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Untangling self-reinforcing processes in managerial decision making. Co-evolving heuristics?

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Abstract

Purpose – Over the last 30 years, specific investigations into self-reinforcing processes in managerial decision making have been gaining momentum within the mainstream literature of management. However, to date, it is claimed that understanding these processes properly still requires additional research efforts. Thus, the purpose of this conceptual paper is to follow this claim.

Design/methodology/approach – The paper tries to inform the conversation about self-reinforcing processes in managerial decision making through adopting lenses drawing from the biological philosophy of organizational change. In particular, the co-evolutionary approach to organizational change, with a focus on CEOs, and/or top management teams (TMT), is adopted.

Findings – As its core contribution, the paper proposes that self-reinforcing processes in the CEOs/TMTs' decision making can occur because of the emergence (and subsequent consolidation) of co-evolving heuristics. On this basis, the paper also prospect potential avenues for future integrations in this field.

Originality/value – As the paper concludes, advancing the general understanding of self-reinforcing processes in managerial decision making can represent an important opportunity for the research and practice of management in general, but also for some management sub-domains, such as that of behavioural strategy, in particular.

Keywords Decision making, Organizational change, Top management teams, Co-evolution, Heuristics, Self-reinforcing

Paper type Conceptual paper

1. Introduction

What theoretical tools can be useful for untangling the dynamics of those managerial decision-making mechanisms currently known as self-reinforcing processes? Widely adopted for substantiating the metaphor "history matters", self-reinforcing has been mostly used as that term which can conceptualize all those kinds of strong "imprinting" (Stinchcombe, 1965) effects of the past on the evolving behaviour of organizations (e.g. Vergne and Durand, 2011; Koch, 2011; Manning and Sydow, 2011; Abatecola, 2012a; Dobusch and Schüßler, 2013; Sydow and Schreyögg, 2013).

It is known that, at least over the last 20 years, both the theoretical and empirical inquiries into self-reinforcing processes in managerial decision making have been deserving great attention from the most relevant literature of management. For example, according to Sydow *et al.* (2009), more than 80 articles published in *Administrative Science Quarterly*, *Organization Studies*, and *Organization Science*, between the years 1995 and 2008, were in some way associated with this concept. Vergne and Durand (2010) obtained similar results. However, addressing the most vivid nature of decisional self-reinforcing continues to constitute an important call for research, as widely advocated also to date (e.g. Page, 2006; Beckman and Burton, 2008; Garud *et al.*, 2010; Gruber, 2010; Thrane *et al.*, 2010).

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Following this call can represent an important opportunity for the research and practice of management and this conceptual article aims to offer its contribution. Mainly drawing on Smith and Graetz's (2011) philosophies of organizational change, the article mostly contends that the biological philosophy (e.g. Jones, 2005; Cafferata, 2009; Breslin, 2011a; Alexander and Price, 2012; Hodgson, 2013) can potentially offer a theoretical solution to the research call stated in this introduction. Thus, the article is structured as follows: first, it provides the readers of *Management Decision* with an initial (and necessary) overview of many current problems associated with the appropriate comprehension of self-reinforcing. Second, it continues with a brief synopsis of the evolving biological philosophy of organizational change. Third, the article attempts to explain how this philosophy in general, and its co-evolutionary approach in particular (e.g. Cafferata, 2010; Lewin and Volberda, 2011; Child *et al.*, 2013; Murmann, 2013), can untangle some mechanisms which, according to the extant research in decision making, still need appropriate development to understand self-reinforcing properly. As its core contribution, the article proposes that self-reinforcing processes in the CEOs/ Top Management Teams' decision making can occur because of the emergence (and subsequent consolidation) of co-evolving heuristics. Potential applications, and supposed implications for research and practice finally conclude the article.

2. Imprinting and self-reinforcing processes in managerial decision making

Understanding self-reinforcing processes in managerial decision making currently represents one of the most exciting and lively avenues for the research and practice in the field. The most vivid tenets of these processes have been generally associated with Charles Darwin's (1859) principle of inheritance (i.e. "history matters"), with one of the most seminal (and thought provocative) bases developed by the outstanding American sociologist Arthur Stinchcombe (1965) in his essay "Social structure in organizations". In this work, Stinchcombe proposed: the liability of newness construct, for explaining why newborn organizations suffer the highest mortality rates[1]; the imprinting construct, through which he asserted that organizations founded in a given external environment (and surviving to the initial natural selection stage) often maintain their founding imprint primarily because "traditionalizing forces, the vesting of interests, and […] ideologies may tend to preserve the structure" (pp. 168-169)[2].

Especially over the last 30 years, Stinchcombe's ideas have greatly inspired research about the constitution of self-reinforcing processes in organizational paths, at both a theoretical and empirical level. This being premised, explaining what self-reinforcing processes are (and what they are not) has not been an easy task to date, as the literature still debates their most vivid conceptual boundaries, their most acceptable definitions and their most reliable research methodologies as well. For example, Arthur (1989, 1994) seminally characterized these processes on the basis of four general properties: non-predictability, that is the indeterminacy of an outcome; non-ergodicity, which means that several outcomes (i.e. multiple equilibria) are possible, with history selecting among the possible alternatives; inflexibility, that happens when actors are entrapped, so a shift to another option is impossible; inefficiency, i.e. those actions, that result from the path, lock the market into an inferior solution. Similarly, David (1985) defined self-reinforcing and path-dependent dynamics as processes in which an asymptotic distribution evolves as a result of these processes' own history. More recently, Vergne and Durand (2010) offered a strict mathematical conceptualization of self-reinforcing as "a property of a stochastic process which obtains under two

conditions (contingency and self-reinforcement) and causes lock-in in the absence of exogenous shock" (p. 741).

Vergne and Durand (2011) also highlighted that self-reinforcing has received attention from a number of case studies at the macro (i.e. institutions), meso (i.e. technology and governance) and micro (firms' resources and capabilities) levels. Many of these cases have regarded the diffusion of technological paths (e.g. Dosi, 1982; Antonelli, 2008; Dolata, 2009; Schiavone, 2011), with samples from the computer (Reinstaller and Holzl, 2009), the optics (Sydow *et al*, 2010) or the digital imaging (Tripsas and Gavetti, 2000) industry. But, the case studies have also focused on different topics, such as the evolution of regional clusters (Martin and Sunley, 2006; Martin, 2010), retail industry (Lamberg and Tikkanen, 2006) or agriculture (Vanloqueren and Bareta, 2009). Indeed, Vergne and Durand (2010) disputed the overall reliability of case studies themselves for testing self-reinforcing and path-dependent mechanisms appropriately, thus suggesting that the explanatory power of alternative research methods, such as computer-based simulations or experimental studies, can be higher. Conversely, Garud *et al.* (2010) maintained that narrative approaches could be of great value to the comprehension of this research topic.

This section has initially attempted to explain that specific investigations into decisional self-reinforcing and lock-in have been gaining momentum over the last 30 years, but that the most vivid understanding of this process has substantially produced no conclusive results, as for its most vivid functioning, to date. In this regard, one of the most interesting and promising conceptual contributions to this understanding was recently attempted by Sydow *et al.* (2009). Substantially, these scholars interpreted the constituting of a self-reinforcing decision path in organizations through a sequential three-stage model (i.e. preformation, formation and lock-in). Their model basically points out that the range of options available to an organization's top decision makers reduces progressively along the three stages. Conversely, a unique, almost unchangeable, and potentially inefficient, decisional regime progressively emerges along them.

Interestingly, Sydow and colleagues supported their theoretical trajectories through a number of examples from the practice of management. At the same time, they recognized that more research is needed for the untangling of why the self-reinforcing mechanisms, i.e. – in their case – the transitions along their three-stage model, occur.

3. The biological philosophy of organizational change

During the second half of the twentieth century, the biological philosophy of organizational change was substantially focused on studying the mutual relationship between firms and their competitive environment[3]. Scholars adopting this philosophy have been exploring this relationship by providing interpretations of a number of intertwined aspects regarding organizational evolution, such as organizational birth and mortality rates, or competitive dynamics along the organizational life cycle.

As the attribute "biological" indicates, this philosophy has been greatly inspired by Charles Darwin's (1859) studies on biological adaptation, with organizational adaptationists attempting to provide both research and practice with conceptual and empirical interpretations of how organizations, instead of human beings or animals, adapt to their external environment and evolve (e.g. Murmann *et al.*, 2003; Stoelhorst, 2008a). In this regard, it is known that the contribution of Darwinism to the study of how socio-cultural evolution generally works has been controversial to date and this debate is still open in the management literature also. In particular – and for the scope of this article – it has to be stressed that a lively question among organizational adaptationists is

whether the principles of biological adaptation can be fully used, or not, when the study of organizations (as opposed to that of human beings) is under investigation.

Two partially converse views exist on this debate (e.g. Cafferata, 2009; Breslin, 2011a; Abatecola, 2013). Those scholars who can be categorized under the heading of Generalized Darwinists (e.g. Nelson, 2006; Stoelhorst, 2008b; Hodgson and Knudsen, 2010; Hodgson, 2013) substantially maintain that, at certain levels of abstraction, the Darwinian biological principles of variation (of genotypes), selection (of the related phenotypes) and retention (of the underlying genotypes) can be applied to study of organizational adaptation also. In this regard, many Generalized Darwinists have been using the concepts of replicators and interactors as substitutes for the concepts of biological genotypes and phenotypes, respectively. In particular, Hull (1988, p. 488) defined the replicator as something of which copies are made and the interactor as "an entity that directly interacts as a cohesive whole with its environment in such a way that this interaction causes replication to be differential". In contrast, those scholars who can be labelled Unorthodox Darwinists (e.g. Witt, 2004; Buenstorf, 2006; Cordes, 2006; Cafferata, 2010), recognize that a number of similarities exist between the adaptation of animals and human beings and that of organizations, but substantially maintain that the principles of biological adaptation can only be partially imported into the management and organization theory literature. Their main explanation behind this statement is that, contrary to the principles of biological adaptation, human intentionality – and the intentionality of firms' top decision makers in particular – plays a pivotal role in determining organizational adaptation, while chance does not.

Over the years, the identified dichotomy has given birth to the emergence of a number of totally (or partially) different perspectives among organizational adaptationists, with deterministic, voluntaristic and co-evolutionary interpretations emerging and developing (e.g. Lewin and Volberda, 2005; Van de Ven and Poole, 2005; Abatecola, 2013). To summarize, determinists have argued that firms' top decision makers are substantially dependent (thus reactive) on the external environment for their strategic planning; conversely, voluntarists have accounted for the firms' substantial independence and pro-activeness against the environment. Also, co-evolutionary scholars (e.g. Burgelman and Grove, 2007; Cafferata, 2009; Lewin and Volberda, 2011; Child *et al.*, 2013; Murmann, 2013) have substantially contended that firms can be either proactive or reactive to environmental pressures as far as different stages of their life cycle are concerned. Accordingly, these scholars have widely conceived "co-evolution" as that (dynamic) process which, especially if observed over the long term, combines the effects of environmental determinism and strategic voluntarism.

To the goals of this article, it has to be finally stressed here that the notion of co-evolution finds its most vivid roots in the seminal Karl Weick's (1969) sense-making construct (and subsequent thinking in circles approach). Sense-making means that, substantially, Weick has not considered reality (i.e. the external world) as something that is objectively existent, but, as something that is primarily enacted by people (at both individual and group level) on the basis of their specific background, past occurrences, and, thus, evolving learning mechanisms. Accordingly, thinking in circles means that the relationship between people and their external world emerges as circular, in that their enactment of the external reality retroactively conditions their evolving behaviour.

Some years later, also on the basis of Weick's thought, Benson (1977) promoted an even more formal circular and dialectical conjecture about the relationship between

organizations and environments (i.e. thesis, antithesis, synthesis), with his thoughts appearing as mostly contrasting the much more dichotomous approaches of that time.

4. Self-reinforcing processes: co-evolving heuristics?

As introduced in the preceding sections, an initial explanation of self-reinforcing decision-making mechanisms and, potentially, decisional lock-in effects can be the following. In particular, assuming a firm's life cycle perspective – and taking into account Stinchcombe's seminal ideas summarized in the previous pages – self-reinforcing could be considered as that process which can eventually start from the stages characterizing firms' birth and initial selection, this consistent with the biological philosophy of organizational change adopted in this article. In fact, it can be supposed that those firms able to survive to the earliest years of their life cycle are those firms able to countervail their liability of newness through a specific set of established resources, capabilities and routines. The firms' initial survival (and especially their initial positive performance) generates an organizational culture within them that, somehow, self-reinforces during their subsequent evolution. This means that the way these firms have solved their problems of initial survival tends to become a sort of decision-making regime over all their life cycle. It is not only that this regime governs the firms' overall evolutionary path, but also – and this could represent the most vivid conceptualization of self-reinforcing – that this regime comes to be, in some cases, completely locked into these firms' decision-making process. In particular, once firms are trapped in their culture, they inertially (i.e. with no possibility of deviating rationally) tend to solve the new problems occurring during their evolving life cycle in the same manner they, once, chose for solving their initial problems. But, it is quite understandable that the effectiveness of the firms' initial decision-making process cannot be considered as functional to all the incumbent situations over the life cycle. Potential ineffectiveness and performance decline can be a consequence of this and this is also why self-reinforcing (and sequential lock-in) has often been used as not simply a minor explanation for grasping the determinants of corporate crises (Abatecola, 2012b).

On this basis, the interpretation proposed in Figure 1 draws on some elements from the biological philosophy of organizational change for shedding some light on how the potential self-reinforcing mechanisms along a firm's evolution may be understood properly.

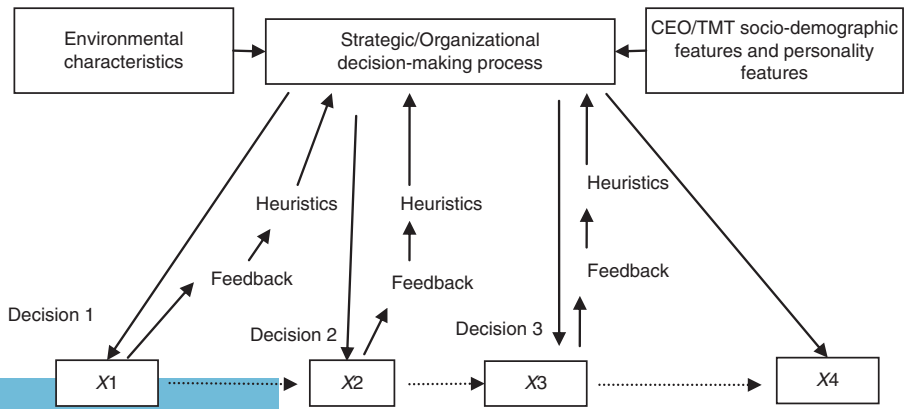

Figure 1.
Co-evolving heuristics in self-reinforcing decisional processes

As shown in the figure, the framework considers the strategic/organizational decision-making process set by a hypothetical firm's entrepreneur – in the case of simple organizations – or by a CEO, and/or Top Management Team (hereafter TMT), in the case of structures evolving as more complex along their life cycle. In fact, the variables *X*1, *X*2, *X*3, and *X*4, represent time and, more specifically, have to be intended as the very beginning of each of the stages (i.e. birth, growth, maturity and decline) traditionally characterizing organizational evolution, this according to the biological philosophy of organizational change.

On this premise, the proposed framework adopts two main elements from this philosophy. First, it adheres to the thought of those scholars who, within this approach, are recognized as Unorthodox Darwinists (e.g. Witt, 2004; Buenstorf, 2006; Cordes, 2006; Cafferata, 2010). As introduced previously in this article, these scholars argue that there are many similarities between how firms and human beings adapt. Nonetheless, they argue, there are also many differences between firms and human beings, with one of the major differences consisting of considering the intentionality and will of those who adapt as very relevant drivers of their adaptive decision-making process. Thus, the CEO/TMT socio-demographic features and personality traits depicted in the right side of Figure 1 follow this perspective.

This taken into account, it is argued here that the way in which these features govern the CEO/TMT's decision-making process can be understood through the advancements performed (and still being performed to date) by Hambrick and Mason's (1984) upper echelons theory. Within the biological philosophy, this theory, as known, is a voluntaristic view which focuses on the strategic implications associated with different CEO/TMT socio-demographic features (e.g. age, functional background, tenure, education, and gender) as pivotal antecedents. Over the years, the upper echelons research has followed two main directions. On the one hand, upper echelons have been committed to exploring a number of associations between these classic socio-demographic features and various strategic outcomes, such as mergers, turnarounds, innovation, internationalization, and diversification processes. On the other hand, these scholars have started to test the association between the CEO/TMTs' most vivid personality features and strategic management. In this regard, although empirical evidence is still not conclusive (e.g. Abatecola *et al*, 2013), there are promising results about the effect of different personality traits, such as CEOs' locus of control (e.g. Papadakis, 2006) or CEOs' narcissism (e.g. Chatterjee and Hambrick, 2011), on the management of firms.

The second element that needs specific commenting on is that the proposed framework substantially agrees with the co-evolutionary view of the biological philosophy (e.g. Burgelman and Grove, 2007; Cafferata, 2009; Lewin and Volberda, 2011; Child *et al.*, 2013; Murmann, 2013). As already introduced, co-evolutionary scholars contend that firms can be either proactive or reactive to environmental pressures within the various stages of their life cycle and that the intensity of determinism and voluntarism, as competitive forces, can be different and changeable over time. Following this perspective, the framework adopts co-evolutionary lenses in that it contemporaneously observes the interdependencies between the environment and the CEO/TMT socio-demographic and personality variables in determining the overall decision-making process. Stemming from recent attempts also (e.g. Evans, 2011; Breslin, 2011b), the framework assumes that looking at these interdependencies is necessary if we want to understand the decision-making process properly.

On this basis, we can consider the effect of a strategic/organizational decision taken during Stage *X*1. This decision creates a circular feedback which, in most of the cases,

affects the decision taken in the subsequent Stage *X*2. As already introduced in this article, we have to stress that the notion of circular feedback (Weick, 1969; Benson, 1977) also constitutes a fundamental property of the co-evolutionary approach (e.g. Lewin and Volberda, 2005). In this case, we assume that the feedback can generate specific heuristics that influence the decision-making process associated with the subsequent decision (i.e. in *X*2). In this regard, it is of common knowledge that Newell and Simon (1972) seminally conceived heuristics as those cognitive shortcuts (i.e. rules of thumb) that our mind is lead to adopt for supporting its decision-making process, especially in situations of information asymmetry and time scarcity. A number of classifications about heuristics have been performed by scholars over the years (e.g. Wickham, 2003; Caputo, 2013). For example, the "availability" heuristic (Tversky and Kahneman, 1973) refers to those circumstances in which a decision maker, ex ante, evaluates the probabilities that an event will occur mainly on the basis of how much his/her brain has recorded in terms of recent happenings of that event. Or, the "representativeness" heuristic (Nisbett and Ross, 1980) refers to those circumstances in which a decision maker instinctively judges someone or something that he or she encounters for the first time mainly on the basis of the similarities with particular stereotypes that his or her mind has already developed before.

We have argued that the decision-making process occurring in Stage *X*2 is strongly affected by the heuristics generated after the decision taken in *X*1. Accordingly, the feedback deriving from the decision in *X*2 makes the previously emerged heuristics evolve, with this evolutionary process thus continuing in *X*3, and up to *X*4. In this regard, we can presume that, especially in the presence of continuous positive feedbacks, the evolving heuristics become object of an overall self-reinforcing effect. Also, what needs to be stressed here is that the evolutionary path associated with these heuristics is, indeed, co-evolutionary in its nature. In fact, as far as the overall decision-making process is concerned, these heuristics co-evolve with the external environment and the socio-demographic features/personality traits of the CEO/TMT.

Heuristics finally merit additional attention, because, over the years, many famous psychologists, such as Kahneman and Tversky, have focused on their possible negative aspects. In particular, what these psychologists have substantially argued is that heuristics can also result in decisional errata (i.e. biases) because they can lead to relevant mistakes in the statistical evaluation associated with scenario planning alternatives. This taken into account, the management field has also greatly contributed to the conversation about heuristics (and the antecedents of their emergence). Indeed, especially from this conversation, current claims emerge that more research efforts should be attempted if we really want to enhance our comprehension about the (positive or negative) implications of using heuristics within the practice of management in general (and of strategic management in particular). For example, in a recent article on a special issue of the *Strategic Management Journal* devoted to exploring the psychological foundations of strategic management, Bingham and Eisenhardt (2011) published a brilliant multiple case study analysis, from which heuristics emerge as very positive. In this regard, also the Business and Policy Division plenary session about the future of behavioural strategy at the 2012 Academy of Management Annual Conference substantially agreed with these claims. Further, the plenary session of the Behavioral Strategy Interest Group at the 2013 Strategic Management Society Conference supported this idea. In sum, the debate whether heuristics are negative or positive is important and directly ties back to the additional question about the potential inefficiency in self-reinforcing decision-making mechanisms. It is supposed here that the answer to this

question may also depend on the lenses adopted: it seems that heuristics can be very positive from the perspective of individual decision makers, especially in highly complex situations (e.g. Gigerenzer, 2008; Gigerenzer and Brighton, 2009). From the perspective of organizations, however, they may result as highly negative (e.g. Kahneman *et al.*, 2011), especially because of their incremental effect on organizational routines.

5. Discussion and implications

This article has been aimed at contributing to our comprehension of the self-reinforcing processes in managerial decision making. In particular, the extant call for additional research on this topic has been commented on and integrated through adopting some elements from the biological philosophy of organizational change. In this regard, the article has put forward the argument that the co-evolutionary approach to change can untangle many of the black boxes currently associated with self-reinforcing. As its core contribution, the process model outlined in the article has attempted to explain how the mechanisms of self-reinforcing can move from one phase to the next in the classical conceptualization of organizational evolution (i.e. birth, growth, maturity, and decline) traditionally acknowledged by the biological philosophy. The proposed model has, *de facto*, attributed core importance to the co-evolution of CEO/TMT heuristics.

The theoretical conjecture attempted in the article opens the door to the first item of discussion in this section, with this item represented by its potential applications in contemporary settings. On this side, and in line with the biological philosophy of organizational change we have adopted, our focus can be on the evolving complexity of decision-making processes associated with different stages (and models) of organizational evolution. In this regard, Table I can provide a fruitful overview about some classical models of organizational evolution widely accepted, to date, from the biological philosophy.

As the table summarizes, while the process of self-reinforcing conjectured in the Section 4 of this article has considered firms' birth as the starting point of any discussion, a number of empirical investigations have, over the years, provided literature also with thorough explanations about the different nature of the overall decision making eventually starting later in the organizational life cycle. On the one hand, as the prospected table denotes, what mainly differentiates the summarized models is that they focus on different aspects of organizational evolution. But, on the other hand, the common feature among these models is that they conceive evolutionary paths as the sequential sum of specifically recognizable stages, whose complexity of the strategic decision-making process incrementally grows. Thus, in general, the theoretical conjecture initially attempted with this article can result as useful for understanding the dynamics and dynamisms associated with the decision-making process in and between the stages. Also, in particular, its utility can even increase if specific associations with the different levels of decisional complexity are successfully performed, especially in terms of moderating/mediating effects.

What highlighted above opens the door to the second item of discussion, and, of course, to potential implications for future research and practice. In particular, as stated in the previous pages, the co-evolutionary approach adopted in the article has focused on CEOs/TMTs as specific units of analysis. This means that co-evolution has been intended as that between CEO/TMT traits/characteristics, heuristics, and the environment. Thus, how can the outlined process model vary if other units of analysis (e.g. socio-political, organizational, or sectoral) are added?

Table I.
Organizational evolution

Author(s)	Model's content	Overall stages	Stages' content
Dewhurst and Burns (1983)	Economic and financial equilibrium of the firm	V	I (start up): new entrants do not come out of the blue II (take off): configuration of the sales and cash flow curve is different III (growth): the sales and cash flow curves start assuming similar paths IV (maturity): problems of market-stretching emerge V (decline): when the end market declines, the cash flow deteriorates as well
Pettigrew (1979)	The firm as a series of governance and management "dramas"	VIII	I Firm's birth, thanks to the founder's business idea II The founder leaves and a successor emerges III Separation between ownership and management IV Strategic change (differentiation or integration) V Change in the internal relationships among shareholders VI Change of the organizational structure VII Anti-crisis policies VIII Closing down and extinction
Parks (1977)	The evolution of the firm as a series of "hurdle races"	V	I (start up): start up hurdle II (take off): cash flow hurdle III (growth): financing and leadership hurdle IV (maturity): market-stretching hurdle V (decline): turnaround hurdle
Scott (1971)	Historical evolution of the firm	IV	I (start up): concentric strategy II (growth by rationalization of the use of resources): horizontal expansion and product differentiation III (growth by internal reinvestment of profits): upstream and/or downstream vertical integration IV (growth by external investment): product or geographical diversification
Steinmetz (1969)	Problems of the monoproduct enterprise	VI	I (start up): simple division of labour and direct control of the owner II (take off): coordination of parts and participants III (rapid growth): separation between governance and management IV (slow growth): problems of market stretching V (maturity): downsizing and/or alliances VI (decline): anti-crisis policies

Note: Increasing complexity along the decision-making process
Source: Adapted from Cafferata (2013)

Accordingly, considering "organizations", as prospected above, as a potential *per se* unit of analysis can open the door to the third specific item of discussion here, this item being associated with the purposes of management research in general, and also of this article in particular. The "organizations" category includes – and should include also in this case – a wide range of different sub-entities, not only firms. Although this article has been mainly conceived as for the studying of self-reinforcing processes in firms, might the scenario somehow change when other kinds of organizations (e.g. public administrations, NGOs, etc.) are concerned? Specific research efforts about this issue are claimed. In fact, it is supposed here that different goals, associated with different organizational types, might lead to important variations as for the study of self-reinforcing process in decision making. In this regard, drawing on Dobusch and Schüßler (2013), interesting evidences might also come from the attempt to integrate the proposed process model with the interpretation of existing cases of lock-in from the practice of business, such as the application to internal and external social networks. In fact, testing some of the assumptions developed here could be very useful to refine the model and to evidence some of its potential limits as well.

Fourth, in commenting on the co-evolutionary process associated with heuristics, it has been stated that, currently, both scholars and practitioners debate on whether heuristics have positive or negative effects on the decision-making process. Especially to the purposes of this article, focusing on the negative view of heuristics, thus on heuristics as eventual sources of decision-making biases, i.e. deviations from rational decision making (e.g. Cyert and March, 1963; March, 1994), can result as particularly important. We know that, over the years, a huge body of managerial and psychological literature has been aimed at the biases' proper comprehension (e.g. Bazerman and Moore, 2008; Brooks, 2011; Kriss *et al.*, 2011; Workman, 2012; Caputo, 2013). In this regard, Herbert Simon's (1947) bounded rationality has always served as the common basis for studying why decision biases can happen: "The capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behaviour in the real world – or even for a reasonable approximation to such objective rationality".

On this basis, a number of scholars have provided the literature with several classifications of the decision-making biases. Very relevant (and classical) samples are the hidden traps in decision making (e.g. anchoring, overconfidence, status quo, confirming evidence, and framing) proposed by Hammond *et al.* (1998), and the competency trap proposed by Levinthal and March (1993) as well. For the purpose of this article, it is worthy of mention that, in the proposed framework, the benefit of considering the biases in decision making for explaining organizational self-reinforcing processes can be twofold. First, the general acknowledgement that these traps often occur can help to explain why the decisions in each of the stages associated within the sampled models of organizational evolution, also when these stages are taken separately into account, can deviate from rationality. Second – and this is even more important as far as the overall lock in associated with self-reinforcing is specifically considered – the decision-making literature has increasingly evidenced that most of these traps (e.g. status quo, anchoring, or confirming evidence) create real self-reinforcing mechanisms when people take decisions. Thus, if the self-reinforcing mechanisms, which ideally occur between each of the sampled models' stages, are sequentially summed up, an overall incremental – and irrational (in this case) – self-reinforcing effect can be presumed.

5.1. Conclusions

This article has been aimed at contributing to our comprehension of the self-reinforcing processes in managerial decision making (and about their eventual lock in effect as well). It is finally argued here that, in line with other recent (e.g. Kay, 2005) and current (e.g. Beyer, 2010; Bednar *et al.*, 2012) claims, this evolving comprehension can represent an important opportunity not only for the research and practice of management in general, but also for some management sub-domains, such as that of behavioural strategy (e.g. Powell *et al.*, 2011), in particular. In this regard, we know that decisions do not come out of the blue (Dewhurst and Burns, 1983). Thus, through properly enhancing their comprehension of the cognitive aspects surrounding strategic decision making, strategists might positively evolve their discussion about the psychological architecture of firms, and of other kinds of organizations as well.

Notes

1. Recent research (e.g. Burke *et al.*, 2008; Cafferata *et al.*, 2009; Carmeli and Markman, 2011; Abatecola *et al.*, 2012) has demonstrated that, although integrated by subsequent theoretical constructs, the liability of newness hypothesis is substantially supported by the extant empirical evidences within the management and organization theory literature.
2. Recently, interesting evidences about imprinting effects on corporate behaviour have been produced, for example, by Lounsbury and Ventresca (2002), Marquis (2003) and Marquis and Huang (2010).
3. I would like to thank one anonymous reviewer for the suggestion to reframe the paper around this philosophy. Further, it appears to be worth of mention here that the biological philosophy presents many similarities with Gareth Morgan's (2006) classical metaphors of organizations as organisms, and as systems of change and transformation as well.

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