

**The Development of Firms and the Evolution of Markets
- The Entrepreneurial Role Reconsidered**

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I. Introduction

Organizational change in firms is as ubiquitous a phenomenon as evolutionary change in markets. In their path-breaking contribution to evolutionary economics, Nelson and Winter (1982) have drawn attention to both phenomena and have tried to explain them simultaneously on the basis of an analogy to natural selection. In their approach, the firm is resolved into a hierarchical set of routines. The level on which selection forces are supposed to operate is the ‘pool’ of all routines of an industry, the analogue to the gene pool of a species. In such a perspective, the individual firm tends to disappear as an integral unit of analysis together with the figure of the entrepreneur whose role in shaping and reorganizing is crucial for understanding individual business ventures. A different, though perhaps complimentary, picture emerges therefore once the analytical focus is shifted to the development of individual firms, i.e. to regularities which individual firms go through during their life span. Rather than being based on selection as a force shaping organizations from outside (an analogy referring to the phylogeny of a population) a developmental approach may emphasize forces residing inside the organization (and, in doing so, it may gain some inspiration from an analogy to the ontogeny of living organisms).

In the present paper the prospects of a developmental approach are discussed in more detail. As a motivation section II starts with a brief review of the approach to the firm organization taken by Nelson and Winter (1982) reflecting about their reasons for emphasizing the evolution of markets and industries rather than the development of firms. Section III turns to Penrose (1959) and her splendid statement of a developmental approach relating to the growth of the firm. Her approach is based on an entrepreneurial theory of organizational change which, it turns out, relies on some rather special hypotheses. In order to provide a more systematic foundation for the entrepreneurial theory, section IV explores the cognitive underpinnings of firm organizations. Relying on earlier work (Witt 1998a, 2000), it is briefly explained how the performance of firm organizations depends on the entrepreneurial capacity to resolve the closely intertwined organizational problems of cognitive coordination and work motivation. In section V the logical structure of the derived developmental regularities in firm organizations and their various contingencies can then be outlined with particular attention to the relationships to the growth of the firm. Section VI takes the step from developmental regularities to contingent successions of organizational stages which would correspond to an organizational ontogeny and discusses in an exemplary fashion for a selection of organizational stages the possibilities for a more formal representation of such a contingent ontogeny of firm organizations. Section VII offers some conclusions.

II. Nelson and Winter’s Approach to Firm Organizations

In order to understand the approach to the firm which Nelson and Winter (1982) have taken in their path-breaking work it is important to note the particular theoretical context on which they focus, namely the “Schumpeterian themes” of capitalist development, technological change, and

the dynamics of industrial market organization. Their contribution to these themes resulted in a first, concise statement of an evolutionary approach to economics. The backbone of that approach is an ingenious synthesis of ideas coming from remarkably different sources.

The frame-setting input to the synthesis is Schumpeter's interpretation of economic development. In his seminal book Schumpeter (1934) had put forward an entrepreneurial theory of economic development in which entrepreneurship is at the core of carrying out new combinations of resources, i.e. innovations. He had argued that entrepreneurial innovativeness gives rise to an incessant competitive restructuring of the economy and to economic growth, where -- in a somewhat elitist interpretation -- the mainspring of endogenous economic change is to be found in the exceptional personality and the achievement motivation of entrepreneurs (Schumpeter 1934, pp.74-94). However, after emigrating to the U.S., Schumpeter (1942) became interested in the role of large trusts which he then saw dominating the industrial dynamics of capitalism. As a consequence he changed his assessment of the entrepreneurial role, arguing that the entrepreneur as a pioneering promoter loses out against the teams and trained specialists of the large corporations which increasingly render him obsolete. Instead of being an heroic leader's achievement, innovative activities are portrayed as being carried out in bureau and committee work (Schumpeter 1942, pp.132-133).

Switching from the psychologically backed theory of entrepreneurship of his early writings -- which never gained much of an influence in economic theory -- to a reappraisal of market competition, the late Schumpeter was able to trigger a debate on the relationships between market structure and innovativeness that occupied economists for decades (see Baldwin and Scott 1987 for a survey). His vision of an incessant, routine-like, industrial innovativeness which revolutionizes production processes, supply of goods, and the organization of the economy embraced monopolistic practices as a necessary concomitant (Schumpeter 1942, ch. 8) and thus grossly deviated from the assessment derived from the static model of perfect competition. However, Schumpeter (1942) did not offer much of a theoretical underpinning for the conjectured systematical relationship between market structure and innovative achievements in industries, a fact that turned out to hamper the empirical work on "Schumpeterian competition".¹ It is at this point that scholars favoring a dynamic, Schumpeterian approach like Nelson and Winter, felt challenged to revise the standard neoclassical assumptions in order to be able to break new ground and to provide an evolutionary interpretation of Schumpeterian competition and the resulting evolution of the markets.

Accordingly, the two further inputs which Nelson and Winter choose for their synthesis came from the organizational and behavioral theory of the firm as suggested by the Carnegie school (Simon 1949, March and Simon 1958, Cyert and March 1963) on the one hand and a loose analogy to the concept of natural selection on the other (Nelson and Winter 1980). This

¹ Perhaps not surprisingly, the results that could be obtained on such a basis were rather insignificant, see Kamien and Schwartz (1982, p.92).

combination was supposed to fill the gap which Schumpeter (1942) had left by arguing that the role of the entrepreneur as an innovator was taken over by corporate teams and departments while leaving open how these units actually operate and generate innovations. Following the notions of bounded rationality as developed by the Carnegie school, Nelson and Winter argued that organizations are based in their internal interactions on behavioral routines, rules of thumb, and regular interaction patterns. Production planning, calculation, price setting, and even the allocation of R&D funds all follow rule bound behavior. The -- evolutionary -- dynamics are added to this picture by means of a loose analogy to the concept of natural selection.

“Economic natural selection”, as Winter (1964) had called it, refers to biological analogies in the theory of the firm that were discussed in the beginning of the 1950s. The question raised there was to what extent diversity in the firms’ goals and performances would be eliminated by competition which may be supposed to drive all those forms out of the market that are not able to operate sufficiently profitably. Put more boldly: does optimizing behavior have a selection or survival advantage over other forms of firm behavior and is it thus possible to vindicate the neoclassical optimization approach? As was already pointed out in the early debate in the 1950s and was carefully explicated further by Winter (1964, 1971, 1975), the analogy implies more tacit presuppositions than its advocates seem to be aware of.² A naive use of the analogy would therefore be counterproductive.

However, Nelson and Winter (1982) nonetheless interpreted routines analogously to “genotypes” in the neo-Darwinian model of natural selection. Specific decisions derived on the basis of a firm’s routines were considered the analogue to “phenotypes”. The latter may be more or less favorable to the firm’s overall performance resulting in potential differences in profitability. Assuming that profitability differentials translate into growth differentials, and that routines successfully enhancing growth will not be changed, the actual expansion can be understood as an increase in relative frequency of the corresponding “genes”. Routines effecting a deteriorating firm performance, by contrast, are unlikely to disseminate. In fact, drawing on the satisficing hypothesis (March and Simon 1958, pp.47-52), it can be argued that a deteriorating performance triggers a search for improved routines, i.e. a kind of induced mutation.

Because of the complexity of the interaction between the routines at the different layers of the firm organization the method of analysis which Nelson, Winter, and Schuette (1976) designed to derive the implications of their assumptions is based on extensive simulation experiments. One of the most significant results which they thus obtained is that their approach supports the inverse rather than the original Schumpeter hypothesis concerning the relationship between market structure and innovativeness. According to the inverse hypothesis, the degree

² In order to judge to what extent all the preconditions on which the analogy depends are fulfilled, various possible behavioral patterns must be carefully explored under diverse possible environmental conditions. This is, of course, exactly what the recourse to the analogy tried to get rid of.

of concentration within an industry, pointing to a potential for monopolistic practices, is a consequence of, rather than a prerequisite for, a high rate of innovativeness in the industry. This result may not be surprising given the special assumptions underlying the simulations. However, what Nelson and Winter were able to demonstrate in this way was that their routine-based approach to the firm organization can provide a rationale for a Schumpeterian analysis of the evolution of markets, that is, for explaining what, more precisely, Schumpeter's "perennial gale of creative destruction" in the industries may mean.

With their basic interest in conceptualizing market evolution Nelson and Winter (1982, chap.5) find it useful to take a perspective on the internal working of firm organizations which focuses almost exclusively on the role of routines. This is the part they take over from the Carnegie school and develop further, and nobody can deny that, in doing so, Nelson and Winter address a significant feature of large, bureaucratic organizations. However, two problems arise here. One relates to the attempt to subsume "what is *regular and predictable* about business behavior ... under the heading 'routine'" (ibid., p.15), i.e. to an attempt to carry out a systematic analysis of what is going on inside firms exclusively in terms of the routines they employ. Routines refer to the form of interactions in the organization not the cognitive content, i.e. the intentions, conceptions, and conjectures playing a role in organizations. But, as will be argued below, intentions, conceptions, and conjectures are no less important for both the form and the performance of organizations. Indeed, many routines are deliberately designed around business conceptions. (What function else should management science have?) A strict separation between formal routine on the one hand and cognitive content on the other is therefore highly problematic.

Moreover, without acknowledging the fact that to conceive of, to implement, and to enforce cognitive content in the form of binding business conceptions are crucial inputs to the firm it is not possible to fully understand the role played by entrepreneurship within firm organizations.³ Business conceptions are an entrepreneurial achievement. They are needed to create and shape a firm. As such they may inspire the design of organizational routines, but they are not organizational routines themselves. In addition to the cognitive content informing the operation of firm organizations which is hard to come to grips with an exclusive focus on organizational routines there are also motivational or incentive problems which tend to be neglected by such a focus. What an entrepreneur conceives as desirable and what actually is realized in the operation of the firm organization including organizational routines may differ widely. Routines in the sense of Nelson and Winter imply recurring, multilaterally expected patterns of interactions between the firm members. Whenever the adoption and pursuit of routines involve potential incentive conflicts, e.g. the possibility of free riding or hold up, then the actually emerging routines may reflect a praxis that, to the disadvantage of the firm, suffers

³ It is, perhaps, not accidental that the role of the entrepreneur is literally absent in Nelson and Winter (1982) -- may be in line with Schumpeter's (1942) verdict of a declining relevance of pioneering entrepreneurs, though surely not in line with empirical evidence.

from these problems. Tendencies towards hold up and free riding are likely to elicit entrepreneur activities to control and fight them. Even though the counter measures may partly themselves result in the creation of organizational routines it is crucial for understanding the organizational change which they may imply as an intentional response to diagnosed incentive problems.

As will be submitted below, such problems depend on the size and age of an organization. Their systematically changing impact may give rise to an endogenously caused development of firm organizations which cannot be explained by exclusively relying on a selection mechanism. Indeed, the second problem related to Nelson and Winter's approach to the firm is the natural selection metaphor itself (which is the source of inspiration for the emphasis on organizational routines). "In our evolutionary theory, these routines play the role that genes play in biological evolutionary theory. They are a persistent feature of the organism and determine its possible behavior ...; they are heritable in the sense that tomorrow's organisms generated from today's ... have many of the same characteristics, and they are selectable in the sense that organisms with certain routines may do better than others, and, if so, their relative importance in the population (industry) is augmented over time" (ibid., p.14). As is well known, for selection to produce systematic change -- as Nelson and Winter of course imply -- there must be sufficient inertia both in the selection environment and in the objects on which selection forces work. In a turbulent, changing environment and/or with rapidly mutating gene pools selection has no time to work out.

In the domain of economics, selection forces result basically from market competition. The speed of replication of the economic equivalent to "organisms" would therefore have to be sufficiently high as compared to the pace of (exogenous) change in the markets. Moreover, the economic equivalent to the genes, i.e. the organizational routines, would have to be basically invariant during that time. However, the two condition together are rather unlikely to be satisfied at the same time. Firms have strong incentives to identify and replace or improve routines in a kind of intentionally produced mutation of their "genes", if they give rise to a deteriorating performance. It can be argued (as Nelson and Winter do) that such improvement or replacement activities are themselves subject to higher routines. The selection argument would then apply to the level of higher routines. Yet, such routines would have to operate on a much longer time scale in order to be able to assess and exchange lower organizational routines. In that case, the condition of an invariant market environment that would allow to discriminate between the higher routines is even harder to satisfy.⁴

⁴ In addition, the higher we get in the problem solving hierarchy of the firm, the more likely the actually produced solutions depend on the personal preferences, interpretations, skills, and experiences of the single involved decision makers rather than on the routines themselves (if there are any). Where this is the case, the differential success of the triggered problem solving process cannot be attributed to the higher routines. Different people involved in the same higher routines at different times may induce strongly differing developments so that selection cannot produce any systematic results.

From the point of view of market evolution, the appeal of Nelson and Winter's approach is that it allows to simultaneously trace out the process of change in firm organizations and their market by focusing on the selection driven modification of the pool of routines of the entire market population of firms. This has elegantly been demonstrated by Metcalfe (1994). However, the firms' attempts to anticipate the effects of the market forces by a kind of 'internal' selection process are difficult to account for in such an approach. Internal selection is based on hypothesis formation and learning from insight and, therefore, refer to the cognitive content informing the firms' behavior. Cognitive processes are likely to produce adaptations which follow their own regularities. Emerging from a limited human information processing capacity -- which means that people are forced to be selective in what they sense, learn, and perceive -- the regularities reflect mental selection processes which in both, their dynamics and their outcome, do not necessarily equal genetic selection processes. The question may therefore be raised how the evolutionary paradigm can be enriched and enlarged to account for, and to be able to explain, cognitively induced features of a development that regularly takes place within firm organizations over time. An exploration of this question requires to shift the heuristic focus from the level of (Schumpeterian) evolution of the markets to the level of the development of firms as discussed in the next section.

III. The Developmental Approach to the Firm

In the debate in the 1950s on biological analogies in economics, and in the theory of the firm in particular, excellently summarized and extended in Winter (1964), one of the most explicit critics of such analogies was Edith Penrose (1952, 1953). At that time she was engaged in a research project which, under the guidance of Fritz Machlup, focused on the growth of firms (see Penrose and Pitelis 1999), a problem she found logically prior to, yet neglected by, the standard theory of the optimal firm size. The project eventually led to her formulation of a theory of the growth of the firm in Penrose (1959). The core idea of her theory is that the growth of firms is a process of endogenous change which is driven by learning and growing managerial experience on the one hand and the entrepreneurial figuring out of, and gaining experience with, the firm's "set of productive opportunities" on the other hand. In her book she introduces basic assumptions such as bounded rationality, limited but growing knowledge and capabilities, process rather than equilibrium orientation, etc. which later became characteristic for the evolutionary approach to endogenous change in the economy. Unlike that approach, however, she tried to conceptualize the endogenous changes within the firm as "a process of development" (Penrose 1959, p.1).

The developmental nature of her theory, and the special meaning she attributed to development, need to be taken seriously.⁵ What she had in mind is "development, akin to

⁵ This is often overlooked and, presumably, explains why Penrose's work is sometimes considered seminal to the resource-based view of the firm in strategic management, a view

natural biological processes in which an interactive series of internal changes leads to increases in size accompanied by changes in the characteristics of the growing object” (ibid.). Perhaps because of her earlier rejection of biological analogies she did not explicate in more detail that those “biological processes” are the ontogenetic development of the individual exemplar of a species, i.e. the unfolding of an organism from its procreation to its dying off. This is a level of analogy quite different from the one in evolutionary economics which try to explain endogenous change within the firm as produced exclusively by variation and selection.⁶ What empirical phenomena in nature do the two different levels of analogy refer to?

The ontogeny of living organisms is an irreversible, for each individual regularly reproduced systematic unfolding of its organism. It can be described as a succession of different morphological stages and transitions between them from the beginning of the organic entity to its end. In its repetitiveness ontogenetic development is very regular, even chronologically. It not only results in a quantitative growth of an organism, but also in qualitative changes of its structure, sometimes stunningly complex ones going far beyond a simple scheme of growth, stagnation, and decline. A striking example is the butterfly which undergoes a complete metamorphosis during its ontogeny which comprises of the four much different morphological stages egg, larva, pupa, and adult. As an expression of the genetic program of the individual organism, ontogenetic processes take place on the level of the individual, subject to the particular environmental conditions. In contrast, the phylogenetic process of the evolution of the species by means of natural selection operates on the gene pool, i.e. on the level of the population.

From this ontological difference follow some methodological differences in dealing with ontogenetic and phylogenetic phenomena. The orderly nature of the successively occurring morphological features during ontogenetic development suggests the use of typological methods. Ontogenetic processes are therefore often described in terms of the various stages of development a “representative” exemplars of a species runs through. The explanation of the development is fairly involved. Besides physiological laws phylogenetic hypotheses about the

actually not assigning much significance to the very phenomenon of development, see Foss (1999).

⁶ Perhaps indicative of the difference is the fact that, for example, Nelson and Winter (1982, p. 36) refer to Penrose only once and without mentioning her particular way of conceptualizing the endogenous process of change within the firm. Incidentally, her move to an analogy at the ontogenetic level contrasts remarkably with the route that was taken by Winter. In his dissertation Winter (1964) had been equally critical of the analogy to natural selection as Penrose had been earlier. Yet in Winter (1971) a loose version of precisely that analogy was introduced which later became characteristic of Nelson and Winter’s “evolutionary” approach as discussed in the previous section.

adaptive value of a species' particular ontogenetic development under the typical environmental conditions of its habitat usually also play a role. Phylogenetic processes, by contrast, deal with a potentially systematically changing frequency distribution of genetic traits in the population. Different from thinking in terms of representative exemplars the analysis of phylogenetic processes, thus, requires "population-thinking", i.e. methods accounting for the existence of genetic variety on which selection forces operate.

In view of the problems of analogies to natural selection (phylogenetic processes) briefly addressed in the previous section the question arises whether anything can be gained by drawing on an analogy to ontogenetic processes. There are obvious differences between ontogenetic processes in nature on the one side and the processes of change occurring inside the firm during its life span on the other. First, there is no direct equivalent in the development of firm organizations to the evident, morphologically defined stages in the development of a living organism. This implies that it can be expected to be more difficult and more controversial -- if possible at all -- to identify regularities in the development of firm organizations in general, and successions of regular states in particular. Correspondingly, an adequate typology, is less easily identified and agreed upon. Second, unlike in nature where the ontogeny of the single organism is a complex genetically controlled physiological procedure with usually remarkable little variance in its timing, the development of a firm organization hinges on a large number of contingencies with an unpredictable time scale. These contingencies have many sources.⁷

Fully recognizing all these differences, Penrose (1959) did not return later in her book to the analogy which she initially alluded to. Given her focus on the growth of the firm she portrayed development as an unfolding of the organizational concomitants of a growing business. The unfolding is contingent on all the prerequisites which have to be met for growth to become feasible for the firm. However, the organizational unfolding is regular in several respects: in its contingencies, in the sequence of stages it runs through, and in its limitations (not with respect to the ultimate size of the firm but in regard to its rate of growth).⁸

⁷ One source is the variance of capabilities, aspirations and preferences of the members of the firm organization; another one is historical path-dependency, i.e. the particular record of the preceding interactions and outcomes within the organization and the attitudes and aspirations created in it; a third source of contingencies is the sequence of events in the markets in which the firms operate and with which they co-evolve; a fourth one may simply be good or bad luck in the timing of activities; the list could be continued.

⁸ The problem of how to define the firm as a unit of analysis is non-trivial (see the extensive discussion of this point in Penrose 1959, chap. II) -- not only, but in a particularly significant form, in a theory presupposing systematic changes of the firm. On the other hand, the focus on the historical order of organizational transformations which is suggested by a developmental approach may at least assure to keep track of *some* continuity. Thus, continuity may be identified on the personal, organizational, legal, or the ownership level, and this may

The major contingency are the managerial capabilities that can be made available to cover the firm's requirements in its different stages of expansion -- incentive problems and motivational conflicts assumed to be absent (Penrose 1959, chap. III-V). Since managerial capabilities and the knowledge of the other resources of the firm are considered a kind of experience good, managerial resources need to be educated to a significant extent inside the firm, something that takes time and therefore limits the expansion the firm can manage, and, hence, its rate of growth, at any point in time. On the other side, precisely because managerial services are an experience good, learning effects can be realized over time in new tasks. Eventually, these learning effects make available again for further expansion much of the managerial resources that had temporarily been bound in pursuing those task.

The regularities in the stages the firm organization runs through, if it expands, result from the changing entrepreneurial perceptions which the firm's management has of its set of opportunities for investment and growth. The changing perceptions, in turn, are due to a cumulatively growing collective awareness of additional prospects that can be pursued with the productive resources and the knowledge the firm has accumulated before. The regularities that follow are the organizational changes accompanying the process of entering, or even creating in the first place, new markets by way of diversification -- often accompanied by acquisition and merger -- the more competitive and, thus, the less profitable the business in the markets for its existing products and services become (*ibid.*, chap. VII-IX).

Although Penrose's theory of the growth of the firm is not drawing on an analogy to ontogenetic processes in nature, her approach clearly presupposes that the firms' development has regular features. Indeed, if firms do not stagnate altogether, and if their development is not all the times entirely erratic, then some regularities of organizational change should exist. By adopting a suitable theoretical perspective it should be possible to identify them. An ontogenetic analogy would in addition require these regularities to imply a succession of developmental stages which can be captured by a properly designed typology of organizational states. Since an evident physical morphology of organizations is absent, both the identification of successive features of organizational development and the construction of a suitable typology are major obstacles to an ontogenetic analogy. If at all feasible, both are bound to demand more idealizations and abstractions, and may themselves be more theory-laden (i.e. depending on what kind hypotheses are invoked), than in the case of the biological analogue.

However, there are theoretical reasons pointing to a succession of organizational stages in the contingent development of firms which justify to pursue the analogy a little further (even though, at the end of the day, this analogy will also turn out to be limited). Penrose's developmental approach can be extended. In order to do so more explicit hypotheses on the cognitive foundations of firm organizations and the related potential for motivational conflicts

allow to still speak of the same unit of analysis.

and incentive problems are necessary. On such a basis, it will be shown to be possible to explain why "... an interactive series of internal changes leads to increases in size accompanied by changes in the characteristics of the growing object" -- namely increases in organization size accompanied by a systematically successively changing organization structure. To prepare the ground the next section discusses in more detail the cognitive background and its implications for organizational change.

IV. Some Cognitive Foundations

The theoretical perspective which will be chosen here to bring out regularities of organizational change focuses on the cognitive underpinnings of firm organizations which, as will turn out, are tightly intertwined with motivational problems. The intention is to make a level of coordination problems visible which is often neglected because of perfect (and, hence, for all equal) information assumptions or because of the strict separation between assumptions on (e.g. asymmetric) information on the one hand and assumptions on individual motivation on the other hand. A multi-person firm is a way of organizing the division of labor. Much as in the case of the division of labor via markets, such a firm has to rely on knowledge dispersed among several agents. Those agents must be motivated to undertake the physical and mental efforts by which they acquire, improve, and apply their individual knowledge to contribute to the objectives of the firm and the particular way by which they are pursued, in short, to contribute to the firm's 'mission'. Moreover, all the individual efforts must be coordinated.

A first and non-trivial problem that arises to that coordination problem is to make sure that all organization members are informed about, and by and large agree upon, the purpose of their activity within the broader frame of the firm's mission. In this context it is useful to recall that any division of labor, be it market based or firm based, has its origin in a venture undertaken by someone or some people. Such a venture rests on an idea of how to (re-)organize work, an idea which initially may not be more than just a more or less speculative imagining. To develop the respective ideas and to undertake efforts to seeing them through is a crucial, entrepreneurial, input in organizing the division of labor. While many of these ideas may be achieved exclusively by means of market transactions there are also more involved ideas which an entrepreneur is unable to realize by her/himself exclusively on the basis of standard market contracts. These ideas lead to the creation, or substantial extension, of firm organizations. Such ideas on organizing the division of labor will be called 'business conceptions' here. They represent the entrepreneur's image of the mission of a firm organization, i.e. of what business to do, and how to do it, with the staff hired for to pursue that mission.⁹

⁹ For the sake of the argument that focuses on the role of cognitive factors in firm organizations, all considerations relating to formal aspects, in particular the legal structure and the ownership in the assets of the organization, will be suppressed. Thus, it will be left open whether the firm organization is a legally independent unit or a part of a larger organization. It

If to convey a business conception would simply be a matter of telling each organization member about the general business and the particular action to be taken by each individual, then the coordination problem would seem easy to solve for an entrepreneur. Moreover, if assigning tasks to organization members would leave no room to the level of effort taken by the members to pursue the assigned tasks, then no motivation problem (and motivational hazard) would ever put strain on a business. However, both is not real, nominal instructions by which everything is fixed are not feasible. Bounded rationality prevents the entrepreneur from anticipating in her/his imaginings all activities unfolding into the future. In addition, the evolution of the markets is always good for causing all sorts of unforeseen changes. In each single task assigned in organizing the division of labor within a firm problems and complications can therefore pop up. If every unforeseen deviation from nominal instructions would in all detail have to be communicated to the entrepreneur in order to determine the proper response, the firm organization would virtually stifle. For this reason, in an evolving market environment, organizing the division of labor within a firm organization always has the connotations of a division of problem solving. Under these circumstances, a business conception (by which the entrepreneur tries to convey her/his image of how the problems should be solved) can, at best, be a sound cognitive frame to be adopted by the employees for their own action.

Cognitive frames channel selective information processing and control the access to memory on an associative basis. Since the limited mental operating capacity allows for only one cognitive frame to be used at any point of time, this also means that, while in use, such a frame cannot itself at the same time be made the object of cognitive reflection. Constrainedness and selectivity also apply to the capacity of imagining and reflecting on alternatives for action. Some particular courses of action, rather than others that could in principle be imagined, are conceived and thought through more or less carefully.¹⁰ This condition is important in several respects for understanding the cognitive underpinnings of firm organizations.

First, an entrepreneur creates a firm organization to accomplish her/his business conception by drawing on individual knowledge dispersed among the employees' and on their work efforts. This intention is the better served, the better the decisions which the firm members make within their respective area of discretion fit the entrepreneur's business conception, i.e. the entrepreneur's interpretation of what the business is all about and how it is to be undertaken. Since each firm member operates on the basis of an individual cognitive frame, dispersed knowledge and individual endeavor would be concerted most effectively, if all firm members were to share the entrepreneurial business conception as their own cognitive frame. The rather

is also left open whether the entrepreneur is self-employed or an employed manager. The only assumption required here is that of a sole entrepreneur with full discretion in determining the organization's mission.

¹⁰ For a comprehensive summary see Anderson (1990, Chap. 3). Different cognitive tasks can, of course, be pursued on the basis of different frames at different times.

unspecific nature of the shared business conception would leave room in the employee's situational problem solving for making use of her/his individual knowledge and for accounting for the special conditions of the singular case.

Second, from the motivational point of view it makes a great difference if people adopt the attitude of contributing to a common goal. Their task perception tends to be framed in a way so that their attention is devoted more to solving problems in the interest of the firm's goals than to pursuing private short run inclinations and separate interests. Conversely, it may be concluded that the level of individual effort (which is particularly difficult to observe in problem solving behavior) may suffer, if there are rivaling business conceptions pursued within the firm, or if all firm members follow just an opportunistic conception of extracting some form of short-run rents for themselves. From the point of view of bounded rationality, the possibility of concerting individual motivation and dispersed knowledge on the basis of a socially shared cognitive frame thus is a crucial part of what makes the firm organization an attractive alternative to the market mechanism. It also appears, however, that an entrepreneurial conception can only foster an efficient division of labor within the firm, i.e. organizational coherence, and a successful firm performance, if it is uncontested within the firm organization. To achieve this, the entrepreneur's conception must be communicated to, and adopted by, the firm members in the first place. This is not a trivial task.

No one can be induced to adopt a cognitive frame simply by order. Consequently, for the entrepreneur's business conceptions and suitable models of behavior to be adopted by the members of a firm organization it is not sufficient to give instructions or to devise organizational and administrative routines. Rather, the social formation of individual cognitive frames follows its own regularities.¹¹ Communication with, and observation of, other agents are a prominent source of information, a major factor in attracting attention, and an important instance of learning. The more intense and lasting communication and observational learning are, the more likely the involved agents tend to develop collectively shared interpretation patterns as well as common tacit knowledge of facts, hypotheses, practices, and skills. In part, these cognitive commonalities result from the fact that, in intensely communicating groups, the agents' selective information processing is occupied with much the same topics which, in a sense, are processed in parallel while for other topics there is simply no attention left. In part, collectively shared interpretative frames emerge in an intuitive way from mutual observational learning.

Observational learning is also behind the formation of social models of how to behave which are characteristic for a group. Within a group of regularly interacting individuals certain patterns of behavior prevail. Conformity to, as well as deviation from, these patterns can be observed by the group members. Since the members focus on much the same, limited, set of

¹¹ This aspect has been widely neglected in the literature on bounded rationality. The present approach relies here on Albert Bandura's social cognitive learning theory (Bandura 1986).

behavioral patterns, these tend to become socially shared models of behavior. Often they are reinforced by giving them some normative connotations as a 'shining example' (or as its opposite). If a firm organization, or some of its divisions, forms an intensely interacting group, there may thus be commonalities in the conceptions adopted by the firm members and in the alternatives of action which they selectively recognize as being feasible (and, of course, those that they disregard). Moreover, as a consequence of intense and lasting communication, the firm members may share some common standards of conduct exemplified by socially shared models of behavior. The work motivation of the agents in the firm heavily depends on the nature of those models.¹²

From the motivational point of view, the question of what kind of social model of behavior or rule of conduct prevails in the firm organization is thus consequential. For the entrepreneur it would be desirable to be able to control what kind of behavior emerges as a social model. However, under observational learning this is difficult to achieve. Since in small groups the consequences of the other members' behavior can easily be grasped by everyone without requiring the effort and costs of own experimentation, any attempt to challenge established social model for whatever reasons acquires the status of a vicarious experiment (Bandura 1986, Chap. 7). The observed vicarious success or failure of the deviating behavior immediately conveys whether advantages or disadvantages can be realized when imitating that behavior. Accordingly, under observational learning, deviating behavior may pose a serious challenge to a prevailing social model of behavior. Within firm organizations the employees may thus be induced to recognize previously unconsidered extensions of their choice set. If a newly tried way of behaving is observed as being successful this weakens the socially approved standard of conduct and may induce a re-framing of action knowledge which can lead to corresponding behavior adjustments.

It is by no means granted, therefore, that an entrepreneur succeeds in making the employees adopt her/his business conception and the social models of behavior that would be conducive to it. Because of her/his formal power over the firm organization the entrepreneurs may be able to determine the structure and the agenda of formal communications not, however, the agenda of informal communication spontaneously taking place every day. On the informal level, entrepreneurial conceptions and social models may well be contested by rival cognitive frames and social models. Failure to prevent them from tacitly taking the lead in the firm's informal communication can have far-reaching consequences for organizational coherence and, hence, for the firm's performance.

Whether or not the entrepreneur is able to take the lead and to succeed in shaping the informal communications and/or in defending the prevalence of her/his business conception

¹² As is well known from social psychology, social models which emphasize task commitment, cooperative problem solving, fairness, and frankness help keep intra group frictions and individual frustrations down (see, e.g., Paulus 1989).

against potential contestants may therefore be decisive for the further fate of the business. In the struggle for maintaining cognitive leadership (as it has been called in Witt 1998a) particular social skills like communicativeness, persuasiveness, and persistence, as well as fairness, credibility, appreciativeness are relevant. But the intrinsic features of business conceptions are also important. If a conception is too complex and sophisticated, it lacks soundness and appeal, not the least in terms of career options, remuneration, qualification enhancement, and working conditions for the employees. If it is obviously unsuited for the imagined business, it is difficult to make employees adopt it. In general, cognitive frames that do not work well in making sense of information coming from the environment are prone to be modified or replaced if they ever are adopted -- an instance of cognitive learning from which entrepreneurial conceptions are not excepted.

V. Developmental Regularities Implied by Cognitive and Motivational Problems

In the previous section, the closely intertwined cognitive and motivational problems underlying a firm organization were briefly outlined. With respect to both problems a central role was attributed to the entrepreneur: as the key figure in conceiving a particular business venture as an organized extension of the division of labor; and as a key figure in motivating the organization and seeing through the business conception in the actual operations of the firm. It was claimed that the performance of the entrepreneur with respect to those problems, i.e. the quality of the entrepreneurial inputs, affects the performance of the entire organization in a substantial way. This has an important conceptual implication to be explained in this section. An analysis of the various contingencies in the interactions between entrepreneurial inputs, firm performance, and systematic changes in the firm organization suggests a developmental approach, an idea also suggested in Langlois (1992). Indeed, these interactions even induce some broad regularities from which a theory of the -- contingent -- development of firms can be derived.

In a developmental perspective, a natural starting point for the analysis is the case of a newly founded firm with few employees. For the moment, ownership, legal structure, and status of the entrepreneur may again be left open. Besides *situational factors* like opportunities, competitive situation, etc. which exert an influence, the performance of the firm has been argued to hinge on the intrinsic features of the underlying entrepreneurial business conception and the social skills of the entrepreneur, i.e. the *quality of the entrepreneurial inputs*. The firm's performance may, or may not, generate the potential for a growing business. Let us assume that the firm indeed grows in terms of the scale and/or scope of its operations.¹³ In that case some developmental regularities can be argued to emerge from the interactions between the variables involved (set in italics) with a logical structure as in the scheme of Figure 1. As a consequence of expanding operations economies of scale and scope may be realized, a less competitive

¹³ Even if no growth potential is generated, or if there is no growth for other reasons, a special form of contingent development can occur as discussed below.

market position may be reached, access to capital markets may be eased, and further *size-dependent factors* may have a favorable effect on the *performance of the firm* (see Chandler 1990, chap.2). Sooner or later a growth of the business leads to an *expansion of the firm organization* in terms of the number of staff employed. Once this happens the question is whether the quality of the entrepreneurial inputs will be affected by the expansion of the firm organization and, if so, in which way. As expressed by the dashed line in the scheme, a more elaborate hypothesis is needed at this point which, in turn, points to a major contingency in the further development of the firm, namely the possibility of an induced reorganization.

 Figure 1 about here

Figure 1 Logical Structure of the Developmental Regularities Induced by Firm Growth

In view of the cognitive and motivational underpinnings of the firm organization discussed in the previous section the working hypothesis is:

Hypothesis 1: If a high quality of entrepreneurial inputs is provided, an expansion of the firm organization beyond a critical size of the staff starts to impede the quality of the entrepreneurial inputs. The critical size of staff depends, among other things, on the personal characteristics of the entrepreneur.

The systematic feature highlighted in hypothesis 1 is rooted in the strain that an ever increasing size of staff puts on the entrepreneur's capacity. To exert cognitive leadership, to master the social learning processes, and to coordinate the firm members on her/his business conception requires a certain frequency of face-to-face interactions between entrepreneur and the other firm members. With a growing number of firm members both time for, and intensity of, these face-to-face interactions is likely to decrease because of a mere time constraint. Even the most skilled entrepreneur has to face an upper bound where a further reduction in personal interaction frequency prevents her/him from maintaining the influence on the informal agenda previously achieved.

What happens after the critical size of staff is exceeded? With no other measures been taken the further expansion of the organization is ever more likely to prevent the entrepreneur from upholding her/his business conception, and some supportive social models of behavior, as the prevailing cognitive regime among the member of the firm organization. Other conceptions can disseminate. The employees tend to switch to cognitive frames and corresponding social models of behavior which can rival with the entrepreneurial business conception or invite opportunistic reflections. Attention is drawn to figuring out how they can take advantage of the

unspecified nature of the employment contract by pursuing their own, separate interests. Work effort tends to go down. As a consequence of all this, the firm organization is likely to perform in a significantly less efficient and coherent way. Profitability is negatively affected, as is the potential for further growth. A critical stage like this is particularly sensible in, and often reported for, start-up firms with a founder-entrepreneur which come to ages. Facing a situation like that the entrepreneur may be induced to think about some form of reorganization to fight the increasing disorientation and declining work motivation. Indeed, next to doing nothing and facing the threat of stagnation or even decline in the business there are several typical reorganization options that can be tried. Two of them may be discussed here exemplarily to point out the further developmental regularities to which they give rise.¹⁴

A first reorganization option is a substitution of the fading regime of cognitive leadership with its organizational culture of loose hierarchical ties and its (also fading) high intrinsic work motivation. An attempt can be made to counter the tendency towards incoherence, inefficiency, and declining work effort by introducing a monitoring regime in running the firm organization. This would mean to tightly control and regulate the activities of the firm members much as described (as the regular case) by Alchian and Demsetz (1972). Note that a monitoring regime can be tried by an entrepreneur from the very beginning of a business venture without ever attempting to gain cognitive leadership, e.g. because of a self-assessed lack of corresponding skills. A monitoring regime may also be tried where already in the very beginning of the firm a regime of cognitive leadership fails because of an insufficient quality of the entrepreneurial inputs. However, there is always a high price to running an organization on the basis of a monitoring regime (Witt 1998a). Monitoring curbs individual creativity and the intrinsic motivation in problem solving (see Williams and Yang 1999). Furthermore, coordination through detailed directions, regulations, authorization, and tight control causes frictions and is slow and costly in terms of time resources.¹⁵

The second reorganization option for saving a cognitive leadership regime is a subdivision of entrepreneurship by creating organizational divisions with own result responsibility. In this way, the fading motivational basis can be restored *and* a sufficient degree of cognitive coherence be maintained for the entire corporation be maintained only if several conditions are met. A trivial condition is that the quality of the entrepreneurial inputs which the employed

¹⁴ Yet another possibility is, of course, the withdrawal of the entrepreneur. Particularly in the case of an owner-entrepreneur there may be a temptation to put up the firm for sale and to ‘cash in’ on the efforts of building up and expanding a business once the organization has grown to a size where the entrepreneur’s capacity to exert cognitive leadership is exceeded.

¹⁵ The larger the firm, the more these negative effects tends to lower its efficiency. Administrative costs increase more than proportionately as monitoring becomes a matter of hierarchical control, and the well known “managerial dis-economies of scale” (Mueller 1972) result.

entrepreneurs can provide must be sufficient. Less trivial is that it must be possible to single out organizational divisions (or to found entirely new ones as partial substitutes for the existing organization) in a functionally acceptable way for which employed entrepreneurs can be given responsibility. Since the organizational restructuring of the firm means that employed entrepreneurs obtain resources for use at their own discretion within the divisions of the firm organization not only separate domains of responsibility must be created but also corresponding reward schemes. The latter point to the fact that the closely intertwined cognitive and motivational problems identified previously recur in the interactions between the employed entrepreneurs in the divisions and the entrepreneur responsible for the corporate level.

This implies as yet another condition that the employed entrepreneurs in the divisions can be coordinated on, and motivated for, an overarching business conception for the entire corporation by cognitive leadership on the part of the corporate entrepreneur. Otherwise it is hard to make sure that the employed entrepreneurs are induced to create a business conception for their divisions consistent with the corporate conception.¹⁶ Given the considerations in section IV, the measures by which the problem of cognitive coherence among the employed entrepreneurs in a corporation can be expected to be overcome are again intense communication and social interaction -- now within the group of entrepreneurs. As in other groups, observational learning may then give rise to socially shared cognitive frames and models of behavior.¹⁷ In a non-hierarchical group of entrepreneurial peers this process and its outcome may be entirely spontaneous. Where there is a superior entrepreneur who employs subordinate entrepreneurs, it is again important for her/him to succeed in shaping communications within the entrepreneurial group in a way that is advantageous to the propagation of the overarching business conception. Here as well, the business conception and the desired social models are vulnerable to the invasion by rival frames and models. Failure to prevent such an invasion in the communication and interactions in the entrepreneurial group can have far-reaching consequences, not only for organizational coherence and for the firm's performance as discussed before, but also for the firm's staff continuity.¹⁸

¹⁶ Taken together these conditions amount to a sub-division of entrepreneurship in which the provision of cognitive -- or strategic -- orientation (on what to do) increases with the level of hierarchy while motivational leadership (on how well to do it) is equally called for on each level.

¹⁷ Sub-entrepreneurs who have been socialized within the firm organization are more easy to integrate than entrepreneurial personnel hired from outside. This does not necessarily imply, however, that the availability of such personnel inside the firm constitutes a bottleneck to reorganizations necessary for the further growth of the firm as perceived by Penrose (1959, chap. IV).

¹⁸ Less integrated sub-entrepreneurs may increasingly re-direct their attention to the possibility of breaking away and starting a business on their own account. If they do so, a fissioning phenomenon may be triggered, as has often been observed, particularly in highly

With the exemplary inspection of a few possibilities of reorganization in the scheme of Figure 1 it becomes apparent that the number of regularities in the development of firms -- and the contingencies on which they depend -- increases substantially. If nonetheless a summary is tried, one should at least refer to two limiting cases in the development of firms with all sorts of intermediate cases that are easy to imagine. The one results from a reorganization able to improve the quality of entrepreneurial inputs by subdividing entrepreneurship within the firm. In view of the conditions discussed that have to be met to achieve such a development, it is perhaps not surprising that a sustained growth and further expansion of the firm organization along this route up to the size of very large corporations is a rather rare case. The other limiting case results for the development of firms if all the demanding prerequisites of a successful subdivision of entrepreneurship cannot be met and the firm attempts to restructure according to monitoring regime. Indeed, this is the more likely to happen, the larger the firm grows and the more mature it becomes. Even tight control notwithstanding inconsistent, or even rivaling, conceptions are likely to gain influence at all levels of the organization. Opportunism disseminates and attenuates efficiency. If, due to the size of the firm already attained, economies of scale and/or scope can be realized this may for a while (over-) compensate efficiency losses. However, even in such favorable cases tight monitoring is prone to stifle the creation of new business opportunities and their pursuit is likely to be hampered by bureaucratic procedures. Sooner or later the firm is falling back in innovativeness and tends to lose market shares to more innovative, entrepreneurial competitors. Eventually, this results in stagnation and decline.

VI. Successions of Organizational Stages - An Exemplary Analysis

What remains to be done now in a developmental approach to the firm is explore how the idea of regular successions of organizational stages, which is constitutive for an analogy to ontogenetic processes, can be expressed more formally.¹⁹ A ‘morphology’ of organizational stages has been derived above on the basis of the theory dealing with the cognitive coordination and motivation problems emerging in firm organizations. In this sense, the developmental approach presented here is in an essential way a cognitive one. Some auxiliary hypotheses on developmental regularities, more precisely on the contingent transitions between organizational stages still have to be derived in order for regular successions of those stages to be derived.²⁰

innovative industries (cf. Ziegler 1985). Departing entrepreneurs usually try to attract other employees of their old firm to their newly founded business in order to capture for themselves some of the otherwise non-transferable resources (capabilities) they have helped to internally accumulate in their old firms.

¹⁹ This section draws on material elaborated in more detail in Witt (1998b).

²⁰ Due to the contingencies, firms may not only differ significantly with respect to how far in a prototypic development they get, but also with respect to how long time they remain in certain stages of that development. A theory of the ‘ontogeny’ of firm organizations can

The analysis will be confined here to an exemplary representation of developmental processes. To avoid tedious enumeration, we will deal in this section only with the organizational stages of a single firm unit and, hence, ignore the ramifications implied by a possible sub-division of the firm as considered in the previous section. The quickly increasing number of possible successions of stages including that reorganization (and, *a fortiori*, reorganizations including also mergers and acquisitions) can easily be traced out, it is claimed, in a similar fashion, though this goes beyond what can be done in this paper.

In the preceding sections a key role in the developmental interpretation of changes in the firm organizations has been given to the entrepreneur. It has been argued that the choice of organizational regimes, he may be striving for in the firm, a cognitive leadership regime or monitoring regime, are basically at her/his discretion, though the success or failure of her/his endeavor is a collective outcome of the organizational interactions. Indeed, under the just imposed restriction of the analysis to a single firm unit, the contingent ontogeny of the firm organization can be seen as passing through a morphological space exclusively formed by these entrepreneurial regimes on the one hand and the factors leading to their success or failure on the other hand. Thus, the morphologic space is given by the organizational stages “cognitive leadership regime” L and “monitoring regime” M on the one side, and “defeat in leadership” D and “incompetence in monitoring” I on the other. The performance of the firm then hinges on what stage is actually attained which, in turn, can induce growth, stagnation, or decline of the firm over time.

The initial entrepreneurial choice between striving for cognitive leadership or for a monitoring regime can be interpreted as a fairly conventional decision problem. After that decision has been made, ontogeny then ‘chooses’ between success and failure. The performance of the firm is expressed in the profits $\Pi(L)$, $\Pi(D)$, $\Pi(M)$, and $\Pi(I)$ respectively.²¹ To add some flesh to the bones let us assume an order relation on the profits as given by

$$(1) \quad \Pi(L) > \Pi(M) > \Pi(D) \geq \Pi(I) \quad \text{and} \quad \Pi(I) \leq 0, \Pi(D) \geq 0, \text{ and } \Pi(L), \Pi(M) > 0. \quad ^{22}$$

therefore at best be expected to provide predictions about potential further steps in the future development and their contingencies, but surely not on their time scale.

²¹ Success and failure may be considered the two limiting cases defining a scale of more or less successful implementation either of cognitive leadership or of governance. An intermediate result may then be thought of as a convex combination of the respective two profits. However, for notational convenience the intermediate cases will not be considered further here. In order to be precise it should be noted that the $\Pi(\cdot)$ represent long term averages.

²² Relation (1) is motivated as follows. Both a cognitive leadership regime and an effective monitoring regime are efficient but, it is claimed, the former is more efficient, if it succeeds, than the latter. Thus $\Pi(L) > \Pi(M)$. If the entrepreneur’s business conception fails to prevail, (s)he is defeated in the struggle for cognitive leadership and rival conceptions and opportunism

Now consider the emergence of the different organizational stages in more detail. In the entrepreneur's act of founding the firm organization the choice between striving for cognitive leadership or for a monitoring regime must be based on the entrepreneur's subjective imaginings of the business unfolding into the future. For ease of exposition, let us interpret the subjective imaginings of the profit opportunities as an unbiased estimate of the present values of the respective stream of profits over the entrepreneur's perceived time horizon as envisioned by her/him before founding the firm. Denoting the present values as $\Pi^-(L)$, $\Pi^-(D)$, $\Pi^-(M)$, and $\Pi^-(I)$ they are supposed to satisfy an order relation analogously to (1). Since success is uncertain, the entrepreneur is assumed to also have subjective estimates of her/his chances of succeeding if (s)he start the firm which, however, may turn out to be wrong. These estimates reflect a self-assessment of the own social skills and the intrinsic quality of the business conception in the case of the cognitive leadership regime and of the own monitoring capacity in the case of the monitoring regime. If social skills and/or the business conception are rated highly, this leads to a comparatively higher estimate of the probability of succeeding with cognitive leadership and vice versa.

Denote the subjective estimates of a success by p_l and p_m respectively. The expected profit of cognitive leadership $E(\Pi_l)$ can then be written as

$$(2) \quad E(\Pi_l) = p_l \Pi^-(L) + (1 - p_l) \Pi^-(D)$$

and the expected profit of monitoring as

$$(3) \quad E(\Pi_m) = p_m \Pi^-(M) + (1 - p_m) \Pi^-(I) .$$

Setting eqs. (2) and (3) equal and solving for p_l , a straight forward decision rule is:

Hypothesis 2: The entrepreneur chooses to strive for cognitive leadership as long as (s)he rates her/his social skills and the intrinsic quality of the business conception such that

$$(4) \quad p_l \geq a p_g + c,$$

where $a = [\Pi^-(M) - \Pi^-(I)] / [\Pi^-(L) - \Pi^-(D)] > 0$ and $c = [\Pi^-(I) - \Pi^-(D)] / [\Pi^-(L) - \Pi^-(D)]$.

crop up. Organizational coherence, coordination, work effort and, in the end, profitability deteriorate. $\Pi(D)$ does not necessarily become negative but, it is submitted here, it is inferior to the outcome of a successful monitoring regime: $\Pi(M) > \Pi(D)$. When, as a result of incompetence on the part of the entrepreneur, the attempt to implement a monitoring regime fails, the employees' performance gets uncontrollable. Depending on their reaction to the mixture of bureaucratic directions and incompetence, an opportunistic, perhaps even destructive, attitude may spread out in the organization and positive profits are difficult to imagine. Accordingly, $\Pi(M) > \Pi(I)$ and $\Pi(D) \geq \Pi(I) \leq 0$.

$\Pi(\neg(D)) \leq 0$ are probability weights appropriately reflecting the profit ratio.²³
 Otherwise the entrepreneur strives for a monitoring regime.

In contrast to the conventional choice-theoretic calculus underlying hypothesis 2, the factors leading to success or failure -- and, hence, the actually resulting initial organizational stage of the firm -- are more complex. After personnel has been hired the entrepreneur's further fate becomes a matter of daily struggle for cognitive leadership or for keeping control of the bureaucracy. As explained in section IV, whether the entrepreneur succeeds or fails depends on the social learning process within the organization which emerges spontaneously from the interactions of all firm members. As a result of collective learning the employees' attitudes are not subject to deliberate choice. (Yet cognitive attitudes determine the set of perceived alternatives on which choices can then be made.) Hence, if the entrepreneur strives for cognitive leadership, success or failure (and the duration of the respective outcome) hinge on the actually demonstrated quality of the entrepreneurial inputs. Likewise, if monitoring has been tried, success or failure (and the duration of the respective outcome) hinge on whether, and how long, the entrepreneur is in fact able to exert control of the bureaucracy.

The initially realized organizational stages is

- L if the entrepreneur's self-assessment is favorable and her/his skills and/or the business conception are indeed strong;
- D if the entrepreneur's self-assessment is favorable, but her/his skills and/or the business conception turn out to be weak;
- M if her/his self-assessment is not favorable, but the entrepreneur is able to keep control of the bureaucracy;
- I if her/his self-assessment is not favorable and the entrepreneur turns out to be incompetent.

The duration of the organizational stages and their further succession depends on how the firm performance affects growth,²⁴ where interest here is not so much in the growth of sales, say, but

²³ Let the equality sign hold between $\Pi^-(D)$ and $\Pi^-(I)$ in the order relation (1). Then condition (4) becomes $p_l/p_m \geq a$, $0 < a < 1$. This means that although the entrepreneur may assess it more difficult for her/him to succeed with cognitive leadership than with monitoring (s)he may nonetheless decide in favor of the former choice.

²⁴ As already indicated in Figure 1, performance is also affected by situational factors and so may be the growth of the firm. Furthermore, differences in profitability do not necessarily translate into corresponding differences in growth. Profits can be used for many purposes other than investing into an expansion of the business, and there are, at least within bounds, several means other than the accumulation of own profits for financing a firm's growth. Moreover, growth of a business can always be achieved at the expense of profitability. However, between all these influences and the four stages L, D, M, and I no systematic relationships seems to exist so that these influences are neglected here.

in the expansion of the organization measured in terms of the size of staff $n(t)$. Let the growth rate of $n(t)$ be denoted by w . Lacking any more specific information and abstracting from the size dependent factors depicted in Figure 1, a simple hypothesis on the relationships between performance and expansion of the firm organization may do.

Hypothesis 3: Differences in performance translate into growth differentials according to

$$(5) \quad w(i) = f(\Pi(i)),$$

where $f(0) < 0$, $f' > 0$, and $f'' < 0$ and $I = L, D, M, I$.

Hence, according to the order relation (1),

$$w(L) > w(M) > w(D) \geq w(I) \quad \text{and} \quad w(I) \leq 0, w(D) \geq 0, \text{ and } w(L), w(M) > 0.$$

This means that, ceteris paribus, in stage L the firm organization expands most rapidly.

However, as submitted in Hypothesis 1 in the previous section, the further development of the firm organization not only hinges on the growth of the business and the expansion of the organization, but also on how the entrepreneurs respond to the organizational stage their firms have actually attained. Since, a sub-division of the firm has been excluded from the exposition in this section, only the following reactions will be considered which actually establish a transition hypothesis:

Hypothesis 4: An entrepreneur who has chosen to strive for cognitive leadership holds on until (s)he experiences being defeated. Then (s)he chooses to strive for a monitoring regime. An entrepreneur who has chosen to strive for a monitoring regime holds on until (s)he experiences "incompetence". Then (s)he holds on until either $n(t) = 0$ or the firm goes bankrupt, whatever happens first, or (s)he shuts down voluntarily before such an event.

Admittedly, hypothesis 4 gives a rather schematic portray of the entrepreneur's behavior. Nonetheless, for the illustrative purpose of the present section it may go through. In particular, the assumption that entrepreneur reacts to D by striving for a monitoring regime seems justified. Closing down the business right away would be no convincing alternative, since it would mean to forego the promise of $\Pi(G) > \Pi(D)$. The same is true for continuing to striving for cognitive leadership after experiencing D. Furthermore, this does not appear promising because the difficulty of the task of turning around the informal agenda setting and the social models in an organization in which a majority has adopted rival attitudes or opportunism can hardly be overrated. Where a transition from L to D occurs as a consequence of the expansion of the organization, striving to regain cognitive leadership would only make sense when, at the same time, reducing $n(t)$ to an extent that would suffice to cure the problems in the social interactions.

This does not seem to be a frequently chosen policy.

Drawing together the hypotheses 1 - 4 the regular successions of organizational stages, which constitute the contingent ontogeny of the firm organization under the chosen simplifications, can be determined as follows:

Proposition: Under the chosen assumptions, the contingent ontogeny of the firm organization is given by six different successions in the morphologic space made up of the four organizational stages *L, D, M, I*. With *S* denoting the starting up of the organization and *E* its exiting and depicted the successions by strings they are:

- (i) $S \rightarrow I \rightarrow E$
- (ii) $S \rightarrow M \rightarrow I \rightarrow E$
- (iii) $S \rightarrow D \rightarrow I \rightarrow E$
- (iv) $S \rightarrow D \rightarrow M \rightarrow I \rightarrow E$
- (v) $S \rightarrow L \rightarrow D \rightarrow I \rightarrow E$
- (vi) $S \rightarrow L \rightarrow D \rightarrow M \rightarrow I \rightarrow E$

(i) is the pattern of the unsuccessful firm foundation. The organization declines and, by hypothesis 4, exists sooner or later. The reason for the disappearing of the firm is the failure to generate any significant profits.

(ii) is the pattern of a successful monitoring regime. The business can prosper and expand at least in a non-innovative market environment. Should the firm exit for internal reasons (the only ones considered here), then because of a transition to state I.

(iii) is the pattern of a double unsuccessful entrepreneurial experiment. Neither striving for cognitive leadership nor the subsequent striving for a monitoring regime are successful. By hypothesis 4 the experiment is sooner or later abandoned.

(iv) is the pattern of an unsuccessful leadership experiment which, however, is followed by an effective monitoring regime. Once, after the initial turmoil, monitoring is successfully established, the further development is the same as the one departing from state M in pattern (ii).

(v) is the pattern of a firm organization which after growing successfully under cognitive leadership eventually faces a deterioration of the entrepreneurial inputs. According to hypothesis 4 a reorganization into a monitoring regime is attempted but fails to be successful. The further development then is the same as the one departing from state D in pattern (iii).

(vi) is the pattern of a firm organization which after growing successfully under cognitive leadership also runs into troubles, but where the entrepreneur's response to those troubles according to hypothesis 4 is successful. The probably most significant developmental pattern features a small, informal start up firm organization which eventually grows into a large, mature bureaucratic enterprise. Once the transition has been made, the further development then is the same as the one departing from state M in pattern (ii).

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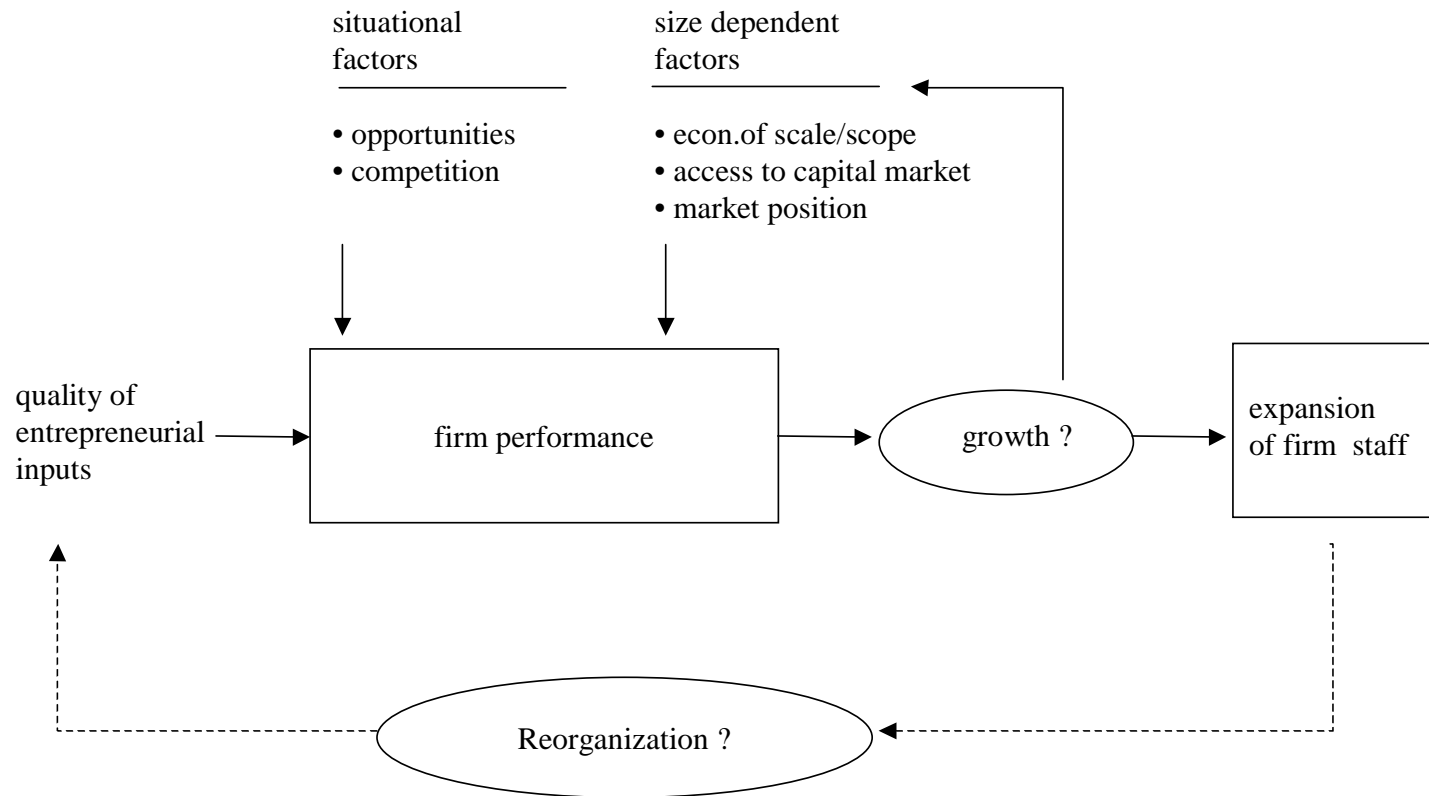


Fig.1 Logical structure of the developmental regularities induced by firm growth