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Re-imagining the growth process: (Co)-evolving metaphorical representations of entrepreneurial growth

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ABSTRACT

We investigate the role and influence of the biological metaphor ‘growth’ in studies of organizations, specifically in entrepreneurial settings. We argue that we need to reconsider metaphorical expressions of growth processes in entrepreneurship studies in order to better understand growth in the light of contemporary challenges, such as environmental concerns. Our argument is developed in two stages: first, we review the role of metaphor in organization and entrepreneurship studies. Second, we reflect critically on three conceptualizations of growth that have drawn on biological metaphors: the growing organism, natural selection and co-evolution. We find the metaphor of co-evolution heuristically valuable but under-used and in need of further refinement. We propose three characteristics of the co-evolutionary metaphor that might enrich our understanding of entrepreneurial growth: relational epistemology; collectivity; and multidimensionality. Through this we provide a conceptual means of reconciling an economic impetus for entrepreneurial growth with an environmental imperative for sustainability.

Keywords: biology; metaphor; co-evolution; entrepreneurship; growth; process; sustainability; natural environment.

1. Introduction

Ideas of growth pervade the study of commercial organizations like firms, especially entrepreneurial ventures (Leitch et al. 2010). Research into the phenomenon of ‘growth’ is primarily concerned with changes occurring when smaller firms grow in size, measured with reference to various indicators such as sales, employment, market share, physical outputs, profits and assets (Delmar 1997). With growth comes viability, both of firms, and more broadly, of regional economies (Audretsch et al. 2004; Robson and Bennett 2000). Despite growth being a kind of *sine non qua* concern for entrepreneurship studies, the field still lacks explanatory theory by which it might be understood (Gilbert et al, 2006), with very little ‘known about the phenomenon, and conceptual development has been limited’ (Wiklund et al. 2009, 351). In light of such, there have been calls for entrepreneurship researchers to work back from empirical studies to question assumptions and build new conceptual frameworks (e.g. Davidsson et al. 2001; Macpherson and Holt 2007; Blackburn and Kovalainen 2009).

Discussions continue concerning which indicators adequately represent growth (Delmar et al. 2003; Weinzimmer et al. 1998), but there is unquestioned consensus that growth equates to economic growth, and that it is desirable. Focusing solely on economic growth, however, conceals other possible dimensions by which growth might be experienced, such as: personal, social, spatial and environmental (Achtenhagen et al, 2010; Anderson 1998; Haugh 2007; Korsgaard and Anderson 2011). Making other dimensions visible might also bring into question the desirability of economic growth, specifically challenging the academic willingness to understand and promote growth simply in terms of the assimilation and accretion of resources (Anderson 1998; Dean and McMullen 2007; Parrish and Foxon 2009). Whilst critical of our reliance on the economic, our paper is not directly oppositional; we are not advocating an anti-growth agenda. Rather, we investigate how assumptions about

entrepreneurial growth have arisen because of preponderate language use, specifically the (necessarily) thoughtless use of metaphor. Using work on metaphor in the field of organizational studies, we reflect on the metaphor of entrepreneurial growth. Metaphors (figurative language that represents one thing in terms of another) exert powerful and often unacknowledged forces on the creation of new knowledge about organizational phenomena (Cornelissen 2005, 2006; Weick 1999). Growth itself is one such metaphor, brought from the domain of biology into conversation with economics, and affording a conceptual array of related theoretical terminology (evolution, branches, adaptation etc.). Such metaphors play a heuristic role in theory building. In bringing different domains into contact they often open up new avenues for understanding and enquiry and cannot be dismissed as simply embellishment or rhetorical devices (Weick 1989). However, if accepted uncritically and indiscriminately promulgated through theory they can restrict insight. Given the integral role metaphors play in how we construct novel and useful theory, use of a particular metaphor to advance understanding should be a thoughtful process (Cornelissen 2004).

Our paper is, then, an exploration of how a language of growth writes us as researchers, as a field, and how, by thinking about the metaphors we use, richer understanding might arise. Specifically, we critically reflect on the heuristic value of biological metaphors used to theorise entrepreneurial growth. First we explore the powerful role of metaphor in the development of theory (Cornelissen 2005) and the opportunity this gives us to re-examine underlying assumptions. Next, we conduct a critical review of the principal image-schema or root metaphors of the entrepreneurial growth process, tracing the emergence of an extended period of interaction between the domains of biological and social science grounded in two related metaphorical domains: (a) the metaphors of organismic growth redeployed in the form of life-cycle and stage models of the growth process; (b) and the metaphor of evolution

applied to aspects of entrepreneurial growth in natural selection and population ecology (Hannan and Freeman 1977).

We then think about the biological metaphor of ‘co-evolution’ - not least re-engaging with its original understanding in the field of biology - and propose its having three characteristics that might enrich our understanding of entrepreneurial growth: relational epistemology, collectivity and multi-dimensionality. Survival and growth of an entrepreneurial firm is a property of a co-evolving ecological system rather than any distinct entrepreneur, firm, organizational species or external environment. According to a co-evolutionary perspective, in order to grow, the entrepreneurial firm must co-evolve in systemic relations with their environment including customers, suppliers, markets, employees, local and international communities, natural environments and even their competitors (Cairns 1995; 2007). This confronts researchers with an idea of growth as being wider than economic growth, allowing studies to take account of contemporary environmental and sustainability challenges that existing perspectives offer little insight into (De Clercq and Voronov 2011).

2. The role of metaphor in theorising

To approach any awareness of complex, uncertain and unfamiliar phenomena we often draw upon more accessible and familiar areas of experience. In many cases, we convey what would otherwise be strange experiences or inchoate ideas using metaphors referring to more common perceptions and conceptions. Such metaphorical thinking grounds our theorising, and metaphors are conceptual building blocks of theory (Weick 1989). As Schon (1993, 137) outlines, metaphor operates as, ‘a process by which new perspectives on the world come into existence’. Yet the importance of metaphor in developing understanding has not always been accepted. Even where it is acknowledged, it is assumed by many to act as staging ground,

allowing theorists to gather meaning with sufficient clarity before then embarking on more mature phases of scientific enquiry that would eventually be characterised by more precise, or literal language (Tsoukas 1991). Proponents of this view, stemming back to Rudolph Carnap's logical positivism and the urge to protect 'truth' from non-verifiable knowledge claims, find metaphor imprecise, ambiguous, difficult or impossible to falsify, and hence unsuitable for conducting scientific investigation (Bourgeois and Pinder 1983; Oswick et al. 2002). Metaphors, being figurative and rhetorical combinations of concepts, do not stipulate meaning (as equivalences do in logic, or laws in scientific practice) but carry it, and these carried meanings remain inexact and potentially misleading if invoked by scientific practice (Ortony 1994). In this view, for example, to understand new organizational forms like entrepreneurial ventures we might begin by adopting a growth metaphor such as a flower seed rooting, taking sustenance from its environment and eventually blooming, but eventually dispense with it in favour of a more empirically-grounded conceptualization associated with investment allocations, assets held, the structure of roles and offices and the like. As the entity itself becomes apparent through analysis, the metaphorical shroud slips away so to speak. The task here is univocity, a clarity by which language confines itself to definition, where what 'is' the case is rendered without 'flowery' ambiguation.

Weick and Daft (1983), Lewis (1999) and Morgan (1980, 1981) take a contrary position, arguing institutional things like 'a firm' cannot literally be known or understood, we only 'imagine' what they are by mapping structure and meanings from other domains such as machines, politics or evolution, with each of these mappings providing different insights and understandings of what a firm is. Imagination is no longer confined to the subaltern role of providing lively images that hasten the march toward conceptual clarity. On the contrary, imagination becomes the ground by which all concepts carry life (Blumenberg 1960/2010, 4).

Invoking the existence of a thing like a ‘firm’ always spills over the edge of our empirical experience. Empirically a firm might equate to: groups of people; machinery ordered and maintained in a building; legally registered permissions, and the like, but in isolation or even an amalgam these things are not rich enough to amount to the concept ‘firm’. Metaphor is necessary, not just to know about the firm, but ontologically to convey the structure and inference patterns that allow a firm to ‘live’ as such (Cornelissen 2006). Theory entails analogical reasoning and understanding emerges from insightful, arresting, persuasive associations that touch but cannot be reduced to empirical experience; though there are non-linguistic referents there is no getting outside of language completely (Lewis 1999; Mutch 2005). Thus in addition to ‘things’ a firm also becomes: an adaptive system; or an organism; or machine, all of which bring the domain firm into the neighbourhood of other more settled domains, affording awareness of what a firm is through association with more readily experienced things (Grant and Oswick 1996; Morgan, 1983). As Lakoff and Johnson (1980) argue, bringing concepts from different, better known domains into conversation with an ambiguous idea or experience (the target domain) allows us, ‘to refer to it, quantify it, identify a particular aspect of it...and perhaps even believe that we understand it’ (Lakoff and Johnson 1980, 26).

Taking the metaphor of the ‘machine’, for example, a firm becomes mechanical in that employees are often gathered and organized in repetitious patterns of activity, there is a machine-like linearity to the logic of performance assessment where inputs are causally tied to outputs, and there is a preference for technical rather than emotional decision making (Inns, 2002). The metaphor enriches the concept firm by blending it with the more concrete mechanical behaviours witnessed from mechanical devices (Oswick et al. 2002). It is through such associative movement that metaphors offer clarity by creating sufficient flexibility for

multiple interpretations, ways of seeing, conceptualising and understanding phenomena (Tsoukas, 1993). Although the generative value of metaphor in creating new meaning either by associating opaque experience and ideas with already existing concrete concepts, or opening up orthodox semiotic relationships, is now more widely accepted in studying commercial organization (Chia 1996; Clark and Mangham 2004; Hatch 1998; Morgan 1996; Tsoukas 1991, 1993), less attention is directed at the ways metaphors actually work.

First, is to consider what it means for metaphors to create or build meaning. Cornelissen (2004; 2005; 2006) argues, in order to be useful, metaphors need to generate new meanings that are derived from previously accepted similarities. However, in doing so they may also have the effect of transforming or supplanting those original meanings (Cornelissen et al, 2012). Here we are getting at awareness of heuristics. Morgan (1981) associated heuristic potential with the maintenance of appropriate difference between the subjects involved in the metaphorical process: ‘if the two subjects brought together [in metaphor] are perceived to be completely unlike, e.g. a boxer and a saucepan, or are seen as almost identical, e.g. a boxer and a man, the metaphorical process produces either nonsensical or weak imagery’ (Morgan 1980, 611); there has to be what Tsoukas (1991, 1993) calls ‘literal structural similarities between concepts’ allowing what was latent to reveal itself. So from Cornelissen’s perspective, the usefulness of metaphor in terms of a heuristic does not lie in emphasising or reporting pre-existing and already known similarities in the features of the ideas or objects being compared, but depends on the conceived similarity and dissimilarity between concepts at their respective higher-order domains (the domains where more specific metaphors are sourced). Metaphor is not simply a comparison of how the properties of one term apply to the other in a similar sense, but rather involves ‘the conjunction of whole semantic domains in which a correspondence is constructed rather than deciphered and where

the resulting image and meaning is creative” as an aspect of how we make sense of experience as well as represent it (Cornelissen 2004, 751). For example, the entrepreneurial firm’s continued existence, its presence over time, might be described as being like the evolution of an organism. Here there is evidently no pre-existent similarity between features of the target - entrepreneurial firm - and the source – an organism’s evolution - but when the concepts trigger their respective higher-order domains a structural similarity between them is created (Lakoff and Turner 1989; Fauconnier and Turner 1998). The general target domain (the birth and growth of entrepreneurial venture) and the source domain (‘biological change’, from where the evolution concept is sourced) are, in their higher-order domain, both characterised by transformative processes from simpler to more complex states, and it is through this wider semantic domain that connections are made. Therefore, rather than reporting existing similarities, metaphors generate emergent meanings and create similarity as correspondences between higher-order domains are constructed.

This construction of meaning works along two related vectors: firstly, the capacity of metaphor to pull us away from both the immediacy of experience and the direct semiotic association of words and referents; and secondly, as a counter-thrust to rigidly structuring language, in resisting settlements of meaning. As the metaphor allows the vague to become clear, so, potentially, what is made clear can itself loosen assumptions, clarifying meaning and prompting new insights. To revisit the metaphor of the firm as machine, the tight grammatical relationship between machine and qualities like repetition, technical, reliability, logical can itself be re-enforced and upset by metaphor. Taylor’s scientific management might be considered an evocation of both uses of the machine metaphor. His advocacy of machine work is grounded in both increasing production rates and attempting to dissolve traditional enmity between management and workers. His efforts in the study of ‘the motions of men and

the simplification of their movements and acts' are directed at finding less 'wasteful' behaviours and more 'impartial' and 'earnest' management (Taylor 1912/1947, 134). Yet it also finds workers being paid more, and workers and managers set as equals in determining what constitutes a full and proper work rate; the mechanical frees as much as it regulates (ibid, 145). And the metaphor might yield yet further opening of meaning. If a firm is a machine, the word machine is no longer tied to specific form of object (a moving amalgam of parts transforming material and form in the service of material production), nor even to a physical object, so processes can become machines, and if the firm is understood as operating like a machine, then what does this imply about the status and function of its employees? If they are like components we might ask whether employees can think in the ways often demanded of them as such, and then whether machines can think come to that.

Therefore, as well as constructing concepts by bringing amorphous, loosely gathered and open phenomena into conversation with more settled ones, metaphor also works the other way, loosening the tight lineaments between signs and referents commonly established within language itself. It is this historical process of loosening and tightening that we investigate in our analysis of the groundwork being done by the metaphor of growth in studies of entrepreneurial firms.

3. The use of biological metaphors in entrepreneurial growth

The integral role that metaphor plays in the process of venture creation (Dodd, 2002; Cornelissen and Clarke 2010; Hjorth, 2007) and in how we talk about the phenomenon of entrepreneurship (Anderson 2005; Cardon et al. 2005), has been well established. Cosgel (1996) for example adopts a rhetorical perspective and examines the metaphorical constitution and storied character of economic thought and critiques the mechanistic metaphor

of neoclassical economics on the grounds that it leaves no active role for the entrepreneur. In a related vein, Cardon et al. (2005) probe entrepreneurs' use of the parenthood metaphor in relation to their ventures (i.e. nurture, passion, attachment, neglect etc.) as part of an examination of the role of emotion in the entrepreneurship process. However, although metaphor has previously been examined in the context of entrepreneurship, as yet there has been limited critical examination of the metaphors used to theorize about the entrepreneurial growth process. Entrepreneurial growth research represents an important subsection of the wider entrepreneurship literature, which has addressed a variety of issues including: the antecedents of growth, intra- and inter-organizational growth processes, and the consequences of growth within and beyond the boundaries of the firm. We seek to shed light on the ways that particular growth metaphors came to prominence and how they have advanced certain interests and constructions over others, the implication being that these heuristics have corralled theoretical development in ways that confine as much as yield understanding (Morgan 1981).

There are two dominant metaphorical images of the growth process: life-cycle and evolution, both conceptually emerging from the root metaphor 'biological change'. There has been long-standing traffic between the biological and social sciences generating emergent meanings (e.g. Alchian 1950, 1953; Hodgson 1991, 1993, 2013; Penrose 1952, 1953; Stanworth and Curran 1976; Foss et al. 1995; Freel 2000). For example, Adam Smith's sense of godless harmony in human affairs, and Malthus' ideas on the inherent tension between linear (food supply) and exponential (population) trends, informed Darwin's study of evolution in flora and fauna. This, in turn, generated new knowledge about the mechanisms by which advantageous traits were preserved in populations through mechanisms of inheritance, variance and selection subsequently re-applied to the economic sphere (Hodgson

1993, 2013; Leonard 2009). For example, Spencer's ([1875, 1889] 1971) quasi-evolutionary theory of social organization was spurred by Darwin's (1864) theory of natural selection and its associated imagery of savage competition and struggle for existence gave rise to the highly contested concept of 'social Darwinism'. Latterly, developments in behavioural economics have made the connection even more explicit, for example citing the evolutionary useful instinct of peer emulation to explain the apparently irrational exuberance by which credit pools so ruinously overflowed at the turn of the millennium.

Economics has always drawn heavily on the natural sciences for metaphors designed to help in the understanding of economic phenomena. Biological metaphors in particular have played an important role in economics and related disciplines that have contributed to the theorising of entrepreneurial growth (e.g. Aldrich and Martinez 2001; Loasby 1991; Nelson 1995). They have provided economic and organizational theorists with an established vocabulary to think about firm growth. The potency of the resulting metaphorical language lies in its capacity to bring ideas from a well-researched context into conversation with more ambiguous phenomena in a newer research field. However, critics have argued that these uses of metaphor have been characterised by a lack of reflexivity (e.g. Klamer and Leonard 1993; McCloskey 1994). In McCloskey's (1995, 219) terms, 'Economists and other scientists are unselfconscious about their metaphors. They suppose that because they can speak an economic metaphor it simply is'. What McCloskey asks of economists, and by extension management and organization scholars, is to consider how such metaphors work upon us and the almost casual (habitual) way in which how we talk and inquire about things finds us assuming that things exist in the way we talk about them. In the context of entrepreneurship and growth this supposition has found its most sustained expression in the case of stage models.

4. Growing organisms – The stages of growth metaphor

From the mid-20th century researchers of firms have routinely adopted the metaphor of organic growth as a heuristic device to explain development in an organizational entity from its initiation to its termination. Stages of development models (first appearing between 1969 and 1972) assume ‘organizations grow as if they are developing organisms’ (Tsoukas 1991, 575) often focusing specifically on the life-cycle of human organisms. This metaphor supposes that, ‘just as humans pass through similar stages of physiological and psychological development from infancy to adulthood, so businesses evolve in predictable ways and encounter similar problems in their growth’ (Bhide 2000, 244). Firms are seen to progress along linear growth trajectories, divided into periods characterised by distinctively different stages of development, each a function of age (Storey 1994). These distinct periods are defined in term of emergence, growth and maturity, followed in due course by decline and death (e.g. Churchill and Lewis 1983; Hanks et al. 1993; Levie and Lichtenstein 2010; Lippitt and Schmidt 1967; Greiner 1972; 1998). Events in the growing firm are seen as either wholly or largely contingent on the organization reaching a particular point in its development.

One model frequently referred to is Greiner’s (1972) model that claims continuous, linear relationships exist between time and growth, with firms moving through five distinct phases of development, each containing a relatively calm period of growth punctuated by transformational crises initiating transition to the next. Greiner (1972, 38) saw the organization as a developing human by applying (1972, 38): ‘...the legacies of European psychologists, their thesis being that individual behavior is determined primarily by previous events and experiences, not by what lies ahead.’ He extended this metaphor of individual development to the problems of organization growth and development. Another extensively

cited model is Lippitt and Schmidt's (1967) organizational life cycle model. Drawing on a quotation from John D. Gardener they propose that, 'like people and plants organizations have a life cycle. They have a green and supple youth, a time of flourishing strength, and a gnarled old age' (Lippitt and Schmidt 1967, 102). Lippitt and Schmidt suggested the concerns of organizations may differ as they evolve: with birth come urges for creation and raw survival, in youth the focus is on gaining stability and reputation, and accompanying pride, and finally with maturity comes an interest in achieving uniqueness and adaptability.

Life cycle or stage models of growth share an intuitive appeal (Phelps et al. 2007, 12-13). They also deserve credit for moving away from mechanistic or machine-based visions of organizations. By using biology as a source of inspiration for thinking about growth, new ideas about firm growth have emerged, for example its longitudinal and temporal nature (Wright and Stigliani 2013). Organismic metaphors also simplify the complexities of growth processes at firm level, enabling models to generate practical and seemingly generalizable prescriptions (e.g. identifying organizational structures, managerial processes and interventions that are deemed appropriate for any firm as it reaches a particular point in the process) (Stanworth and Curran 1976). The models also gain legitimacy from the anecdotally familiar experiences they describe. For example, entrepreneurs often recognise and relate to Greiner's 'crisis of leadership', when the founder of a growing owner-managed firm is unable to cope with the scale and/or complexity of its operations. This intuitive appeal has encouraged particular lines of thinking, to the extent that, 'researchers applying the life-cycle analogy have pursued this immanent logic, on the assumption that common principles can be extracted through research into the 'natural history' of existing firms' (Aldrich 1999, 197).

With popularity comes criticism, and stage or life-cycle models have been heavily criticised (Phelps et al. 2007; Stanworth and Curran 1976; Stubbart and Smalley 1999). For

example Eggers et al (1994) examined Churchill and Lewis' (1983) five stages model on a large sample of high-potential firms, finding nearly 40% of companies sampled did not follow the predicted growth model. The available evidence does not support the theory that firms have a life cycle characterised by a consistent transition through recognisable stages of development similar to those of living organisms. Rather, as Penrose (1952, 806) notes, 'just the opposite conclusion must be drawn: the development of a firm does not proceed according to the same 'grim' laws as does that of living organisms'. Unlike organisms, firms do not develop according to prefigured rules and necessarily progress, instead they often find themselves at, or the entrepreneur even choosing to remain at, an 'embryonic' or 'primitive state' rather than progressing to a 'more realised and mature' state (Van de Ven and Poole 1995). Here the metaphor of life cycle is not able to account for the agency of the individual entrepreneur (Wright and Stigliani 2013). For example, what Stanworth and Curran (1976) call the social marginality of would-be venture creators (entrepreneurs), their feeling of dislocation and estrangement by which employment in established organizations becomes an anathema, is too messy to measure as nascent staging. Estrangement can arise from a multiplicity of experiences: frustrated intelligence, personal tragedy, feelings of boredom, ethnicity, resentment, institutional encouragement all of which might coalesce into venture creation and influence directly the experience of firm growth. Indeed being marginal might extend to a critical relationship with the socially accepted norm associating firm growth and progress; the entrepreneur ipso facto resists normalized configurations of growth (Hjorth 2013). These models also attend to very little in relation to how the external environmental events can impact on the firm, concentrating instead on internal characteristics by which firms unfold into growth.

Acknowledging these critiques, and yet keeping within biological metaphor, adherents of the natural selection metaphor have argued that the life-cycle model focuses too much attention on the firm as the key unit of analysis. Their response has been to counteract this tendency by focusing on the operation of environmental selection mechanisms, and arguing that this can best be done by analysing changing patterns in organizational populations in relation to their wider ecology.

5. Entrepreneurial growth as evolution – A process of natural selection?

More recently researchers have moved away from life-cycle models whilst retaining an interest in process but re-focusing their attention on the more expansive metaphorical language of evolution (Aldrich and Martinez 2001). These models of entrepreneurial growth draw on the principles of biological evolution and natural selection put forth by Lyell, Wallace and Darwin, and within entrepreneurship, stemming from the work of Aldrich and others (Aldrich 1999; Aldrich and Martinez 2001; Barnett and Burgelman 1996; Montgomery 1995; Schendel 1996). As Van de Ven and Poole (1995, 518) outline, ‘evolution explains change as a recurrent, cumulative, and probabilistic progression of variation, selection, and retention of organizational entities’. The evolutionary approach to firm growth focuses primarily at the population level and studies the creation of new organizational structures (variation), the way in which firms modify and use resources to survive in changing environments (adaptation), the circumstances under which such organizational arrangements lead to success and survival (selection), and the way in which successful arrangements tend to be imitated and perpetuated by other firms (retention) (Aldrich and Martinez 2001). Within evolutionary models observed changes are often viewed to emerge by blind or random chance; arising out of a largely unintentional and emergent process, rather than as the result of

planning and design (Aldrich 1979; Campbell 1969). In biological terms, when the environment changes or when a new species gradually encroaches on the resource 'niche' traditionally held by another species, the change will eventually be reflected in population structure as species tend to share similar strengths and weaknesses. Although some individual members may be fitter than others in their species, they are unlikely to be as fit as the new species and therefore likely to meet the same fate as the rest of their population in the longer term, that is, the whole species that tends to survive or fail (Morgan 1997).

Recent work by Hodgson (2013) suggests how organizations like entrepreneurial firms experience selection insofar as they have distinct internal characteristics and act in local environments from which variety stems from success or failure as each firm struggles to show a capacity to change structures and strategies to pre-empt or react to environmental changes. Retention comes from developing routines that predispose the firm to conditioned patterns of behaviour. Selection of organizations occurs principally through the competition for scarce resources and the environment selects entities fitting the available and emerging environmental, or those most capable of resisting competition (Hannan and Freeman 1977; Lazerson 1988). Entrepreneurial firms, like organisms, depend for survival and growth on their ability to acquire an adequate supply of the resources necessary to sustain their existence. In this effort they have to face competition from other types (species) of organizations, and since there is usually a resource scarcity, only the most robust can survive. The environment is thus the critical factor in determining which entrepreneurial firms will succeed (and grow) and which will fail, as it 'selects' the fittest competitors and eliminates the weaker ones. The nature, numbers, and distribution of organizations at any given time are dependent on resource availability and on competition within and between different species of organizations. This ecological perspective finds entrepreneurship scholars examining macro

questions regarding the factors that influence ‘rates’ of organizational births and deaths. New firms are born into environments that are structured by intra-population processes (such as prior founding’s, dissolutions and organizational density). Relationships between populations of organizations affect the distribution of resources available to entrepreneurs in the environment and institutional factors (government policies, political events, social and cultural norms etc.) shape the external ‘macro’ context within which these processes occur (Aldrich 1990).

There are advantages of the evolutionary metaphor over the growth stage models as they offer more open-ended prospects for understanding the dynamics of growth and the diversity to which they give rise to over time (Audretsch et al. 2004; Freel 1998). Unlike the life-cycle models, evolution accounts for the idiosyncratic nature of firms as the growth of the firm over a period of time is contingent on the interaction of a number of internal and external forces. Hence, the nature and timing of a firm’s growth are governed by contingent, even unique ecological circumstances: there is no standard model or sequence of stages to be observed (Vinnell and Hamilton 1999). As Aldrich and Martinez (2001, 43) note the evolutionary perspective does not primarily focus on the, ‘prominent exceptions of organizations that manage to survive and grow, rather the ubiquitous efforts that fail ...most entrepreneurial efforts do not result in the formation of an organization and even when they do, the resulting firm is often quite small and shortlived.’ The natural selection perspective does not see all organizations as alike but also does not see organizations as unique places, ‘emphasis instead on research methods that improve the description or organizational forms, define more homogenous groupings and specify the limited conditions under which predictions may be expected to hold through’ (McKelvey and Aldrich 1983, 101). As Nelson (1995, 85) notes, ‘one of the appeals of evolutionary theorizing about economic change is that

that mode of theorizing does seem better to correspond to the actual complexity of the processes, as these are described by the scholars who have studied them in detail'. Such a framework therefore helps us as researchers to see, and better appreciate, the inter-connectedness of economic processes.

Concern with evolutionary explanations of growth often stem from what is perceived as its deterministic quality: where is the room for strategic direction and decision? Empirical research has shown that entrepreneurial firms have the ability to transform from one kind of organization into another or shift from a declining niche to a more profitable one (Brown and Eisenhardt 1997; Clarysse et al. 2011), or even resist apparently advantageous solutions for asset acquisition because of a reluctance to grow. As Wright and Stiliani (2013, 5) note, venture growth is the, 'outcome of a rich array of factors, including the decisions entrepreneurs make about how, how much, when and where they should grow their firms'. Unlike the natural world, where natural selection arises from accidental conjunctions of attribute and circumstance, the guiding evolutionary mechanisms of variation, selection and retention in organizations remain open to intentional and accidental modification, guided by capacity for imagination and conjecture. While social structures may resist, guide and even compel human agency, they are not readily analogised to the immutable routines encoded in strands of DNA (cf. Nelson and Winter 1982; Nelson 1995; Feldman and Pentland 2003).

Another issue is with the competitive twist that population ecology studies put on the process of natural selection which views entrepreneurial firms as existing in a continuous state of tension or struggle with their external environments, ever anxious to resist those who may usurp scarce but critical resources. Yet entrepreneurial firms often seek to establish collaborative relationships with those around them to counter inertial pressures in the environment (Bøllingtoft and Ulhøi 2005; Eisenhardt and Schoonhoven 1996; Lipparini and

Sobrero 1994). Relatedly, rather than assume the environment is very much a separate and mute repository of resources for a distinct entity called a firm, entrepreneurial firms, like organisms, are not self-sufficient entities living in discrete isolation from each other but are rather are part of an inter-reliant, mutually constituting system (Morgan, 1990).

Clearly the evolutionary perspective has to be used with more care, something offered by the metaphor of co-evolution, which has been adopted by organizational scholars in a further round of exchanges with the biological sciences. In contrast to earlier organismic and evolutionary metaphors, a co-evolutionary perspective on entrepreneurial firms sees them existing within a complex, inter-dependent and mutually constituting ecosystem, one population system within, and along with, others. This metaphor also allows for intentional force in adaptation. So alongside selection, strategic decisions can count as more or less useful behaviours in response to the problem of scarcity and strategy processes can count as more or less useful organizational dispositions to retain and transmit relevant information, thus avoiding connotations of blindness, randomness, and determinism often associated with evolutionary perspectives (Hodgson, 2013).

6. Entrepreneurial growth as a co-evolutionary process

6.1 Co-evolutionary metaphors in organizational research

The concept of co-evolution has increasingly been used as a heuristic to understand change in complex organizational systems such as the co-evolution of technologies and institutions (Nelson 2002), population of industries and universities (Murmann 2003), behaviours and institutions (van den Bergh and Stagl 2003), populations of producers and consumers, or supply-demand co-evolution (Safarzyńska and van der Bergh 2010; Janssen and Jager 2008), organizations and their environments (Porter 2006; McKelvey 1982; Baum

and Singh 1994), political strategies and technological paradigms (Ward 2003) or perceptions and actions (Weick 1979). In particular there has been wide-ranging debate regarding the application of co-evolutionary analyses in entrepreneurship and related fields, reflected in special issues of the *Strategic Management Journal* (Barnett and Burgelman 1996), *Organization Science* (Lewin and Volberda 1999), and *Organization Studies* (Lewin and Koza 2001). Yet despite the increasing popularity of the use of co-evolution as a concept, the grounding meaning of co-evolution and its origins in biological discourse are routinely ignored. It is often simply used to show how two aspects of a system can have binary relationship and impact on the development of each other for example Van den Bosch et al's (1999) show how knowledge environments coevolve with the emergence of organization forms and capabilities that are suitable for absorbing knowledge.

Biologically, coevolution refers to, 'the simultaneous development of adaptations in two or more populations, species or other categories that interact so closely that each is a strong selective force on the other' (Raven and Johnson 1986, emphasis added). Simple examples include: the evolution of the beaks of hummingbirds and the shape of the flowers they feed on, the behaviour of bees and the distribution of flowering plants (Ehrlich and Raven 1964; Kniskern and Rausher 2001; Thompson 2005). A biological understanding of co-evolution is much more than a simple binary relationship between two parts of a wider a system but rather shows one species or population is necessary to the survival of other parts and integral component in a complex network of species in a richly connected web of life (Janzen 1980). In contrast to natural selection's 'survival of the fittest approach' approach, co-evolution emphasises how the earth's ecological life support systems (including human society) might interact so changes might enhance the survival of all (Cairns 2007), creating an abundance that alleviates the problem of scarcity by exposing entities to more resources

through collective rather than selfish adaptations. Sustained life (survival and growth) is a property of a co-evolving ecological system rather than any single organism or species environment (Bateson 1972).

When we attempt to understand entrepreneurial growth processes with this metaphor in mind, it becomes necessary to understand ventures-in-environments in patterns of creation and dissolution. Like organisms, entrepreneurial firms are not discrete entities rather they exist as elements in a complex ecosystem. Survival can only be survival with, never survival against, the environment or context in which the firm exists. According to a co-evolutionary perspective in order to grow the entrepreneurial firm must co-evolve in systemic relations with their environment including suppliers, markets, employees, local and international communities, natural environments and even their competitors. Competition is not stressed here but cooperation is important to ensure that the system as a whole survives and prospers.

A co-evolutionary perspective reframes our understanding to see that it is the whole ecosystem that evolves (and grows) and that the process of evolution can only really be understood at the level of the total ecology. While the life-cycle metaphor can be seen to operate at the level of the firm, and the natural selection metaphor at the level of the environment, the co-evolution perspective works at the level of the entire system, not privileging one level over another, the entrepreneur, firm, and external environment are all integral aspects of the entrepreneurial process of growth. It is therefore not deterministic in the sense of the population ecology perspective, where no agency is attributed to the individual entrepreneur. As Norgaard (1988) argues, humans adapt to their environments, but also actively transform them, and then adapt to their transformations. As a result, they can play an active role in shaping their future, especially when acting in collaboration with other parts of the system. Environments then become in some measure always negotiated rather

than independent external forces. We identify three characteristics of the co-evolutionary metaphor that might enrich our understanding of entrepreneurial growth: relational epistemology; collectivity; and multidimensionality, which are outlined below. We also highlight the work that already exists which could sit within a co-evolutionary metaphor.

6.2 Relational epistemology

Epistemologically a co-evolutionary metaphor of evolving interdependence offers a basis for a relational epistemology which aims to understand how entrepreneurial growth is relationally constituted within a ‘both/and’ logic, rather than focusing on an ‘either/or’ logic. Fletcher (2006) highlights the utility of a relational approach as moving away from structurally-determinist and cognitive/agency-oriented views of entrepreneurship and understanding the entrepreneurship process as relationally and communally constituted through regularity and variance of processes. The co-evolution metaphor allows for a relational understanding of entrepreneurial growth, whereby multiple sub-components such as perceptions, behaviours, actions, institutions, technologies and environments co-evolve and interact, each continually producing the other, without arrest. Thus the metaphor begins to loosen the prevailing entitative epistemology by which the field is considered as a series of discrete things held in changing relationships.

Importantly co-evolutionary thinking might offer a conceptual way out of the agency vs structure dualism; i.e. how much scope do people have for independence and creativity in the face of structural constraints on their understanding and behaviour (Aldrich, 1999)? This kind of question has been a concern in entrepreneurship studies since Penrose’s (1952, 1959/2004) attempt to clarify the effects of purposive human action within a modified evolutionary framework (i.e. her work acknowledged the influence of human decision and

imagination without granting entrepreneurial sovereignty to a discrete individual) (Blundel 2013). In a co-evolutionary perspective, instances of entrepreneurial agency (e.g. an owner-manager's strategic decision-making), are appreciated alongside the agency of other more or less apparent actors (customers, advisors, suppliers, regulators, families, rival firms, civil action groups, future generations, regulators). The co-evolution metaphor facilitates this kind of detailed examination of entrepreneurial agency, prompting researchers to examine how it can be both facilitated and constrained by the context in which actors are situated. Using the framework of Actor Network Theory (ANT) Korsgaard (2011) has developed a broadly similar approach showing how agency is not the privilege of reflexive humans but belonging to networks of humans and non-human elements. Thus when we heed recent calls to restore the entrepreneurial actor, 'to the heart of the interpretation' in accounts of industrial development (Casson and Godley 2007, 1075; Stigliani and Wright 2013) we do so aware that co-evolution proffers a far less discrete 'entrepreneurial self', where the wider system is not passive and inconsequential, where there is no metaphorical 'heart' as such.

This mirrors some important points made by entrepreneurship scholars engaging in narrative analyses of entrepreneurial activity (Clarke and Holt 2010; Fletcher 2007; Hjorth 2007; Steyaert 2007). As pointed out by Fletcher (2007) sequential and temporal order are the result of post hoc narrative sensemaking. In other words, the causality of one thing leading to another found in many narratives offered by entrepreneurs is not in the events as such as they are unfolding (the literal meaning of evolution), but installed later in the analytic process of making sense of what happened through concepts. So the first contribution of co-evolutionary metaphor is that it helps to dissolve the assumed discreteness of boundaries between agency and structure.

6.3 Collectivity

The second aspect of the co-evolutionary metaphor is the sense of collective heritage and destiny being engendered. To get a sense of how co-evolutionary metaphor might influence thinking about entrepreneurial ventures we might begin by contrasting it with what Morgan (1997) refers to as egocentrism. Egocentric entities draw boundaries around narrow definitions of themselves and see themselves as discrete entities separate from the environment and therefore attempt to advance the self-interest of this narrow domain. This leads them to overemphasise the importance of themselves while underplaying the significance of the wider system of relations in which they exist. As Morgan (1997, 260) notes, ‘many of the social ills of our time are associated with this kind of egocentric enactment and the kind of free-standing individualisms it implies’ where individual and organizations destroy the very context upon which they rely. By treating the wider physical, economic and social environment as a kind of external dumping ground and ignoring the impact of their actions, ultimately these smaller inward looking entities set the basis for longer term problems that challenge and severely constrain any possibility for growth.

This collective dependency has been acknowledged by many entrepreneurship scholars. The individual entrepreneur is powerless without the agency of others as the agency of the entrepreneur is an effect of the network in which he or she is embedded. Networking extends the reach and abilities of any actor to access resources held by others and so improve entrepreneurial effectiveness, these networks becoming an important aspect of growth. Hite (2005) argues that the nature, extent and types of social interaction that take place between an entrepreneur and his/her network are fundamental to building and growing organizations. Similarly, Anderson et al. (2010) have shown that networks are essential for instituting change, developing growth and thus creating the future. But networking is not limited to

physical resources. As Minniti (2005) explains, by observing others, a potential entrepreneur acquires information and knowledge; meets others who have complementary expertise; and gains financial support, all of which are also touched upon by, Terjesen and Elam (2009) in their study of how in international markets entrepreneurs rely on social, cultural and symbolic capital as readily as economic. The co-evolutionary metaphor can therefore help us understand the work in recent years that has been considering the collective, systemically inter-twined nature of entrepreneurial growth, challenging the idea of the solitary entrepreneur and emphasising the importance of networks and embeddedness in possibilities for growth (Cope et al. 2007; Jack and Anderson 2002; Jack et al. 2008; Johannisson 2000).

A co-evolutionary perspective emphasises the importance of collaboration. Under the influence of interpretations of evolution that emphasise ‘survival of the fittest’, competition is often encouraged as the basic rule of organizational life. Within a co-evolutionary perspective ‘survival of the fitting’ and the ethic of collaboration receives much more attention (Morgan 1980). Firms should not see their survival and growth as hinging on the preservation of their own fixed and narrowly defined interests but rather on the evolution of the more fluid and open interests of the system to which they belong. This also links to the quest for sustainable use of the planet resources where mutualistic relationship between humankind and the ecological life support system exists that is sustainable i.e. capable of lasting indefinitely (Kallis 2007). Co-evolutionary metaphors find human economies diverging markedly from a sustainable relationship with natural systems by damaging their integrity, health and component species (Potts et al. 2010). Since these systems collectively represent natural capital that provides resources (e.g. Bateson 1972; Daily and Ellison 2002; De Clerq and Voronov 2011), the capacity for growth will become reduced as more and more ecosystems collapse and the course of biological evolution is altered. The metaphor challenges the

endogenous/exogenous understanding of ventures, finding growth less a function of possession, and more a function of how ventures learn to see themselves in relation to their broader 'environment' and create new potentials for transformation.

6.4 Multidimensionality

The third and final aspect of the co-evolutionary metaphor is the capacity to account for growth beyond simply economic concerns. In a co-evolutionary approach attention is given to multiple criteria by which growth is appreciated. Wiklund and Shepherd (2003), for example, show non-economic concerns maybe more important for entrepreneurs than financial outcomes in determining attitudes to growth and hence we should not ignore the critical human and social aspects of this process - growth might not be a goal pursued by all entrepreneurs. When we adopt such a co-evolutionary perspective entrepreneurship overflows the economic domain; such conditions can also present entrepreneurial opportunities in the political, creative or the socio-cultural domains, or perhaps in all three. And these can all be critically important in making economic entrepreneurship possible. By looking across multiple dimensions, the co-evolutionary metaphor shows growth is a multidimensional, not uni-dimensional and allows for firms to 'grow' differently. As Penrose (1952/1971, 5) argues a comprehensive theory of the growth of the firm, 'must explain several qualitatively different kinds of growth and must take into account not only the sequence of changes created by a firm's own activities but also the effect of changes that are external to the firm and lie beyond its control.' So entrepreneurship processes have social and environmental outcomes that may well be just as important as the economic outcomes (Shaw et al. 2013).

Korsgaard and Anderson (2011) argue that (economic) growth measures entrepreneurial ventures on a single dimension, thereby making invisible the many other

dimensions involved in entrepreneurship (social, personal, spatial, environmental). In Korsgaard and Anderson's case of an entrepreneurial sustainable settlement, the authors find that although none of the typical indicators of growth are present (e.g. increase in sales or employee numbers), social value was created in different forms at different centres and on different levels: from individual self-realisation to broad societal impact. They also find that the different types, centres and levels of value creation are interconnected in a synergistic interplay between individual and communal levels of growth. This is part of an emerging literature (e.g. Anderson 1998; Dean and McMullen 2007; Parrish 2010), which examines how entrepreneurial agency might become compatible with environmental sustainability.

When we examine growth, using only the conventional business metrics such as sales, employees and profits it is easy to lose sight of the underlying social processes and to under-emphasise qualitative dimensions of growth including social value creation. These alternative forms of value can be more readily acknowledged and accounted for under a co-evolutionary understanding of entrepreneurial growth. The metaphor elicits what Bateson (1991: 52) calls 'system wisdom', a capacity to feedback influences occurring in wider systems (for example the effect of competitive asset acquisition upon wider systems such as local community well-being, the natural environment, or economies of other nations). Thereby adaptations that appear successful from one perspective (avoiding waste disposal costs, replicating standard store models) are pathological from others (despoliation of nature, creating homogenous retail environments). With pathology comes wider system depletion; a firm can adapt and grow too much, and survival is an outcome of a capacity to unadapt, to unlearn; it is a fight for flexibility in which long term adaptation vies with shorter term reversals and the preservation of redundancy (Bateson, 1991: 101-2), or what Morgan (1981) calls an incessant blending of integrating and disintegrating behaviours.

7. Concluding discussion – re-imagining the growth process

Although growth is perceived to be an important characteristic of entrepreneurial behaviour (Sadler-Smith et al. 2003), the actual process of growth is recognised to be complex and one which needs further investigation, particularly in theoretical terms (Shepherd and Wiklund. 2009). We argue that controversies about the essence and definition of theoretical concepts may be in part due to the differences in metaphors used. Revealing the underlying metaphors helps to highlight the sources of these controversies and facilitate an exploration of the richness of the various meanings of theoretical concepts. While metaphors can have great heuristic value in specific circumstances, if mindlessly promulgated in theory they can also become obstacles to greater understanding. Our purpose in this article has been to create an enriched understanding and deeper appreciation of the use of biological metaphors in entrepreneurial growth. To this end, we first outlined the importance of metaphor to the process of theory construction, before moving on to present critical reviews of biological metaphors used in firm growth research and reflecting on the routine and often unreflective application of these metaphors in entrepreneurial growth studies. We focused attention on the interaction between biological metaphors and research on the growth of entrepreneurial firms and highlighted how these exchanges have influenced the ways that researchers and policy-makers think about the growth process.

Our paper has supported the contention that metaphors applied to firm growth can exercise a profound effect on empirical and conceptual research. This is problematic in the case of the more conventional organismic and or partial evolutionary metaphors of entrepreneurial growth, which can offer little agency to the individual entrepreneur (Wright and Stigliani 2013). We have also shown how metaphorical language promotes what Gartner

(2001) calls the unstated assumptions about growth, including the pervasive view that economic growth is the only variety that matters (Korsgaard and Anderson 2011).

Subsequently, we go on to suggest an alternative metaphor - co-evolution - could be used to reorient research in entrepreneurial growth studies. Given that metaphors, 'establish images, names and an understanding of how things fit together ... articulate what is important and unimportant ... (so) in the context of such models believing is seeing' (Hill and Levenhagen 1995, 1057), unpicking what a co-evolutionary metaphor means for research into growth as we have done in this paper is integral to reflexively develop our understanding. Although the metaphor of co-evolution has received increasing attention in organization studies, it is often simply used to show how two aspects of a system can have a binary relationship and impact on the development of each other. By reflecting on the most basic meaning of co-evolution and its origin as a metaphor from biological discourse which is routinely ignored, we have "loosened" these previous assumptions and shown that a biological understanding of co-evolution is much more than a simple binary relationship between two parts of a wider system but rather shows one species or population is necessary to the survival of other parts and integral component in a complex network of species in a richly connected web of life (Janzen 1980). Thus the co-evolution metaphor invokes an ontology of flow rather than substance (Chia 1995; Jack et al. 2008; Fletcher 2006; Steyaert 2007) in which social entities such as firms, entrepreneurs and markets are seen as effects created in relational exchanges, and where the focus of analysis is on processes of formation rather than social forms.

The purpose of this paper was not only to examine how current theoretical perspectives on the entrepreneurial growth process might be enhanced through identifying limitations identified in the existing body of work and re-examining the metaphor of co-evolution, but also to provide a number of more practical potential implications for research

into entrepreneurial growth. A relational perspective like co-evolution suggests researchers develop methodologies that do not rely on assuming rigid boundaries between the firm and the environment and that we theorize the processes rather than products of entrepreneurial growth. This suggests a move away from cross-sectional studies towards process based research designs such as case studies, ethnographies and longitudinal work in which, contra Stigliani and Wright's (2013), the very idea of 'a unit' of analysis and an identifiable process with defined outcomes becomes problematic. This reinvigoration of the co-evolutionary metaphor also promotes a cooperative rather than egocentric logic, directing attention to how firms can grow while promoting collaboration (rather than competition), care for the environment, social value creation etc. The importance of accounting for the growth of the firm as integral to sustainable wider systems has been expressed recently in terms of two stark warnings: (1) that current economic growth trends are environmentally disastrous; (2) that any conscious attempt to reduce economic output (i.e. *decroissance* or 'de-growth') would create severe forms of economic and social instability (Jackson 2009, 38-46). The co-evolution metaphor can provide a means of reconciling the economic impetus for entrepreneurial growth with the environmental imperative for radical transitions towards sustainability. Therefore the co-evolutionary metaphor is a more appropriate heuristic to understand how 'sustainable' (or 'ecopreneurial') ventures might balance the demand for material resources incurred during the growth process with their core ambition to reduce environmental damage (Dean and McMullen, 2007; Parrish, 2010). It can also help entrepreneurship researchers understand the increasing variety of non-conventional entrepreneurial forms that are inherently systemic in nature such as loosely coupled 'virtual' networks, social enterprises, community-based ventures and cross sector partnerships.

While the critical examination of existing understandings that we outline in this paper is important, we should also recognise that the luxury of identifying limitations in our knowledge is built on the substantial contribution of researchers of all persuasions, ‘little by little uncovering the true complexity of the phenomenon’ (Davidsson et al., 2005, 19). The only way we are likely to further refine our understanding of entrepreneurial growth processes, is through open and constructive engagement across the traditional academic divides. This is, by definition, a collective endeavour. As the authors of a recent research methods handbook have suggested: ‘The key issue is therefore to combine respect for the current traditions with an open mind to innovative approaches’ (Neergaard and Ulhøi 2007, 5). In this spirit, we propose the metaphor of co-evolution as a means of revisiting and revising the metaphorical language of the growth process. There needs to be recognition across the research community that existing conceptualizations of growth require modification and enhancement to address the issues discussed in this paper. The research community also needs to engage in disciplined reflection on the metaphorical language of the growth process. The ‘reflexive turn’ in organization and management research is fraught with difficulties, yet the experience of related fields suggests that it is possible for researchers to undertake this kind of reflection while maintaining a close connection between theory and practice (Johnson and Duberley 2003, 1296-1297). This debate can be seen as anticipating many of the risks attached to the unreflective application of biological metaphors. If conducted in an appropriate way, where listening and critical reflection takes a higher priority than rhetoric and erudition, such debates could assist in clarifying the meaning and application of particular metaphors, exposing false assumptions, refining core arguments and encouraging creative, yet disciplined thinking.

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