

RESEARCH ARTICLE

From framework to theory: an evolutionary view of dynamic capabilities and their microfoundations

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Abstract

Dynamic capabilities (DCs) are organizations’ ability to integrate, build, and reconfigure competences, on which they draw to adapt to changes. Despite a significant stream of literature exploring DCs, the following question remains: *how do dynamic capabilities allow organizations to adapt to changes and succeed?* To fill this gap, this paper outlines a theory of DCs, based on an analysis of strategic behavior (micro)formation at the individual and collective levels. This theory conceptualizes an evolutionary paradigm in which the intentions of organizational agents are intertwined with environmental influences. It defines DCs as ‘instruments able to entrepreneurially solve problems of evolutionary fitness of organizations.’ In doing so, it advances theoretical conceptualization of DCs and their microfoundations to provide insights into how an entrepreneurially led organization may confront and solve problems and ultimately prosper.

Key words: Co-evolution; dynamic capabilities; evolution; microfoundations; theory

According to the firm-level dynamic capabilities (DCs) framework, DCs can integrate, build, and reconfigure competences to address changes in the business environment (Teece, Pisano, & Shuen, 1997). However, how DCs enable organizations to adapt and succeed remains pending (Barreto, 2010; Eriksson, 2014; Hodgkinson & Healey, 2011; Kurtmollaiev, 2020; Teece, 2014, 2018; Wang & Ahmed, 2007). The answer to this question is key to understanding the basis of competition (Levinthal & Rerup, 2006). As Teece (2007, p. 1344) argues, if an enterprise has resources/competences but lacks DCs, ‘it cannot sustain supra-competitive returns for the long term except due to chance.’ If we do not understand how DCs can shape an organization to become more resilient, we cannot identify the mechanisms that allow survival and growth in volatile, uncertain, complex, and ambiguous environments (Arndt, 2019; Barreto, 2010). Here we argue that what is needed is a *theory of dynamic capabilities* to explain how DCs allow entrepreneurially led organizations to solve problems, and ultimately prosper.

The need for a theory of DCs emerges from the recognition that earlier works ‘merely sketched an outline for a dynamic capabilities approach’ (Teece, Pisano, & Shuen, 1997, p. 530; see also Teece, 2007, 2014, 2018). In practice, conceptualizations and results around DC took the form of a framework and not of a theory. From that, there is a lack in understanding how the elements of the DC framework enable organizations to adapt to changes and succeed by relating to one another¹. For example, despite the entrepreneurs’ or managers’ perception about a firm’s history

¹In this vein, it is important to bear in mind the differences between frameworks and theories. In her Nobel laureate address Ostrom (2009) put it as follows: ‘A framework is intended to contain the most general set of variables that an institutional analyst may want to use to examine a diversity of institutional settings including human interactions within markets, private firms, families, community organizations, legislatures, and government agencies. it provides a metatheoretical language to enable scholars to discuss any particular theory or to compare theories. A specific theory is used by an analyst

matters as a microfoundation of their ability to sense opportunities (Suddaby, Coraiola, Harvey, & Foster, 2020), it is not investigated how perception is linked with routines – another microfoundation of DCs (Zollo & Winter, 1999).

To fill the above gap, in line with the recent evolutionary and ecological conceptualization of DCs (Arndt & Bach, 2015; Arndt & Pierce, 2018; Björklund, Maula, Soule, & Maula, 2020; Galvin, Rice, & Liao, 2014; 2015), we adopt an evolutionary lens, including elements from the co-evolutionary stream (that sees the firm-environment relationship as *dialectical* rather than deterministic), for building a theory of DCs able to investigate the formation of the DCs at the micro-level analysis, thus microfoundations. In doing that, this article answers the call of this special issue on DCs for the *Journal of Management & Organization* to ‘unpack the processes by which DCs are created, expressed and transformed within organizations.’

To unpack these processes, adaptation is here seen as the ‘evolutionary change in which the organism *creates* a constantly better solution to the problem it faces, whose result is finally that of being adapted’ (Lewontin, 1989, p. 157). In practice, the adaptation process is the way organizational agents seek to make a change (Levinthal, 1991). That is, it is akin to the way organisms in the natural world strive to redefine or design the external conditions in which they exist, based on their capabilities. In essence, this idea of co-evolution – from which some elements are considered for the proposed conceptualization – assigns a proactive role to organizations in *designing* their path, determining ‘the speed at, and the degree to which, the firm’s particular resources can be aligned and realigned to match the requirements and opportunities of the business environment to generate sustained abnormal (positive) returns’ (Teece, 2012, p. 1395; see also Augier & Teece, 2006; Teece, 2014; Teece, Pisano, & Shuen, 1997; Zahra, Sapienza, & Davidsson, 2006). This is in contrast to the theoretical perspective of generalized Darwinism.

Stemming from the above, this paper advances the theorization of DCs, considering strategic behavior formation both at the individual and collective levels. It explicates how ordinary and low-order capabilities and their substantiating elements (meaning, knowledge, and habits/routines) co-evolve, and explores the shift from these initial capabilities to intentional actions by organizational agents (Zollo & Winter, 2002; Zollo, Bettinazzi, Neumann, & Snoeren, 2016). Thus, our theory exploits the microfoundations of DCs. By considering, within the proposed theory, evolutionary mechanisms (e.g., replicators and interactors) that were not included in prior evolutionary studies of DCs (Zollo et al., 2016; Zollo & Winter, 2002), this article responds to the critique of some scholars (Abatecola, Breslin, & Kask, 2020) underlining a lack of clarity in what is varied, selected, and retained in the evolution of DCs (Teece, Pisano, & Shuen, 2000). Thanks to that, this work explicitly positions DCs as an evolutionary theory – as asked by Galvin, Rice, and Liao (2014). However, the proposed theory does account for the complexity of multi-level co-evolutionary relations within and beyond organizations; this is the main limitation of our theory. Despite that, provided conceptualization helps interpret DCs as tools used to entrepreneurially achieve the evolutionary fitness of organizations. That is, a means to adapt to changes and ultimately succeed.

Theoretical issues

DCs: definition and theoretical developments

How do firms achieve and sustain competitive advantage? This is the question addressed by Teece, Pisano, and Shuen (1997) in the late 1990s. Using the Schumpeterian innovation-based conception of competition, Teece, Pisano, and Shuen (1997) highlighted DCs as drivers of wealth creation and capture.

Teece, Pisano, and Shuen (1997, p. 516) identified the critical elements of DCs as resources, routines, ordinary capabilities, and low-order capabilities. Resources are ‘firm-specific assets

to specify which working parts of a framework are considered useful to explain diverse outcomes and how they relate to one another.’

that are difficult if not impossible to imitate' (e.g., trade secrets). Routines are the clusters of firm-specific assets that trigger activities by people and groups that arise from complex interactions among learning, organizational resources, and organizational histories (e.g., exposing a business unit's results in the weekly meeting). Ordinary capabilities (e.g., production process) are the 'competences that define a firm's fundamental business' (usually connected with administration, operation, and governance processes). Low-order capabilities allow the organization to grow somewhat routinely (e.g., development of new products) and can be assisted by simple rules to provide guidance but with enough flexibility to respond to emergencies. In some parts of this theorization, we'll use the term *operating* capabilities to underline both ordinary and low-order ones.

Resources, routines, and capabilities can be continuously created, extended, upgraded, protected, and kept relevant only through the action of difficult-to-imitate DCs, such as market sensing and sensemaking, and associated new product development. Organizational resources and competences are, therefore, 'hierarchical' (Wang and Ahmed, 2007) and DCs are a *meta-competence*, transcending operational competence and enabling organizations to develop and produce differentiated products and services that address new and existing markets while meeting (long run) profitability tests (Teece, 2007, 2014); or, at least, to resiliently survive change. An example is the Italian airline, Alitalia, which has used the DC 'building alliances' with other industry players to overcome several financial crises. Thanks to this DC, Alitalia was able to catch the financial resources missing in critical periods of its life cycle or benefit from the resources of other players or develop new capabilities to exploit new business opportunities. This is the case of: (a) the SkyTeam alliance of flight operators joined in 2001, which helped Alitalia in replacing their Boeing 747 with new Boeing 777-200ER, and (b) the transatlantic joint venture participated by Alitalia in 2010 and including Air France, KLM, and Delta Air Lines. This latter allowed the division of costs and revenues coming from routes operated across Europe and North America, Amsterdam and India, North America and Tahiti, as well as building operational competences in new markets.

For analytical purposes, Teece (2007) clusters DCs according to their capacity to: (1) sense and shape opportunities and threats (*sensing*); (2) seize opportunities (*seizing*; i.e., allocating resources to catch them); and (3) maintain competitiveness through enhancing, combining, protecting, and, when necessary, transforming the organization's intangible and tangible assets (*transforming*). In this regard, the three depicted DCs are rooted in a series of microfoundations – for example, distinct skills, processes, procedures, organizational structures, decision rules, and disciplines – which are difficult to develop and deploy. Yet, DCs themselves are foundations of the sustainable competitive advantage of firms, mainly because explaining the strategic adaptation of the firm in rapidly changing environments.

For DCs to be strong, management must be entrepreneurial; according to Teece (2007, p. 1321): 'Dynamic capabilities assist in achieving evolutionary fitness, in part by helping to shape the environment. The element of dynamic capabilities that involves shaping (and not just adapting to) the environment is entrepreneurial in nature.' Yet, Teece recognized that DCs cannot operate alone; they must be accompanied by VRIN (valuable, rare, imperfectly imitable, and non-substitutable) resources and effective strategizing, which makes relevant the cognition-action nexus underlining DCs (Barreto, 2010; Kurtmollaiev, 2020; Zollo & Winter, 2002).

Recently, the concept of DCs has been expanded in two ways: (1) incorporating the individual managerial level, and (2) seeing DCs as (workable) management systems theory. First, it has been introduced the concept of dynamic managerial capabilities (DMCs), which are 'the capabilities with which managers build, integrate, and reconfigure organizational resources and competences' (Adner & Helfat, 2003, p. 1012; Teece, 2018). Regarding the second development, Teece (2018) recently advanced considering DCs as akin to (workable) management systems theory, in that DCs are nested (systems are formed by sub-units and DCs are essential at the corporate and operational levels), emphasizing the importance of feedback mechanisms (information for systems theory and learning for DCs) (see also Kay, Leih, and Teece, 2018). However, critics argue that systems theory is too abstract and cannot detail the most critical relationships at a particular

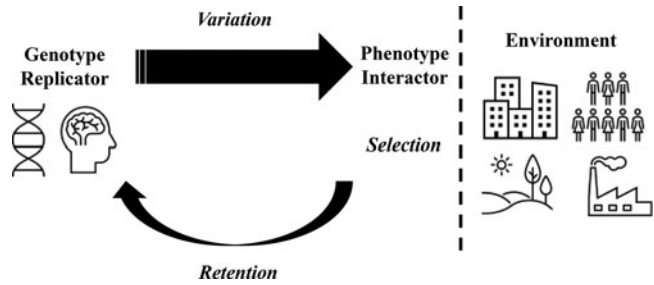


Figure 1. Variation, selection, and retention.

junction (Teece, 2018). In particular, Teece (2018, p. 363) describes ‘general systems theory, with its biological orientation and emphasis on reactivity, [as] consistent with an evolutionary view of the firm. Strategic management, however, calls for a framework that recognizes both evolution (path dependence) and design (entrepreneurship).’ We address this by considering the principles of the co-evolutionary view.

Generalized Darwinism

Over the last 40 years, organizational evolution studies have adopted different approaches to understanding how organizations adapt and evolve. One such approach is generalized Darwinism, mainly adopted in evolutionary economics (Witt, 2004). Another is co-evolution, primarily used in management and organization studies (Abatecola, 2014; Abatecola, Belussi, Breslin, & Filatotchev, 2016). In this sub-section, we discuss generalized Darwinism before turning to co-evolution in the following sub-section.

Two biological elements underpin generalized Darwinism: (1) variation–selection–retention (VSR) principles; and (2) replicator–interactor mechanisms. Both are considered here to explain how DCs form meanings, knowledge, habits, routines, and capabilities.

As shown in Figure 1, VSR principles can be conceived in the organizational domain (Hodgson & Knudsen, 2010; Hull, 1988) as follows:

- (1) Current routines, competencies, and/or business practices that randomly mutate or are subject to recombination, that is, blind variation. For example, ordering items according to their perishability mutates into ordering them based on seasonal demand. These are, in biological terms, the instructions in an entity’s underlying coding attributes (i.e., genes) (Abatecola, Breslin, & Kask, 2020).
- (2) Configurations produced by variation (i.e., genotypes), which may, for example, include documented procedures for ordering items. These variations are selected, reducing disorder or entropy. Selection occurs according to the fitness rule that determines the probability a variation will survive or reproduce.
- (3) Variations that have been selected are retained, thus preserved, duplicated, or otherwise reproduced. Replicators (abstracted from genotypes; Hull, 1988) are units that are transferred to other subjects (e.g., individuals, groups, organizations) through a series of subsequent replications, while interactors (abstracted from phenotypes; Hull, 1988) interact with their environment. Thus: ‘Y is a replicate of X if and only if: (i) X and Y are similar (in some relevant respects), and (ii) X was causally involved in the production of Y in a way responsible for the similarity of Y to X. Replication is any process by which a replicate is produced’ (Godfrey-Smith, 2000, pp. 414–415)².

²Aunger (2002) better explains that an element can be considered a replication of another if exhibiting the following four characteristics: (1) *causation*, the source must be causally involved in the production of the copy; (2) *similarity*, thus the copy must be like its source in relevant respects; (3) *information transfer*, the process that generates the copy must obtain the

Breslin (2016) highlights that evolutionary scholars adopt two main approaches to interpreting replicators and interactors, the entity view and the practice view. According to the entity view, replicators are ideas, routines, ordinary and low-order capabilities, and knowledge repositories, while interactors include technological artifacts and organizational performance. In the case of the entity view, variation, selection, and retention are driven by external selection forces. In contrast, the practice view sees replicators as abstracted cognitive structures and cognitive understandings (i.e., forms of schemata, Breslin, 2008), while interactors are behaviors, socially situated practices, language, and narratives. Unlike the entity view, the practice view sees variation, selection, and retention as driven by individuals, groups, and organizations, which continually modify replicators through their actions, such as visualizing a product prototype on paper or drawing a business model. The practice view aligns with the concept of DCs and therefore is adopted in this work.

Co-evolution

The overlap among replicators and interactors proposed by some scholars is closer to the co-evolutionary approach. Due to its ability to consider the entrepreneurialism of organizational agents and the influencing constraints of the environment, co-evolution provides a useful interpretative lens for understanding how DCs enable organizations to adapt to changes and ultimately succeed.

In particular, according to Weick (1969), co-evolution – in biological terms, ‘the evolution of two or more species through the action of reciprocal selective pressures and adaptation between them, as each has a causal influence on the other’s evolution’ (Abatecola, Breslin, & Kask, 2020, p. 2) – assumes that the reality faced by organizations does not objectively exist, but is enacted by organizational members. That is, organizational decision makers intend or design co-adaptation. For instance, they decide to sell the company or change its business model in response to an industry downturn (Aldrich, 1999). The firm–environment relationship is then interpreted as dialectical (Cafferata, 2016), substantiating the first assumption of co-evolution: *thinking in circles* (Weick, 1969), meaning that the relationship between people and their physical and/or social environment is circular. The second assumption of co-evolution is the so-called *interdependence and reciprocal feedback* among different entities. However, interacting entities may not be positioned at the same level, because there is a macro-level (i.e., general environment–organizations), meso-level (i.e., industry–organizations), and micro-level co-evolution (i.e., units within organizations). This gives rise to the third assumption of co-evolution, *multi-level logic* (Abatecola, 2014; Paniccia & Leoni, 2019). This latter is not fully developed in the provided theorization.

From the above, the co-evolutionary approach partly differs, but not in an unreconcilable manner, from evolutionary economics. These differences are highlighted in Table 1.

In general terms, evolutionary economics is focused on studying mechanisms (based on biology) that explain the evolution and disequilibrium of economic systems. At the same time, co-evolution describes the co-influencing effects of managerial intentionality and environmental determinism on a multi-level basis (Benson, 1977; Breslin, Kask, Schlaile, & Abatecola, 2021). These differences stem from distinct theoretical underpinnings. Evolutionary economics embraces the principles of generalized Darwinism, such as ‘blind variation’ and ‘selective retention.’ The role of leadership is discounted, and relative emphasis is placed on change (only incremental innovations are counted). Co-evolution, however, while recognizing the value of VSR principles and replicator–interactor mechanisms – and this is the main point of consistency between Generalized Darwinism (GD) and co-evolution – incorporates intention into new

information that makes the copy similar to its source from that same source; and (4) *duplication*, during the process, one entity gives rise to two (or more).

Table 1. Evolutionary economics versus co-evolution

	Evolutionary economics	Co-evolution
Main claim	Economy is constantly changing, it <i>naturally</i> is in disequilibrium. Changes can happen internally and/or externally. From that, innovation is endogenous (emerges from interactions of micro entities)	Organizations' evolution is the product of the joint dynamic outcome of managerial intentionality, environment, and institutional effects. The environment is not 'given,' but it is co-constructed through intentional rationality, commitment, and learning over time
Theoretical underpinnings	Evolutionary biology, general Darwinism, Marxism, behavioral theory of the firm	Dialectical theory, organizational learning, system theory, sensemaking, behavioral theory of the firm
Authors	Aldrich, Baer, Boschma, Collins, Dopfer, Dosi, Douma, Friedman, Galor, Hanush, Hodgson, Kirzner, Michalopoulos, Menger, Moav, Nelson, Schumpeter, Veblen, Winter, Witt	Abatecola, Almudi, Benson, Breslin, Burgelman, Cafferata, Cristofaro, Hrebiniak, Jenkins, Jones, Joyce, Kask, Lewin, Murmann, Panicia, Rindova, Volberda
Adopted explanatory mechanisms	VSR, replicators, interactors, Lamarckian-type inheritance, self-transformation	Thinking in circles, interdependence and reciprocal feedback, multi-level logic, VSR, replicators, interactors
Units of analysis	Firms, institutions, industries, employment, production, trade, and growth	Institutional environment, industrial dynamics, firm/ entrepreneurial capabilities, individuals

entrepreneurial ways of solving problems. This happens because the co-evolutionary approach fully acknowledges the role played by human creativity and actions in entrepreneurially shaping the environment (Murmman, 2013; Teece, 2007). Co-evolution acknowledges how human actors drive their own evolution and that of their organizations/institutions. In brief, co-evolution does not consider evolution as the sole product of uncontrollable environmental forces. In fact, co-evolution – building on its roots in the behavioral theory of the firm and systems theory – can be conceptualized as the making of new combinations while also considering the environment (Abatecola, 2014; Abatecola, Breslin, & Kask, 2020; Cafferata, 2016). In this regard, although evolutionary economics does not entirely ignore intentionality, the role of executives in organizations is implicit. Yet, in evolutionary economics, the object of analysis is usually the organization, industry, or supra-entity level, taking a collective, rather than an individual approach. In contrast, organizational agents' perceptions and learning mechanisms are at the center of the study of co-evolutionary dynamics, in which the role of agents is explicit (Levinthal & March, 1993).

Evolutionary view of DCs

In this section, we propose our evolutionary theory of DCs. See Figure 2 for an illustration.

The theory is composed of six propositions that deal with DCs at the individual and collective levels. The explanation of the theory is divided into three parts: (a) from the dynamic context to sensemaking, (b) from the retained meaning to ordinary and low-order habits/routines, and (c) from habits/routines to ordinary and low-order capabilities toward competitive advantage. As to provide a flowing and causal view of DCs and their microfoundations, the explanation starts always from the individual level, and then it is referred to the collective one. It is worth to note that, apart from the hierarchy followed based on the different individual/collective levels of analysis, the provided theorization is rooted in the hierarchy of microfoundations: meaning, knowledge, ordinary and low-order habits/routines, ordinary and low-order capabilities. The

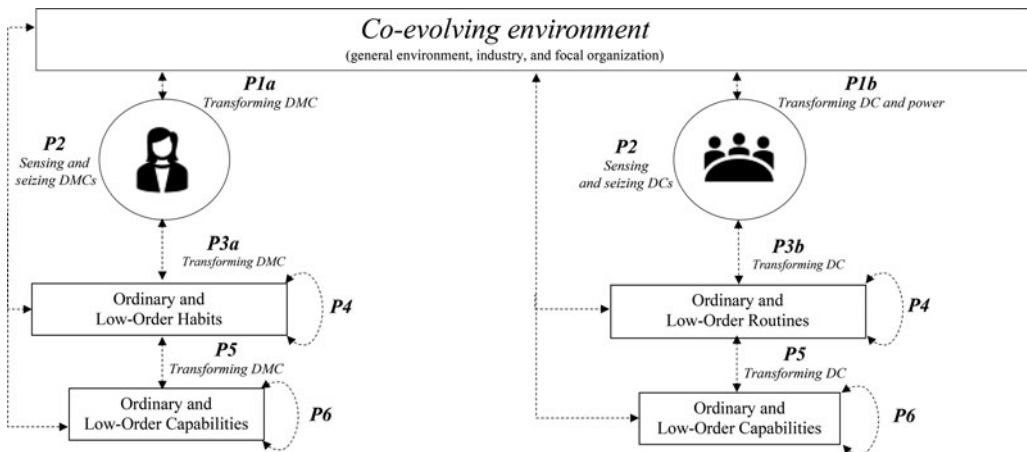


Figure 2. Evolutionary theory of DCs.

three DCs identified by Teece (2007), sensing, seizing, and transforming, explain the transitions among the identified microfoundations and how they are shaped as to allow organizations to adapt to changes and succeed. In particular, apart from the co-evolutionary relationships emerging within the context in which the organization is embedded (among the general, industry, and the organizational environment itself), the three DCs by Teece (2007) are at the center of evolutionary processes, especially the transforming DC. In this regard, evolutionary processes are here considered to happen among microfoundations themselves and in relation to the context. In our opinion, it is the study of microfoundations and their co-evolutionary relationships that allow organizations to adapt to changes and succeed.

From the dynamic context to sensemaking

The business environment faced by organizations is increasingly 'dynamic,' thus featured by rapid change in external environmental forces (e.g., technology shifts and market conditions), with consequences for the enterprise. Dynamicity can be seen also within organizations, referring to changes in organizations' internal conditions (e.g., a shift in business model). These latter heighten or are heightened by competition, following the multilevel property of co-evolution (Dijksterhuis, Van den Bosch, & Volberda, 1999; Murmann, 2013) for which the general environment, industry, and organizations influence each other – that is, *co-evolve* – and create discrepancies in the state of the world (Weick, 1969; Weick, Sutcliffe, & Obstfeld, 2005). These discrepancies trigger managerial actions (Teece, Pisano, & Shuen, 1997), thus stimulating exploration processes to support the capacity to renew capabilities to achieve congruence with a changing environment (Teece, Pisano, & Shuen, 1997). Organizational agents that expect or see the current state of the world to be different from the predicted state (i.e., adaptive sensemaking; e.g., company does not meet expected profits) or become aware of something absent or concealed (i.e., generative sensemaking, Dong, Garbuio, and Lovallo, 2016; such as identification of new business opportunity), try making sense of the causes and find a suitable organizational response (Weick, Sutcliffe, & Obstfeld, 2005). Making sense of these causes is a microfoundation in the proposed reasoning. As a first step, the individual enacts the situation: thus, the agent interprets the ongoing and chaotic environment and starts collecting cues that can help this activity (Weick, 1969). As for the case of a hospital, changes in health conditions of the populations, such as a pandemic, are some of the propellants for the enactment activity, whose goal is to quickly respond to these forces by moving medical treatments in and out according to value maximization criteria.

According to Zollo and Winter (2002), this enactment stage of sensemaking provides the raw materials, the cues to be interpreted, for the *variation* of learning activities, the object of which is ‘ideas’ ‘initially [present] in embryonic and partly tacit form’ (p. 343; see also Winter, 2000). Zollo et al. (2016) refer to these ‘ideas’ as ‘cognitive schemata’ or the mental templates that organizations use to react to changes quickly and consider these the principal drivers ‘of the evolution of the enterprise model in a given firm’ (p. 234). However, more recently, Cristofaro (2020) builds on the assumption that emotions drive sensemaking by recalling congruent (emotional) events. He proposes *emotional schemata*, an emotionally directed mental template individuals use to give an environment form and meaning; so, emotional schemata are the ‘engine’ of sensemaking.

From a practice perspective (Breslin, 2016), here adopted for the understanding of DCs’ formation (Wenzel, Danner-Schröder, & Spee, 2020), emotional schemata are the *replicators* that vary according to the collected and updated cues as well as to *interactors*, that is, the narratives, language, or other kinds of carriers that support these mental representations (Cristofaro, 2021). The initial emotional schema is intentionally selected by testing it for plausibility, an internal and intentional selection to judge whether it is, compared to others, able to build a plausible story for solving the existing discrepancy (Price, 1995; Weick, Sutcliffe, & Obstfeld, 2005). If it fails the test, another emotional schema will be selected and tested until one is intentionally retained (Schlaile & Ehrenberger, 2016). This mental template is then the first one selected when understanding future similar situations.

In this regard, Cristofaro (2021), starting from prior sensemaking studies (Maitlis, Vogus, & Lawrence, 2013), postulated that it is usually selected and retained: a novel and favorable plausible account of the situation when positive affective states are predominant; an accurate and unfavorable plausible account of the situation when negative affective states are predominant; too many or no plausible account of the situation when mixed affective states are predominant. In practice, the emotional schema that fits this selection criterion substantiates the meaning that is retained.

The process of VSR is completed by the organizational agent, in brief, with a new or reinforced meaning. The VSR process is an entrepreneurially driven transformation of the DMC, producing learning and helping organizational agents implement their intentions (Pandza & Thorpe, 2009), with the goal of achieving sustainable competitive advantage. The mastering role of the transforming DMC–DC in the retention of meaning can be intuited in a series of studies, such as in Warner and Wäger (2019), where the digital transforming capabilities consist of navigating innovation ecosystems and other substantiating activities all oriented to identify meaning to the changing digital environment. Also in the study by Chang (2019), conducted on senior executives of 169 firms operating in an industrial district, it emerges how DMCs–DCs are developed by firms to master sensemaking and enable rapid response to environmental change in a network’s context. Thus, we propose the following.

Proposition 1a: At the individual level, the greater the transforming dynamic managerial capability’s exertion, the more plausible the retained emotional schema to make sense of the context.

Like at the individual level, groups of organizational agents respond to needs and challenges in the external and internal environments. However, according to Cristofaro (2021), when scaling up to the collective level, the selective-retention of emotional schemata occurs through entrepreneurially power-directed sensegiving–sensemaking cycles³ – which are mastered through the transforming DC (Lovallo, 1996a, 1996b). These cycles – which may occur simultaneously to facilitate adaptation (further supporting the co-evolutionary logic) (Scarduzio & Tracy, 2015) – are based on the emotional and cognitive contagion among organizational agents. Emotional and cognitive contagion are the processes by which an individual catches the affective states/mental models of others, sometimes without being aware of it, and in turn, converges on their

³Meant as the process by which others shape sensemaking.

affective states/mental models. ‘A sensemaker’ (e.g., a leader) initially makes sense of a situation, then emotionally or cognitively passes this to others (e.g., employees) through sensegiving. However, organizational members engaged in sensemaking processes from sensegivers are not simply passive recipients of others’ emotional schemata; they ‘activate their own sensemaking, with the consequence of adopting, or not, the sense they have been given and influencing the hierarchy’ (Cristofaro, 2021, p. 9). From this last passage emerges how the sensegiving–sensemaking relationship is moderated by the power intentionally exerted (or not) by sensegivers (Heaphy, 2017; Hoyte, Noke, Mosey, & Marlow, 2019). Indeed, the hierarchy may, or may not, adapt to the emotional schemata of the others – consistent with the entrepreneurial view of the DCs framework (Teece, 2007). Therefore, not just at an individual, but also at a collective level, emotional schemata act as replicators, while behaviors, narratives, and other ways of carrying the replicator are the interactors.

The final meaning assigned to a situation is the product of power-directed sensegiving–sense-making interactions (Cristofaro, 2021), a microfoundation at the collective level in our reasoning, that advances the dual role of sensemaking as the object and subject of evolutionary processes (Abatecola, 2014; Breslin, 2016). The role of power clearly emerges in that the intentionality of powerful organizational agents has a driving role in the formation of meaning (Schildt, Mantere, & Cornelissen, 2020). From that, the more powerful actors can ‘alter the situation so that meanings in the situation are consistent with their own definition of the situation’ (Cast, 2003, p. 188; see also Dionysiou & Tsoukas, 2013). Sensegiving–sensemaking cycles are, accordingly, negotiations undertaken in structures that privilege some actors over others, whose accounts are imposed and accepted (Helms Mills, Thurlow, & Mills, 2010). For example, Mikkelsen and Wåhlin (2020), through an investigation of the political processes of sensemaking about diversity management practices in a Danish retailer, found that who controls cultural values within organizations also impacts the circulation of specific emotions. Managers who circulate a set of values linked to diversity and persuade subordinates to them through sensegiving processes will control emotions connected to these values and their spread (through metaphors, axioms, and stories), facilitating the ongoing reproduction of social order within organizations. From that, we advance the following.

Proposition 1b: At the collective level, the greater the transforming dynamic capability’s exertion pushed by powerful agents, the more plausible and adopted the retained emotional schema to make sense of the context.

The sensemaking phase, not only for the assonance with the *sensemaking* word, sees also the implementation of *sensing* DC – devoted to the ‘identification, development, co-development, and assessment of [technological] opportunities’ – and *seizing* DC – intended as the ‘mobilization of resources to address needs and opportunities, and to capture value from doing so’ (Teece, 2014, p. 332). Here we see a synthesis of ideas from the sensemaking and DCs literature. When organizational agents notice and bracket the environment to interpret it (Weick, Sutcliffe, & Obstfeld, 2005), they are entrepreneurially making ‘a diagnosis, which is important to strategy,’ in other words, sensing (Teece, 2014, p. 341). In other words, ‘sensing (and shaping) new opportunities is very much a scanning, creation, learning, and interpretative activity’ (Teece, 2007, p. 1322). In parallel, seizing, as an act of combining policy with action to efficiently and effectively mobilize resources (Teece, 2014), aligns with Weick’s (1969) emphasis on the link between enactment and action within the sensemaking process. That is, from the initial sensing of an opportunity and identifying that it requires action, in parallel, one seizes the resources to be allocated to catch that opportunity, thus building the foundation for superior performance (Lovallo, Brown, Teece, & Bardolet, 2020). In other words, organizational agents try identifying, through the retained emotional schema, potential solutions or opportunities (sensing) and forecasting the resources needed for capturing value (seizing). This has been intuited in a series of studies

(Henneberg, Naudé, & Mouzas, 2010; Sheng, 2017), which explained that: when organizations make sense of turbulent environments, they define their competitive positions and strengthen critical processes to prepare alternatives for turbulences. Accordingly, we propose the following.

Proposition 2: The greater the development of sensing and seizing dynamic capabilities, the greater the number (and potentially quality) of discovered opportunities and solutions during the sensemaking process.

From the retained meaning to ordinary and low-order habits/routines

Considering the cognitive definition of learning – ‘the reorganization of experiences in order to make sense of stimuli from the environment’ (Merriam & Caffarella, 1999, p. 254) – we see sensemaking and learning as complementary. In particular, the use and challenge of emotional schemata are at the basis of the entrepreneurial reorganization of experiences (Marchionini, 2019). Thus, sensemaking assists learning. At the individual level, this learning activity brings tacit knowledge (Lei, Hitt, & Bettis, 1996), a kind of knowledge that is highly personal, not easily visible, difficult to formalize and communicate, and deeply rooted in an individual’s actions and experience as well as in their ideals, values, or emotions (Nonaka, 1994).

Knowledge is here considered as the final output of the sensemaking process which, at the individual level, provides the scaffolding for ‘a propensity to behave in a particular way in a particular class of situations,’ also called *habit* (Hodgson, 2009, p. 29; see also Breslin & Jones, 2012), at the basis of routines in organizations. However, not all habits are equal. Some habits are ordinary (e.g., send an activity report at the end of the working day), and some are low-order (e.g., start breaking a problem down into chunks) (Winter, 2003), and this distinction is driven by intrinsic, contextual, and actionable knowledge quality.

Habits become the new replicator and their ostensive aspects, the narrative/script behind the habit, substantiate the interactors (Cristofaro, 2021). Habits, therefore, vary according to the relationship with interactors, the new knowledge produced in sensemaking processes, the interaction with other habits and ostensive aspects, and other individuals/groups/organizations (Hodgson & Knudsen, 2004). This variation, and then also the selection process, occurs through interaction with the environment. Then, stemming from the assumption that ‘humans developed the capacity to acquire habits concomitantly with the evolution of a cultural apparatus by which adaptive solutions to problems of survival could be preserved and passed on’ (Hodgson, 2009, p. 28; see also Hodgson, 2004; Richerson & Boyd, 2001), habits that show the best performative aspects are selectively retained (Wood, Mazar, & Neal, 2022). Other habits that are less performative or that are not being used are selected out (Hodgson & Knudsen, 2004).

The transforming DMC masters the VSR process of habits, and this can be seen, for example, in the central role of managerial autonomy and self-determination expressed in Salvato and Vassolo (2012) for the selection and retention of habits. The transforming DMC gives the capacity to match the requirements of a changing environment (Teece, 2014) and, from that, it selects the habits that maximize the specific configuration of organizational resources (Krzakiewicz & Cyfert, 2017). It is the individual that makes the decision about which habits should be used and, therefore, reinvigorated through the application (Hodgson & Knudsen, 2004). And this decision is driven by the transforming DMC, such that how much it is developed influences the selection of performative habits. This can be also observed in Salvato and Vassolo (2018), who proposes the individual actions on which DCs are formed as an integration of habits. Accordingly:

Proposition 3a: At the individual level, the greater the exertion of the transforming DMC, the more performative are retained ordinary and low-order habits.

Habits are the basis for routines at the collective level (Hodgson, 2009), together with the knowledge produced in group contexts through sensegiving–sensemaking cycles. These cycles are akin to a *thinking in circle* dynamic (Weick, 1969), in which, following the practice view (Breslin, 2016), knowledge is the element passed from one level to another (i.e., the replicator) and modified according to the behavior, language, narratives, and socially situated practices (i.e., interactors), mastered by the transforming DC (e.g., Sheng, 2017). This latter substantiates the intentionality and the entrepreneurialism of the organizational agents. The identification of a routine as being ordinary or low-order depends on the level of patterning of routines and can be measured on a continuum ranging from high rigidity (ordinary routines) to high flexibility (low-order routines) (Friesl & Larty, 2013; Salvato & Rerup, 2011; Winter, 2003). Thus, the more (less) flexible is the processes' substantiating routines, the more low order (ordinary routines) are produced.

The nature of the routine varies, therefore, according to their implicit or explicit nature, manifested into interactions of behaviors and narratives, as well as using explicit tools, such as templates, case studies, flow charts, and process descriptions (i.e., the interactors; Breslin and Jones, 2012). Like habits, routines vary according to the interactions with the environment that occur with routines' interactors, the knowledge produced during the sensemaking processes, the interaction with other routines and their ostensive aspects, and other individuals/groups/organizations (Hodgson & Knudsen, 2004).

Within this intervention of interactors, power plays a crucial *entrepreneurial* role. Indeed, as found by Safavi and Omidvar (2016) in their analysis of a merger initiative in the educational sector, the ostensive aspects of routines provide opportunities for organizational actors to exercise power by shaping those understandings. This is aligned with Feldman and Pentland (2003, p. 110) who stated how changes in routines rely on the power of individuals who can 'turn exceptions into rules.' In sum, organizational agents that can more persuade or inhibit routines influence their replications and the basis for organizations' strategizing. And this ability to intentionally modify the routine or substitute it according to conditions is mastered by the transforming DC, which takes the form of a political (i.e., power-oriented) process (Breslin, 2008; Friesl & Larty, 2013). In fact, as reported by Winter and Szulanski (2002), the replication of routines is a capability to be mastered as to benefit from the learning of the routines' replication process and build superior routines. If the transforming DC is well developed, the group of organizational agents can selectively retain good routines that have few errors and that are able to face diverse situations (Winter & Szulanski, 2001). From the above, we propose that:

Proposition 3b: At the collective level, the greater the transforming dynamic capability's exertion pushed by powerful agents, the more performative and adopted the retained ordinary and low-order routines.

Habits and routines are adaptive, as suggested within the 'patterned approach' to DCs (e.g., Zollo and Winter, 2002). A habit may vary through the modification of individual knowledge (Aarts & Dijksterhuis, 2000) as well as from interaction with other habits (such as time spent with technology in the workplace and time spent interacting with colleagues; Schraeder, 2014), and other external elements. Therefore, habits (of all orders) interact, through ostensive aspects, according to a co-evolutionary logic according to which habits modify each other (Breslin, 2011a; Breslin & Jones, 2012).

At the collective level, routines are the product of collective learning that embraces an escalation of habits at the individual level to routines at the group one (Breslin & Jones, 2012), which happens due to interactions among agents within and outside the organization and by the coevolving interaction of routines themselves (Breslin, 2011a; Taj, Kautz, & Bruno, 2021). This escalation takes the resemblance of knowledge creation since this process is made by *orchestrated* passages from an individual to a collective (and vice-versa) and by inclusion, exclusion, addition, substitution, and combination of knowledge (Breslin, 2016; Nelson & Winter, 1982). In this

regard, Friesl and Larty (2013) discuss routines as *entrepreneurially* replicated, arguing that this occurs by ‘forward knowledge flows’ (e.g., from a Top Management Team [TMT] to a group of senior executives) and ‘reverse knowledge flows’ (e.g., from a group of senior executives to the TMT). This second process suggests that ‘routines are adapted and further developed as an organization *learns* [emphasis added; Zollo & Winter, 2002] more about them during the process of replication’ (Friesl and Larty, 2013, p. 111).

Being habits and routines *reservoirs* of knowledge (Lazaric & Raybaut, 2005) explicating how things are done, when passing through the VSR process and interacting with the environment, a learning activity takes place (Rerup & Feldman, 2011). Due to this learning, routines accordingly modify their knowledge structure, whose final form is the one that most adapts to the faced context (Becker & Lazaric, 2003; Breslin, 2011a; Winter & Szulanski, 2001). Accordingly:

Proposition 4: Ordinary and low-order habits/routines co-evolve such that the more interaction, the greater the learning and reinforcement/change of substantiating microfoundations.

From habits/routines to ordinary and low-order capabilities toward competitive advantage

Because of the repetitive, intentional relationships with the environment (consistent with the co-evolutionary properties of thinking in circles and substantiated by individuals’ actions and decisions; Hodgson, 2009; Weick, 1969), ordinary and low-order habits/routines are retained or substituted with more effective ones and – due to this learning process being driven by the transforming DMC–DC – knowledge, skills, and abilities are enhanced (Adner & Helfat, 2003). These three latter elements are the foundation of capabilities formation (Aguinis, 2009) and create the distinction among ordinary (e.g., absorptive capacity; Cohen and Levinthal, 1990) and low-order (Teece, Pisano, & Shuen, 1997; e.g., conflict resolution) capabilities. Therefore, capabilities (ordinary and low order) become the new unit of analysis that is subject to replication.

Therefore, like habits/routines, operating capabilities pass through the VSR process. The variation occurs due to the elements that carry out the capabilities themselves (e.g., the Customer Relationship Management system that supports the customers’ analytics capability), the interaction with agents that are endogenous and exogenous to the organization, and the relation with other capabilities – in a coevolving fashion (Biesenthal, Gudergan, & Ambrosini, 2019; Breslin, 2016; Galvin, Rice, & Liao, 2014). In line with Newey and Zahra (2009, p. S82), we propose that the interactions between DMCs–DCs and operating capabilities do not only occur because of exogenous triggers, but also thanks to ‘the firm’s endogenously driven entrepreneurship [...], and it is through this mechanism that firms also build their adaptive capacity’ (see also Eriksson, 2014; Lavie, 2006).

The selectively retained capabilities by the organizational agents are the ones that demonstrate having a fit with the internal and external environments (Breslin, 2021), such that the exertion of the transforming DMCs–DCs of organizational agents orient to selectively retain the capabilities that allow the organizational agent to operate/successfully adapt to the changing environment (Teece, 2007, 2014; Teece, Pisano, & Shuen, 1997). Indeed, through DMCs–DCs ‘the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness [...they are] exemplified by an organization that adapts its operating processes through a relatively stable activity dedicated to process improvements’ (Zollo & Winter, 2002, p. 340). This is also in line with Zott (2003, p. 98) who argued that ‘dynamic capabilities are indirectly linked with firm performance by aiming at changing a firm’s bundle of resources, operational routines, and competencies, which in turn affect economic performance.’ In this regard, the capabilities’ degree of fitness is substantiated by their performance, also called ‘technical fitness,’ which captures ‘how effectively a capability performs its intended function’ (Helfat et al., 2007, p. 7).

The transforming DMC–DC produces, by managing the VSR process of ordinary and low-order capabilities (Cepeda & Vera, 2007), a learning outcome that shapes individual/organizational

development (Newey & Zahra, 2009) and forms organizations' coadaptation (Cacciolatti & Lee, 2016). In fact, it is the specific role of DMCs–DCs to change the key internal components of the firm, such as operating capabilities (e.g., Eisenhardt & Martin, 2000; Helfat et al., 2007; Teece, Pisano, & Shuen, 1997; Winter, 2003), and routines (Zollo & Winter, 2002). From that, DMCs/DCs play a primary role in individual and organizational development such that the activation of entrepreneurial leadership/management practices allows the organization to discover, co-create, and change (Augier & Teece, 2006), driving operating capabilities and their substantiating habits/routines (Barreto, 2010; Zollo & Winter, 1999). Accordingly, we propose:

Proposition 5: The greater the exertion of the transforming dynamic managerial capability/dynamic capability, the more performative ordinary and low-order capabilities are retained.

Operating capabilities do not operate in silos, but they influence each other as it is in the nature of firms where multiple parts and participants interact (Cafferata, 2016). Indeed, as to transform raw materials into finished products, a series of ordinary and low-order capabilities are needed to interact, such as monitoring contracts with suppliers and leading new product development. For example, Willcocks, Reynolds, and Feeny (2007) described the nine human resource capabilities (leadership, informed buying, business systems thinking, relationship building, contract facilitation, architecture planning and design, vendor development, contract monitoring, and making technology work) that are needed, also taking into account their interactions, to have an advantage in the IT services market. Yet, Golgeci and Gligor (2017), based on the findings from dyadic interviews with 26 marketing and supply chain management executives from business-to-business firms, found co-evolving influences among relational, market learning, innovativeness, and supply chain agility capabilities. Yet, they highlighted that cross-functional awareness among different departments of an organization and their distinct capabilities – obtainable through the feedback of their intertwined operations – fosters cross-functional capability synergies, able to diminish discrepancies in the firm system.

Thanks to the dialectic with the environment, ordinary and low-order capabilities enable organizational agents to learn and accumulate experience, exploit and explore social ties, and refine their habits/routines and emotional schemata that substantiate them (Biesenthal, Gudergan, & Ambrosini, 2019; Dunning & Lundan, 2010; Lei, Hitt, & Bettis, 1996; Salvato & Rerup, 2011; Winter, 2003). Thus, organizational agents learn and produce new knowledge (Quansah, Hartz, & Salipante, 2022) that can reinforce or change DCs' antecedents, thus confirming, or not, the way in which things are thought/done is the correct one. This can be seen in Cepeda and Vera (2007) who found, with a sample of 107 firms in the information technology and communication industry in Spain, that operating capabilities are the product of VSR of knowledge, such that modifications in operating capabilities substantiate the modification of their knowledge structure. Yet, Nielsen (2006) advanced that the DCs and the associated knowledge management activities create flows to and from the firm's stock of knowledge and they support the creation and use of organizational capabilities. In particular, the operating capabilities are seen as a 'use of knowledge,' whose output contributes to the development of the knowledge basis, then recombined to reinforce/change the habits/routines behind operating capabilities. Accordingly:

Proposition 6: Ordinary and low-order capabilities co-evolve, such that the more interaction, the greater the learning and reinforcement/change of substantiating microfoundations.

The proposed theorizing clarifies that ordinary and low-order capabilities evolve 'through explicit managerial intervention' (Salvato & Rerup, 2011, p. 471) – that is substantiated by the exertion of the transforming DC – but this happens with due consideration of the dialectic with the environment. Indeed, the implementation of operating capabilities creates a

contextualization within the environment and feedback received establishes a learning mechanism (always mastered through the transforming DC) that modifies/reinforces, as an inverted cascade effect, the ordinary and low-order habits/routines. From that, the emotional-cognitive aspect of mental representations that are at the basis of sensemaking, retained habits/routines, and subsequent capabilities/DMCs are reinforced and will be first used for further sensemaking processes (Cristofaro, 2020, 2021). From that, the modified/reinforced emotional-cognitive aspects used for other sensemaking processes will co-evolve to affect habits/routines and operating capabilities (Kars-Unluoglu & Kevill, 2021). The process in action is the product of organization–environment dialectical relationships that contribute to reaching (or maintaining) the ‘systemness’ of the organization (Cafferata, 2016).

Here, DCs substantially *drive* adaptation at the firm level, and firms co-evolve with industry and macro forces. Indeed, DCs allow strategic growth alternatives, such as global diversification, new applications of current technologies, and the development of new lines of business that can produce competitive advantage and, thereby, reduce uncertainty (Dixon, Meyer, & Day, 2014; Lei, Hitt, & Bettis, 1996).

Example of the theory in action

Consider the case of a global car manufacturer that observes a shock in the energy market, such as the one provoked by the current Russia–Ukraine war. The goal of the car manufacturer is to quickly respond to that crisis by mobilizing organizational responses, such as building alliances with car manufacturers established in countries rich in energy sources.

To find organizational responses, the Chief Operations Officer (COO) of the global car manufacturer must better understand the new energy supply scenario. In this regard, the perceived features of the context (e.g., inflation of prices) will elicit some affective states (e.g., fear, surprise) that will influence the process of cues collection (e.g., being in a negative mood, which leads to being more accurate in cues collection). Within this COO’s sensemaking activity, the initial emotional-cognitive frame of the phenomenon, ‘physiological and temporary shock in the energy market’, challenges other emotional-cognitive frames, such as the ‘pathological and permanent shock in the energy market’. If the COO is strongly able to combine different information coming from distinct IT data systems owned by the company (a type of DMC), the COO will be more solid in the process of cues collection and in testing the plausibility of the emotional schema. From that test, the framing ‘pathological and permanent shock in the energy market’ comes out being able to interpret the occurring scenario better than others, and it is selectively retained and adopted (proposition 1a).

In cases where is not the COO, but the whole TMT who must make sense of the changing context, the adopted meaning is the product of power-oriented cognitive and emotional exchanges among TMT members. This happens when the COO advances an interpretation (‘pathological and permanent shock in the energy market’) corroborated by combining different information and found reinforcement from most other TMT members that share the same negative feelings toward the shock in the energy market. The few members that differently interpret the situation will finish adopting the meaning of the COO which gained more appreciation for its plausibility and power endorsement (proposition 1b). While making sense of the new scenario by collecting cues and combining information, the COO, or the whole TMT, implicitly try to identify and seize the potential solutions to the problem, such as building alliances with car manufacturers established in countries rich in energy sources. The produced solution will be as valuable as it is the COO and TMT’s experience in sensing and seizing opportunities in cases of sudden shocks (proposition 2).

The COO/TMT’s learning activity, emerging from the selective retention and implementation of the emotional schema, gives light to chunks of knowledge. Assuming that the shock in the energy market is pathological and permanent, the COO/TMT relates with counterparts of

competitors and knows that European governments are already signing agreements with other countries for energy supply. This news leads the COO/TMT to collect and check energy prices in countries where other car manufacturers are established and that are rich in energy. On an individual basis, the more the COO can combine different information coming from distinct IT data systems owned by the company, the more effective the collection and check of energy prices (proposition 3a). On a collective basis, the more the powerful TMT members can combine different information coming from distinct IT data systems owned by the company, the more effective the collection and check of energy prices (proposition 3b). In either case, ‘collecting and checking energy prices in countries where other car manufacturers are established and that are rich in energy’ is a repeated pattern that interacts with others, such as ‘exploring new sources of information’. If there is a positive interaction between the two, such as an addition of a new source of information that allows a larger data collection of energy prices, it is possible to produce new knowledge and reinforce/change the initial framing of the context (proposition 4).

The ability to combine different information coming from distinct IT data systems owned by the company is directly influenced by the newly produced knowledge, and the stronger this ability, at the COO or TMT level, the more developed are linked operating capabilities, such as the diagnostic capability and forecasting capability (proposition 5). These two operating capabilities, diagnostic and forecasting, due to their nature and aims in the firm, are connected and live in a constant interplay. The greater the frequency of their exchanges, the more reinforced/modified will be the ‘exploring new sources of information’ pattern (proposition 6).

Conclusions and implications

By adopting the evolutionary lens, with some elements from the co-evolutionary stream, this paper exploits the microfoundations of DCs and advances a theory to explain how DCs enable organizations to adapt to changes and ultimately succeed. As well as implications for theory, we identify implications for practice and a future research agenda.

Our theory of DCs elucidates strategic behavior and its microfoundations (Felin, Foss, & Ployhart, 2015). Responding to calls for DCs as a theory *per se* (Barreto, 2010; Easterby-Smith, Lyles, & Peteraf, 2009), we form propositions to consider the individual and collective levels and the scale-up from the former to the latter. We explicate how ordinary and low-order capabilities and their substantiating elements (emotional schemata, knowledge, and habits/routines) are intentionally varied, selected, and retained through DCs, and then depart from their origins, that is, the initial sensemaking of organizational agents. Our theorizing overcomes some limits in the DCs research, answering, for example, the question of Schilke, Hu, and Helfat (2018, p. 417): ‘what are the similarities and differences in routinization at the individual and organizational levels of analysis?’ Indeed, we explain that both habits and routines are patterns of behavior based on chunks of knowledge coming from the sensemaking activity. Habits and routines similarly pass through VSR processes that select the most performative. However, for routines, powerful organizational agents are determinant for retained selection.

Our theorizing clarifies the positive developmental influences of DMCs/DCs on individuals and organizations (Teece, 2007, 2014; Teece, Pisano, & Shuen, 1997). In particular, a primary role is covered by the sensing, seizing, and transforming of DMCs/DCs. The first two find application in the sensemaking process and are assumed to orient the attention of organizational agents to the discovery of opportunities and the mental allocation of resources to catch them. Transforming, instead, is the capability that masters knowledge creation cycles, and the VSR process of emotional schemata, habits/routines, and capabilities. These processes help organizational agents to engage in sensemaking that enables them to find suitable meanings and create knowledge, habits/routines, and other capabilities that allow the organization to survive environmental changes and prosper. We extend this conceptualization of sensing, seizing, and transforming as

building organizations' strategic orientation and competitive advantage to incorporate co-evolutionary dynamics, which includes agents' behavior. Because sensing and seizing are part of the sensemaking process, sensemaking is here considered the *locus* where organizational agents' strategic behavior is formed and implemented, where strategy and competitive advantage start to take shape. Our theory extends prior studies by conceptualizing DCs (in particular sensing and seizing) as shaping sensemaking and, positioning organizational agents as responsible for the survival and prosperity of their organizations, or, in other words, of its *evolution with design* (Augier & Teece, 2006). Hence our study advances the understanding of *strategic behavior* as discussed in the behavioral strategy stream of research (Powell, Lovallo, & Fox, 2011). In particular, it is expanded the conceptualization that firm evolution is *only* underpinned by interactions between dynamic and operating capabilities (Helfat et al., 2007; Newey & Zahra, 2009; Winter, 2003; Zollo & Winter, 2002) by enlarging the view which includes the interactions of DCs with emotional schemata, habits, and routines – thus, all other microfoundations.

Our view of the firm as evolving around DCs clarifies the relationship between routines and innovation and explains how strategic decisions of dynamically capable managers are vital to the fates of firms and the dynamics of industries. While our proposed theory recognizes habits and routines as the very essence of operational (ordinary) capabilities, it also suggests that routine-based explanations are not sufficient to account for the most essential features of the firm. In fact, while the honing of routines is vital for 'doing things right' (i.e., efficiently), this is just one contributor. Our theory of DCs shows that executives are central to the firm's evolution because they can impact whether existing routines and capabilities will remain in the firm and whether new ones should be added. And this decision is driven by DCs, in line with the DC-related understanding of the evolutionary fitness as 'how well a dynamic capability enables an organization to make a living by creating, extending, or modifying its resource base' (Helfat et al., 2007, p. 7).

Our proposed theory can contribute to answering two critical questions posed in the behavioral strategy literature (Lovallo, 1996a, 1996b; Powell, Lovallo, & Fox, 2011). How does individual cognition scale to collective behavior? What are the psychological underpinnings of strategic management theory? To do so, our propositions should be empirically tested. Mixed-methods research, based on qualitative and quantitative data, could investigate if our propositions are consistent when applied to a range of cases.

Our proposed theory also has the potential to advance questions about learning as an outcome and catalyst for DMCs/DCs, consistent with the conceptualization by Augier and Teece (2006, p. S4) of 'organizational [and individual] knowledge, learning and capabilities ... [as] a triangle: the ongoing development of organizational knowledge is, or can be, a dynamic capability that leads to continuous organizational learning and further development of knowledge assets' (see also Easterby-Smith and Prieto, 2008). Here we see how DMCs/DCs play a co-evolutionary role in environmental feedback, both producing learning when implemented in the sensemaking phase or when mastering VSR processes and learning underpinning their formation (Teece, Pisano, & Shuen, 1997). Learning can be considered the vehicle for stability and ongoing adaptation (Levinthal, 1991) – in contrast to other views that see this role played by 'simple' routines – however, it is not a continuous and linear process but co-evolutionary, where contradictory forms of knowledge emerge. Relatedly, learning, as achieved through the transforming capability of DMCs/DCs – by activating processes of evolution and adaptation – can help organizations gain competitive advantage (Argyris, 1993; Levinthal & Rerup, 2006; Zollo & Winter, 1999, 2002). While it is clear that ordinary and low-order capabilities, therefore, do not simply reside in routines (Nelson & Winter, 1982), but in the learning of organizational agents, questions remain about whether virtual or hybrid learning supports the development of DCs. Under what conditions does power bias learning processes and lead to dysfunctional organizations? Can particular aspects of an emotional schema improve or limit learning?

Our study also contributes to the discussion of affect-cognitive interplays and power as the basis for developing meaning, habits, routines, and capabilities. While the centrality of the social aspect in habits and routines has been recognized in the literature, only recently have affective states been included as drivers of DCs (Kars-Unluoglu & Kevill, 2021) and evolution (Breslin, 2021). We extend this by considering affective states in the initial formation of routines. We argue that an affective evaluation initially evokes judgment before any higher-level reasoning occurs, considering this as consistent with our concept of emotional schemata. Therefore, sense-making, DCs implementation, and reasoning are intertwined processes to be entrepreneurially managed and shape all subsequent outputs (e.g., habits, routines, ordinary and low-order capabilities). This theoretical explanation is consistent with the work of prior scholars for whom capabilities are based on non-cognitive processes (Hodgkinson & Healey, 2011; Kars-Unluoglu & Kevill, 2021; Nayak, Chia, & Canales, 2020). Our theory further recognizes that the affect-cognitive interplay is not the only mechanism that drives the later formation of meaning, habits, routines, and capabilities. Power (or politics) within organizations can also cause this cognitive and emotional interplay and the selection of retained meaning (Cristofaro, 2021), routines, and capabilities which impact resource allocation and the success of companies (Bardolet, Brown, & Lovallo, 2017; Lovallo et al., 2020). Future studies could identify if different forms of power are needed at the sensemaking, routine, and capabilities levels to favorably select the desired meaning, routine, and capability. For example, is hierarchical power more effective than social power for selecting routines?

In terms of ontological advancements, our work responds to Teece's (2018) call to adopt systems theory to understand DCs. By adopting elements from a system-based evolutionary lens (i.e., co-evolution), we can see the role of the 'intentionality' of top decision makers and governance bodies in organizations' life cycles (Abatecola, Breslin, & Kask, 2020; Breslin, 2011b; Cafferata, 2016; Cristofaro, 2019, 2021; Murmann, 2013). In doing so, we contribute to the ontological debate about DCs as a source of sustainable competitive advantage. Future studies could investigate where specific characteristics of organizations' external environment moderate the DC-competitive advantage connection.

Our evolutionary interpretation helps to see DCs as instruments able to entrepreneurially solve organizations' evolutionary fitness problems. It explains how DCs emerge from the characteristics of the TMT, and from the organizational culture and structure – in close interaction with the environment (see Ambrosini, Bowman, and Collier, 2009) – supporting organizational routines established under the stewardship of top management. Here we answer the call by Schilke, Hu, and Helfat (2018, p. 407), who argued that 'studying the evolution of dynamic capabilities' is consistent with a focus on DCs in strategic change research. Again, more mixed-methods research, which can allow for simultaneous theory extension and testing, can advance the proposed theory and support the ontological point of view presented in this work.

Our study also has implications for managers. Practitioners positioned at the managerial and governmental levels – both in public and private organizations – can reconsider the meaning of competitive advantage to understand it not only comes from the resources and capabilities of the firm, which can be expanded through collaborations/acquisitions, but as based on learning mechanisms that can be activated through the transforming DC. This dialectic move is, in fact, the platform for the generation, selection, and retention of patterns of thoughts, knowledge, habits, and routines that build capabilities. Given the idea of learning organizations, in which continuous transformation takes place (Senge, 2014), it can be argued that organizational agents should adopt and support systems thinking to improve capability building, sustainable competitive advantage, and related coadaptation. Indeed, systems thinking helps: (a) seeing events, mental models, and patterns of behavior as operating simultaneously to find links and loops, (b) developing personal (and intrapersonal) mastery, and (c) developing emotional schemata, in which they reflect on how their own and others' mental models are created. This can build a shared

vision and create a common identity that provides focus and energy for learning and supports team learning through dialog and debate.

Finally, this theorizing is not exempted from limitations. The main one is in not deeply accounting for the complexity of multiple multi-level coevolutionary relations within and beyond organizations, that would clearly impact the focal DCs, habits, and routines. The narrative can be developed further as to include this more complex interpretation of coevolution, for example including the range of interactions within the organization itself. This limit was taken into account from the very beginning due to the fact that a microfoundational view, that calls for seeing the specific basic elements of a phenomenon does not align with a fully multi-level theory (Felin & Foss, 2005).

Conflict of interest. The authors declare none.

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