logo of Salesforce is a metaphor (highly figurative cross-domain parallel) which echoes the value creation dimension of Salesforce's business model: as such, the metaphor highlights that the value being created represents a radically different offering category than the traditional software.

Finally, we independently reviewed the documented analogies and metaphors to determine whether and how they related to each other and to check if there were any patterns or themes that emerged across them. This led us to appreciate

that a common underlying logic seemed to undergird groups of analogies and metaphors. We develop this notion of the undergirding meta-narratives below.

Brief Summary of Salesforce Case

Prior to Salesforce's entry into the market, enterprise CRM firms such as SAP or Siebel (later acquired by Oracle) sold perpetual per-user licenses as well as yearly maintenance and support fees, which could add up to 20% of their software's purchase price, every year. In addition, enterprise CRM vendors also required customers to purchase dedicated server hardware and an enterprise database (such as provided by Oracle, IBM, or Microsoft) which was deployed onsite, at the customer's premises. This necessitated customization, installation, and training services supplied by vendor or third-party consultants (Scarbrough, Robertson, & Swan, 2015).

In contrast to these incumbents' traditional business model, Salesforce offered to manage customer data on central servers hosted on the Internet ("the cloud"). Doing so eliminated the initial costs of hardware and software licensing – effectively "*creating*" immediate cost-savings (and value) to their clients. At the same time, Salesforce introduced a series of novel ways of *delivering* the value to the customers directly through Internet (as opposed to on-premise software deployments and installation). Salesforce also used a novel way to *capture* value through low-cost subscription fees, thus yielding predictable recurring revenues. Salesforce's business model innovation thus involved novelty in all three business model axes, introducing new value creation, delivery, and capture mechanisms to the enterprise software industry. This contributed to the development of a new ecosystem around Salesforce based on cloud computing that allowed for pay-as-you-go web SaaS (see Snihur et al., 2018a).

In order to better understand Salesforce's use of analogies and metaphors in their efforts to connect to the surrounding ecosystem of customers and partners, it helps to first present Salesforce's history. The initial idea for Salesforce came from Marc Benioff during the period 1996–1998, when he was a senior executive at Oracle. Through his work at Oracle, Benioff came to see an opportunity to deliver CRM using the Internet and central servers to store customers' data. Benioff left Oracle and founded Salesforce in March 1999. By the beginning of April 1999, he and his team had built a first prototype and they were asking friends and colleagues to test it. By August, they were releasing the service as a free trial.

Owing to Benioff's experience, the firm had a well-affirmed marketing focus. From very early on, they had a two-page marketing web presence, which was upgraded when a *Wall Street Journal* (*WSJ*) article cited Salesforce as an example of the new SaaS trend. In early December, *WSJ* published another piece highlighting that "Salesforce takes the lead in the latest software revolution." This resulted in another flood of sales leads and interest for the service. The team created their distinctive "NO SOFTWARE" messaging around this time,

establishing Salesforce as "Amazon meets Siebel Systems." By the end of the year, Benioff had raised an unprecedented $17 million of angel funding to prepare for the firm's accelerated growth.

The venture formally launched its service in February 2000, with high-profile guerrilla marketing tactics deployed at the main competitor's annual conference, as well as their own uniquely branded launch party. They complemented this with provocative advertising featuring a modern plane shooting down an antique biplane – a feat that PR Week recognized as the Hi-Tech Campaign of the Year. To fund continued growth, the team raised an additional $35 million from venture capital (VC) firms toward the end of 2000.

They continued their aggressive marketing throughout 2001. They also continued improving the service, launching a city "roadshow" consisting of customers, partners, prospects, and the press that generated an almost cult-like following. The firm and service continued to pick up accolades throughout the year (such as receiving Aberdeen Groups' "What Works" Award, a Five Star Rating from *PC* Magazine, and were named a Cool Company of 2001 by the *Fortune* Magazine). As the influx of accolades continued, they expanded international sales in 2002, launching their service offerings in German, French, Italian, Spanish, Korean, and Chinese to complement the Japanese service from the year before. The development team continued to add flexibility to the service, notably adding features whereby customers could begin to create their own applications. To fund all this, they raised another $13 million from VCs.

Salesforce became profitable in 2003. The firm then began to engage with customers and developers more formally, with the first DreamForce Conference in November. This conference was a logical extension of the previous year's road shows, bringing customers, partners, developers, and press to a single location to celebrate the innovative service.

Salesforce entered the NYSE in 2004 (ticker: CRM). This initial public offering not only garnered intense media scrutiny but also yielded a Security and Exchange Commission query as to the legality of their revenue recognition. For all intent and purposes, then, this period offered a litmus test for Salesforce's new business model. Nevertheless, accolades continued to arrive. In 2005, for instances, Forbes described Salesforce's AppExchange as the "iTunes of business software." Oracle acquired Siebel at about the same time and Salesforce became recognized as the new leader of the CRM marketplace.

Findings

Building on this short historical sketch of Salesforce's development, we explain below how Salesforce' core entrepreneurial team used analogies and metaphors during their entrepreneurial journey. In this regard, Table 2 presents our analysis of the various analogies and metaphors used by Salesforce's key people during the firms' early years. Not only are these analogies and metaphors interesting to consider separately, they also combine into meta-narratives that facilitated Salesforce's success.

By and large, our analysis reveals that that Salesforce's people mobilized a broad array of diverse analogies. These originated from the service industries (particularly utilities) (A1, A2), music (A6), religion (A7), airline industry (A8), and other digital businesses (A3, A4, A5). For example, press releases presented Salesforce as "an online information utility" (A2), a company that "builds and delivers business applications as an online service" or that sells "software-as-a-service" (A1). Similarly, Salesforce used technologies from airports, such as automated check-in self-service kiosks (A8) to streamline their relationship with the customers during the various events they organized.

The uncovered metaphors similarly draw from a wide range of domains outside the business context, including warfare (M1), hell versus heaven (M2), the Ghostbusters movie (M3), school bullying (M4), the biblical story of David and Goliath (M5), pain (M6), and superheroes (M7). For example, an antithesis metaphor of "No Software" derived from an association with the Ghostbusters movie (M3) became a logo to advertise Salesforce's competence in (not) selling software. Salesforce used the "Dreamforce" metaphor to name its annual conference mobilizing its ecosystem's members, thereby drawing on a combination of the pleasurable association of dreaming and force to communicate the power aspect of its community (M8).

As Table 2 further indicates, the classification of analogies and metaphors with respect to value creation, delivery, or capture of the innovative business model (Teece, 2018) revealed that throughout most of its early developments, Salesforce predominantly used or evoked analogies and metaphors centered on value creation and delivery, with comparatively much fewer instances focused on value capture (see Table 2, column 5).

Though prior research theorizes that radical innovation is more effectively legitimized through metaphors and more incremental innovations through analogies (Cornelissen et al., 2011), our data suggest that both analogies and metaphors are used simultaneously for communicating and legitimizing the same radical business model innovation. In fact, our analyses uncover a pattern of interwoven analogies and metaphors that are jointly used to craft two meta-narratives. Each *meta-narrative* represents an overarching storytelling structure about the new business model that underpinned various analogies and metaphors.

We grouped analogies and metaphors into these two meta-narratives based on: (1) the connections between them in the text (e.g., A1 was explicitly mentioned as the goal for developing M1–5 by the founder in his book); (2) implicit connections in their meaning (e.g., M1–5 concerning war, hell vs heaven, Ghostbusters taskforce, school bully, and David vs Goliath, all relate to a broader theme of resistance and fight against evil); and (3) associations with strong emotions (e.g., M1–5 are associated with fear and anger, whereas M7–8 are associated with pride and hope). Observing their lack of such connections with any overarching narratives, we left four analogies (A2–5) and one metaphor (M9) to stand alone (see Table 2). These standalone analogies and metaphors mainly focus on providing clues about how Salesforce business model worked, without explicit calls for action from their target audience. We discuss below the nature of the two meta-narratives that we uncovered.

Table 2. Findings: Analogies and Metaphors Analysis at Salesforce.

Metaphor (M) or Analogy (A)	Source	Value Creation	Value Delivery	Value Capture	Quote	Builds upon
A1	Service business model	X	X	X	Unlike other dot-com parties, which functioned to introduce a company and its products, we needed to introduce an entirely new market (**on-demand, or SaaS, or cloud computing**) and promote a new way of doing business.	
	Note: selling software as a service was unusual at the time of Salesforce founding; the analogy was made from the service industry				Although I don't think that its executives ever understood this, the fracas with Siebel was not personal. We had a problem with the traditional software model that didn't care about customers' success. We believed that "**business as service**," pursuing long-term customer engagement, was better for our bottom line. (*Source*: Founder's book)	
					Founded in March 1999, salesforce.com (http://www.salesforce.com) delivers **enterprise software as an online service**.	
					With more than 20,000 companies registered for its flagship service, salesforce.com (http://www.salesforce.com) is the market leader in delivering enterprise applications as online services	

				Founded in March 1999, salesforce.com's (www.salesforce.com) mission is to deliver traditional enterprise applications **as online services**. Salesforce.com is the world's leader in delivering **software-as-a-service**. (*Source*: Corporate description)	
M1	War	X	X	Unlike other dot-com parties, which functioned to introduce a company and its products, we needed to introduce an entirely new market (on-demand, or SaaS, or cloud computing) and promote a new way of doing business. Salesforce.com used this difference to its advantage and created a story about **waging war** against the traditional and ineffective way software was delivered. (*Source*: Founder's book)	A1
M1a	Boeing B-52 Bomber			We hired the **B-52s**, the "world's greatest party band," which made for lively and unique entertainment. (*Source*: Founder's book)	A1
M1b	Throwing away garbage and whacking game	X		There were carnival games, including **Pitch CDs in the Toilet** and **Whack-a-Mole**, where the moles to be whacked were other software company logos (*Source*: Founder's book)	A1
M1c	Army uniform	X		I played the role of revolutionary at our launch party and even wore **army fatigues** because I needed to demonstrate that I was ready to lead our battle against the established software industry. (*Source*: Founder's book)	A1

Table 2. (*Continued*)

Metaphor (M) or Analogy (A)	Source	Value Creation	Value Delivery	Value Capture	Quote	Builds upon
M1d	Modern jet fighter shooting a biplane	X			In an effort to further raise the collective consciousness about our war against software, I created a provocative advertisement with a **fighter jet shooting a biplane**. The fighter jet represented our company, which was built on the most advanced technology and was a vast improvement on anything that came before it. The **biplane was a metaphor** for the software industry: obsolete and ill-suited for its task. (*Source*: Founder's book)	A1
M1e	Social protest		X		On the morning of the conference, we sent **protesters** (in reality, paid actors) to the Moscone Center to picket the conference. They waved mock **protest signs posters** – and shouted, "The Internet is really neat … Software is obsolete!" We also hired actors to pretend to be a TV crew from local station KNMS, who came on location to cover The End of Software movement. "What do you think of the Internet?" a fake TV reporter asked passersby, pointing a microphone toward them. (*Source*: Founder's book)	A1
M1f	Ambush and Chinese philosophy ("Art of war" by Sun Tzu)	X			We succeeded because we caught our competitor by complete surprise. (This was another tactic I learned from The **Art of War**, in which Sun Tzu advises, "appear at places where he must rush to defend, and rush to places where he least expects.")	A1

				Participating in our competitor's events helped us weave our name into its stories, articles we knew would garner a lot of attention. To further leverage its announcements, we issued press releases about salesforce.com's new features or new customers the same day its quarterly earnings releases went live. We meticulously planned so that anyone looking for Siebel always found salesforce.com. (*Source*: Founder's book)	
M2	Hell vs heaven, Nirvana	X	X	[…] we transformed the lowest level of the theater into a space that represented enterprise software, aka **hell**. There were cages with actors playing captured enterprise salespeople locked inside. "Help, get me out," they screamed. "Sign this million-dollar license agreement. I need to make my quota!" ……. After our guests worked their way through this inferno, they progressed to **limbo**. Finally, when they were ready, they were able to go up one more level and obtain **Nirvana**. The top floor represented **heaven**. There was a harp. There was light. There was salesforce.com. (*Source*: Founder's book)	A1
M2a	Prison and sado clubs			There were cages with actors playing captured enterprise salespeople locked inside. "Help, get me out," they screamed. "Sign this million-dollar license agreement. I need to make my quota!" (*Source*: Founder's book)	A1

Table 2. (*Continued*)

Metaphor (M) or Analogy (A)	Source	Value Creation	Value Delivery	Value Capture	Quote	Builds upon
M3	Ghostbusters taskforce	X			My "go to the guru" approach led me to hire Bruce Campbell to help brand salesforce.com. Bruce is one of the best admen in the business. He branded and launched Saturn, was part of the "Tuesday Team" for President Reagan's Morning in America TV campaign, and helped in rebranding public television, Bank of America, and the Gallo Winery. I shared with him our "End of Software" mission, and he came to me with an idea for a NO SOFTWARE logo (the word SOFTWARE in a red circle with a line though it; think **Ghostbusters**). On the morning of the [Siebel, the main competitor] conference, we sent protesters (in reality, paid actors) to the Moscone Center to picket the conference. They waved mock protest signs posters – and shouted, "The Internet is really neat … Software is obsolete!" We also hired actors to pretend to be a TV crew from local station KNMS, who came on location to cover The End of Software movement. "What do you think of the Internet?" a fake TV reporter asked passersby, pointing a microphone toward them.	A1, M1f

			Later, we devised a way to transfer attention from the competition to our company at Siebel's European User Week. The conference was in Cannes, France, which most visitors access by flying into Nice and taking an airport taxi to Cannes. We rented all the taxis and used the forty-five-minute drive, which we provided for free, as an opportunity to pitch our service. We decorated the vehicles with NO SOFTWARE logos and filled them with our marketing brochures. The executives, left with no other option than to take our rides, became irate and called the police (again). (*Source*: Founder's book)	
M3a	End of the era/ radical change and disruption of old ways	X	My "go to the guru" approach led me to hire Bruce Campbell to help brand salesforce.com. Bruce is one of the best admen in the business. He branded and launched Saturn, was part of the "Tuesday Team" for President Reagan's Morning in America TV campaign, and helped in rebranding public television, Bank of America, and the Gallo Winery. I shared with him our "End of Software" mission, and he came to me with an idea for a **NO SOFTWARE** logo (the word SOFTWARE in a red circle with a line though it; think Ghostbusters). On the morning of the [Siebel, the main competitor] conference, we sent protesters (in reality, paid actors) to the Moscone Center to picket the conference. They waved	A1, M1e

Table 2. (*Continued*)

Metaphor (M) or Analogy (A)	Source	Value Creation	Value Delivery	Value Capture	Quote	Builds upon
					mock protest signs posters – and shouted, "The Internet is really neat … **Software is obsolete**!" We also hired actors to pretend to be a TV crew from local station KNMS, who came on location to cover The End of Software movement. "What do you think of the Internet?" a fake TV reporter asked passersby, pointing a microphone toward them. I also appreciated the phone number it inspired, **1-800-NO-SOFTWARE**, which provided customers an easy way to find us. The End of Software mission and the No Software logo effectively conveyed how we were different. I put the logo on all our communications materials and policed it to make sure none removed it (they did so anyway). I wore a **NO SOFTWARE** button every day and asked our employee to as well. We decorated the vehicles with **NO SOFTWARE** logos and filled them with our marketing brochures. (*Source*: Founder's book)	

M4	School bully	X	"Don't get **bullied**," a campaign featuring a **schoolboy** writing on a chalkboard. One advertisement showed the schoolboy (my cousin) writing the message, "I will not give my lunch money to Siebel" one hundred times. Another had him writing, "I will not spend my summer, vacation installing Siebel." (*Source*: Founder's book)	A1, M3
M5	David vs Goliath	X	The reality was that in terms of revenue and customers, we were still just a tiny little start-up. No one at the Wall Street Journal, the New York Times, or BusinessWeek really cared about a small start-up. However, they did care about a small start-up that pledged to upend the industry leader. Journalists welcomed hearing from a challenger that was a harbinger of an industry-wide transformation. Being an agent of change was a key element of our marketing strategy. A **David versus Goliath** story is interesting, but we had to pitch the bigger picture. (*Source*: Founder's book)	A1, M1, M3
M6	Pain	X	Among other things, I explained that "Microsoft Great Plains will cause 'Great **Pains**' to the software CRM players who built their products in Microsoft's path." Not only was this quote reiterated in many industry articles, some used the "Great Pains" pun in the headline! (Home run.) (*Source*: Founder's book)	

Table 2. (*Continued*)

Metaphor (M) or Analogy (A)	Source	Value Creation	Value Delivery	Value Capture	Quote	Builds upon
A2	Utility business model Note: selling software like electricity or water utility was unusual at the time of Salesforce founding; the analogy was made with the utilities industry	X	X		Salesforce.com delivers its CRM solution as an **online information utility** via a Web Services infrastructure. (*Source*: Corporate description)	
A3, A4, A5	Amazon.com, eBay, Windows	X	X	X	Early on, for example, I said, "salesforce.com is **Amazon.com** meets Siebel Systems," then it was "AppExchange is the **eBay** of enterprise software," and later, "Force.com is the **Windows** Internet operating system." (*Source*: Founder's book) Note: all three source companies had an iconic status at Salesforce founding and helped provide clues in terms of how Salesforce was planning to develop its business model	

A6	Street team concept from the music industry		X		A friend introduced me to MC Hammer, who visited our San Francisco office (wearing a business suit, not the trademark Hammer pants) and shared his "Street Team" concept: that of building local networks of people to back you. At the time, I didn't know how salesforce.com Street Teams would work in action, but I thought that MC Hammer was a creative genius and that this unconventional idea was worth investigating. (*Source*: Founder's book)	
A7	Testimonies used by Reverend Billy Graham		X		Around this time, I had the opportunity to meet and speak with the **Reverend Billy Graham**, and I realized the power of testimony to inspire and influence audiences. I began to think about how to **apply an evangelical system to sales**. We continued to encourage customers to speak out and share their stories. Rather than address an audience and preach about salesforce.com (prospective customers didn't believe what we said; they believed what customers were experiencing), I began to call on someone from the audience spontaneously and ask her to share her experience. (*Source*: Founder's book)	A6
M7	Hero's	X	X		We were grateful to these users, and our strategy became centered on nourishing our customer network. We referred to our users as "customer heroes," and blew up giant pictures of them and posted them at events and included them on our materials (with their permission of course). Their companies acknowledged their success	A7

Table 2. (*Continued*)

Metaphor (M) or Analogy (A)	Source	Value Creation	Value Delivery	Value Capture	Quote	Builds upon
					too; with salesforce.com, they had achieved a fast implementation and high user adoption, and had made a positive impact on the bottom line. Many, rewarded for these results, rose to new heights in their careers.	
					(*Source*: Founder's book)	
A8	Airport check-in self-service kiosks		X		[…] we extend our promotion of on-demand technologies to include **self-service kiosks (similar to those in the airports)** to allow attendees to quickly and easily check in to our events.	A6
					(*Source*: Founder's book)	
M8	Dream, force		X		After a few years, our City Tours became so deluged with attendees that there was standing room only. The next step was an annual user conference where we would have the opportunity to fuel camaraderie and further strengthen our community of evangelists. We named this event **Dreamforce**. Unlike a City Tour event, which ran for a few hours, the annual **Dreamforce** event was held over the course of a few days.	A6, A7
					(*Source*: Founder's book)	
M9	Cloud	X	X		Salesforce logo is put in the cloud	M2
					(*Source*: Salesforce logo from their website)	

First Meta-Narrative of "Software-as-a-Service"

In the first meta-narrative (A1–M1–M2–M3–M4–M5), the analogy A1 is the overarching goal: software now being delivered as a service rather than traditional enterprise software. As such, this overarching goal provides the underlying thrust for metaphors M1, M2, M3, M4, and M5. While A1, A2, A3, A4, and A5 reflect the content of Salesforce's value proposition, the metaphors M1, M2, M3, M4, and M5 contrast, competitively position, and legitimize Salesforce's value proposition with regard to the main competitor and market leader, Siebel. While M3 is not directly targeted at their main competitor (Siebel), M4 and M5 are more personal, mentioning Siebel directly. Moreover, this particular meta-narrative allows Salesforces to display to its advantages a certain banter or playfulness: while the audience can easily perceive that the analogies and metaphors are not "true" per se (Salesforce is a business, not a war machine or a ghostbuster), the implicit message conveyed is quirky and interesting, contributing to the construction of a distinctive and memorable organizational identity.

We also observe different layering of metaphors within the first meta-narrative. For example, M1 has numerous embedded lower-level metaphors (M1a, M1b, M1c, M1d, M1e, and M1f), M2 has the M2a metaphor embedded, and M3 has M3a. These layers provide additional richness of embedded meaning with ideological and cultural references that might resonate with different types of audiences (e.g., readers of Sun Tzu strategy treatise, fans of Ghostbusters movies, or people engaged in social movements/protests). These layered metaphors create additional connections that go well beyond the economic value that Salesforce's business model innovation brings to its target customers and business partners. These metaphors offer intellectually stimulating, sometimes even ideologically flavored references and connotations that favor deeper engagement and identification with Salesforce and its developing ecosystem. They also communicate (shared) moral values (e.g., importance of social protests, fighting bullying) and (shared) individual preferences (e.g., music or movie tastes), rather than simply satisfying the purely economic needs of customers for cheaper and user-friendly software. This finding aligns with research emphasizing the importance of cultural resources for businesses (see Giorgi, Lockwood, & Glynn, 2015, for a review).

As part of this analysis, we also noticed that this first meta-narrative generally drew on sources associated with negative emotions, such as fear or anger related to conflicts (e.g., war, protests, bullying) and religious references (e.g., hell). These negative emotions were channeled against competitors with the objective of differentiating Salesforce as a unique and highly innovative alternative.

Second Meta-Narrative of "Customer Engagement"

In the second meta-narrative (A6, A7, M7, A8, and M8), the analogies not only reflect how the business model works (i.e., in action) but are also used as sources of new ideas for further business model adjustments through proactive ecosystem engagement in additional innovations (cf. Snihur et al., 2018a). For example, both

musical (A6) and religious (A7) references are used to drive stronger engagement with Salesforce customers and partners who are encouraged to enthusiastically participate in its business model. These analogies "act" as they help Salesforce boost customer engagement, contributing to ecosystem development around the company. The metaphors M7 and M8 are similarly used to reframe and communicate adaptations in the business model initiated through the analogies A6 and A7 ("street teams" of supporters and "evangelists"-customers). In this way, they align with the emerging research into the performative power of discourse for entrepreneurial innovators (Doganova & Eyquem-Renault, 2009; Garud, Gehman, & Giuliani, 2014; Snihur, Thomas, & Burgelman, 2018b).

Interestingly, the second meta-narrative builds upon the sources associated with positive emotions, such as admiration and pride ("heroes," "evangelists") and hope ("dream"). These positive emotions are generally directed to enlist and sustain the support of the Salesforce ecosystem in terms of its customers and partners who start to form a tight ecosystem of loyal enthusiasts around Salesforce.

Discussion

In order to advance academic understanding of the use of analogies and metaphors beyond the initial ideation stage and into managerial efforts to further the diffusion and legitimization of business model innovations, we investigated how key executives at Salesforce mobilized these cognitive tools during the first few years of the venture's launch and accelerated growth. By doing so, our chapter makes three primary contributions.

The Pivotal Importance of Meta-Narratives

First, we build on our empirical observations to develop the notion of *meta-narrative*s – an overarching storytelling structure about a new business model that underpins founders' and stakeholders' mobilization of various analogies and metaphors. Contrary to what was previously assumed in the extant literature (e.g., Cornelissen et al., 2011), we found that managers at Salesforce did not use analogies and metaphors separately, for different purposes and/or at different times, but used these concurrently and weaved them together in overarching storytelling structures. By doing so, they allowed for these analogies and metaphors to build upon each other, amplifying their effect in terms of educating stakeholders about the innovation and spurring them to join Salesforce's ecosystem.

By uncovering the pivotal importance of these meta-narratives, we are able to highlight the use of analogies and metaphors for the competitive differentiation of radical innovations. In this regard, the first meta-narrative illustrates a robust "us-versus-them" theme by differentiating Salesforce from existing incumbents and triggering strong negative emotions toward presumably hostile "them" while simultaneously explaining what values "us" stands for. Interestingly, political science studies have documented politicians' mobilization of similar "us-versus-them" framing tactics to galvanize support (Mols, 2012). Our case similarly documents Salesforce entrepreneurial team's skillful use of analogies and metaphors

to build a distinctive explanation of "who we are as an organization" (Albert & Whetten, 1985), a particularly important endeavor for entrepreneurs engaged in radical innovation (Snihur, 2016) during which early customers' business partners and other stakeholders' support becomes paramount. Underpinned by a common meta-narrative, analogies and metaphors can then play both an educational and a motivational role in innovation diffusion to simultaneously explain the uniqueness of organizational identity and engage stakeholders to further promote it. By uncovering the importance of such meta-narratives, our observations complement existing research on the cultural toolkit of innovating entrepreneurs (Lounsbury & Glynn, 2001): such meta-narratives provide for an effective organizing structure to magnify the power of individual analogies and metaphors.

Among other interesting possibilities, the above findings and observations stimulate further research focusing on whether and how meta-narratives might be used for business model innovations the same way that series of commercials are being used for the marketing purposes. Theoretically, a combination of metaphors should strengthen the whole message and cater toward reinforcement and consistency of the message in a creative way, in line with the marketing advertisement patterns documented by Goldenberg, Mazursky, and Solomon (1999).

Boundary Conditions for the Power of Analogies and Metaphors

Second, we bring forth additional nuances regarding analogies' and metaphors' role in the business model innovation process. In Table 2, we illustrated the use of analogies and metaphors to explain business model novelty in terms of value creation, delivery, and capture. Our results revealed that most analogies and metaphors focus on value creation and delivery rather than on value capture.

These observations suggest that the challenges of introducing and diffusing radically novel business model innovations might encourage (or even, require) innovators to devote different levels of attention – and consequent communication strategies – to different dimensions of their business model. For instance, the high novelty of Salesforce's business model might have called for careful explanations of what it offered (*value creation*) and how it did this (*value delivery*) before it could gain traction among its early adopters, target customers, business partners, and other stakeholders. Whether by accident or design, the fact that Salesforce top management did not emphasize novelty in *value capture* (i.e., a subscription revenue model) might have reduced the cognitive load placed on the audience, thus facilitating the effectiveness of their strategies toward value creation and value delivery.

In parallel, the relative absence of analogies and metaphors to communicate value capture points toward boundary conditions beyond which the power of analogies and metaphors in fostering the diffusion of business model innovations might be more limited. Accordingly, we propose that value capture might be a more contested and difficult part of a novel business model to explain, necessitating other tools and instruments beyond analogies and metaphors. This calls for additional research into how companies communicate novel value capture mechanisms with strong financial implications, such as subscription revenue

models. More generally, promising avenues for research lie in investigating the boundary conditions where analogies and metaphors might be more (or less) profitably used, not only for communicating different dimensions of business model innovations but also across other aspects of innovations, in a broader sense.

The Role of Cognitive Dynamics Beyond Ideation

Third, our work fosters increased appreciation of the cognitive mechanisms and processes involved in innovation, well beyond the ideation stage. Prior research at the intersection of cognition and business model innovation literature had largely focused on highlighting the negative effects of cognition in terms of creating cognitive inertia and hampering change during business model innovation endeavors (Gilbert, 2005; Tripsas & Gavetti, 2000). In contrast, our study shows that cognitive tools (like analogies and metaphors) can play important roles during the implementation phase of business model innovation. Our findings demonstrate that analogies and metaphors help a new venture to proactively develop an ecosystem around its new business model. Even though several of these analogies and metaphors surprisingly showcase negative emotions, they still serve as enablers rather than hindrances, facilitating new business model implementation and scale-up. Seen in this light, a promising avenue for future research might be to examine how entrepreneurs use cognitive tools to engage stakeholders, not only by appealing to self-interest and economic needs but also by associating their innovations with more subtle values and emotions.

Practical Implications

Our research also has important practical implications for entrepreneurs who are launching novel business models. Our findings encourage them to think contextually and strategically: for instance, what analogies or metaphors can help them engage stakeholders to build an ecosystem around the new business model? Our study suggests that rather than using analogies and metaphors separately and in isolation from one another, entrepreneurs might be better off mobilizing combinations of analogies and metaphors, to more effectively communicate the essence of their business model innovation to various stakeholders. Moreover, these analogies and metaphors do not necessarily need to elicit positive emotions to be effective; entrepreneurs can also elicit negative emotions to spur stakeholders to action. Meta-narratives also suggests that entrepreneurs need to take a long-term and holistic perspective on cognition and linguistic tools such as analogies and metaphors. By thinking outside the business box, by building relations to other cultural and ideological domains, and by crafting meta-narratives, they can galvanize support from stakeholders.

Limitations

The findings reported here are based on the analysis of a single case. Although representative of a highly disruptive business model innovation, the Salesforce

case has several particularities, such as being set in the software sector characterized by high dynamism and low regulation. Our findings are therefore exploratory and might not generalize to cases of business model innovation across other industries. This limitation encourages more research into the functions and use of analogies and metaphors in fostering the diffusion of business model innovations in different settings and industries.

These limitations notwithstanding, the Salesforce's case suggests useful insights for other industries undergoing disruptive business model innovation related to digitalization. Our findings notably provide some examples of how innovators can frame such disruptions. Analogies and metaphors remain relevant today, as firms continue to use them while communicating their business model innovations (e.g., BMW communicates their new initiative as "Airbnb for cars," *Financial Times*, 2016). For instance, a recent large-scale qualitative research has validated that both analogies and metaphors are often used by CEOs, and their use has distinct effects on different audiences (König, Mammen, Luger, Fehn, & Enders, 2018). Therefore, to the extent that such analogies and metaphors are being habitually used by certain CEOs, they are likely to form meta-narratives consistent with our research findings.

Conclusion

In this chapter, we have investigated the role of analogies and metaphors in the launch and subsequent diffusion of Salesforce's business model innovation. We showed that in their journey to become the dominant player in the CRM software market, Salesforce's key people skillfully used meta-narratives built from a mix of analogies and metaphors to galvanize stakeholders around their innovation. They did not use analogies and metaphors separately (as is often assumed), but skillfully assembled them around meta-narratives creating a more powerful story, contributing to a distinct organizational identity and augmenting the firm's appeal among its target customers, business partners, and other stakeholders. We hope that our analysis will inspire scholars to further investigate the role of cognition in business model innovation processes by focusing on the properties and power of analogies, metaphors, and other narrative strategies.

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The Metacognition Underlying Radical Business Model Innovation: Four Case Studies of Individual Criticism

Emilio Bellini and Silvia Castellazzi

Abstract

This chapter explores the role of individual cognitive abilities in the radical innovation of business models and their value proposition. The focus on a specific cognitive construct – metacognition – contributes to understanding the specificities of "criticism," an approach relevant to addressing the challenges of the radical innovation of value drivers. Based on empirical data, this exploratory research identifies the characteristic elements of criticism from a metacognition perspective, pinpointing the key moments and attitudes of innovators, i.e., cognition of own cognition. The analysis of the findings shows that successful innovators are able to leverage the perception and control of own cognition to more effectively develop and negotiate the radical innovation of the business model in their organization, going beyond the dichotomy between rational and affective mental states. This chapter concludes with a discussion and future research outlook.

Keywords: Radical innovation; value drivers; business model innovation; metacognition; criticism; case studies

In this chapter, we explore the role of individual cognitive abilities in the radical innovation of business models and their value proposition, taking a specific perspective on innovation enhanced by "criticism."

Applying an established construct from the cognitive sciences to the literature on the foundations and processes of the radical innovation of value drivers and the role of individual innovators, we contribute to knowledge on radical business model innovation. The research is explorative in nature, aiming to shed light on a promising intersection that has yet to be extensively studied and unveiling areas for further research and theory development (Handfield & Melnyk, 1998).

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Specifically, this chapter explores the role that individual metacognitive abilities play in the process of developing radical innovation. This research builds on a wide and growing body of literature on cognitive abilities and skills supporting innovation and business models. However, to the best of our knowledge, this is the first exploration of how metacognition might support the microfoundations of criticism in innovators and professionals. In fact, most studies at the intersection of cognition and innovation have thus far focused on ideation and creativity skills for (incremental) innovation and the ideation and problem-solving process (e.g., Ward, 2004), leaving criticism and judgment abilities rather underexplored. This is all the more surprising given the uncertain quality and reliability of information and sources on which managers can rely in their decision-making, the weight that cognitive biases and cognitive overload demonstrably have on thinking processes and decisions (Schwartz, 2004), the challenges that technologies pose, the ability to increase and access the number of potential ideas (Verganti, 2017), the growing obsolescence of skills, the relevance of learning strategies for individuals' lives in general, and for professional activities in particular (Autor, Levy, & Murnane, 2003).

This chapter is structured as follows: Section 1 describes the relevant literature from both sides of this interdisciplinary work. Section 2 illustrates our conceptual framework and introduces the key cognitive construct adopted, as well as the overall research methodology. Section 3 illustrates the key findings from the data. Section 4 discusses the results and managerial implications, while Section 5 concludes with the limitations and avenues for future research.

1. Value Creation, Value Capture, and the Key Role of Criticism

According to the comprehensive literature review of Zott, Amit, and Massa (2011), business model studies follow five value dimensions: value networking, value creation, value proposition, value delivery, and value appropriation. In this chapter, we assume a business model innovation and technology management perspective where the main efforts of entrepreneurs and executives engaged in new business model design and development concern *value creation* (Zott & Amit, 2010).

Furthermore, contributions to business model *innovation* have been traditionally limited to incremental innovation (i.e., new formulations of existing value drivers) enabled by strategy-making processes (Ghezzi, Cortimiglia, & Frank, 2015; Schneider & Spieth, 2013). In this respect, Ghezzi et al. (2015) show that business model innovation has become a relevant research field, even though no precise definition is provided. Business model innovation may refer to business model design (entrepreneurs/managers designing new business models from scratch) or business model adaptation (entrepreneurs/managers adapting existing business models with different levels of innovativeness). With reference to the models of Zott et al. (2011) and Osterwalder and Pigneur (2010), we focus particularly on the *value proposition* dimension and the underlying value drivers that best capture the source of innovation in the business model canvas.

With regard to value drivers, there is widespread recognition that the competitive environment in different industries (also due to technological advances) poses more and more challenges for managers to innovate the value drivers and achieve a sustainable competitive advantage through differentiation, decommoditization, and customization (Kano, Seraku, Takahashi, & Tsuji, 1984; Pine & Gilmore, 1999; Porter, 1980). With the aim of supporting businesses in pursuing this differentiation path and gaining a long-term competitive advantage, radical innovations that set new standards and paradigms are proven more effective than engaging in incremental innovations alone (O'Connor & Veryzer, 2001; Reid, Roberts, & Moore, 2015). Indeed, by introducing new standards, radical innovations protect against the commoditization of products and services, which might in part rely on technological advances, but are first and foremost a function of the innovation's ability to pull together the technology, the customer base, and the complementary assets (Schilling, 2017), hence a business model perspective on an organization's ability to create value.

We focus on the radical innovation of value drivers as a key element of gaining a sustainable competitive advantage, taking a design-driven innovation approach to envisioning radical innovations (Verganti, 2009, 2017). According to Schilling's (2017, p. 48) definition, radical innovation is "an innovation that is very new and different from prior solutions," whereas incremental innovation is "an innovation that makes a relatively minor change from (or adjustment to) existing practices." The design-driven approach distinguishes innovation of meanings and directions from innovation of solutions. The former is radical, the latter is often incremental. Examples of radical innovation and their respective business models and partner alliances in this sense include Starbucks, Nest, and Nintendo Wii (Dell'Era & Verganti, 2010; Pinto, Dell'Era, Verganti, & Bellini, 2017; Verganti, 2009). Working on meanings enables entrepreneurs and executives to identify new value drivers, since a radically innovative value proposition does not solve existing problems (*how*) but opens up new paths, offering people a more meaningful experience (*why*), satisfying basic aspirations, emerging values, those unexpressed and unarticulated. In this sense, the authors refer to meaningful innovation or innovation as a way of creating meaning. For example, in 2006, Nintendo released Wii and instead of powerful graphics provided a benefit that was not explicitly requested: the ability to play by moving; in the 1980s–1990s, Starbucks launched a new coffee retail experience in the United States: a sense of community in a third place between home and work; in 2012, Nest launched a learning thermostat not to control the temperature but to enjoy a warm home without the need for control.

Verganti (2017) shows that new meanings have value both for people and businesses, incorporating the value creation (value for people) and value capture (value for business) dimensions in a new business model. The radicality of the innovation driven by meanings often translates into a new product-service category or setting a new standard. In being radical, design-driven innovation is positioned within the research and literature streams to which the Blue Ocean Strategy (W. C. Kim & Mauborgne, 2014), Value Proposition Design (Osterwalder, Pigneur, Bernarda, Smith, & Papadakos, 2014), and Disruptive Innovation (Christensen, 1997) pertain.

From a managerial perspective, "envisioning" new value drivers (valuable to people) has become a key challenge. The abundance of available technologies, solutions, information, and the cognitive effort linked to selecting solutions and managing providers is considered relevant issues in the management literature (e.g., Schwartz, 2004; Verganti, 2017). However, ideation and creativity can only contribute to innovation up to a certain point. Moreover, organizations are now largely equipped with tools that enable their people to be more creative (e.g., design thinking). More and more, a critical attitude and judgment rather than the deferral of criticism and brainstorming are emphasized, the latter helping with the incremental innovation of solutions, but not supporting radical innovation.

Starting from Verganti (2009, 2017), we consider the key characteristics that set radical innovators apart from incremental creativity-driven teams:

- Output: visions vs ideas; proposals vs answers
- Process: depth vs speed; experimentation vs brainstorming
- Assets: knowledge vs methodologies; scholars vs newbies
- Key Performance Indicators (KPI): robustness of vision vs number and variety of ideas

These characteristics contribute to an innovation approach that is supported (but not limited) by criticism through taking critical stances in innovation discussions and processes:

> Criticism is the way to *challenge* our own cognitive frame; it's the way to question how we make sense of the environment. (…) Criticism indicates *the practice of going deeper* when interpreting things. (Verganti, 2017)

Despite widespread recognition that different cognitive models shape the ideation and creativity processes, little is known about the cognitive underpinnings of criticism that are relevant for the radical innovation of business models. Moreover, criticism helps in designing effective tools for the empirical inquiry of individual executives facing relevant experiences in designing the radical innovation of business models.

Looking more broadly at innovation and not only at the development of new value drivers and business models, interdisciplinary contributions leveraging the cognitive sciences have largely focused on creativity and ideation (e.g., Dietrich, 2004; Weisberg, 2010), under the assumption that such processes are fundamental to spur innovativeness and proactivity within organizations (Kelley & Kelley, 2013).

Scholars have long referred to the cognitive sciences literature to inform and support managerial decision-making and innovation processes and practices. Starting from the first conceptualizations of bounded rationality and the cognitive limitations of rational actors (Simon, 1957), the impact of biases on decision-making and the exploration of different thinking systems (Gilovich, Griffin, & Kahneman, 2002; Kahneman, 2011), and risk-perception and loss aversion (Kahneman & Tversky, 1979), ample studies testify to the fecundity of

interdisciplinary work between the cognitive sciences and management/economics. Other contributions from the cognitive sciences have more specifically focused on business models as cognitive constructs per se (Doz & Kosonen, 2010) or schemas helping managers visualize and organize value linkages (Furnari, 2015). In general, however, key contributions at the intersection of the cognitive sciences and business model literature have focused on the schema itself, while embryonic research focuses on the antecedents of business model design, such as attention (Frankenberger & Sauer, 2018).

With this chapter, we aim to focus on the traits of radical innovators, using the cognitive sciences to provide an edge not inherent in other approaches. Thus, the key research question explored in the chapter is:

> How can cognitive constructs help better define and pinpoint the criticism attributes of radical business model innovators?

2. Conceptual Framework and Methodology

For this study, we reviewed existing literature at the intersection of cognitive sciences and management to narrow down the scope of potentially explanatory constructs to further investigate. We have also reviewed the adjacent cognitive sciences literature to explore constructs not yet embedded in the management and innovation disciplines to expand the horizon of potentially constructive interactions between the two disciplines and deepen understanding of the cognitive microfoundations of "criticism" for innovation.

Research on individual cognitive styles (De Visser & Faems, 2015) and team cognitive styles (Büschgens, Bausch, & Balkin, 2013; De Visser, Faems, Visscher, & De Weerd-Nederhof, 2014) shows important interdependencies between cognitive constructs and managerial/entrepreneurial performance and with regard to radical innovation. Another relevant and adjacent research stream related to criticism and the construction/processing of the innovation funnel derives from the dynamic capabilities and absorptive capacity literature (Berends, Smits, Reymen, & Podoynitsyna, 2016; Helfat & Martin, 2015), focusing on cognitive elements supporting flexible strategic thinking and the ability to effectively and speedily move between fast and slow thinking (Laureiro-Martínez & Brusoni, 2018; Wrona, Ladwig, & Gunnesch, 2013).

The concepts of learning and learning strategies are necessarily explored in relation to dynamic capabilities and absorptive capacity. However, much of the literature embeds such concepts in the "fail fast, learn fast" landscape, positioning the innovation of value drivers as an agile or prototyping-close activity.

While this is relevant for a series of successful innovations, radical innovation based on meanings and criticism does not start with speed and agility but with reflection. This prompted us to search for a construct and an understanding of learning that could encompass reflection more than action. To do so, we explored the relevant literature on education studies and psychology identifying "metacognition" as a promising construct to explore as a contributor to radical innovation processes.

While cognition refers to first-order thinking and intellectual enterprise, metacognition refers to second-order reflection – thinking about the thinking. We refer to the seminal work of Flavell (1976) and consider metacognition as the knowledge and cognition of cognitive experiences, both intellectual and affective. Metacognition is traditionally recognized as a function of two different abilities: monitoring and control (Perfect & Schwartz, 2002). Effective metacognition enables effectively controlling and steering one's own thinking, opinions, thinking strategies, and inferences.

Wide research on the metacognition concept has been undertaken largely on students, linked to learning abilities and strategies, but some research also considers the impact and role of metacognition on firms and managers (e.g., Haynie, Shepherd, & Patzelt, 2012; D. Kim & Lee, 2018; Rhodes, Lok, & Sadeghinejad, 2016), highlighting the interesting contribution of metacognition abilities to firm performance.

Based on the identification of this construct, we put forward an exploratory study. Fig. 1 summarizes the conceptual framework that guided our research, inspired by Sund, Galavan, and Brusoni (2018) in its three levels.

The analysis explores the cognitive elements by referring to three different levels of cognitive processes: the individual, team, and organizational level. In each case, the unit of analysis is the innovator's thinking and particularly his/her criticism.

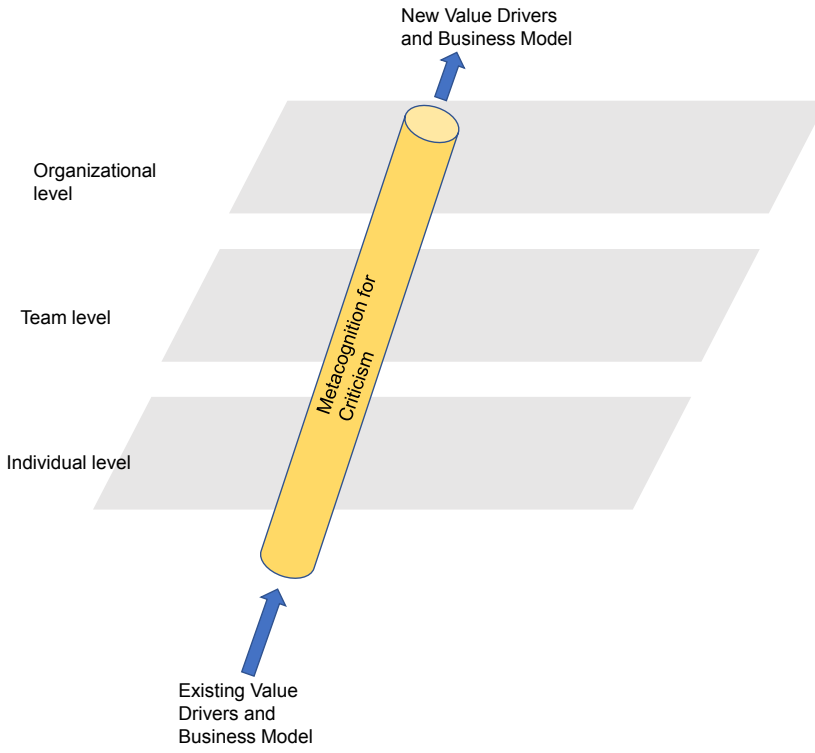

Fig. 1. The Conceptual Framework.

To this end, we conducted an explorative study aimed at understanding the possible boundaries and characteristics of criticism in the radical innovation process and the role of a specific cognitive construct in understanding its use.

In particular, we investigated four cases of radical innovation of value drivers (Company Alpha in the semi-conductor industry, Company Beta in the luxury-fashion industry, Company Gamma in the banking industry, and Company Delta in the grocery industry), together with the individual lead innovator's story. The case study methodology enables shedding light on scarcely explored areas for a first investigation of the criticism phenomenon (Handfield & Melnyk, 1998). For each case, we reviewed secondary sources on innovation and execution and the involvement of key informants in the business model innovation itself. Moreover, we conducted interviews with the four leading innovators (semi-structured, followed by content analysis; Atteslander, 2006) to explore the role of metacognition in their processes. We selected the cases based on the innovators' successful implementation of radical changes in the value drivers and value proposition of their business model.

3. Results from the Case Studies

This section provides an overview of the four cases and describes the findings from the innovators' interviews.

Case	Industry	New Value Proposition	Innovator
1. Case Alpha	Semi-conductors	The sensor as a value platform for new products and services for business customers and end users	Alpha (CxO for R&D)
2. Case Beta	Banking	Fully digital private banking services as an independent value platform for financial services providers and investors	Beta (Founder)
3. Case Gamma	Luxury fashion	The omnichannel retail service as new value platform for brands, store team, and customers	Gamma (Head of Digital Innovation)
4. Case Delta	Grocery	The grocery store as new value platform for collaborative services and new relationships between farmers, food companies, and end users	Delta (Head of Digital Innovation)

We operationalized the three modes of criticism at the individual, team, organizational level by asking the interviewees to reflect on their radical innovations and identify key moments according to the three types: individual moments of reflection on the innovation; moments of reflection and discussion with their team; and moments of discussion or reflection with organizational stakeholders,

both internal (other departments) and external (customers, partners, suppliers). The scope of the innovation on which they were asked to reflect encompasses both the value creation (definition of new value drivers) and the value capture dimensions (design and execution of the new innovative business model).

A. Individual Reflection

All interviewees recalled moments of individual innovation thinking where they elaborated and advanced key ideas. The individual moments, often devoid of organizational constraints or structure, frequently related to deep reflection, clarifying the idea or argumentation, critical review, and *synthesis*. These are reportedly not moments to scout new ideas or inspiration but moments to reflect on the large amount of information either available in the world or provided by their teams, and on which they needed to make decisions as managers or decision-makers. The word "synthesis" was frequently recalled to describe the activity:

> […] moments of synthesis, and of focus, of what you already have … (Alpha)
> […] trying to create some mental order … (Alpha)
> […] It's been a process of long synthesis and cleaning of all that which we represent for customers and affiliates … (Delta)
> […] There have been different, subsequent integrations … It was not like Paul on his way to Damascus (*to arrive at the new model*), there have been different pieces which have grown over time. I decided to take my time and my curiosity … I realized that I did not like the world of finance anymore, I wanted to take the conflict of interest out of it … I then had different moments with someone who was helping me to focus, to give more to a construct … (Beta)

In these individual moments, managers did not reflect on single problem-solving instances, but were asked to identify moments relevant for the radical innovation they were working on. In Case 4, particular attention was given in the innovation process to the organization's core activities and resources to allow deep "cleansing" of a (back then) very unclear and crowded value proposition.

Such synthesis involves the ability to understand the value and correctness of the information and idea available to oneself, distinguished from unclear thinking processes and potential fallacies:

> […] one knows what one knows … (Alpha)
> […] I have entered a loop-circle several times, at the individual level, between cause and effect, means and ends … (Delta)
> […] Today that there is such an excess of information, I mean … I do not save all emails, I try to remember through a double step, I fix in my mind the content, the person that has shared the information … (Alpha)

> […] It's an immediate thing. Usually, I do not immediately understand or appreciate the stimulus, I do not understand it completely, I asked to tell me again, and I realized that there was something interesting in there. It's not exactly a strategy, it's hidden, it's more something that comes up automatically when there is something that makes me change my way of thinking … I had taken for granted that I needed to choose between a dilemma, and then I felt that there was (*in what someone was saying*) something that was changing the rules of the game, more than a strategy, it's an external stimulus because it tickles me, it seems counterintuitive, and I see some space to work on it. (Gamma)

Moreover, deeper moments of reflection are linked to the meaningfulness of the innovation undertaken, as one interviewee described:

> […] you are pushed into thinking a bit, and if you are really taken by the project – and a project takes me if I am really changing something meaningful, then in that moment I really think in depth about that thing … I see something and reconnect it to the project I am doing … This thing only happens I think if you are very much deeply involved … I start to think about everything in a different way … (Gamma)

Managers develop their own strategies to support them in innovation thinking, for instance, avoiding being subject to the argumentation of others and critically reflecting on their own thinking position – an ability that requires the support of the two key metacognitive *monitoring* and *control* functions:

> […] I think that if you know the whole iceberg then you are automatically influenced, you follow the argumentation of the other, but if you know only the tip of the iceberg you connect the dots in a different way … (Alpha)

Such awareness allows taking actions and prevents being subjected to own confirmation biases or those of others by critically thinking about different sources and the informants they might involve to double-check their position:

> […] It's a little demonstration via negation, I need to find something that is against my own thinking … (Alpha)

Metacognitive abilities, such as recognizing own fallacies in thinking, also support communication and sharing with the rest of the team:

> […] I then recheck the whole mental process I went through in my mind, with variations so that I can adjust the direction. Obviously,

> at that point I need to convince, to explain to those who work with me why I had doubts, why I changed my mind, and then I bring some explanations, and from the discussion a shared understanding usually arises … (Gamma)

B. Interactions with the Team

In situations where managers take the lead in decision-making while working with their teams, without the constraints of other stakeholders, meetings often take the form of "challenging" and development sessions:

> […] your thinking divides into two parts … on the one hand, you are following the discussion and the different inputs that you receive, on the other hand, you keep on thinking on your idea or on that emerging from the discussion, and I notice this thing because it happens often in these discussions, if there is something very different (*that emerges from the team meeting*) then I need concentration, I need to stop everyone and say you all stop, I didn't get it, explain it to me again because I was thinking as if it was an individual phase but with input continuously arriving … It's not the usual meeting where you listen to others and are concentrated on how you reply, on how to defend your opinion, in these meetings there is still a creative process ongoing … (Gamma)

This again requires being able to monitor and *differentiate* (Semerari et al., 2012) one's own mental state by recognizing that own beliefs and mental states might be subject to personal lenses and fallible, subjective interpretation – both their own and those of others with whom the innovators engage:

> […] My role in these meetings has been double … (*the second one*) being a bit of a disruptor, when I see them too convinced I challenge them, and if their ideas still hold true then good. I rarely enter a meeting and follow the rational flow that they have prepared, because I assume that theirs is correct. If by following another flow the result is the same, good, if not then it means there was a bug … (Alpha)

In this case, the innovator's role is again to maintain the direction and promptly identify possible fallacies or mistakes in the proposals of others and stimulate them into going deeper.

With his/her own team, the innovator is often aware of the different thinking styles and cognitive preferences of colleagues:

> […] but it's ok (*that we have different approaches and disagree*). He then moved on and became a teacher, it was his natural dimension. Less stressful. Fewer decisions between head and gut … (Alpha)

This ability assumes the manager's capacity to distinguish between the "proof" and the team's argumentations, and his/her own role to challenge and prompt them to go further, while not forgetting the dual value creation and value capture dimensions:

> […] My role was steering toward a conclusion … it's not that we have this meeting, then we have another one, and so on … there are no more. Trust your gut, use your cognition to the best (*to make a decision*), one week more or one week less will not change your life … (Alpha)

C. Interactions with Stakeholders (Internal and External)

The particularity of interactions with internal or external stakeholders necessary to embody a new value proposition and new business model is that, more often than not, there are rare discussion occasions. The pressure on the innovator to persuade others of the value of his/her proposal is high, time is short, and the complexity to be managed is usually considerable. In the interviews, we explored the ability to act and react (*monitor* and *control*, going back to the two key metacognition functions) during the meeting rather than individual preparation strategies.

The interviewees highlighted the need for the dual ability to perform successfully in meetings where authorization or a green light needs to be given – be it with customers, new partners, or new suppliers. The first is the ability to focus on understanding and interpreting the other person or persons:

> […] No, I am not focused on my idea, I am focused on the other person … (Alpha)
> […] I am constantly listening to who is in front of me, and somehow I am able to anticipate changes, the fact that dissent can be explicitly expressed, and so I adjust the direction, not to change the destination, but to change the way to get there, I still need to get there … (Delta)
> […] You need to be very concentrated … as soon as I realized that it was not a topic they wanted to discuss at that moment I immediately slightly changed the subject … I had a very versatile presentation … (Gamma)

In meetings with a high level of technical complexity, this ability to focus is supported by technical preparation, which allows the innovator to concentrate on the meeting and not on what is being said:

> […] In my case, technical preparation allows me to jump to solutions which have not yet been validated … (Alpha)

The second ability interviewees described, enabled by focusing (on the other person), relates to thinking what the other person is thinking and understanding

the best way to follow their flow of thoughts and reformulate the message in a way that is coherent with the starting mental states of the other person, thus reinforcing and not confusing them:

> […] I think what he is thinking. I try to think what he is thinking, and I try to adapt my message so that I can reinforce his thinking. It's not emotional, it's rational. I try to understand where he is going … (Delta)
>
> […] I was thinking about what he might have been thinking … no, not my idea … his perception of my idea … but this is what happens when you need to convince someone to give you money for an investment. When I was in the meeting for the investment (*in the technology behind the new business model*) and there was the then-CEO, and he had understood something different from what I meant. And then when you weigh the options, you risk losing time by correcting what he understood – so you assume that what he thinks is true and slowly bring him back to where you want. It's a rational thing. The mistake that people with a technical background make is that they say 'no it's not like that', and especially if the person covers an important role in the organization, then it becomes difficult for the other person … (Alpha)

Another function that innovators enacted in these meetings is the ability to change their strategy according to the feedback they receive from the environment, being able to rapidly adapt as needed:

> […] Before the meeting I would tell myself, these are the three things that you need to discuss and bring "home." I would keep presentations very, very light to be able to adapt based on how the meeting was going, both from a time management and from a mood perspective. There have been a couple of times where I immediately realized that I was not going to obtain anything, and so I left the things I wanted to ask for the following meeting. I really had to live the meeting, beyond the presentation, and be careful about the dynamics among people, and how these dynamics were forming … Over time, I for sure have learnt to listen more, and understand where the thing that the other person says is coming from. I have learnt whether I need to explain something in another way, if I have to get there through another route, if I have understood that the path I have taken will not work … (Gamma)

The criticism involved in radical innovation projects is not devoid of affective elements and the awareness and impact thereof:

> […] If I see that there is no great interest in the topic I am bringing, then I get a little sad, and I realize already during the meeting that

> I am not going to be as effective as I wanted because getting sad is impacting my way of presenting (*and this awareness*) unnerves me even more so that the situation gets even worse … (Gamma)

4. Discussion of Findings

The key research question of this chapter relates to how cognitive constructs can help better define and pinpoint the attributes of criticism adopted by radical business model innovators able to envision new radical ways to create and capture value.

The findings from the cases show that the mental processes recalled by radical innovators in their key innovation moments refer more to the ability to strengthen the robustness of the vision and proposal, rather than adding to the number of possible solution or ideas. Indeed, they referred to *synthesis*, to *order*, to *challenging* and *cleansing*, to uncovering *bugs* and not being subject to own *biases* and *fallacies* (Section 3.A). The approach of these innovators seeks to ground the proposal in the awareness of possible constraints around them, rather than in the ignorance of their existence, and are open to discussing possible fallacies and constraints with their teams (Section 3.B). This is coherent with the fact that radical proposals need higher buy-in compared to incremental innovations, and thus from innovators the ability to create a shared vision among different stakeholders, both internal and external (Verganti, 2017). This shared vision (and the investments in it) often relies on the innovator's ability to manage meetings and objections by co-thinking with stakeholders and adapting to their mental state (Section 3.C).

Driven by the amount of available information and technologies, and the increasing risk of fake news and algorithm-reinforced biases, radical innovators are aware that they pursue a real quest (and love) for truth in their activities and proposals. Radical innovators have the ability to be aware of their own "quality" of thinking, together with the ability to modify their assumptions and strategies when they deem these ineffective.

These first findings show that the use of the metacognition construct and its sub-elements allows characterizing the criticism in which radical innovators engage in a deeper and more precise way in the whole value proposition design and execution cycle. Moreover, the metacognition construct enables identifying key moments in which the innovator's thinking and concentration are at their highest. Different moments of the innovation and business model construction require different criticism levels and slightly different connotations.

Based on our exploratory research, we put forward a more detailed characterization of criticism that encompasses both radical innovation thinking dimensions:

- The first is the quest for truth on the object of value creation innovation (innovation of value drivers).
- The second is the quest for a shared proposal that will allow the innovation to be executed, thus creating value for all partners involved in the business model.

Both activities are supported by metacognition in that they require the ability to effectively reflect on their own and others' mental states (*monitoring*), and the ability to change and take action, interpreting the feedback from their own and others' reactions, expressions, and argumentations (*control*).

This approach and thinking differ greatly from other cases where the mantra is "fail fast, learn fast," as the core radical innovation and implications for the business model in the four cases would have been very difficult to test in a prototype. The innovators' proposals were all-or-nothing new value drivers: bringing significant changes to the relationships among the stakeholders (Case 1), a potentially new meaning in the banking industry (Case 2), in a totally new system in the distribution channels (Case 3), and in a thorough rethinking of the organizational purpose and proposals for the community (Case 4). All innovators needed strong commitment and partnerships to be able to advance in the first place. In this respect, the solidity and "synthesis" of the proposal is something that resembles more the *cold brewing* process than a *capsule coffee*, which the innovators approached with strong mental commitment in different situations.

In the innovation literature, research on thinking has thus far related more to the technical elements of an innovation, more focused on the object or the *problem* to be solved in itself (e.g., progressing through the traditional innovation funnel, with its gates, or ideating several options for its early stage). The use of the metacognition construct allows envisioning a new research perspective. This perspective is not driven by the innovation itself but by the innovator and his/her own mental state – so that the quality of criticism during the course of a meeting with partners receives priority in the innovator's attention (and can be a deal-breaker), as much as the other stages of the innovation process – decoupled from the traditional innovation funnel gates. Put differently, the use of metacognition broadens our understanding of criticism and thinking in innovation in that the object of thinking is *not external to the innovator* (the technology, the problem, the user) *but becomes own thinking itself*, own mental cognitive and affective states, own ability to investigate those of the others involved in the innovation, and ultimately the individual's contribution.

Metacognition also helps shed light on the nature of criticism in radical innovation by not polarizing on only the logical, System 2-type elements. Rather, it enriches criticism with the awareness that the rational and affective elements are not opposed or extremized but included in a second-order reflection in which both become relevant "red flags" to pay attention to. The innovators interviewed all described the interplay of the "feeling" of not understanding something, feeling too certain of something or understanding that it is the right moment for a gut decision, feeling that the other person was lost in the argumentation, their own more or less emotional reaction, observing themselves reacting in a more or less effective way, and being affected by this awareness. The metacognition construct does not exclude emotional or affective elements from the analysis but rather adds to criticism a way of considering the obvious and frequent feelings and reactions that individuals have and their way of managing them. In this respect, the object of the criticism is not external to the innovator but becomes own thinking, and in the end, the own *self* with its different states.

Based on the research conducted, we put forward the definition of radical innovators as *inclusive discussants*. They are discussants in their almost scientific ability to dissect what makes sense from what does not, paying attention to the method, to the information, to the "tricks" of their own mind. They are inclusive in realizing that the new business model proposal will only be successful if they are able to include and have onboard all relevant stakeholders. They are able to successfully propose and facilitate radical business model innovation due to their ability – in given moments – to be very aware of their own situation and thinking, both on the technical side and in the organizational challenge of finding partners and allies.

5. Limitations and Research Outlook

As all research, this study has some limitations that we acknowledge. First, the concept of metacognition is adjacent to a series of other cognitive constructs that might also shed light on the criticism concept. By selecting metacognition as the key concept to characterize criticism, we ignore other potential constructs that could reflect and support the idea of criticism: an aspect to be further explored in future research.

Second, the exploration of metacognitive elements in the criticism of innovators via interviews and semi-structured questionnaire has some limitations and ambiguity, the first being the task of recalling and reflecting on mental processes that interviewees previously experienced while innovating the business model. Hence, the distance in time between the mental process and the recollection of the mental process might have biased some of the results. However, interviews remain a key tool in all cognitive sciences and psychiatric research exploring metacognition. Other tools, for instance, thinking-aloud protocols, which hypothetically might have been an alternative tool, have other limitations and require contemporary observation of the innovation process, which was not possible in our case. A second difficulty for interviewees is recalling exactly what was occurring in their minds, trying to rationalize *ex post* as little as possible. Some bias might thus have ensued.

Finally, the number of cases is limited, albeit deemed appropriate for exploratory research. Considering that access to top innovators and managers is key to this type of research, having four cases of radical innovators is a significant result considering the constraints in the availability of this elite group.

This first exploratory study on the cognitive foundations of criticism, enlightened by the metacognition concept, gives rise to a series of interesting and relevant research questions to be further explored. The role that metacognitive abilities can and do play in the activities of managers and innovators would seem potentially very important. Metacognition supports, and is involved in, many of the key situations managers face both internally and externally. Research on business model innovation can profoundly benefit from a deeper look at the foundations of criticism and innovation processes, for instance, identifying factors supporting the development of metacognitive abilities in managers and organizations from socio-educational factors to organizational practices, and possibly specific training and tools.

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Barriers in Searching for Alternative Business Models: An Essay on the Fear of Looking Foolish

Sea Matilda Bez and Henry Chesbrough

Abstract

A successful business model creates a heuristic logic that connects technical potential with the realization of economic value. But this logic constrains the subsequent search for new, alternative models for other technologies later on. This logic gives rise to two behaviors that affect the implementation of Open Innovation inside organizations. The well-known Not-Invented-Here syndrome constrains the use of Outside-in Open Innovation, while a new syndrome we identify, the Fear of Looking Foolish, constrains the use of Inside-out Open Innovation. We focus particularly on the latter behavioral constraint in this chapter and present three mini-cases that demonstrate the constraints in action. We then sketch possible managerial solutions to overcome these behaviors.

Keywords: Business model; business model innovation; Open Innovation; behavioral constraints; Fear of Looking Foolish; inside-out technology

Introduction

Successful business models (BMs) are all the rage these days, whether they be in the form of "everything as a Service," or the rise of business platforms, or the value of designing improvements on one's current BM (Cusumano, Gawer, & Yoffie, 2019; Osterwalder & Pigneur, 2010; Sabatier, Craig-Kennard, & Mangematin, 2012; Teece, 2010). However, BMs contain a dark side that is often overlooked: a successful model can cause managers to filter out technologies that are promising but do not fit their current BMs (Chesbrough & Rosenbloom, 2002); these promising but rejected technologies are called "false-negative" technologies and end up unused and unknown (Chesbrough, 2003, 2008).

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The emergence of Open Innovation practices holds the promise of allowing the exploration of new BMs for these false-negative technologies that do not fit the company's current BM. Instead of letting the underused technology remain unused and unexplored on the shelf, the firm can let another actor explore it with an alternative BM. In exchange, the company can receive pecuniary or non-pecuniary compensation. This approach is called the "inside-out" branch of the Open Innovation framework (Chesbrough, 2006). It fits with a more recent branch of the BM literature called the business model innovation (BMI) that has become influential in searching for new source of innovation that "complements the traditional subjects of process, product, and organizational innovation" (Zott, Amit, & Massa, 2011, p. 1032).

However, while it may make sense for BMI to allow unused technology to flow to the outside, the adoption of this advice by firms is rare (Chesbrough & Chen, 2015). Since other aspects of the Open Innovation framework have been widely adopted (Chesbrough, 2019), this oversight deserves further scrutiny.

This chapter serves to introduce the notion Fear of Looking Foolish (FOLF). FOLF is a behavioral constraint generated by a successful BM that consists of preferring to allow a technology to languish rather than being referred to an external partner. By denying the deployment of the technology externally to another company, FOLF provides a behavioral explanation for barriers that limit the innovation of a new BM.

The rest of this chapter is organized as follows: We begin with a consideration of the behavioral constraints from a cognitive perspective of successful BMs. We highlight how successful BMs are a source of cognitive bias that filter against potential technology. We then link this to the role that these constraints play in the implementation of Open Innovation. Open Innovation practices are ways to find alternative BM for these ideas filters out by the current BM. We follow by focusing particular attention on this novel behavioral constraint: the FOLF. We then sketch the effect of these constraints across three different mini-cases and conclude by sketching possible managerial responses to overcome these behavioral constraints.

The Behavioral Constraints of Successful BMs

The cognitive perspective of strategies offered by BM constructs has received significant interest from managers and academics alike (Chesbrough, 2010; Doz & Kosonen, 2010; Martins, Rindova, & Greenbaum, 2015; Massa & Tucci, 2013). A sub-stream of researchers, in which this chapter belongs, specialized their approach by analyzing BMs as schemas that organize managerial understandings about the design of firms' value-creating and value-capturing activities. This chapter aims to clarify and contribute to one of the major shifts of this BM literature: moving from the initial view of BMs as a mechanism that unlocks latent economic value embedded in a technology's potential, to a more critical view of BM as a source of cognitive bias that filters against technical potential when the technology does not fit the current BM.

Early work on strategy used this to offer a cognitive structure or mental map to managers about the firm's growth opportunities (Doz & Kosonen, 2010). Indeed, Edith Penrose (1959) started by offering a cognitive model of rational calculation

and full information. She introduced the notion of sources of growth for the firm arising from management's ability to manage additional businesses. Later, Teece (1982) relaxed the assumption of full information and built a framework where a firm has underutilized resources and imperfections in the markets that can be configured to confer advantage for diversification moves. Empirical evidence has shown how a firm's technological position helped it enter nearby business areas because experience in "related" technologies reduced the costs of entering into adjacent areas (Silverman, 1999; Teece, 1993). Mintzberg (1979, 1994) further relaxed the information assumptions underlying the process of making strategy. He identified the "emergent" character of many successful strategies and emphasized the importance of adaptation over teleological planning. Burgelman (1983a, 1983b) developed a process model for how a firm can enact strategic change based on managing limited information between front-line managers, middle managers, and top managers.

A later branch incorporated bounded managerial rationality into the idea of strategy and BMs. Prahalad and Bettis (1986) introduced the notion of a dominant logic: a set of heuristic rules, norms, and beliefs that managers create to guide their actions. This logic usefully focuses managers' attention as they seek new opportunities for the firm. It also facilitates organizational coordination across different parts of the company but also makes them overly dependent on such mental models in their evaluation of new opportunities.

Indeed, importantly for this chapter, the dominant logic of Prahalad and Bettis also implicitly filters out ideas and behaviors that do not comport with the dominant logic. Concretely, firms suffer from cognitive biases *toward* investments in technologies that can be deployed within familiar BMs sometimes to the point of over-investment. Companies are biased *against* making investments in technologies that do not fit with their established BMs even if there may be significant potential value in those technologies. For instance, an analysis of Xerox's showed that Xerox failed to invest in many of the technologies that originated out if its PARC research facility (Chesbrough, 2002). More recently, Bohnsack, Pinkse, and Kolk (2014) highlighted how the development of sustainable technologies could not be done in the current BMs of fossil fuel companies because it violates the dominant logic of their business.

An emergent research stream employs design-centered thinking to conceive of BMI as a process consisting of searching, experimenting, and transforming the current BM (Demil & Lecocq, 2010; Doz & Kosonen, 2010; Foss & Saebi, 2017; Massa & Tucci, 2013; Osterwalder & Pigneur, 2010). Adopting this approach leads one to take a dynamic approach and look into the organizational behaviors that facilitate or hinder the process of designing and improving BMs. We now turn to these issues in the context of Open Innovation.

Behavioral Constraints in Open Innovation: Not Invented Here and FOLF

Open Innovation has recently been defined as "… a distributed innovation process based on purposively managed knowledge flows across organizational

boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model" (Chesbrough & Bogers, 2014). From its inception, the Open Innovation concept has been closely linked to the idea of BMs. Early work on Open Innovation included an empirical observation of "false negative" technologies. False negatives refer to technologies that are not pursued by internal technology and business managers because they do not fit with the core BM, but when they exited to the outside, different BMs allowed these technologies to generate significant economic value. One famous false-negative example is the fact that the cumulative market value of technology spin-off projects out of Xerox's PARC research facility exceeded the value of Xerox's own market value (Chesbrough, 2003).

An immediate implication of this research was that there was tremendous latent economic value to be realized from focusing on false-negative technologies and creating processes to explore alternative BMs for them. Allowing these technologies to flow out of the focal organization to other entities is called "inside-out" Open Innovation. This idea of inside-out Open Innovation was one of the key original contributions of the 2003 book that introduced Open Innovation. Since that time however, inside-out processes have been relatively less practiced and less studied than the processes of outside-in Open Innovation (Chesbrough, 2017).

However, a later branch of the Open Innovation research that focused on getting business results from Open Innovation revealed that its promise comes with real barriers to overcome (Chesbrough, 2019). Knowledge and technology flows must be carefully and thoughtfully managed if they are to generate results. They do not arise by themselves absent such management. There are important behavioral factors that would block Open Innovation unless these factors are themselves carefully managed.

For instance, the Not Invented Here (NIH) syndrome is one well-known concept hearkening back to Katz and Allen (1982) and presented as a formidable barrier to Outside-in Open Innovation (Gesing, Antons, Piening, Rese, & Salge, 2015; Hannen et al., 2019). NIH is an attitude of technical pride often supported by historical success by internal technical groups in achieving important technological outcomes that lead to an overestimation of internal ideas relative to external one (West & Gallagher, 2006).

Notwithstanding these concerns, recent surveys of large organizations reveal that outside-in Open Innovation is widely practiced (Brunswicker & Chesbrough, 2018). Roughly 80% of large firms surveyed in Europe and North America were practicing at least some aspects of Open Innovation, and outside-in practices were by far the most common. Thus, NIH behavior may be limiting the practice of Open Innovation to some extent, but the survey data suggest that this limitation is not too severe.

Left unaddressed are the findings from the same survey that show the Inside-out Open Innovation actions are much less practiced relative to Outside-in actions. We turn now to what behaviors might be inhibiting Inside-out Open Innovation actions.

The FOLF

If there are many possible false-negative technologies in the technical organizations of many large companies, then why don't we see more practices focusing on unlocking the potential value in them? This pattern was observed with Xerox PARC's many computer technology spin-off companies. It was also observed in the pharmaceutical industry, in Chesbrough and Chen's (2015) study of daptomycin (trade name, Cubicin). This was an intravenous antibiotic drug that was abandoned by Eli Lilly, but successfully revived and turned into a blockbuster drug, by the specialty pharma company, Cubist. In their interviews with managers from both companies, they found that managers inside Lilly who restricted the external use of unused technologies incurred no penalty for allowing abandoned technologies to languish. Conversely, when abandoned compounds are recovered by other companies, the internal managers who allowed this external use of unused technologies risked "looking foolish" if the technology becomes successful. "Who let that one get away?" a senior manager might inquire. The fact that the technology was going nowhere internally is overlooked, and the external success of an outside party suggests that some internal manager had failed in his or her duty.

This FOLF greatly inhibits the chance to allow unused internal technologies to go outside for others to use in their businesses and BMs. Yet to our knowledge, this behavior has not yet been introduced into the academic literature on searching for, designing, or improving BMs. We suggest that this is an oversight, and that organizations may be leaving money on the table by not opening up unused internal technologies to others for them to evaluate and use in their businesses and BMs.

Where might this manifest itself? How would an organization know if it suffered from this syndrome? We offer a couple of ways to identify the possible risk of FOLF and then show its presence in a few mini-cases below. One indicator of possible false negatives, and the behavior of FOLF in failing to address them, would be a pattern of low patent utilization. This low utilization of patents results from a disconnect between the motivations of the technical organization to generate more technologies – indeed, some technical organizations' performance is measured in part by the number of new patents received each year – and the motivations of the internal business units to employ that technology (which can be quite low if the patented technology is not closely connected to the needs of the business). We explored this phenomenon with several managers and our discussions revealed that it was fairly common to observe such low patent utilization in large firms.

A related manifestation might be in working with startup companies. Many innovation groups in large companies seek out relationships with young startup companies to access new technologies and stimulate greater innovation. Yet internal businesses in those large companies may disdain or simply ignore the technologies of these young startups. If there is a lack of adoption of new technologies from young startup firms by these internal business units, then some combination of NIH and/or FOLF may be in play. We will clarify this further below in the discussion of the mini-cases.

Table 1. Comparison of NIH and FOLF.

	NIH syndrome	FOLF
Phenomenon observed	Technical managers resist using internally technologies from Outside or Outside-In Open Innovation	Business Unit's managers resist allowing unused internal technologies to go Outside or Inside-out Open Innovation
	Concretely, managers are rejecting external ideas or technology for their current business model	Concretely, managers reputations are safer if they bury the opportunity than if they expose it to outsiders. This restricts consideration of alternative business models
Manifestation	Low use of external patent (or startups)	Low use of internal patent (or startups) by external actors
Source	Internal technical organization resistance	Internal business unit resistance
Outcomes	Underuse potentially valuable external ideas and technologies in one's own business model	Sharp restriction on external evaluation and use of unused internal technologies
	This reduces supporting technologies for current business model	This restricts possible new business models

The Practical Impact of these Behavioral Constraints: Three Mini-Cases

Case 1: Lucent's New Ventures Group.

(Read Chesbrough (2003) and more specifically chapter 7 for more details on the case.)

Internal Challenge and FOLF. In 1997, Lucent, an American multinational telecommunications equipment company, had an issue. They had lots of unused patents coming out of Bell Labs, and internal researchers who were truly convinced of the economic value of their potential technology complained about the neglect of these technologies. Regardless, the company refused to develop these patents internally. The main reason was that the technologies did not fit Lucent's established businesses. For the inventors, seeing their technology languish was heartbreaking, and some of them wanted to spin off the unused technology into a new organization. However, some managers of Lucent stood in the ways of these inventors. They did not want the inventors to try to explore an alternative BM externally to the company even if they knew Lucent would not use it. These managers feared Lucent's reprecussions in case the inventor became successful outside of Lucent. They would have to justify why they did not give the inventor

the opportunity internally. This behavior that constrains the possibility to explore the technology externally is an example of the "Fear Of Looking Foolish."

Management of FOLF and its Implications. In response, they created Lucent's New Ventures Group (NVG). The NVG was created in order to commercialize technologies that did not fit with any of Lucent's established businesses. The NVG could nominate any inside ideas or projects of the R&D labs that they sense could be brought to market via an independent venture. Once a new idea or discovery was nominated, the internal Lucent business groups were given first priority over the technology. If the business unit wanted to use the technology in its own business and take over funding the technology, then that technology would migrate from the lab to the business unit. Essentially, the technology would go into that unit's BM or perhaps into a minor variant of that BM.

Importantly, the business unit had to make this determination within a fixed period of time – initially as long as nine months but later reduced to three months. Thus, the business unit could not wait indefinitely for a nominated technology. However, if the business unit declined to accept the responsibility and funding for the idea or technology, then the NVG could take it to market itself or make it available for external licensing to other companies. This licensing process was a success because Lucent received over $400 million in 2001 in licensing payments, and thus this option was frequently employed as well.

This process is particularly interesting because it allowed Lucent a way to discover possible false-negative technologies. For instance, in 1997, a technical project about an optical video coder that was deemed to address a small niche market actually came to market. Its sales were initially small but growing nicely and pulling in

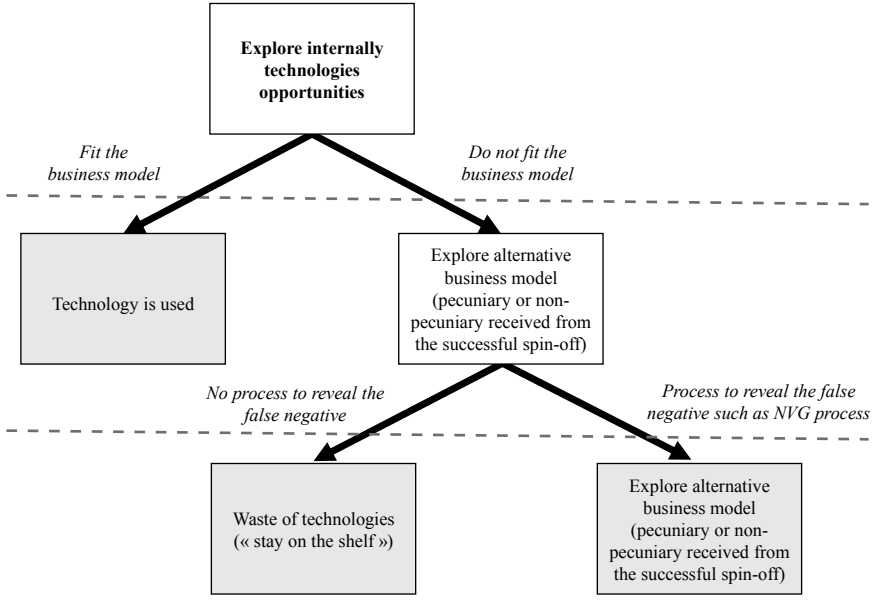

Fig. 1. The Lucent Process.

sales of other Lucent products. In 1997 however, one of Lucent's business units was no longer interested in this project. The Lucent business unit manager argued that "it's just a niche market, and therefore not interesting to us." However, the NVG nominated the ideas and moved it to external commercialization. Two years later,

> the venture has already done $15 to 20 million in revenue, and it'll do $25-30 million next year. Moreover, it is helping us close big deals with our other equipment in key accounts.

The NVG process represents a powerful "second opinion" that reveals potential false-negative technologies such as the optical video coder. The business units now faced a cost if they delayed their use of a new technology because that technology might then be made available to outsiders for evaluation and possible use. We show how NVG impacts the Lucent process in Fig. 1.

Case 2: Telefonica's Go Ignite program

Internal Challenge and FOLF. In 2016, Telefonica launched a startup program called Go Ignite done in collaboration with three competing telecommunications companies (called Telcos in the industry jargon). This Go Ignite program was initially created to strengthen the appeal of the Telcos to startup companies (i.e., outside-in). Many startups viewed the telcos as slow movers who were tied up by slow processes and a lack of an innovative mindset. By banding together, the Go Ignite Telcos could offer a combined market of over 1 billion consumers, making them much more attractive to potential startup partners, and attracting better, more capable startups to work with them. Doing this required each telco partner to share deal flow and exchange opportunities with one another for specific and agreed vertical target domains such as Big Data, cybersecurity, or IoT. In the process, Telefonica is connecting qualifying Startups to their competitors, in addition to themselves.

The initial goal was that these connections called "referrals" would attract more and higher quality startups to the telcos. Once connected, the hope was that these higher quality startups would be able to grow larger and faster than otherwise.

What they did not expect was some misunderstanding and frictions concerning the "referrals" system inside the organization. From time to time, the persons in charge of the referral could receive an intense call from an internal business unit who would not understand why the startup was being referred to a competitor. These intense calls could happen even if the business units had previously rejected the startups or had been in discussion for months without finding any agreement.

This is another example of the FOLF. The business units feel insecure when the startups are referred to a competitor. It is not the relevance of its decision that they fear – they know whether the startup fits their current BM or not. What they fear is that the startups become successful on the outside with another competitor, and that the business unit then must justify why they did not explore an

alternative BM even though it was out of their scope. For instance, none of the big Telcos had seen the potential of WhatsApp and none predicted that it could become a competitor for text messaging. It required an alternative BM.

Management of FOLF and its Implication. Telefonica decided to keep the referral system of Go Ignite. By doing so, they split the decision between internally exploring a startup and the decision of referring the startups to an external actors. The former is handled by the business units and the later by Telefonica's team inside Go Ignite. Splitting the decision is a managerial principle allowing Telefonica to not suffer from a FOLF that could be impeding the exploration of alternative BM externally to Telefonica. What was not expected is that these referrals processes would change the internal perception of Telefonica's business units toward the external ideas of these startups, but that is exactly what happened.

As with NVG above, before Go Ignite, there was no forcing function to get the business units to pay more attention sooner to the work of these young startups. Go Ignite changed this paradigm because some of the startup referrals that Telefonica business units passed over attracted the interest of one or more of the other telcos in the program. Another telco showing interest in the startup was powerful validation to the internal Telefonica businesses that this startup might be worth engaging. Simply knowing that a competitor could have the opportunity to work with the referred startups increased the business units' attention toward the external startups in the selection process.

An illustration of this phenomenon is that a business unit decided to work with the startups only when the business unit discovered that this startup had been introduced by Telefonica to a competitor and the startup had already agreed

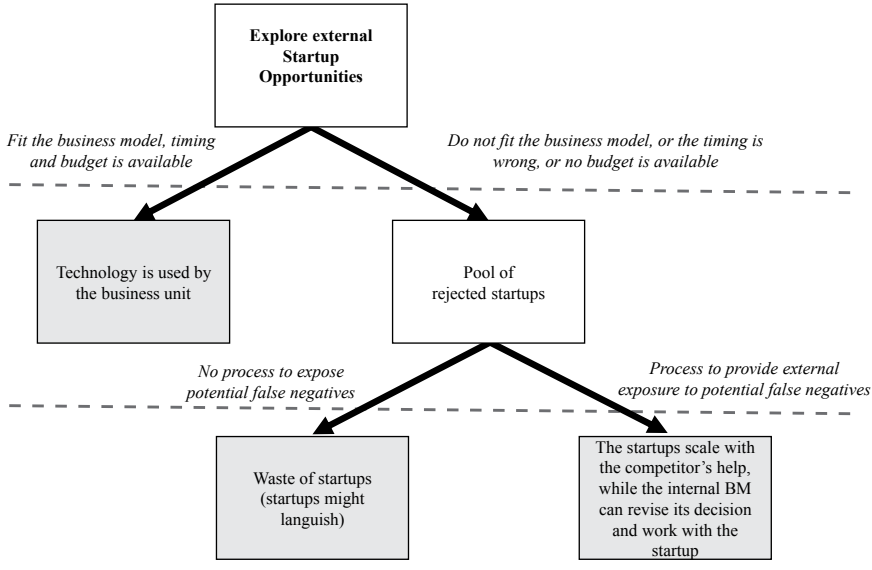

Fig. 2. The Telefonica Process.

upon a contract with the competitor. Soon after, the contract with the Telefonica business unit was signed. Fig. 2 below shows how Go Ignite impacts the Telefonica process.

Case 3: Plug & Play

For the record, this mini-case aims to show a broader implication of a FOLF across multiple startups and how it can be managed.

Internal Challenge and FOLF. Plug & Play is a platform that aims to connect its large corporate clients to promising startups able to solve corporates' specific challenges. Plug & Play is specialized in pin-pointing each client corporation's business challenges and matching them to the startups in Plug & Play's portfolio of venture investments with the right solutions. The entire process is based on a deal review process where the startups present for 30 minutes in front of Plug & Play's corporate clients' chief information officers (CIOs), chief technology officers (CTOs), and/or chief marketing officers (CMOs). The goal is to identify some startups for these corporates to do business development, investment, or acquisition. When the startups are selected, the large company will commit three engineers at 20% of their time to codevelop a proof of concept within 100 days with the chosen startups. One of Plus & Play's big successes is a startup that codeveloped a solution with the french bank BNP Paribas that allows the bank to save 10 million euros a year.

However, the CEO and founder Saeed Amidi quickly realized that even if the business units of these large corporations were ready to sign a big check, their CIOs, CTOs, and/or CMOs were not always ready to spend time to listen to the startups pitch and really be involved in a collaboration with the startups.

The worst was that some of the managers complained if the startups were going to pitch in front of a competitor even if they had not come to their dedicated pitch and had not showed any interest in getting involved with the startups. This is the FOLF – a conscious or unconscious behavioral constraint that makes managers resist the success of the startups they denied.

Management of FOLF and its Implication. To solve this challenge, Saeed Amidi came up with an idea: rather than making the startups pitch only in front of one company, enable the startups to pitch in front of several corporates including peers from competing companies. The result was instantaneous. The business unit managers who previously had no time to come to hear these pitches suddenly made the time to attend. These busy managers were afraid that one of their peers from a competing company would start working with a promising startup that the busy manager had previously rejected because he or she lacked the time or the budget to explore potential collaboration with the startup. In other words, they risked looking foolish and a senior manager inquiring "Why did we not invest in these startups while everyone else did?" or "Why did we not anticipate these shifts in the environments while the competitors did?"

A surprising implication of this fear is that not only the CIOs, CTOs, and/or CMOs got more engaged in the startups pitching, but they changed their decisions. Some of them started to invest in startups in which they had initially criticized the technical potential or the realization of economic value. They wanted

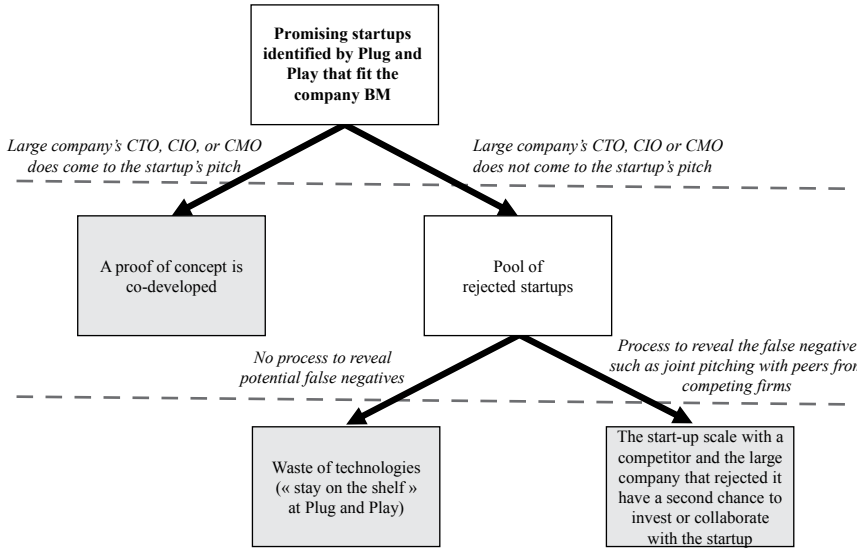

Fig. 3. The Plug & Play Process.

to keep an option to show to their senior managers in a path that did not believe in but that competitors were investing in. Fig. 3 shows the Plug & Play process.

For the record, Plug & Play not only connects startups and large companies, but it also invests in some of the startups. Saeed Amidi recognizes that it is impossible to pick winners in advance especially in very different industries, but he argues that it is possible to use others' wisdom in making your decision. Thus, Plug & Play invests in startups only if they have also been invested by a large company. The pitching of startups in front of several large competing companies can lead to a private purpose of validating the startups identified before investing.

Managerial Responses to FOLF

Managers in organizations where there is a significant investment in technology development are likely to be at risk of the FOLF syndrome. How might one assess whether this risk is significant or not in their own organization?

Concrete indicators would be the rate of Patent Utilization or a new measure: the Invested Startups Utilization in the organization. For the rate of Patent Utilization, this indicator is comprised of a ratio formed by all the patents owned by the organization as the denominator. Those patents that are actively used or outlicensed are in the numerator. Anecdotal evidence suggests that this ratio ranges from 5% to 30% in most large organizations implying that 70% or more of owned patents are neither practiced nor licensed to others. For the rate of the Invested Startups Utilization, this indicator is comprised of a ratio formed by all startups invested by the organization in the denominator. Those startups working with the

Table 2. Sum-Up of the Managerial Solution and FOLF of Each Mini-Case.

	Lucent	**Telefonica**	**Plug & Play**
FOLF	Lots of unused patents and some managers resisting internal inventors that want to spin out their technology denied by Lucent	Business units get upset if the startup is referred to a competitor even those they had denied it	CIOs, CTOs, and/or CMOs do not want the startups that they denied to be pitching in front of competitors
Managerial solutions implemented	Allowing the New Ventures Group to work with any internal patent that the BUs are not developing (with a three months warning)	Referring denied startup or promising startup that need scaling opportunities to a competitors	Inviting competitors to attend the startup pitch and work with it if they want (the pitching is occurring simultaneously in front of all the competitors)
Implications observed after the implementation of a process to reveal false negative	Some business units decide to work with some of the patents nominated by New Ventures Group while they had the opportunity before but had not done it	Some business units speed up their decision to work or not with a startup and use the competitors' decision as an argument to justify internally their investment	Decide to come to the startup pitch while they had declined the invitation previously

organization's business units or competitors' business units are in the numerator. For the startup utilization, this rate is according to a specialist in startups and big companies' collaboration of 10% implying that 90% or more of invested or selected startups do not generate direct results for the organization business units. If your organization has a similar ratio, then it is likely to suffer from FOLF.[1]

One managerial response to FOLF observed in Lucent's NVG is that one can adopt corporate policies of "use it or lose it" to counteract FOLF. In Lucent's

[1]Another informal indicator to a firm suffering from FOLF would be the internal resistance that a manager encounters when a patent or a startup is refereed or out-licensed to external factors including competitors. How long does this process take? How many meetings are required? How far up the chain of command are decisions taken to allow this to happen? If it takes 12 months, with dozens of meetings, and the signoff of the CEO or COO, then this likely indicates a strong case that the organization has FOLF.

NVG, the internal business units had first claim on new technologies, but this claim had a time limit. After a nine-month period, if no business unit adopted a particular technology (which meant, among other things, taking over the budget for its further development), then Lucent's NVG group and its licensing group had the chance to evaluate the technology. One interesting second-order effect of this policy was that Lucent's internal business units paid more attention to technologies and did so more rapidly as a result of this policy. A similar policy, with a similar business unit response, was observed at Procter & Gamble (Chesbrough, 2006).

A second managerial response to FOLF can be found in the Go Ignite program of Telefonica. Startups that were identified by Telefonica's venture group were sometimes overlooked by internal Telefonica business units. The internal business units of Telefonica responded with renewed interest when these ventures attracted the interest of Telcos that were also part of Go Ignite. Having another telco interested in the startups helped to validate the business potential of otherwise overlooked technologies in these startups. Thus, some business units shift from resisting the referral system to perceiving it as an ally that they can use to support their own investment in the startups. This is an important implication for corporate venture capital programs more generally. Just because a venture team makes an investment in a new venture, one cannot assume that the internal businesses will automatically embrace the venture's technology. Instead, it may be prudent to seek third-party validation for that venture's technology in order to attract interest and action from the internal businesses of the investing company.

A third managerial response to FOLF: Are competitors engaged already?

As for Telefonica, Plug & Play noticed that its corporate clients were overlooking the startups that it had identified and incubated for them. This overlooking can be concretely observed by the low presence or engagement of corporate clients into startups pitching day. To overcome it, they opened up these pitches to its corporate clients' competitors. Thus, competitor presence is a managerial tool that managers can leverage to justify internally an activity such as listening to startup pitches.

The Plug & Play mini-case goes further. Some managers decide to take an option in a startup that they do not believe in because they risk "looking foolish" as the competitors decided to invest in the startups. "Why are we not doing it if competitors are doing it?" a senior manager might inquire. In that case, the fact that the technology did not fit the BM is overlooked, and the competitors' decisions to invest in the startups suggest that some internal manager had failed in his or her analysis. It reveals that the key challenge is first to have the corporate investing in the startups. The other competing corporate will follow by FOLF. Thus, when there are processes to reveal false negatives, the FOLF changes behavior from generating "resistance" to generating "action."

Conclusion

While BMs are increasingly important in managing innovation, managers are limited in their ability and motivation to search for them. One important behavioral

constraint that limits this search for innovation BMs is the "Fear of Looking Foolish (FOLF)." This syndrome greatly limits the use of Inside-out Open Innovation and likely results in lost economic value for the firm. However, revealing this latent value can make the manager who previously declined to employ the technology feel foolish. It is safer for this manager that the technology remains on the shelf unused. Due to this behavioral constraint, the decision for whether to expose unused internal technologies to outsiders should not be left only to the internal managers. Rather, corporate policies should be adopted that open up these unused, potentially false-negative technologies, to outside parties even including competitors. FOLF is a syndrome that may arise in a variety of contexts from low utilization of internal patents to low levels of engagement from business units with startup ventures, to low levels of interest in corporate sponsors of external incubators. We hope other researchers will join us in exploring this phenomenon further in future research, and we hope that managers may find some of our suggested responses to be useful in addressing FOLF.

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Business Model Innovation in Incumbent Firms: Cognition and Visual Representation

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Abstract

Business model innovation (BMI) constitutes a priority for managers across industries, but it represents a notoriously difficult innovation, with several challenges, many of which are cognitive in nature. The received literature has variously suggested that one way to overcome challenges to BMI, including cognitive ones, and support the cognitive tasks is using visual representations. Against this background, we aim at offering a contribution to the emerging line of inquiry at the nexus between business models (BMs), cognition and visual representations. Specifically, we develop a new method for visual representation of the BM in support of simplification of the cognitive effort and neutralisation of cognitive barriers. The resulting representation – a *network-based representation, anchored on the activity-system perspective and offering complementarity and centrality/periphery measures* – allows to visually represent an existing BM as a network (nodes and linkages) of interdependent activities and to express information related to the degree of centrality/periphery of single activities (nodes) with respect to the rest of a BM configuration. This information, we argue, is potentially very valuable in supporting the cognitive tasks involved in business model reconfiguration (BMR). We guide the reader to progressively appreciate how the development of the proposed method for visual representation is anchored to two main characteristics of BMR, namely the discovery-driven nature of BMR and the path-dependent nature of BMR. We offer initial insights on the cognitive value of such a type of representation in relationship to the simplification of the cognitive effort and the neutralisation of cognitive barriers in BMR.

Keywords: Business model innovation; business model reconfiguration; cognitive view; visual representation; activity system; network-based representation

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Introduction

Business model innovation (BMI) constitutes a priority for managers across industries (Amit & Zott, 2012), but it is a notoriously difficult innovation activity (see, e.g., Johnson, Christensen, & Kagermann, 2008) that is affected by numerous challenges (see, e.g., Björkdahl & Holmén, 2013; Koen, Bertels, & Elsum, 2011; Sund, Bogers, Villarroel, & Foss, 2016), many of which are cognitive in nature.

At a general level, these challenges range from sensing opportunities (Teece, 2007) and generating visions for BMI (De Reuver, Bouwman, & Haaker, 2013; Martins, Rindova, & Greenbaum, 2015) to the need to overcome dominant logic traps (Chesbrough, 2010; Zott, Amit, & Massa, 2011) and reduce the cognitive load associated with BMI (Doz & Kosonen, 2010). This last task is accomplished by simplifying the complexity inherent in business models (BMs) (Massa, Viscusi, & Tucci, 2018), including dynamic complexity that results from interdependencies among BM components (Casadesus-Masanell & Ricart, 2010). In addition to these difficulties, BMI is generally characterised by considerable uncertainty (Thompson & MacMillan, 2010), whether perceived or inherent, which creates challenges from the point of view of scanning, interpreting and acting upon external environments (Sund, 2015). In a nutshell, BMI involves many distinct types of cognitive tasks and relative barriers, making the study of BMI and cognition extremely rich, interesting and, simultaneously, challenging.

The received BM literature has variously suggested (see, e.g., Chesbrough, 2010; Henike, Kamprath, & Hölzle, 2019; Täusher & Abdelkafi, 2017) that one way to overcome challenges to BMI – including cognitive ones – and support the cognitive tasks involved in BMI is to use visual representations of the BM. Visual representations have several general cognitive merits, as well as communicative and collaborative ones, that can, in many ways, support overcoming not only cognitive but also general barriers to BMI (Chesbrough, 2010; Eppler & Hoffmann, 2012; Eppler, Hoffmann, & Bresciani, 2011; Eppler & Platts, 2009; Gordijn & Akkermans, 2003; Osterwalder & Pigneur, 2010; Snihur, Lamine, & Wright, 2018; Täuscher & Abdelkafi, 2017). Visual representations can support creativity and idea generation (Eppler & Hoffmann, 2012); they can reduce cognitive load (Doz & Kosonen, 2010), promote knowledge sharing (Doganova & Eyquem-Renault, 2009), support collective understanding and stimulate collaborative innovation (Eppler & Hoffmann, 2012). Importantly, visual representations can also be used to articulate, challenge, transfer and reassemble the tacit knowledge at the background of implicitly understood mental schemata, heuristics, narratives and other organisationally embedded manifestations of BMs as cognitive and linguistic instruments (Massa, Tucci, & Afuah, 2017). Thus, research on visual representations represents a fruitful area of inquiry for BMs and cognition, and for BMI in general (Foss & Saebi, 2017), across a broad spectrum of possible cognitive tasks. These include ideation, collective sense-making and simply neutralising dominant logic traps. Arguably, these cognitive tasks are distinct or only partly overlap, but this heterogeneity is rarely discussed, and its implications for research at the nexus between BMI, cognition and visual representations may not be sufficiently recognised.

This is perplexing, given the quantity of research that has now accumulated. Since the beginning of research on BMs, much work has been published (albeit not always in top-ranked journals) on visual representations of BMs. This work has resulted in a plethora of tools, design artefacts and instruments that offer visual representations of BMs (see, e.g., Henike et al., 2019, for a recently published review). Yet there has been a potential disconnect between these visual-representation instruments and research on BMs and cognition, as recently noted by Täusher and Abdelkafi (2017). This disconnect, we suggest, manifests in two main ways: notably, in 1) the design of the instruments themselves, in relation to the specific tasks under investigation, and 2) the validation of their cognitive value.

The first manifestation refers to the fact that the design of the instrument – i.e., the process followed to generate the instrument itself – may have not been sufficiently accompanied by efforts to understand the specific sub-phenomena behind BMI. Within the domain of conceptual modelling, these efforts are referred to as requirements engineering. Many tools for visually representing BMs claim to be useful for BMI (or parts of BMI), but it is difficult to understand what specific features of the BMI process have informed the design of such tools. How to use them and under what conditions to do so are similarly unclear. As previously noted, BMI involves several different activities with different cognitive manifestations. This heterogeneity of activities and cognitive manifestations suggests that it is unlikely to find a universally valid instrument that would work effectively for all activities. However, the prevailing literature at the nexus between visual representations and cognition seems to be relatively silent on this matter. We are left without knowledge of how to ground a tool's design in the specific cognitive tasks involved in a given phenomenon – in our case, BMI in its different delineations (see later).

The second way in which the disconnect has manifested refers to the fact that the cognitive values of different instruments – their abilities to overcome cognitive barriers and biases resulting from taken-for-granted heuristics, or to support collective sense-making or ideation, for example – have not been subject to empirical validation and testing. It could be that a method to visually represent the BM has the potential to support certain activities or specific BMI tasks by intervening in the cognitive process underlying them, but this potential does not ensure that it actually does. Given also that organisation-level interpretation and cognition are affected by a number of boundary conditions (including modes of search) and various types of uncertainty (Sund, 2015), a fact that would further invite embracing a contingent approach, this lack of validation is a particularly strong qualifier of claims that a tool can effectively support certain tasks. Validation requires the testing of specific hypotheses in carefully designed experiments and other forms of empirical investigation. In turn, the ability to validate a tool requires that the specific phenomena and cognitive tasks for which the tool is employed are understood and delineated and that the design choices that led to the generation of a given visual representation are made explicit. This specificity is largely lacking.

Building on these premises, this paper aims to contribute to the emerging line of inquiry at the nexus between BMs, cognition and visual representations.

Specifically, we illustrate the process that we followed in developing a new method for visual representation of the BM in support of the simplification of the cognitive effort in, and the neutralisation of cognitive barriers to, the innovation of *existing* BMs.

We differentiate between BMI in existing organisations, or business model reconfiguration (BMR), and BMI for newly formed organisations, or business model design (BMD) – arguably related yet distinct phenomena (Massa & Tucci, 2014) – and focus on the former.

Our proposed method culminates in a new tool for visual representation of BMs. The result, a *network-based representation, anchored on the activity-system perspective and offering complementarity and centrality/periphery measures*, allows the visual representation of an existing BM as a network (nodes and linkages) of interdependent activities and the numerical (but also visual) expression of information related to the degree of centrality/periphery of single activities (nodes) with respect to the rest of the BM configuration. This information, we argue, is potentially very valuable in supporting the cognitive tasks involved in BMR. We guide the reader to progressively understand how the development of the proposed method for visual representation is anchored to two primary characteristics of BMR, namely its discovery-driven nature and path-dependent nature. We offer initial insights on the cognitive value of such a representation as regards simplifying the cognitive effort involved in BMR and neutralising cognitive barriers to it.

Thus, our main contribution is to offer an illustrative example of the process involved in grounding the development of a visual tool for BMI in a specific instance of BMR (innovation of *existing* BMs) and in a relationship to specific cognitive tasks: simplifying cognitive effort and neutralising cognitive barriers. This is a small yet potentially important initial step towards a more consolidated scholarship of BM, cognition and visual representations.

We do not offer to test hypotheses related to the cognitive value of the proposed instrument but offer some insights and considerations which could be taken as a basis for future research.

This article proceeds as follows: We begin by offering a discussion on the BMR phenomenon, specifically emphasising its discovery-driven and path-dependent nature. Building on the main insights that emerge from this first step, we highlight four main design criteria motivating the proposed method, namely i) network-based representation, ii) activity-system perspective, iii) complementarities and fit and iv) centrality/periphery measures/visuals. Next, we illustrate how to embed each of these in a methodology for visual representation in BMR. Finally, we illustrate the application of this methodology to produce a representation of the BM. We exemplify the illustration using the iconic case of Ryanair, as its low-cost BM has been well documented in the accepted literature (e.g., Casadesus-Masanell & Ricart, 2010; Rivkin, 2000b), making analysis, comparison and understanding of this example easier and less ambiguous. We conclude by discussing our proposed approach's meaning and significance for research on BMs and cognition, and we detail ideas for future research.

BMI, BMR and BMD

We began by defining our goal, i.e., the purpose of modelling (see Burton-Jones et al., 2009), in broad terms: to offer a tool in support of the cognitive process involved in BMR. This general objective implies two sub-tasks that follow as corollaries: isolate BMR from other instances of BMI and unpack the cognitive process involved in it.

As noted earlier, BMI comprises two distinct phenomena with different implications for research at the nexus between BMs and cognition: BMR and BMD. In general terms, BMR has been defined as the process of innovating a BM when one is already in place. BMD, however, refers the process of designing an entirely new BM (Massa & Tucci, 2014). To slightly oversimplify, BMR is relevant to incumbent organisations, which, by definition, already have a BM. BMD is a challenge for start-ups, which are temporary organisations in search of a scalable BM (Blank & Dorf, 2010). Both are forms of BMI, but they entail important differences. In the words of Massa and Tucci (2014, p. 425),

> because reconfiguration assumes the existence of a BM, it involves facing challenges that are idiosyncratic to existing organizations, such as organizational inertia, management processes (that may inhibit or foster change), modes of organizational learning, modes of change, and path dependent constraints in general, which may not be an issue in newly formed organizations. On the other hand, newly formed organizations may face other issues such as considerable technological uncertainty, lack of legitimacy, lack of resources and, in general, liability of newness, which do influence the design and validation of new BMs (cf. Aldrich & Auster, 1986; Bruderl & Schussler, 1990).

To put it differently, BMR is about the tension between the old and the new, while BMD is about the tension between the new and nothing else – or between the new and everything.[1] BMD and BMR both involve cognitive challenges, but these challenges are arguably different.

Thus, an important qualifier is that this paper focuses on BMR and the nature of the phenomenon behind it in relation to cognition.

Following our reading of the BMI and BMR literature, we decided to focus on two main facets of the BMR phenomenon that are meaningful from a cognitive standpoint and have been explicitly or implicitly addressed in the prevailing literature. The first is the discovery-driven nature of BMR (McGrath, 2010; Teece, 2007, 2010), emphasising the appropriateness of experimentation for BMR. The second is BMR's path-dependent nature, i.e., the fact that an existing BM

[1]We thank an anonymous reviewer for this insight.

introduces structural and cognitive constraints that generate path dependence.[2] We treat them separately for analytical purposes, but the reader will realise that they are overlapping concepts.

Discovery-Driven Nature of BMR – Requirements

The literature has variously emphasised that BMR is the result of discovery-driven processes (see, e.g., McGrath, 2010). This stands in contrast with ideas of strategic planning, and even control, for BMR. BMR and, to a large extent, BMI, in general, cannot be planned in the strict sense.

These ideas have their theoretical roots in the notion of discovery-driven planning (DDP) (McGrath & MacMillan, 1995) and modern versions of it, including lean-start-up or agile management. The basic idea is that because of considerable uncertainty, it is impossible to ascertain what will work through formal analysis and planning (Thompson & MacMillan, 2010). Analysis and planning are more appropriate in more stable, more predictable, less cognitively complex and less uncertain environments and contexts, such as innovation manoeuvres within well-defined industry or BM boundaries or in highly integrated value chains (as opposed to fragmented ecosystems across industry and BM boundaries). On the contrary, identifying the 'BM of the future' for an existing company is an exercise characterised by a degree of uncertainty that cannot be resolved through standard analysis and planning. Many sources of uncertainty stem from events, such as the way technology evolves, regulation and market dynamics, which are related to the future and as such as not predictable. This fact even further emphasises the importance of proceeding via experimentation and exploration of different growth opportunities while working with an existing BM. In this way, new BMs are 'discovered' rather than planned: they progressively 'emerge' as firms engage in experiments, trial-and-error learning and continuous adjustment (see, e.g., Sosna, Trevigno-Rodriguez, & Velamuri, 2010).

A fundamental question then arises: 'what do firms experiment with?' Answering this question is beyond the scope of this paper's humble contribution. For the purposes of this paper, it suffices to say that the seizing of growth opportunities (while employing a contemporary BM) requires a firm to change specific activities

[2]Here, it is important to underline that the phenomenon behind BMR, given that it involves dynamics within an organisation, is complex and multifaceted; it comprises aspects such as organisational inertia, collective sense-making, structural and cognitive barriers, managerial interpretation and interpretation systems, organisational learning and many other aspects – both scientific, as in 'theory-driven' or 'theory-oriented', and more practice-oriented – that have variously been described by the literature under the umbrella term of 'organisational change'. It would have been impossible to consider all of these aspects together. We purposefully decided to focus on BMR as configurations of interdependent activities and the discovery-driven nature of BMR since these two aspects, to the best of our knowledge, represent two of the most important qualities that set BMR apart from more 'typical' strategic and organisational-change thinking.

(or entire bundles of activities) within the existing BM. According to Amit and Zott (2012), there are three ways in which existing activities can be changed: i) by changing the 'content' of an activity (e.g., by adding novel activities, as through forwards or backwards integration); ii) by changing the 'structure' linking activities; and iii) by innovating the 'governance' of an activity (e.g., by changing one or more parties that perform any of the activities). In short, the discovery-driven nature of BMR implies that the locus of innovation, the fundamental unit of analysis in experimentation, is the single activity (or the bundle of activities).

However, as also indirectly highlighted by Amit and Zott (2012), a single activity cannot be changed without making changes to other activities. This is because activities in an existing BM are interdependent. We now turn to the second aspect of BMR, its path dependence.

Path-Dependent Nature of BMR – Requirements

BMR assumes the existence of a BM, which constrains experimentation and the changing of activities. Thus, and differing from BMD, BMR emphasises path dependence and inertia. The existence of a BM in BMR implies two types of barriers: cognitive and structural ones (Chesborugh, 2010).

Cognitive Barriers. The nature of cognitive barriers to BMR has been variously illustrated in BM literature (Chesbrough & Rosembloom, 2002; Massa et al., 2017; Zott et al., 2011). For the purposes of this manuscript, it suffices to remind the reader that managers in existing firms make sense of their BM by creating, over time, cognitive representations of it. Within a given firm, such a cognitive representation manifests as a general mental model, or 'a theory of the business' (Drucker, 1994), a prevailing 'wisdom'. This wisdom is the result of the largely unconscious process of selecting and retaining a collection of assumptions, 'theories' and rules of thumb concerning how business is done in a given industry and even how it *should* be done. These rules act as heuristics that speed decision-making (Kahneman, 2011). However, these heuristics risk becoming sources of inertia, opposing innovation and change. They represent a 'dominant logic' (Bettis & Prahald, 1995) that prevents the identification of opportunities falling outside what is believed to be important, a phenomenon defined as the dominant logic trap (Bettis & Prahald, 1995). Because dominant logic is largely unquestioned and taken for granted, it can easily engender myopic thinking (Levitt, 2004).

One way to avoid this risk and neutralise cognitive barriers to BMR is to develop a visual representation of the existing BM. This leads to the possibility of explicitly analysing otherwise taken-for-granted choices and activities. Alternatives (to past choices that led to the current BM's activities) become possible, and a formal representation offers the opportunity to deliberately challenge both taken-for-granted past choices and the activities of today. These challenges can take the form of posing 'what-ifs' or validity questions. In this way, a visual representation would contribute to avoiding dominant logic traps.

Structural Barriers. It has been suggested that structural barriers are manifested in terms of conflicts with the existing configuration of activities and

assets (Chesbrough, 2010). A BM implies a structure in place: the assets and activities but also processes, flows of information, etc. which allow a firm to operate so as to create and capture value at a given point in time. Existing structures create path dependence insofar as initiatives that aim at innovating an existing BM are constrained by the existing BM itself by virtue of interdependencies among its parts. This idea finds its theoretical roots in strategy literature – specifically, in the notion of strategy evolution (how firms' realised strategies evolve over time), as reflected by, for example, the work of Siggelkow and colleagues (Rivkin, 2000a; Rivkin & Siggelkow, 2003; Siggelkow, 2001, 2002). Such a view emphasises a firm's realised strategy as a configuration of interdependent choices/activities which evolve over time by means of progressive adjustments and evolutions that would lead to internal fit, i.e., consistency between organisational elements (Siggelkow, 2002).[3]

Coupling between BM parts implies that fast, radical changes of whole BM structures, or configurations, are unlikely. An existing BM (or, to continue with the same terminology, an existing configuration of highly interdependent and consistent parts) is typically not changed overnight (Siggelkow, 2002).[4]

In one way or another, even in strategic moves that contemplate employing two BMs simultaneously (Markides & Charitou, 2004) or introducing experimentation with a new BM in an existing organisation (Sund et al., 2016), the loci of innovation within the existing BM are single activities (Casadesus-Masanell & Ricart, 2010), a point that we have already emphasised.

Because of interdependencies, however, these changes in single activities are followed by necessary adjustments to the rest of the structure until fit has been reached again and the new configuration is in place.

The whole BM, at different points in time, has changed (Siggelkow, 2002), but the whole is not itself the object of change. Rather, it is the result of changes to single (bundles of) activities and adjustments to the whole configuration. To paraphrase Amit and Zott (2012), managers must embrace systemic thinking to understand a whole BM and 'see the forest rather than the trees' (the whole configuration and not only its constituents). This consideration adds to our previous discussion on the importance of focusing on single activities. According to the proposed line of reasoning, focus on single activities is important but not, in itself, sufficient. That focus must be complemented by explicit attention to the entire configuration.

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[3]The reader will probably recognise the strong conceptual overlap between the notion of a firm's realised strategy as a system of activities (Porter, 1996; Porter & Siggelkow, 2008; Siggelkow, 2002) and both the activity-system perspective of BMs (Zott & Amit, 2010) and the (strategic) choices-and-consequences perspective offered by Casadesus-Masanell and Ricart (2010). Each points to a system of interdependent activities that firms implement as they go to market.

[4]Even when playing with dual BMs (Markides & Charitou, 2004), companies need to consider the potential conflict, but also the possible synergies, with the existing structure and either build the new BM within that existing structure, preparing for separation, or build it outside of the existing structure but prepare for future integration.

Model Specification

Our excursus into the nature of BMR led us to distil the following considerations (see Table 1).

First of all, BMR (but also BMD) is non-deterministic in the sense of implying decision-making in the presence of Knightian uncertainty (Thompson & MacMillan, 2010).

The scope and value of standard analysis (and planning) in the presence of such uncertainty is limited; the range of outcomes and possible future states

Table 1. The Discovery-Driven Nature of BMR.

Interpretation	**Uncertainty Non-determinism**	**Cognitive and Structural Barriers Path Dependence; Inertia**
Consequences for managerial decision-making	Limited scope for formal planning Importance of experimentation	The BM in place generates cognitive as well as structural barriers.
		Managers interpret the environment and filter opportunities through the existing dominant logic and mental frames (cognitive path dependence)
		Changing a part has implications for the whole configuration (evolution towards fit).
		The existing configuration constrains how parts can be changed (structural path dependence).
		The locus of innovation is both a single activity (bundle) AND the whole configuration.
Implications for business modelling	Network-based visual representation (parts and interdependencies): BM visualised as a configuration of interdependent parts (units of analysis are single parts AND the whole configuration).	
	Activity-system perspective: nodes expressed as choices/bundles of activities and interdependencies as simple linkages (units of analysis are choices/bundles of activities AND the whole activity system).	
	Include information useful to understanding how changing one part will alter fit of the existing configuration.	
	Distinguish between central and peripheral parts within the configuration.	

is largely unknown (and unknowable), and probabilities cannot be assigned to them. As a consequence, managers are left with the possibility of progressively changing single activities (or bundles of activities).[5]

Second, BMR is path dependent. The existence of a BM introduces constraints that generate path dependence. Constrains are of two types: cognitive and structural.

From the cognitive angle, managers interpret the 'environment' by means of a mental model, a high-level heuristic (Chesbrough & Rosenbloom, 2002) reflecting shared wisdom on how to do business in a given context, which can be source of myopic thinking (Levitt, 2004). This wisdom implies that the validity of today's activities, as related to past strategic choices, is often unquestioned and taken for granted. Thus, one way to avoid dominant logic traps is to focus on single activities and challenge their taken-for-granted nature.

Structural constraints are related to the current configuration intended as the *architectural logic* under which a firm operates its BM. Changing parts alters the fit within the existing configuration, potentially creating a instability until fit is established again. Conversely, the existing configuration determines the degree and the scope to which the parts can be changed (structural path dependence).[6]

These initial considerations led us to identify the following design criteria to be considered in our proposed methodology (see Table 1).

- *Network-based representation: BM visualised as a configuration of interdependent parts.*
- *Activity-system perspective: nodes expressed as bundles of activities (and related past strategic choices) and interdependencies expressed as simple linkages between activities.*
- *Strategic fit: interdependencies understood as strategic complementarities among pairs of choices/bundles of activities.*
- *Visualisation with centrality/periphery information to support analysis of structural path dependence.*

We elaborate on each of these in the following sections.

[5]We add that experimentation is an activity that involves risk in the sense that it is partly conducted with the goal of acquiring information that is not available before the experiments are conducted. To contain risk while maximising learning, companies should conduct small experiments that would allow learning while containing the costs of failing. Within the boundaries of BMR, conducting small experiments implies operating at the periphery of an existing BM and focusing on single activities.

[6]To paraphrase Amit and Zott (2012) once more, managers need not only to 'look at the forest rather than the trees' but also to 'act on the trees while considering the implications for the configuration of the forest'. If parts are interdependent, then changing one part has consequences on the overall configuration of the other parts. In addition, the existing configuration affects the ability to change specific BM parts. Linkages among parts constrain how parts can be changed (structural path-dependence).

Network-Based Representation: BM Visualised as a Configuration of Interdependent Parts.

A network-based representation is here defined as a representation of the BM that is obtained by formally representing the BM parts as well as the linkages between parts.

Within the mainstream BM literature, network-based representations have been relatively rare. Casadesus-Masanell and Ricart (2010) were among the first to formally develop an approach of this type. The pair based their visual model on choices and their consequences, and they included the notion of feedback loops. Similarly, Cosenz and Noto (2018) have offered a dynamic business-modelling approach that builds on system dynamics (see, e.g., Forrester, 1994) to express causal interdependencies. In the broader strategy literature, there is a tradition, albeit one outside of mainstream strategy work, of strategy visualisation with network-based models emphasising interdependencies. These include, for example, strategy maps with causal linkages (see, e.g., Cheng & Humpreys, 2012) and dynamic scorecards with causal loop diagrams (Barnabè; 2010).

Network-based representations are different from static representations, which are obtained by spatially placing the main components without explicit information on the interdependencies among them. The majority of visual tools for BMs that have been offered tend to fall into this latter category. Examples include the famous Business Model Canvas (Osterwalder & Pigneur, 2010, the Platform Business Model Canvas, or the four-component tool offered by Johnson et al. (2010), to mention a few.

A network-based representation is needed to represent how a BM functions as a configuration, but it is also necessary to understand how the existing configuration constrains trajectories for BMR experimentation by determining the conditions for successful modification of activities. Since geometric representations, by definition, don't show the interdependencies between elements, it would not be possible to use a static representation to accomplish our objectives.

Activity-System Perspective: Nodes Expressed as Bundles of Activities (and Related Past Strategic Choices) and Interdependencies Expressed as Simple Linkages Between Activities.

At a general level, an activity system is a representation that focuses on expressing an organisation by visualising its main activities and their linkages. Porter (1996) introduced the concept (to strategy theory) with the goal of elaborating on the notion of strategic fit (see Sheehan & Foss, 2009, for a discussion of the intellectual roots of the activity-based view). Competitive strategies (e.g., cost leadership or differentiation) are products of the selection and implementation of specific activities and of the linkages between the activities. Activities imply committed choices (Ghemawatt, 1991); thus, choices and activities can be viewed as two sides of the same coin (Zott & Amit, 2010).

The key to understanding the importance of the activity system for mainstream strategy is to appreciate that activities, in isolation, are not sources of

competitive advantage in terms of either cost leadership or differentiation. To be sources of rents vis-à-vis competition, activities should be 'coherent' with one another. It is the entire system of activities and their fit that explains how companies achieve sources of competitive advantage, not the list of isolated activities.

Zott and Amit (2010) were among the first to embrace the activity-system perspective and adopt it to analyse BMs, even if only conceptually (as opposed to visually). In their words,

> an activity in a focal firm's BM can be viewed as the engagement of human, physical and/or capital resources of any party to the BM […] to serve a specific purpose toward the fulfillment of the overall objective. An activity system is thus a set of interdependent organizational activities centered on a focal firm. (2010, p. 217)

They noted that the whole of BM literature implicitly or explicitly supports the activity-system perspective (Zott & Amit, 2010; Zott et al., 2011).

Within an activity system, interdependencies among BM parts are expressed as simple linkages. There are two possibilities for representing linkages (interdependencies) between a BM's parts: either with causalities (causal linkages) or without (simple linkages). In the representation of Casadesus-Masanell and Ricart (2010) and that of Cosenz and Noto (2018), the visualised linkages are two-directional and/or causal. They display information in the form of 'A causes B' (and/or vice versa).

It was identified earlier that the purpose of the modelling defines what should be included in a representation/visual tool. Strategy maps (and BM tools that take a strategy-implementation angle to the BM, as in Casadesus-Masanell & Ricart, 2010, and Cosenz & Noto, 2018[7]) are used for translating a strategy to all levels of the organisation and help understand how strategic objectives are achieved (Kaplan & Norton, 2004a, 2004b). In cases such as these, causalities are important. In the context of BMR, and for reasons related to structural path dependence, as earlier illustrated, it is important to know how changing a single activity is likely to affect other activities – to use the words of Zott and Amit, to understand interdependencies so as to 'provide insights into the processes that enable the evolution of a focal firm's activity system over time' (2010, p. 2018). This formulation of interdependencies is coherent with the path-dependent nature of BMR.

Overall, the activity-system perspective offers a language and tool for BMR which emphasises system-level design over partial optimisation (and is thus

[7]Both take a strategy-implementation angle to business modelling. To explain this intuition, Casadesus-Masanell and Ricart (2010) explicitly state that in their view, a BM is a manifestation of the firm's realised strategy. Similarly, Cosenz and Noto (2018) suggest that their proposed modelling approach, which combines conventional business model schemata with system dynamics modelling, results in a 'strategy design tool' (p. 127).

coherent with the idea of BM as a system-level concept where the system is composed of components and interdependencies) (Zott et al., 2011). This creates the possibility of shedding light on the path-dependent nature of BMR and on evolution through experimentation in BMR (Zott & Amit, 2010). These attributes identify the activity system as a useful perspective for our goals.

Strategic Fit: Interdependencies Understood as Strategic Complementarities Among Pairs of Choices/Bundles of Activities.

We suggest that there are several possible ways in which one could express the content of interdependencies between two or more activities. This is related to the fact that organisations (and BMs) are very complex entities (see, e.g., Massa et al., 2018). Different images/metaphors for organisations are possible (Morgan, 1986; Senge, 1990), each producing a different conceptualisation of the content of interdependencies. For example, the image of an organisation (and its BM) as a *machine* implicitly produces an understanding of linkages in terms of operations or specific processes between parts (see, e.g., Morgan, 1986), pointing to the content of the linkage as flows of materials. The image of an organisation as a *brain*, which emphasises information processing and knowledge transfer within the organisation, produces an understanding of linkages as flows of information. The image of an organisation as a *coalition*, which emphasises human dynamics, informal organisation and power hierarchies, implicitly produces an understanding of linkages as related to the interests of different sections within the firm as well as the existing power structure. In this latter view, the content of linkages could be conceptualised as negotiation tactics and activities of institutional design. It is, once more, beyond the objectives of this contribution to offer an exhaustive analysis of this important aspect of visual representations of BMR. What is sufficient is to notice i) that there are several possible methods of expressing the content of linkages between components of a BM and ii) that the choice of which one is appropriate is a function, as before, of the goal of the representation.

We suggest that the notion of fit, or overall coherence in an activity system, is central to the conceptualisation of interdependencies in relation to BMR. Strategic fit entails that activities reinforce one another (Casadesus-Masanell & Ricart, 2010; Porter, 1996). That is, activities that display reinforcing links 'fit' each other in the sense of creating more value together than individually. Other possible understandings of 'fit' within activities, originally proposed in Porter (1996), are the ideas of removing overlaps and creating synergies between the activities. Notwithstanding these nuances, the basic idea of strategic fit is one of system-level optimisation. Given the centrality of the notion of value creation to the BM discussion, it seems reasonable to build on a conceptualisation of system-level optimisation and coherence in value creation. The accepted literature, implicitly or explicitly, supports this perspective. For example, Baden-Fuller and Morgan (2010) state that a BM cannot be defined simply as a set of elements as this would ignore that the BM's elements are combined and arranged in unique ways that determine the value-creation potential of the particular BM. Similarly, Teece (2010)

suggests that BM elements must be designed in reference to one another to support value creation and capture.

Building on these considerations, we suggest understanding linkages as strategic complements (see, e.g., Brandenburger & Nalebuff, 1996; Milgrom & Roberts, 1985). The notion of strategic complementarity herein offered is qualitatively coherent with the concept of complementarity originally proposed by Edgeworth in his seminal work *Mathematical Physics* (1881) and subsequently popularised, about a century later, in strategy and management economics by Milgrom and Roberts (1990, 1995) (see Furlan, Vinelli, & Dal Pont, 2011, for an historical excursus on the notion of complementarity and a recent empirical investigation).

According to this perspective, activities are defined as complements if *doing (more of) any one of them increases the returns of doing (more of) the others*. In mathematical language, this idea corresponds to having positive mixed-partial derivatives of a payoff function: the marginal returns to one variable are increasing in the levels of the other variables. In other words, the activities reinforce each other.

In the proposed model, and coherent with the notion of complementarity applied to BMs (see, e.g., Amit & Zott, 2001; Zott & Amit, 2007), we simplify the original formulation of complements to understand complementarity simply as the quality where having bundles of activities together provides more potential for value creation than the value obtainable by each activity in and of itself. Thus, our (non-mathematical) conceptualisation of complementarity is conceptually close to an idea of mutual reinforcement/exclusivity or coherence/trade-off.

An exemplary BM will help bring this abstract concept down to earth. Consider the case of IKEA, the Swedish multinational known for having introduced the ready-to-assemble BM that has revolutionised the furniture and home-accessory industry. A central element of IKEA's BM is represented by the choice to build its shops (comprising showrooms and pick-up-yourself areas) at cities' peripheries, with no presence in city centres. For simplicity and convenience, we refer to this choice (and the related bundle of activities that allows it to materialise) as 'periphery'. The bundle of activities labelled 'periphery' is consistent with another distinctive feature of the IKEA BM (and its value creation), which is 'no delivery': warehouses are placed next to the showrooms, and clients themselves pick up their goods immediately after having selected and paid for them. Thus, the two bundles of activities (i.e., 'periphery' and 'no delivery') are complements, according to the perspective proposed and discussed above. They are in a condition of mutual reinforcement with respect to the value-creation potential of IKEA's BM.

In turn, these two activities increase the payoff of offering non-assembled products ('ready to assemble'). The size of non-assembled products is contained, allowing clients to carry most of the purchased materials in their cars, which in turn supports (reinforces) a 'no delivery' model that is catalysed by the 'periphery' choice (which provides inexpensive land and large spaces for storage and pickup operations). In this example, these bundles of activities, 'periphery', 'no delivery' and 'ready to assemble', are complements; they reinforce one another

in a coherent fashion. A corollary of this formulation of complementarity as reinforcement among distinct BM activities is that when two (or more) activities are complements, the negation of one activity introduces some form of trade-off from a value-creation (coherence) standpoint. It is not only true that doing A reinforces simultaneously doing B but also true that doing 'non-A' (the opposite of A) is in conflict with doing B. Going back to the IKEA example, the negation of 'periphery' – which would imply 'city centre' as the opposite alternative – introduces trade-offs with respect to the choices of 'no delivery' and 'ready to assemble'. Both 'no delivery' and 'ready to assemble' are inconsistent with the idea of having warehouses and showrooms in city centres. The first prospect is simply not practical in economic and even structural terms. The second, having showrooms in the city centre, is incoherent with the IKEA customer journey and customer experience. We return to this aspect of trade-offs (and complementarity) in the following section. For now, it is sufficient to highlight that i) the value-creation potential of a BM is increased when activities have the quality of mutual reinforcement and ii) that such reinforcement can be expressed by understanding the linkage between activities as complementarity.

Centrality and Periphery in Relation to the Entire Configuration

Since BMR involves experimenting with activities and activities are interdependent, it may be important to have information on the centrality or, conversely, the periphery of a focal part with respect to the rest of a configuration. Centrality/periphery is here understood as a measure of the degree of interdependence of a focal part with respect to the rest of the configuration (also referred as the 'structure'). Parts (or activities) that are peripheral have only few connections to the rest of the BM configuration. This means that changing or experimenting with them is, *ceteris paribus*, easier because it is not going to alter the fit with the existing configuration. In contrast, activities with high degrees of centrality – those that have several connections to the rest of the configuration – are more difficult to experiment with as their modification implies diffused modifications to the rest of a BM configuration. Altering them can profoundly alter the fit within the rest of a BM.

Having information about centrality/periphery of specific activities vis-à-vis the entire configuration is possible with our proposed approach. Centrality/periphery measures are common in network analysis. Our proposed methodology visualises a BM as a network in which nodes represent activities and linkages express the complementarity between them. In the simplest version, with binary linkages (either complementarity or no complementarity), the network will simply display a linkage between two activities whenever they display any degree of complementarity. Symmetrically, the absence of a linkage between two activities indicates that the two activities have no complementarity.

Overall, our proposed approach offers *a network-based representation anchored on the activity-system perspective with complementarity and centrality/periphery information*. It allows the representation of an existing BM as a network (of nodes and linkages) that includes information on the nature of the main

activities and expresses numerically (but also visually) the degree of centrality/periphery of single activities (nodes) with respect to the configuration at large. In the following section, we illustrate how to produce a visual representation of a BM in support of BMR efforts according to our proposed methodology. We use the case of Ryanair, the airline which pioneered the low-cost BM in Europe. As will become clear below, the Ryanair case has certain advantages, most notably a popular and novel BM that is quite well documented in existing literature (see, e.g., Casadesus-Masanell & Ricart, 2010; Rivkin, 2000b), that characterise it as uniquely appropriate for the goals of this contribution. Applications of the methodology to cases not displaying the same characteristics (a known BM with easily identifiable activities) are possible and require some adaptation of the proposed methodology. Because of space constraints and for simplicity's sake, these adaptations are only marginally described in this contribution.

Generation of Visual Representation

The generation of a visual representation, *model generation*, with the proposed methodology is based on four main steps: i) identification of core activities, ii) assessment of complementarity, iii) centrality calculation and iv) visualisation.

Identification of Core Activities

Model generation starts by identifying the key activities (Zott & Amit, 2010) that underlie how a BM functions. As noted earlier, both key activities and strategic choices (Casadesus-Masanell & Ricart, 2010) work for this purpose because they represent two sides of the same coin (we also use the terms interchangeably from time to time). As the name suggests, the goal of this phase is to identify the main choices/activities characterising the BM in use.

We illustrate the generation of the model using the Ryanair case.

Ryanair is a low-cost airline that was founded in Ireland in 1985. It is known for being the first company to offer extremely cheap flights on continental routes in Europe. At the background of Ryanair's BM were, at that time, very unconventional strategic choices, setting the Ryanair BM apart from those of conventional airlines in Europe. For example, unlike conventional airlines that create value for customers by flying to airports conveniently located at main destinations (we call this choice/activity bundle 'primary airports'), Ryanair explicitly employed a model based on flying to secondary airports (for example, the Bergamo Airport for Milan or the Girona airport for Barcelona). In our language, 'secondary airports' is a strategic choice that involves a set of activities. Additionally, Ryanair has never offered, since its inception, meal service on flights. 'No meals' is another strategic choice that is entails a bundle of specific activities.

The simplest way to identify the key activities/choices is to rely on prior representations of the BM or, if available (and reliable), on archival data. As noted earlier, Ryanair was purposefully selected to illustrate our proposed methodology partly because a rich description of key activities is available (Rivkin, 2000b). We report them in Table 2. Whenever such information is not available, researchers

Table 2. Ryanair BM: Core Strategic Choices and Activities.

Resources
• Standardised fleet
• Non-union workers
Management
• Strict management (extremely cost-conscious culture)
• High-powered incentives
Operations
• Secondary airports
• Short-haul flights (point-to-point routing)
Services
• No meals
• No business class
• Nothing extra is free (luggage, check-in, etc.)
Partners
• Low commissions to travel agencies

Source: Adapted from Rivkin (2000b).

can seek to gather it via interviews with managers or other company informants. Procedures similar to those used to guarantee inter-coder reliability in content analysis can be employed to guarantee the reliability of the data.[8] The output of this phase is a list of the key activities that underlie how the focal BM functions. With the goal of managing the tension between parsimony and comprehensiveness, we suggest limiting the number of activities to between 10 and 15 as a pragmatic heuristic.

Assessment of Complementarity

The next step involves assessing the complementarity between each pair of activities. We recall that complementarity is conceptualised as the degree to which two activities are mutually reinforcing in the sense of increasing the value-creation

[8]As noted, a discussion on how to apply our proposed procedures to cases in which information on high-level activities is not available falls outside the scope of this contribution. Yet one consideration is worth mentioning: the identification of core activities could be a daunting task. As noted by Porter, but also Zott and Amit, the number of potential activities is often quite large, and the breadth of these activities depends on the level of aggregation and decomposition that is chosen. One way to deal with this issue is to focus on choices, which, as noted, are simply another way to conceptualise activities. In our experience, while activities may lead to complications in terms of fixing the aggregation level, high-level strategic choices suffer from this problem less. Also, our previous exploratory applications of the proposed model have provided some initial evidence that focusing on choices also naturally leads to fixing the number of choices at a manageable quantity (as a heuristic, we suggest dealing with a number of choices–activities in the 10-to-20 range).

potential of the focal BM. One of the advantages of the proposed approach is that complementarity is assessed only for pairs of activities (first-order complementarity), which strongly reduces complexity even as the overall model is able to offer information on system-level interdependencies.

The first step for assessing complementarity involves building a matrix in which the key activities/choices previously identified are located on the rows and columns in the same order. This generates a squared, symmetric matrix. Let n and m identify the n-activity on the rows and the m-activity on the columns, respectively. With this nomenclature, the cell corresponding to $n = 3;m = 5$ identifies the linkage (vertex) between the third activity/choice (node) in the rows and the fifth activity/choice (node) on the columns. Similarly, each cell in the diagonal ($n;m$, with $n = m$) identifies the intersection of an activity/choice with itself. Referring back to the IKEA example previously discussed, assuming that n corresponds to the node 'no delivery' and m to the node 'periphery', the cell n,m identifies the linkage between 'no delivery' and 'periphery'. In this cell, therefore, the degree of complementarity between 'no delivery' and 'periphery' is to be expressed.

The degree of complementarity is estimated qualitatively, using an l-intervals Likert scale with values in the interval 0–1. Zero indicates no complementarity (no reinforcement), and 1 indicates the activities' full complementarity (activities fully reinforce each other). Values between 0 and 1, typically with $l = 5$ intervals, indicate different degrees of the magnitude of reinforcement. For simplification, we limit the analysis in this paper to the use of binary values ($l = 1$). Amit and Zott (2001) used a similar procedure to evaluate the extent to which BMs include elements of complementarity, lock-in, novelty or efficiency in their system of activities.

To assess complementarity, we adopted an iterative process and involved multiple researchers. First, we brought on a research assistant and explained our methodology. Second, we independently filled the matrix after having read the Harvard Business School Ryanair Case Study (Rivkin, 2000b). During this phase, each researcher also took extensive notes on the rationale for scoring the matrix. For example, with reference to the choice 'secondary airport', we discussed that secondary airports primarily appeal to leisure travellers or students but not to business travellers, which is coherent with the choice 'no business class'. On this coherence, we wrote '*secondary airports*: *suitable for leisure travellers, not for business travellers → no business class*'. We produced similar notes for each pair of activities. These notes are available from the authors of this article upon request.

We held meetings to contrast and compare our individual assessments and notes and to discuss sources of possible disagreement. The process was iterated twice until consensus was reached; Table 4 presents the result of this process. It should be underlined, for clarity's sake, that even though we applied a scoring methodology based on qualitative assessment by multiple independent researchers (a way to ensure that subjectivity is limited), this methodology does not, by itself, ensure that the assessed values match the 'real' level of strategic

complementarity among BM Ryanair key choices/activities. It should also be underlined that in this particular case, this approximation is not a concern; the goal is simply to walk progressively the reader through the steps to producing the visual representation. Nonetheless, our intuition is that the match between the assessed value and the 'real' value can be improved in several ways, including increasing the number of independent analysts, measuring inter-coder reliability, employing expert scoring (e.g., the Delphi method) and engaging in data triangulation (for example, including informants from the focal company if archival data of good quality are non-existent).

Calculation of Centrality/Periphery

The output of the previous step is a squared, symmetric matrix that includes information on the degree of complementarity for each pair of activities. We refer to this as the complementarity matrix (Table 3). This matrix is used as the basis for a calculation of the centrality/periphery of each node in the configuration. Centrality is a measure of the degree of connectedness of a node with respect to the whole configuration. One straightforward way to calculate centrality is simply to impute the number of directly affected elements weighted by the intensity of the linkage, if relevant (Freeman, 1979). However, in complex configurations, as is the case with interdependencies in a BM, nodes tend to have important complex ramifications (Siggelkow, 2002). Node A is not only connected to node B (a first-order connection) but is also, via B, connected to the rest of the configuration (second-order connections). Our choice of centrality is eigenvector centrality, which is suitable for these purposes and applicable to the case of a squared matrix. We compute this measure with the software NodeXL®; other possibilities exist.

Table 4 illustrates the calculated degree of centrality for each activity in our graph. Table 5 presents some general information about the network.

Visualisation

Fig. 1 illustrates the visual representation obtained by following the steps above. We produced the visualisation in this article using the built-in features of NodeXL. In this visualisation, the area of each node is representative of the measure of centrality, as expressed in Table 4. As the visualisation illustrates, the choice 'non-union workers' is highly central. Moving from 'non-union workers' to union workers is a difficult manoeuvre because changing this choice involves making many changes to other choices that are interlinked with it. To use the same terminology employed in our theory section, the change of this choice may strongly alter the fit within the entire configuration. Conversely, the choice 'low commissions to travel agencies' is relatively easy to change (experimentation is easy, at least from a configurational fit point of view, with this choice). The software offers several possibilities for customising the visualisation; other possibilities beyond NodeXL exist.

Table 3. The Complementarity Matrix.

	Standardised Fleet	**Non-union Workers**	**Strict Management (Extremely Cost-Conscious Culture)**	**High-Powered Incentives**	**Secondary Airports**	**Short-Haul Flights**	**No Meals**	**All Passengers Treated Equally (No Business Class)**	**Nothing Extra Is Free (Luggage, Check-in, Etc.)**	**Low Commissions to Travel Agencies**
Standardised fleet	1	1	1	0	0	1	0	0	0	0
Non-union workers		1	1	1	0	1	1	1	1	0
Strict management (extremely cost-conscious culture)			1	1	1	0	1	1	1	1
High-powered incentives				1	0	0	0	0	0	0
Secondary airports					1	0	0	1	0	0
Short-haul flights						1	1	0	1	0
No meals							1	1	1	0
All passengers treated equally (no business class)								1	1	0
Nothing extra is free (luggage, check-in, etc.)									1	0
Low commissions to travel agencies										1

Source: Own assessment.

Table 4. Graph Metrics: Centrality Measures.

Choices/Activities	**Centrality**
Low commissions to travel agencies	3
Strict management	10
Secondary airports	4
No business class	7
Nothing extra is free	7
No meals	7
Short-haul flights	6
Non-union workers	9
High-powered incentives	4
Standardised fleet	5

Table 5. Network Information.

Graph Type	**Undirected**
Vertices	10
Unique edges	31
Edges with duplicates	0
Total edges	31
Self-loops	10
Reciprocated vertex pair ratio	Not applicable
Reciprocated edge ratio	Not applicable
Connected components	1
Single-vertex connected components	0
Maximum vertices in a connected component	10
Maximum edges in a connected component	31
Maximum geodesic distance (diameter)	3
Average geodesic distance	1,42
Graph density	0.466666667
Modularity	Not applicable
NodeXL version	1.0.1.418

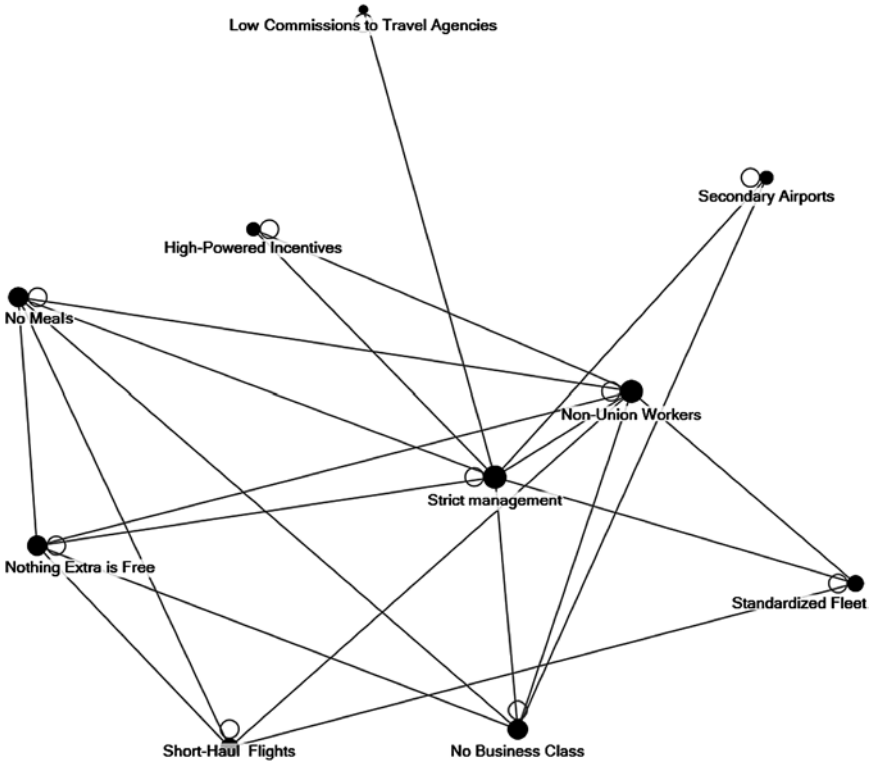

Fig. 1. Representation of the BM as an Activity System With Complementarity Information. *Source*: Own elaboration.

Discussion

We started this contribution by observing that BMI involves several tasks and barriers, many of which are cognitive in nature. The accepted literature has repeatedly highlighted that visual representations of the BM can help managers overcome barriers to BMI, including those involving cognitive tasks, and can support BMI in general. Scholars have produced numerous different tools and instruments to represent BMs, many of which have been accompanied by claims of their value in supporting BMI. Unfortunately, there has been a disconnect between these instruments for visual representation and research on BMs and cognition. This disconnect, we argue, is manifested in at least two ways: one a failure in anchoring the design of the instrument in the phenomenology of BMI and the other a lack of validation of the cognitive value of the instrument itself for specific cognitive tasks.

Concerning the first manifestation of the disconnect, we have highlighted the following limitations. First, BMI is an umbrella term potentially covering very different instances, which only partly overlap, of innovation of a BM. As a consequence, the chances of finding a one-size-fits-all method that works

equally well across different manifestations of BMI are miniscule. Second, even within different manifestations of BMI, cognitive tasks are likely to be different, inviting once more the reflection that decision-makers may benefit from the use of dedicated tools that have been designed to support specific activities in BMI. Both considerations highlight the importance of anchoring the design of instruments for visually representing BMs in specific instances of BMI and doing so with reference to the specific cognitive tasks involved in BMI. This can also increase transparency in the main design choices made in producing a tool and, as a consequence, in the design of empirical tests and other forms of validation to assess the cognitive value of the instrument.

Against this backdrop, we have proposed to distinguish between BMR and BMD. We have focused on the former and discussed two facets of the phenomenon behind BMR that, in our view, have cognitive implications. These are the discovery-driven nature of BMR and its path dependence, both cognitive and structural. In our theory section, we offered an analysis of the meaning and significance of these aspects of BMR for the design of an instrument in support of the innovation of existing BMs.

Building on this analysis and against a set of criteria representing multiple perspectives, we have proposed a conceptual design for a visual model in support of BMR. The proposed visual representation specifically serves to reduce complexity in representing the inherent relationships within a BM by drawing on some basic elements of graph theory.

And now, the time has come to offer some more reflections on the possible value of the proposed approach as an instrument related to BMs and cognition. The widely emerging cognitive view on strategy has begun to make increasing headway into BM-related research. The relevance of this entrance has previously been argued as self-evident as the notion of cognition cannot find strong antecedents only throughout the history of science, but moreover, it demonstrates conceptual and logical links to managerial problems such as decision-making in relation to value creation and capture (Baden-Fuller & Haefliger, 2013; Baden-Fuller & Mangematin, 2013; Baden-Fuller & Morgan, 2010; Morgan, 2012; Nersessian, 2008). Such decision-making oftentimes takes place in the form of models. In this vein, the cognitive view on modelling provides important perspectives on modelling's inherent basis – in particular, the cognitive basis of model-based reasoning practices (Nersessian, 2008). Against this backdrop, we argue, our work contributes to further establishing a cognitive basis of model-based reasoning in the practice of business.

As mentioned transparently, this paper does not offer to test hypotheses related to the cognitive value of the proposed method for BMR in relation to specific aspects of BMR. Here, we limit our discussion to highlighting certain aspects of this nexus that could offer guidance for future research.

The Proposed Model as an Instrument

The point of departure is the consideration that firms employ specific architectures for value creation and capture that manifest in the systems of activities they

employ (see, e.g., Zott & Amit, 2010). These systems of activities are often quite complex in both computational (due to the large number of activities and parts of the system) and dynamic terms (due to the complexity inherent in a web of interdependencies between activities that give rise to a complex behaviour). Managers simplify this complexity and make sense of their (and others') BMs by creating mental representations. In its declination, the BM is prevailingly viewed as offering an implicit (that is, taken-for-granted) mental schema – a cognitive structure that operates as a 'focusing device' (Doganova & Eyquem-Renault, 2009). From a theoretical standpoint, this idea finds its roots into the notion of firms as 'interpretation systems' (Daft & Weick, 1984) as well as in theories concerning cognition and industry belief systems (see, e.g., Porac, Ventresca, & Mishina, 2002; Spender, 1989; see Massa et al., 2017, for a comparison with other interpretation of the BM construct), As noted, this prevailing mental model can constitute a barrier against BMI, but the proposed instrument can support overcoming this barrier. It invites managers to explicitly reflect on past choices that led to today's taken-for-granted activities, requiring those choices to be made explicit (by being listed, for example). This exercise provides the opportunity to more deliberately question past choices' present values vis-à-vis changes that may have occurred since the strategic choices were initially made, thereby shifting the perception of the value of activities from a condition of taking-for-granted to one of explicit awareness.

The proposed model also encourages embracing system-level design as opposed to partial optimisation, thus improving the ability to design coherent BMs, as advocated by Zott and Amit (2010). This is achieved by the complementarity assessment, which constitutes a quick and transparent way to illustrate available synergies as well as potential disconnects between components of the BM.

Uncovering Inefficiencies and Structural Path Dependence

The centrality/periphery analysis allows the BM to uncover implicit – marginal and not necessarily visible – inefficiencies, which may in turn prove particularly relevant to studying a BM in terms of strategic fit (assessing the extent to which the BM truly realises what the company's strategy predicts). In addition, the centrality/periphery analysis offers information that could improve decision-making in relation to the challenges stemming from structural path dependence. Structural path dependence is manifested by coupled structures, configurations of activities which are interdependent, constraining the ability to change single activities because such changes imply altering the existing fit. Within such a configuration, our proposed methodology offers information on the degree of centrality and periphery of each activity. Peripheral activities in a BM have less interdependencies with the rest of the configuration, and as such, they are easier to experiment with during a discovery-driven processes. Changing them will not alter the fit within the existing BM configuration. Central activities, in contrast, have many connections to other activities. As such, changing them is more challenging because it risks compromising the fit. By offering centrality/periphery information, our proposed methodology can empower managers to

better anticipate the difficulties involved in experimenting with single activities, thus supporting planning as well as prioritisation.

From Visual to Cognitive

Strictly speaking, the visualisation approach put forward in this paper represents a mental model. It thereby embodies the capacity to mentally depict a bundle of both real-world and theoretical situations, but it also allows one to make inferences about future states. More specifically,

> a mental model is a structural analogy in that it embodies a representation of the salient spatial and temporal relations among, and the causal structures connecting, the events and entities depicted. (Johnson-Laird, 1983; as cited in Nersessian, 2008, p. 103)

Extant work on the BM as a construct still falls short of some of the conditions of providing a fully fledged mental model. For example, neither spatial and temporal relations nor causal structures are necessarily being considered a central part of mainstream BM construct definitions (for an exception, see Furnari's (2015) work on cognitive maps for BMs). In this context, we hope to offer an avenue to open up the BM to greater richness as its underlying mental model allows for a more granular and exhaustive representation of the real world.

At the end of the day, cognition remains contingent on underlying antecedents such as environmental, organisational or individual factors (Bandura et al., 1989). Hence, the efficacy of applying cognitive devices in practice – such as mental or cognitive maps for BMs – rests on a broad variety of contextual factors and biases that are supremely difficult to be entirely accounted for by any device, even the most comprehensively designed. Yet instead of running after the ultimate 'super tool', when it comes to making cognitive devices real and functional, simplicity can be more productive than comprehensiveness. In this vein, more recent developments of cognition literature have increasingly pointed to the notion of heuristics, or 'simple rules' (see, e.g., Vuori & Vuori, 2014), as a particular perspective of the cognitive view within strategy research at large. Similarly, both BMD and BMR can take place though a pragmatic modelling approach such as finding similarities to other 'simple rules' of previously seen BMs and multiplying these with others (e.g., based on Gestalt theory; see Loock & Hacklin, 2015). This not only makes business modelling a practice prone to cognitive limitations such as recognition bias (dominant logic), but moreover, it opens up avenues for more formal tool creation that are based on shaping and further articulating such simple rules. In this context, a formal representation that both visualises and embodies implicit simple rules (such as graph theory-based properties) can help us to avoid cognitive bias by more explicitly addressing it. For example, heuristics can become articulated through formal representations within the tool, as through frequently observed dominant patterns across various graphs of BMs.

Implications for Managerial Practice

The conceptualisation of a tool representing a BM has, in general, the potential to further contribute to the 'boundary object' property of the BM (Doganova & Eyquem-Renault, 2009). Specifically, this tool offers managers with increased richness and depth in driving informed discussions around the BM, such as 'how can synergies within different elements of our BM be enhanced?' or 'where can we find inefficiencies or bottlenecks in how our BM is operating?' In so doing, the tool has the potential to assist decision-makers in avoiding potential biases through the uncovering of complementarities, points of dominance and unequal balances in the BM. Further, being an analytic tool that is formalised at a higher level and that does not solely rely on individual qualitative judgment, this tool is particularly suitable for comparative analyses, such as analysing the difference between two focal BMs or tracking the development of BM change initiatives over time. Hence, the tool can serve in support of the essential steps of strategy formulation: scanning, sense-making and decision-making (Narayanan, Zane, & Kemmerer, 2011).

Limitations and Further Research

While the conceptual approach put forward in this study offers potential answers to some questions posed by the research on BMs and cognition, it simultaneously raises a few of its own. Most notably, while we consistently argue for the importance of this type of analysis for offering a neutral, easily reproducible perspective in order to overcome dominant logics, we are aware that we, at the same time, may be introducing one. Specifically, linking back to the pragmatic view on BMs, working with graphical illustrations like these may, in the cognitive reasoning of individuals involved, give rise to more easily recognisable frequent patterns ('this looks like …'). Repeatedly working with a tool like this may, in principle, make us more susceptible towards categorising BMs in light of what we have seen thus far, which would constitute a novel type of recognition bias. In other words, attempting to avoid biases by introducing 'simple rules' may potentially introduce new biases in turn. Therefore, we suggest that further research is needed to explore the interrelatedness of BMs as heuristics and dominant logics. As a starting point for such work, one may ask to what extent recognition bias may give rise to structural isomorphism. One potential avenue to resolving this could also lie in finding ways to link this graphical tool with more qualitative perspectives to provide richness on the content of its causal structures as well as mechanisms (Furnari, 2015).

Needless to say, a conceptual tool like this one can only benefit from being tested on a broader basis – tested both for codifying a larger sample of BMs for running more large-scale quantitative research and also in managerial settings, to drive internal discussions. In the latter case, we are aware of the challenge of identifying and selecting the right categories for preparing the adjacency analysis (i.e., the column/row titles in the matrix), which may not always be as evident as in the well-documented case of Ryanair. In this context, documentation and

guidelines, as well as the development of a more intuitive software tool, will be needed not only to ensure this visual representation tool's ease of use but also, thereby, to gain more consistent adoption in managerial practice.

Conclusion

The existence of a BM creates barriers to BMI efforts aimed at innovating the existing BM. These barriers are manifested not only in general cognitive terms (dominant logic traps) but also in terms of structural impediments (structural-path dependence and evolution towards fit), which may have a cognitive manifestation and which require specific ways of visualising an existing BM.

Against this backdrop, we have introduced and discussed an attempt to build a visual representation that meets some of these requirements, showcasing a specific avenue for developing more work at the nexus between visual representations and cognition in BM research.

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Science and Swagger for Success: The Interactions of Hypothesis Testing and Self-Efficacy to Influence Business Model Performance

Ted Ladd

Abstract

Extant literature on entrepreneurial cognition declares that entrepreneurs who are confident in their ability to design a new business perform better than entrepreneurs who lack such a self-perception of efficacy. This is swagger. A different set of literature, including Discovery-Driven Planning, Design Thinking, and Lean Startup Method, recommends that entrepreneurs create, confirm, or reject hypotheses to design and refine the specific elements of their business model. This is the scientific method.

This article used survey data from 353 participants in an international business pitch competition to connect these two literatures. We found that the number of hypotheses that the entrepreneur elucidated and confirmed were linked to business model performance. Counter-intuitively, the number of hypotheses *rejected* by the entrepreneur showed the strongest relationship to success. We found no significant relationship between the number of interviews that an entrepreneur conducted and the business model's performance: more effort was not always helpful.

Although we found no direct connection between an entrepreneur's self-efficacy in searching for a new idea and the business model's eventual success, entrepreneurs with high levels of this narrow form of self-confidence were more likely to perform the constructive actions of elucidating, confirming, and rejecting hypotheses. In summary, swagger leads to science, and science leads to success.

Keywords: Lean startup method; discovery driven planning; design thinking; opportunity recognition; self-efficacy; entrepreneurial cognition

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Introduction

The phrase "hypothesis testing" has celebrity status. A hypothesis is "a proposition to explain a phenomenon" (*The American Heritage Dictionary of the English Language,* 4th edition, 2016), whose purpose is to guide subsequent investigation. It is the foundation of the scientific method. Several authors have advanced theories that contend that the use of hypothesis testing in designing and refining the business model for a new venture will increase the probability that the venture will create and capture value for potential customers and therefore generate profits. These theories include Discovery-Driven Planning (McGrath, 2010), Design Thinking (Liedtka, 2016), the Lean Startup Method (Ries, 2011), and Dynamic Capabilities for Generative Sensing (Dong, Garbuio, & Lovallo, 2016). In short, these theories assert that science generates venture success. Our first research question aims to empirically test this assumption by asking if the activities within hypothesis testing increase the performance of new business models.

These activities to test hypotheses consist of a series of cognitive acts (Garbuio, Dong, Lin, Tschang, & Lovallo, 2018). The elucidation of a hypothesis requires that the entrepreneur think both creatively and analytically about the key assumptions that underpin the business model. The declaration that a hypothesis is confirmed or rejected requires that the entrepreneur aggregate, interpret, consider, and eventually render a conclusion. Entrepreneurs' willingness to conduct these cognitive acts – and the likely positive impact that would result from these acts – depends on the entrepreneurs' own self-efficacy. This term is defined as a person's confidence in their prediction that, by performing a specific activity, he or she will increase the likelihood of a positive outcome (Bandura, 1977). Entrepreneurial self-efficacy focuses on an entrepreneur's self-confidence in performing the various activities relating to designing a new business model (Zhao, Seibert, & Hills, 2005). McGee, Peterson, Mueller, and Sequeira (2009) empirically validated a sub-dimension of entrepreneurial self-efficacy for s*earching* (ESES) that refers to the entrepreneur's self-confidence to conduct the activities that relate to designing a novel business model. ESES is swagger. Our second research question explores the connection between ESES and the specific actions of hypothesis testing to ask if self-efficacy is a significant positive antecedent to hypothesis testing.

This article bridges these literatures on entrepreneurial cognition and business model design by exploring which of the steps of hypothesis testing ("science") are most important for success and the role of self-efficacy ("swagger") as a predicate for these steps using a sample of 353 students who participated in an international business pitch competition ("success"). We find that several activities within hypothesis testing improve the likelihood of venture success and that entrepreneurs with a higher sense of entrepreneurial efficacy for searching for new ideas are more likely to employ these activities. In the vernacular, swagger leads to science, and science leads to success.

This paper begins with a review of extant literature on hypothesis testing within the realm of entrepreneurship from which we identify several propositions for subsequent testing. We then discuss self-efficacy and introduce additional

propositions to connect this cognitive construct to the entrepreneurial actions within hypothesis testing. Thereafter, we describe the sample and methods used in this study, followed by the empirical results of the analysis. In our discussion, we examine the multiple possible interpretations of the results. In the conclusion, we highlight the implications of the findings for practicing entrepreneurs, academic researchers, and business educators. We also provide suggestions to resolve the study's limitations in order to generate additional insights into the relationships of science, swagger, and entrepreneurial success.

Literature Review and Propositions on Hypotheses

This review of the existing literature begins with a discussion of the role of hypothesis testing in entrepreneurial research and practice.

Hypothesis Testing

Dewey (1903) posited that human beings naturally construct hypotheses subconsciously whenever they encounter a problematic situation and then test these hypotheses through experiential experimentation. Hypotheses that withstand this reflection graduate to "warranted assertions" (Dewey, 1941) that form the basis for pragmatic knowledge. More recently, the discipline of Total Quality Management (TQM) explicitly incorporated hypothesis testing in the management of manufacturing. By comparing the output against hypotheses around a process, Deming (1982) championed a movement toward rigorous analysis as the basis for business process improvement. TQM grew from a narrow function within a niche department to a broad function practiced by many departments (Liedtka, 2016). The field of "evidence-based management" also explicitly uses hypothesis testing to improve business performance (Rousseau, 2006). Emanating from evidence-based medicine, this discipline relies on "systematic reviews" (Briner, Denyer, & Rousseau, 2009, p. 26) to blend original data with managerial judgment, external theories, and observations from other organizations into a process that escapes hysteresis or mere intuition.

Hypothesis testing was late to arrive to the entrepreneurship process. Until recently, successful entrepreneurship has been viewed as the result of a confluence of entrepreneurial verve and market opportunity (Shane, 2000). However, more recent research recognizes the need for a more analytic process. Four recent theories emphasize the action of hypothesis testing as the process to design and refine a potentially profitable business model that can create and capture value for potential customers (Morris, Schindehutte, & Allen, 2005).

First, Discovery-Driven Planning provides a process model to reduce uncertainty within a new business model (McGrath, 2013; McGrath & MacMillan, 1995). One of the tactics within this process asks entrepreneurs to create a comprehensive checklist of their assumptions (i.e., hypotheses) in the business model and then systematically conduct experiments to reduce them (Mansoori & Lackéus, 2019).

Second, Design Thinking, primarily ascribed to David Kelley at Stanford University, asks entrepreneurs to empathize with potential customers to find a

serious but unaddressed problem. The entrepreneurs then ideate to create novel solutions, which they test with customers using prototypes. Design Thinking has the entrepreneur both "hypothesize novel explanations to observations" and "hypothesize about what to create" (Garbuio et al., 2018, p. 50) in a cognitive act of abduction.

Third, the Lean Startup Method puts hypothesis testing at the heart of its process, asking entrepreneurs to test assumptions using actual consumer opinions: "validated learning is the process of demonstrating empirically that a team has discovered valuable truths about a startup's present and future prospects" (Ries, 2011, p. 39). The Lean approach has been heralded as "evidence-based entrepreneurship" (Blank, 2013; Eisenmann, Ries, & Dillard, 2012). The method advises entrepreneurs to define the hypotheses that underlie their business models and then to test those hypotheses using conversations with potential consumers, called customer discovery (Blank, 2006) and rigorous open-market experiments, called minimum viable products (Ries, 2011; Shepherd & Gruber, 2020).

Finally, the broader theory of Dynamic Capabilities observes that managers create repeatable routines to sense and seize opportunities in order to transform their business model to capture value (D. J. Teece, 2010; D. J. Teece, Pisano, & Shuen, 1997). Dong et al. (2016) narrowed and relabeled "sensing" for entrepreneurs to "generative sensing," which

> involve[s] undertaking actions to proactively create hypotheses about the future implications of observed events and trends, and testing these hypotheses to grease the pathways for new products, services, and business models … In short, generative sensing is about hypothesis building and learning. (D. Teece, Peteraf, & Leih, 2016, p. 21)

Although these four theories all trumpet the importance of hypothesis testing to design and refine business models in order to generate profitable performance, none of them provides direct empirical evidence to determine if the process of hypothesizing generates success. The remainder of this paper posits several propositions to connect the various steps of hypothesizing with the performance of the resultant business model. We then test each of these propositions using empirical data and methods to fill this gap in the literature.

Propositions[1] About Hypothesis Testing

In all four approaches listed above, the first cognitive step in hypothesis testing is the construction of hypotheses, also called "elucidation," to create an artifact

[1]We chose to use the word "proposition" to describe the relationships that we test in this paper instead of the word "hypothesis" in order to reduce confusion between these and the hypotheses that our study's subjects elucidated, confirmed, or rejected. This seemed clearer than "hypotheses about hypothesis testing."

of a problematic situation that reveals uncertainty (Dewey, 1903; Simon, 1969). Even if not tested with data, this elucidation brings subconscious assumptions into conscious existence for reflection and discussion with others. This artifact also aligns with behavioral design theory (Cyert & March, 1963), where decision-makers create an aspirational expectation for performance. Forty years of research supports the ability of this theory to explain and predict success for both individual decision-makers and organizations (Lounsbury & Beckman, 2015) but rarely has it been applied to entrepreneurial founders constructing hypotheses to evolve a new core business model. We assert that a hypothesis is a declaration by the founders about how they hope the business model will create and capture value for target customers. Using the literature from behavioral decision theory, we propose that founders who construct more hypotheses increase the likelihood that their venture will be successful.

> *Proposition 1*: There is a significant, positive relationship between the number of elucidated hypotheses about a new business model and that business model's eventual success.

Once a hypothesis is elucidated, the entrepreneur collects enough data to make an interpretation on the veracity of the hypothesis. The entrepreneur can draw two possible conclusions: confirmation or rejection.

The first possibility is to declare that a hypothesis is confirmed by evidence as valid. An idea with several validated hypotheses has both reduced uncertainty and uncovered latent customer demand, according to all four of the design approaches described above. This is the idealized theoretical expectation from Discovery-Driven Planning, Design Thinking, the Lean Startup Method, and Dynamic Capabilities. This proposition declares that a business model that is supported by hypotheses that have been validated by potential customers is more likely to achieve success in providing value to those customers.

> *Proposition 2*: There is a positive, significant relationship between the number of confirmed hypotheses about a new business model and that business model's eventual success.

The second possibility that an entrepreneur could draw after testing a hypothesis is that the hypothesis is invalid in the face of evidence and therefore should be rejected. All four theories of entrepreneurial design conclude that rejected hypotheses can add value to an entrepreneur's design process for several reasons.

First, they highlight elements of a potential business model that will not generate customer demand. Second, they prompt an entrepreneur to "pivot" (Grimes, 2018; Wood, Palich, & Browder, 2019) away from an unproductive model toward a new idea that can become the subject of subsequent testing. Third, they signal that the entrepreneur is objective and not trapped into confirming what she already believes to be true (Fuchs, Sting, Schlickel, & Alexy, 2019).

Proposition 3: There is a positive, significant relationship between the number of rejected hypotheses about a new business model and that business model's eventual success.

Note that many hypotheses are not tested, or those tests do not yield a conclusion. These hypotheses remain unconfirmed; they are neither confirmed nor rejected. This category can be a large proportion of elucidated hypotheses. This distinction is important because it reduces the collinearity between the number of elucidated hypotheses and the number of confirmed or rejected hypotheses.

The three propositions above all use the hypothesis as a unit of analysis to reflect the inputs to the process of business model design. The Lean Startup Method introduces an additional input: the interview with the potential customer in order to collect data to confirm or reject the hypotheses. It is possible that the artifacts of the search – the number of hypotheses elucidated, confirmed, or rejected – may matter less to the business model's eventual success than the number of interviews that the entrepreneur conducted during hypothesis testing. These interviews provide the founder and potential customer an opportunity to co-create a business model that will provide value (Shams & Kaufmann, 2016), even if the conversation does not explicitly impact the process of hypothesizing. The raw numbers of interactions between founders and customers has been shown to positively correlate to venture performance (Ladd, Lyytinen, & Gemmell, 2015).

Proposition 4: There is a positive, significant relationship between the number of interviews conducted during the design of a new business model and that business model's eventual success.

Self-efficacy

The process of creating, testing, interpreting, confirming, or rejecting hypotheses consists of a series of cognitive acts (Garbuio et al., 2018). The four propositions above describe externally observable actions that a founder might follow to design and refine a business model. Implicit in these behaviors are elements of cognition. The elucidation of a hypothesis requires that the entrepreneur think both creatively and analytically about the key assumptions that underpin the business model. The declaration that a hypothesis is confirmed or rejected requires that the entrepreneur aggregate, interpret, consider, and eventually render a conclusion.

All of these decision points rest on the founder's own confidence in conducting these cognitive acts in a manner that will maximize the venture's possibility for success. Self-efficacy is a person's self-perception in her own ability to conduct a particular task (Bandura, 1977; Kerr, Kerr, & Xu, 2017). Unlike the vernacular word "confidence," self-efficacy is domain specific, prompting De Noble, Jung, and Ehrlich (1999) to theorize a more specific construct of entrepreneurial self-efficacy, which reflects the entrepreneur's own assessment of the potential impact of his or her skill to start and operate a new venture. A person who believes that

he or she can overcome challenges to complete a task is more likely to initiate and successfully complete that task. The construct of entrepreneurial self-efficacy has repeatedly been empirically linked to new venture performance in many circumstances (C. C. Chen, Greene, & Crick, 1998; Hmieleski & Baron, 2008; Ladd & Kendall, 2017; McGee & Peterson, 2017, 2019).

Responding to a call to explore the multidimensionality of this construct, McGee et al. (2009) empirically validated four independent sub-dimensions of ESES that evaluate an entrepreneur's own perception of competence in four common activities that entrepreneurs pursue as they design and launch a new venture:

- *Searching* (ESES) refers to the phase in which entrepreneurs are creatively innovating to find a novel solution.
- *Planning* converts an idea into specifics.
- *Marshaling* assembles the necessary resources.
- *Implementing* applies the resources to a specific plan in order to generate sustainable revenues

This paper focuses exclusively on ESES, because it is the cognitive attribute that is related to the phase of venture creation that employs hypothesis testing. This specific measure has been linked to entrepreneurial intention and entrepreneurial orientation across regions and genders (Ladd, Hind, & Lawrence, 2018).

The interpretation of evidence to declare a hypothesis valid or invalid in the face of uncertainty requires an entrepreneur's judgment, which is rife with biases (Tversky & Kahneman, 1974). Consider the action of validating a hypothesis. While it may reflect the underlying wisdom that a business model built on confirmed hypotheses more consistently creates customer demand, the confirmation of hypotheses might also reflect the entrepreneur's own preexisting biases (Fuchs et al., 2019; Nickerson, 1998). By rejecting a hypothesis as invalid in the face of disconfirming evidence, the entrepreneur may be demonstrating a capacity for objectivity to overcome preexisting expectations and confirmation bias (Klayman & Ha, 1987). Hypothesis testing may also fall victim to other biases, including an escalation of commitment (Wood et al., 2019).

The purpose of this paper is to explore the empirical link between self-efficacy and hypothesis testing. It is not to identify the mechanisms by which self-efficacy might influence the activities relating to hypothesis testing.

Propositions About Self-efficacy

As noted above, entrepreneurial self-efficacy has been repeatedly linked to venture success. From this, we derive a proposition that relates McGee's narrow construct of self-efficacy while searching (ESES) to the success of the business model.

> *Proposition 5*: There is a positive significant relationship between the entrepreneur's self-efficacy in searching (ESES) for a new business model and that business model's eventual success.

Table 1. Summary of Propositions.

P	Summary
1	Hypos elucidated --> success
2	Hypos confirmed --> success
3	Hypos rejected --> success
4	Interviews --> success
5	ESES --> success
6a	ESES --> hypos elucidated
6b	ESES --> hypos confirmed
6c	ESES --> hypos rejected
6d	ESES --> interviews

ESES has also been explicitly linked in prior literature to hypothesis testing: entrepreneurs must "gain confidence in the hypothesis" during generative sensing (D. Teece et al., 2016, p. 21). The above proposition links self-efficacy directly to venture success. Our next analysis ties ESES to the actions within hypothesis testing that we described in *Propositions 1* through *4*. We contend that a merger of McGee's exploration on self-efficacy and the four approaches to designing a new business model – McGrath's Discovery-Driven Design, Kelley's Design Thinking, Ries' Lean Startup Method, and Teece's Dynamic Capabilities – generates a proposition that asserts that self-efficacy in searching (ESES) is a significant predictor to arriving at one of the three actions in hypothesis testing – elucidation, confirmation, and rejection – as well as the number of interviews conducted during business model design.

> *Proposition 6*: Entrepreneurs who are more confident in their ability to search for a new business model (ESES) are more likely a) create, b) confirm, and c) reject hypotheses. They are also more likely to d) conduct customer interviews.

Table 1 and Fig. 1 summarize all of our propositions. Please note that *Proposition 6* explores only the direct link between ESES and hypothesis testing; it does not imply a mediated model.

Methods

We tested these propositions with 353 participants in an international pitch competition. The dependent variable of success was measured as victory in the second round of the competition in March. This is an important detail. Throughout this paper, we have referred to "venture success" in ambiguous terms, meaning generally that the venture survives and generates sufficient profit to satisfy its founders.

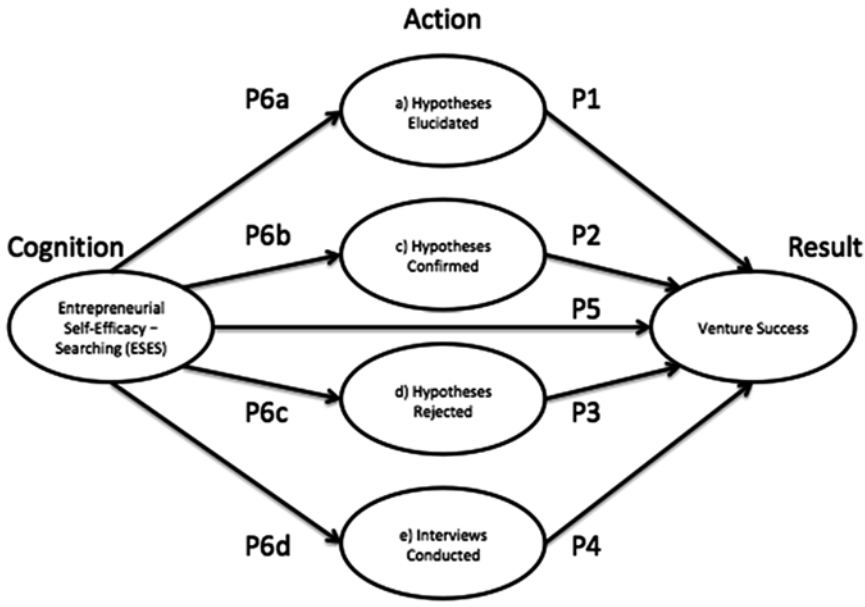

Fig. 1. Diagram of Propositions.

In our analysis, we are taking a much narrower measure of venture success with the intention of drawing more generalized conclusions. In other words, we assert that the relationships between self-efficacy, hypothesis testing, and success in the competition will hold even when the outcome variable is expanded from the pitch competition to profitable operation in a competitive marketplace. Several articles support this assertion.

Business pitch competitions (a contemporary iteration of business plan competitions) prompt students, often in teams, to conceive of a new idea and present a summary to a panel of judges, who determine the idea's market potential. These competitions aim to reward content over showmanship (X.-P. Chen, Yao, & Kotha, 2009), and they provide accelerated education for aspiring entrepreneurs in several aspects of entrepreneurship (Russell, Atchison, & Brooks, 2008). Many of the core activities in a business pitch competition – the identification of a business' optimal strategy, the resources it will need to grow, and the processes that are necessary for organizing those resources – have also been deemed as vital for explaining the success of new business models after launch (Chrisman, Bauerschmidt, & Hofer, 1998; Delmar & Shane, 2003).

Our focal sample emanated from an annual pitch competition where the organizers declare a "grand challenge" (George, Howard-Grenville, Joshi, & Tihanyi, 2016): a specific global problem that can be solved by private market (i.e., nongovernmental) entrepreneurial solutions. Any student in any location pursuing an undergraduate or graduate degree in any subject can apply to compete. Typically, over 15,000 students register for the annual competition, which

occurs in three successive rounds of elimination. The winning students in the final round receive $1 million as an award to launch their social venture.

Of the 14,547 people contacted via email to receive the first survey in January 2017, 1,443 emails bounced. We received 1,658 responses that contained complete data for our focal constructs for a minimum actual response rate of 12.65%. We could not determine how many emails may have been blocked by spam filters. The average age of respondents in 2017 was 23.5 years old (standard deviation (SD): 4.7 years) with 2.3 years of business experience (SD: 3.3 years), from a wide array of regions of the world (Table 2, where some respondents did not identify their home region). This first survey inquired about self-efficacy using 5-point Likert scales for ESES using the scales from McGee et al. (2009).

The second survey in March 2017 was sent only to the 476 respondents who had won the first round of the business pitch competition in January 2017 and competed in the second round in March 2017. The response rate of 353 reflected a rate of 74%. The second survey in March asked respondents to self-report their values for the number of interviews and hypotheses of various kinds. In other words, the respondents gave single point values for the number of hypotheses that they elucidated, confirmed, and rejected. It is important to note that the reports of entrepreneurial cognition occurred before – or at least early in – the process of hypothesis testing. These longitudinal data ensure that results of the business pitch competition did not influence the respondents' measures of self-efficacy.

Twelve of these respondents won the second round (3.4%). Most of the questions in the survey gave an additional prompt for unanswered questions but did not force a response. These partial responses were included in the dataset, which explains the varying sample sizes across questions.

Table 2. Region of Origin of Respondents.

Region	***N***	**Percentage**
North America	330	21
Central America	48	3
South America	110	7
European Union	53	3
Europe outside of the EU (including Russia)	23	1
Middle East	178	11
Africa	294	19
Southeast Asia	304	20
Asia excluding China	186	12
China	27	2
Total	1,553	100

Volunteer business professionals and faculty members typically perform judging in the first two rounds. Judges for the final round are typically luminaries in international businesses, with particular acumen in social entrepreneurship. A pitch lasts for no more than 15 minutes, usually aided by slides. There is no other written component to an entry.

For the competition that occurred in 2016–2017, the grand challenge asked contestants to design a profitable private venture that would bring 10 million refugees into the formal economy within 10 years. The scale of solution required participants to contemplate business models that would operate in multiple regions of the world, across multiple refugee migrations.

The data were collected in Qualtrics. This analysis employed SPSS v25.

Results

The descriptive statistics and correlations of the key constructs are depicted in Table 3.

The psychometric scale for ESES showed adequate reliability with Cronbach's alpha for ESES of 0.703 (Hair, Black, Babin, & Anderson, 2013).

In terms of results, students who won in the focal round in the pitch competition created, confirmed, and rejected significantly more hypotheses than students who did not win (Table 4). However, there was no significant difference in the measure of self-efficacy or in the number of interviews conducted by students who won compared to students who lost. The low number of cases in the sample that won in the focal round of the competition ($N = 6$) is cause for concern, but the difference in the mean of elucidated, confirmed, and rejected hypotheses between the losers and winners is still sufficiently large to generate significant results.

Binary logistic regressions in Table 5 for each of the independent variables reinforced these results, where the elucidation, confirmation, and rejection of

Table 3. Descriptive Statistics and Bivariate Correlations.

	Mean	**SD**	***N***	**0**	**1**	**2**	**3**	**4**
0. Success	0.03	0.18	353					
1. Hypos elucidated	18.40	20.54	172	0.158*				
2. Hypos confirmed	11.18	17.42	167	0.243**	0.733**			
3. Hypos rejected	10.01	16.69	161	0.331**	0.700**	0.760**		
4. Interviews	89.11	104.09	325	−0.01	0.201**	0.216**	0.12	
5. ESES	4.24	0.64	1,727	0.08	0.14	0.345**	0.14	0.231*

**$p < 0.01$, *$p < 0.05$.

Table 4. ANOVA of Actions by Success.

	Lost			Won			ANOVA Significance
	N	Mean	SD	*N*	Mean	SD	
Hypos elucidated	164	17.29	19.25	6	34.33	31.67	0.039*
Hypos confirmed	159	10.25	15.86	6	32.83	38.11	0.002**
Hypos rejected	153	8.35	13.44	6	35.33	36.40	0.000***
Interviews	312	87.84	103.02	10	79.9	54.18	0.809
ESES	121	4.26	0.55	4	4.50	0.43	0.387

ANOVA: analysis of variance. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

Table 5. Results of Separate Binary Logistic Regressions on the Dependent Variable of Success.

Independent Variable	Beta	SE	Wald	Beta Significance	Model Fit *p*-Value	Nagelkerke R^2
Hypos elucidated	0.026	0.014	3.623	0.057#	0.086#	0.065
Hypos tested	0.037	0.014	6.55	0.01*	0.022*	0.116
Hypos confirmed	0.033	0.013	6.62	0.01*	0.023*	0.116
Hypos rejected	0.045	0.015	9.26	0.002**	0.004**	0.186
Interviews	−0.001	0.003	0.059	0.808	0.803	0.001
ESES	0.947	1.096	2.335	0.387	0.360	0.027

SE: standard error. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, #$p < 0.10$.

hypotheses were all positively and significantly related to business model success, with adequate model fit. (Each line in Table 5 represents a separate statistical test with different independent variables on the same dependent variable of business model success. These results exclude the constant in the regression equation. For example, row 2 reports on a regression with the independent variable of the number of hypotheses elucidated by each member in the sample with the dependent dichotomous variable of success in the second round of the competition. It reports barely adequate model fit and a barely significant positive relationship between independent and dependent variables.) The model that regressed the number of rejected hypotheses against success in the competition demonstrated the highest levels of coefficient (beta) significance ($p < 0.002$) and explanatory power (18.6%).

Both the ANOVA and the binary logistic regressions support *Propositions 1*, *2*, and *3*. They do not support *Proposition 4* or *5*.

Although ESES was not significant in directly predicting success, it did play an interesting role in predicting the specific actions of hypothesis testing. Separate

Table 6. Results of Separate Linear Regressions for ESES on the Dependent Variables of Entrepreneurial Actions.

Dependent Variable for Entrepreneurial Action	Standardized Beta	*p*-Value of Beta	Adjusted R^2	Conclusion
Hypos elucidated	0.158	0.039*	0.019	Positive and significant
Hypos confirmed	0.243	0.002**	0.053	Positive and significant
Hypos rejected	0.331	0.000***	0.104	Positive and significant
Customer interviews	−0.014	0.809	−0.003	Nonsignificant

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

Table 7. Summary of Propositions and Results by Action.

P	Summary	Conclusion
1	Hypos elucidated --> success	Supported
2	Hypos confirmed --> success	Supported
3	Hypos rejected --> success	Supported
4	Interviews --> success	Rejected
5	ESES --> success	Rejected
6a	ESES --> hypos elucidated	Supported
6b	ESES --> hypos confirmed	Supported
6c	ESES --> hypos rejected	Supported
6d	ESES --> interviews	Rejected

linear regressions (Table 6) tested the influence of ESES on the four outcomes of hypothesis testing. (In contrast to Table 5, each line in Table 6 represents the same independent variable, ESES, with a different dependent variable. For example, row 2 regresses the independent variable of ESES against the dependent variable of the number of elucidated hypotheses by each member of the sample.)

These results support *Propositions 6a*, *6b*, and *6c* but not *6d*. Table 7 and Fig. 2 show the results of this analysis for each proposition.

Discussion

These results have several interpretations for the research and practice of designing and refining new business models.

Hypothesis Testing and Success

First, the elucidation of hypotheses, even if they are not tested or interpreted, showed a significant relationship to the success of a business model in the pitch

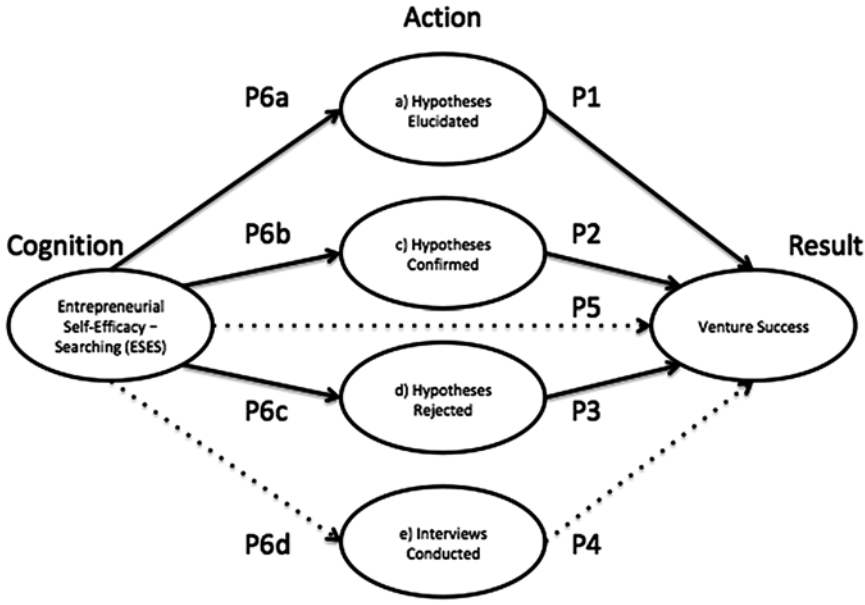

Fig. 2. Diagram of Supported Propositions.

competition. Second, confirming more hypotheses as valid was even more strongly linked to the performance of a business model. This result suggests that successful business models are based on – and confirmed by – external evidence. Third, our analysis found that rejecting more hypotheses as invalid also showed a significant link to the performance of a business model. Indeed, the number of invalidated hypotheses was the *most significant predictor* of success. Presumably, these rejections allowed the entrepreneur to pivot the business model toward other models that are more likely to appeal to potential customers. A higher number of rejections might also reveal that the entrepreneur is listening objectively to the evidence, overcoming his or her own biases.

Finally, conducting more customer interviews was *not* linked to improved performance of the business model. There might be no relationship between the number of interviews and venture success, or there might be a threshold for the number of interviews that the entrepreneur needs to hold with potential customers. Conducting more interviews beyond this threshold may not add useful evidence but instead only mixed messages and confusion (Ladd et al., 2015). It is possible to conclude from this finding that an entrepreneur can leverage the process of hypothesis testing with a small number of interviews. It is also possible that entrepreneurs who conducted many interviews were merely flattering their biases: the entrepreneurs may have been talking to friends who already declared a preference for the potential business model (selection bias), or the entrepreneurs may have interpreted the conversations to confirm what they already believe to be true (confirmation bias).

However, given the strong bivariate correlations between the numbers of interviews conducted and the number of hypotheses created and confirmed (0.201** and 0.0216, respectively, as reported in Table 3), it is likely that the number of interviews is an important antecedent to hypotheses testing but too distant from success in the causal chain to have a significant impact. Other actions and events that occur between the interview and the measure of a business model's success may obscure the link between these two constructs.

Self-efficacy, Hypothesis Testing, and Success

We found that the construct of entrepreneurial self-efficacy in searching for a new business model was not by itself a direct, significant predictor of the business model's success. There are several potential explanations for this result. First, the small number of successful models in our sample, combined with the low variance for the ESES measure, may conclude nonsignificance in this sample, but it might reveal a relationship in a larger sample. Second, winning a business pitch competition may not sufficiently mirror the dependent variables that McGee et al. (2009) employed when they validated the measure. Third, it is possible that the link that McGee et al. found between entrepreneurial self-efficacy and success relied on all four of their sub-dimensions. A narrow focus on only the construct for self-efficacy in searching, neglecting their other sub-dimensions for networking, marshaling, and implementing, may have mooted any significant connection to success.

Nonetheless, our analysis demonstrated that entrepreneurs who already showed a high level of entrepreneurial self-efficacy in searching for new ideas (ESES) were more likely to elucidate, confirm, and reject hypotheses. However, ESES did not predict the number of interviews that the entrepreneur conducted.

Conclusion

Implications for Entrepreneurs

This analysis demonstrates that the entrepreneurial actions of elucidation, confirmation, and rejection of hypotheses are linked to the success of a business model, where more repetitions of these actions are directly, positively, and significantly related to performance. In more assertive terms, hypothesis testing works, and more testing is better. Among these three actions, hypothesis rejection is the most significant predictor of eventual success, which is a conclusion rarely discussed in practical or academic literature.

The action of conducting interviews with potential customers does not directly relate to success: there was no significant correlation between the number of interviews and performance of the business model. In short, more interviewing is not better. However, it is possible that the evidence collected during interviews becomes important to actions related to hypothesizing.

Entrepreneurs who are confident in their ability search for a new business idea (ESES) are more likely to elucidate, confirm, and reject hypotheses. There are

several routes to gain ESES: setting moderately challenging but attainable goals to help students experience mastery first-hand; finding distant role models and proximate mentors in the specific target domain; practicing self-reflection; and embracing optimism even in the face of failure to become more resilient (Bandura, 2008). Formal programs in entrepreneurial education may provide some of these opportunities, especially if they include opportunities to practice the scientific method. Bolstering entrepreneurial self-confidence in hypothesis testing will increase the frequency and efficacy of this process.

Implications for Researchers

The empirical conclusions from this paper lay a foundation for researchers to further explore *how* the process of hypothesis testing around a new business model uncovers or creates a new entrepreneurial opportunity. Does it occur during hypothesis elucidation or during confirmation? Do customer interviews simply provide evidence for confirming or rejecting hypotheses, or do these interactions drive the initial creation of hypotheses? Is there a specific characteristic of an interview that would, indeed, be directly relevant to success?

Even though we found no significant direct relationship between self-efficacy and success, this article establishes a potential causal chain where self-efficacy predicted actions that we found to be vital to the success of a new business model. Does self-efficacy in searching for new ideas also reward other activities outside of hypothesis testing, like co-creation or innovation through solitary imagination? This query suggests that the entrepreneurial activity may mediate or moderate the translation of self-efficacy into success. Such an analysis was outside the boundaries of this paper and could be important to explore further.

It is important to remember that our assessment of self-efficacy occurred before entrepreneurs engaged in rigorous feasibility analysis and well before judges evaluated their business model. This suggests that entrepreneurial cognition was a useful predictor to some entrepreneurial actions. It portends that entrepreneurs will be more successful in employing hypothesis testing if they have already bolstered their confidence to search for new ideas in other contexts unrelated to business model design. While this is not surprising from the broader literature, this conclusion has not yet entered the literature on Discovery-Driven Planning, the Lean Startup Method, Design Thinking, or Dynamic Capabilities.

Implications for Educators

First, this analysis suggests that elucidating, confirming, and rejecting hypotheses are actions that educators should teach to students in order to improve performance of the business models they design. The theory of hypothesis testing has become popular in educational environments for its simplicity. With this paper's results, the approach can also boast an empirical connection to success.

Second, educators should not just emphasize and reward the confirmation of hypotheses but also the rejection of hypotheses, which demonstrate the entrepreneurs' objectivity and openness to new evidence.

Third, in recognizing the importance of various kinds of self-efficacy, educators can develop not just high-performing student-conceived business models but also competent serial entrepreneurs, because self-efficacy may endure beyond the current idea and increase the likelihood and efficacy of hypothesis testing for subsequent ideas. Teachers might therefore include specific assignments and affirming evaluations to entice students to increase their self-perception of their competence in the skills of searching for a new idea. These exercises may increase the subsequent frequency and efficacy of hypothesis testing for students' immediate construction of business models and their long-term careers as entrepreneurs.

Limitations and Future Research

This study has several limitations. Foremost is the small number of ventures in the sample that succeeded in the business pitch competition. The relationship between our various constructs and this dependent variable were statistically significant but arguably precarious. Moreover, success in a business pitch competition is neither an ideal proxy for performance of the business model once it is launched into a competitive market nor a reliable measure of long-term business model success. However, these weaknesses are balanced by the strength of the measure's immediacy. There is little time between the design of the business model and its evaluation by a panel of judges for other individual or environmental factors to introduce exogenous factors or noise into the sample. A future study could increase the total size of the sample, even if the percentage of winners remains constant, to increase the validity of the analysis.

A second limitation is the potential for self-reported responses to rely on definitions that diverge from common parlance. Did respondents share this paper's definition of a hypothesis as a testable, falsifiable assumption about a specific, narrow aspect of a new business model? Only some participants may have received training in the Lean Startup Method, Design Thinking, Discovery-Driven Planning, or Dynamic Capabilities of Generative Sensing. Only some of that training may have been consistent with best practices and definitions. And only some of that training may have been retained. Respondents might also have had differing thresholds for declaring a hypothesis to be valid or invalid. These definitional ambiguities can be solved with deeper questions that avoid using jargon like the words "hypothesis" or "confirmed."

A third, related limitation echoes concerns from Wood et al. (2019). Our analysis assumed that all hypotheses and interviews could have been potentially constructive. A more nuanced approach might test and then draw conclusions on the difference between hypotheses constructed and interviews conducted early in the design of the business model compared to those completed later in the process. We also assumed that hypothesizing equally influenced all business models. In contrast, although Wood et al. (2019) did not consider individual steps in the process of hypothesizing, they did note that startup ventures have different consequences for falsely confirmed hypotheses and attribution for those errors (Dutton, 1986). Future work on the role of hypothesis testing would benefit from incorporation of these environmental variables.

While the cognitive constructs were tested in advance of the entrepreneurs' design of their business models, we cannot tell from this study design if respondents had already demonstrated or developed self-efficacy before they arrived at the competition, or if these cognitive attributes endured after the conclusion of the competition. These issues can be resolved by conducting multiple repeated measurements longitudinally.

Finally, because of the celebrity status of hypothesis testing in entrepreneurship, it is also possible that the judges in the business competition weighed the occurrence of hypothesis testing over their expectations for the future success of the business model. In other words, this analysis assumes that the evaluation of venture success was based on its merit, not the method by which the entrepreneurs designed or refined the business model. However, judges may have included the method in their evaluation.

Hypothesis testing is gaining traction in management education through several popular approaches to business model design. Through further study, we can understand not only the specific processes that drive these approaches but also the cognitive antecedents of their implementation. Armed with this understanding, we can begin to identify and test the elements and cognitive attitudes of Lean Startup 2.0 or Design Thinking 2.0 that might achieve even more impact in accelerating the design of success new business models.

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