

Knowledge: a Challenge for the Austrian Theory of the Firm

by

Pierre Garrouste

ATOM

Maison des Sciences Economiques

106-112 Boulevard de l'Hôpital

75647 Paris cedex 13

France

e-mail: [**galau@club-internet.fr**](mailto:galau@club-internet.fr)

November 2001

ABSTRACT

In this paper I argue that the unequal distribution of knowledge implies that an Austrian theory of the firm must investigate two items. The first is the growth of knowledge within the firm (learning process), the second the way in which the rights to decide over the distribution of knowledge are assigned and controlled. Finally, because those two elements are interdependent, we must define what their possible relations can be.

Thanks to Cristiano Antonelli, Jack Birner, Nicola Foss and Peter Klein for helpful comments, and to the International Center for Economic Research (Torino) for financial support. Usual caveats apply.

Forthcoming in Nicolai J. Foss and Peter G. Klein (eds.) *Entrepreneurship and the Firm: Austrian Perspectives on Economic Organization*, Aldeshot: Edward Elgar

I. Introduction.

Until recently, no economist in the Austrian tradition had even begun to develop an Austrian theory of the firm (Loasby, 1989). This has now changed; a number of authors such as Lewin and Phalan (2000), Dulbecco and Garrouste (1999), Iaonnides (1998) Klein (1996) and Foss (1994) have contributed to an elaboration of such a theory. There has even been a dramatic growth of the works concerning this topic¹. For all their other differences, one thing all these publications have in common is the idea that knowledge and its distribution are, or should be, central elements any Austrian theory of the firm. Nevertheless, it seems to me that not all the implications of this important idea have been addressed. For one thing, the fact that knowledge is not only distributed but is also evolving has been relatively neglected, in the Austrian tradition in general and in the Austrian analysis of the firm. More specifically, an Austrian theory of the firm could improve the analysis of learning by systematically developing connections between knowledge and its distribution on the one hand, and time on the other. Learning, or the problem of the growth of knowledge, has become an object of research in economics in general.

In Kirzner's approach, the idea that knowledge is unequally distributed and that "alertness" can explain why some people are able to manage organizations better than others are based on the notion of entrepreneurship. However, he does not analyze² the structure of this "collocation of knowledge and decision authority" within the firm (Jensen and Meckling, 1992). This suggests that it may be worthwhile for an Austrian theory of the firm to integrate results of incentives-based and contractualist theories of the firm.

In this paper I will argue that the unequal distribution of knowledge implies that an Austrian theory of the firm must investigate two items. The first is the growth of knowledge within the firm (learning processes), the second the way in the rights to decide over the distribution of knowledge are assigned and controlled (the terminology is Jensen and Meckling's, 1992). Finally, because those two elements are interdependent, we must define what their possible relations can be.

The first section explains why the distribution of knowledge and its main determinants lead us to study learning processes and incentives. The second section shows how an Austrian theory of the firm can integrate particular results of the economics of learning. The third section argues that for an Austrian analysis of the firm it is even more important to investigate the relationships between incentives and the role of knowledge in the firm than it is for contractualist theories. The fourth section explains how an Austrian theory of the firm can integrate the elements analyzed in the previous sections.

II. The growth and distribution of knowledge and the Austrian theory of the firm.

An Austrian Theory of the firm would consider the problem of the coordination of individual plans of actions as crucial. This problem, together with the emphasis on knowledge, its distribution and growth, the Austrian concept of time and subjectivism would distinguish such a theory from others (cp. O'Driscoll and Rizzo, 1996).

Existing Austrian theories of the firm already assume that knowledge is an essential element of any explanation of the existence of the firm. But I want to go further in this direction. Austrians try to explain the emergence of institutions (“*organic* institutions”), rules of action, conventions, traditions etc., as part of spontaneous coordination process. In this way, «cognitive commonalities, that is, socially shared tacit knowledge including knowledge about social models of behavior, may emerge spontaneously from intense communication as an unintended collective outcome and may, as such, be difficult to influence.» (Witt, 1998, p. 166). Such a conception of the coordination process is important, but it is not the only one. They neglect the existence of what we may call *pragmatic institutions*. Hayek writes however that "my central aim has made it necessary to stress the spontaneous evolution of rules of conduct that assist the formation of self-organising structures. This emphasis on the spontaneous nature of the extended or macro-order could mislead if it conveyed the impression that, in the macro-order, deliberate organisation is never important." (Hayek, 1988, p.37). He adds that "the elements of the spontaneous macro-order are the several economic arrangements of individuals *as well as* those of deliberate organisations." (ibidem).

In order to distinguish spontaneous and deliberate coordination processes, Hayek uses another distinction, that between concrete, codified and specific rules of conduct on the one hand, and abstract, tacit and general rules on the other. This is tantamount to the distinction between general and specific knowledge. "Although Hayek is not always clear on this point, what distinguishes the two classes is not so much their origins as the nature of the rules they comprise. The rules of an order are abstract and independent of purpose, whereas the rules of an organization are concrete and directed toward a common purpose or purpose." (Langlois, 1993, p.169).

Hayek's distinction between organizations and orders as based on that between specific (codified and concrete) and general (tacit and abstract) knowledge is not without shortcomings³. As far as the firm is concerned, it is more useful to consider both as an institution and as an organization.⁴

In order to exist and act, firms need some common body of knowledge, *i.e.*, the « interpretative frameworks » of the members of a firm should be partially consistent with one another. That common body of knowledge sometimes emerges spontaneously. For example, Egidi and Narduzzo (1996) show how in an interactive context routines may emerge without there being a common will of the individuals involved. That indicates that both in societies as in smaller communities, spontaneous rules of action exist. On the other hand, Witt (1998) argues that, «sometimes ... the institutional set-up of the interactions assigns certain individuals a position in which they get a chance to shape the communication processes and thus to exert an influence on the collective outcome. The firm organization is a case in point. » (Witt, 1998, p. 166). Depending of the aspects we study, the firm can either be considered to be a spontaneous and a deliberated created order.

An accepted distinction in economics is that between *ex ante* and *ex post* modes of coordination. The former indicates the possibility for individuals to agree on some common commitments⁵ before transacting, the latter some mutual-adjustment of individuals' actions. This seems very similar to the Austrian distinction discussed above. However, the Austrian framework is richer in content. First, because time matters and because coordination *processes* cannot be reduced to coordination *modes*. An Austrian theory of the firm needs to take into account both evolution of coordination mechanisms, and in addition the evolution of individuals' knowledge

inasmuch as knowledge conditions those mechanisms *and* is conditioned by them. Second, the *ex ante* and *ex post* modes of coordination are usually considered as exclusive, that is to say the former characterizes the firm and the latter the market⁶. According to the Austrian theory of the firm those two modes coexist within an organization.

The first point is essential. In fact, according to Menger (1976) the growth of knowledge is an important explicative element. Indeed, when he criticizes the Smith's theory of the economic progress he says that what explains fundamentally this progress is the increasing of the knowledge individuals have of the relations between their economic ends and the set of the ordered economic goods. In the same way when he analyzes the emergence of an organic institution such as money, he emphasizes on the fact that individuals are learning from those who are more highlight than them. This self-reinforcement process ends up in the emergence of an institution. It is then difficult not to consider that learning is a cornerstone of Menger's analysis. If we then conceive the firm on the basis of the structure and evolution of knowledge, it is justified to look at the way it is possible to introduce learning as an important element of the organization and evolution of the firm.

According to the second point, the fact that individuals either act without any inter-individual commitments or with bilateral contractual constraints make the coordination of their action very different. In the first case individual behavior is not restricted by any constraints that are not concerning his own wealth, in the second this behavior is engaging the wealth of those with whom he has agreed on some collective results. As far as knowledge is concerned, the problem becomes interesting because what is in question is not only the management of the coordination of behaviors but also and much more importantly the management of the coordination of knowledge. In other words if knowledge is dispersed and unequally distributed between individuals what are the consequences of such a phenomenon in terms of distribution of the decision rights? In this way I will show below that two kinds of problems are induced by this aspect of the coordination process (Jensen and Meckling, 1992). The first is concerning the assignment of decision rights and the second is dealing with the possibility to control the actions on the basis of the distribution of decision rights.

Indeed as far as the relations between knowledge and coordination processes are concerned we are then faced to two different problems. The first is concerning the organization and evolution of individual knowledge in relation with the coordination processes, and the second is link with the way the dispersion of knowledge influences the way coordination is designed en enforced.

III. Learning models and the Austrian theory of the firm.

Learning in economics, perhaps because of its novelty, is very differently analyzed. However, three mains way of analyzing learning processes can be identify.

- The most important part of the literature is dealing with what can be called “strategic interacting individual learning”⁷. This way of analyzing learning is essentially due to some recent developments in game theory and is mainly interested with the way individuals are modifying their beliefs or their behaviors in a context of interactions.
- Another conception of learning considers that organizations are learning. Such a view seeks to show that the way an organization is set up explains its capability to increase its reactivity to some modifications of its environment. As an example Marengo (1992) analyzes the adaptability of an organization as depending on its level of centralization.
- The last one is based on the evolutionary theory of learning. Such a conception is due both to evolutionary game theory and more generally to evolutionary economics. This kind of learning is called “social learning” (Fudenberg, Levine, 1998).

There is a strong parallelism between those three kinds of learning processes and the way it is possible for Austrians to analyze the evolution of knowledge. Indeed first, individuals learn because they are confronted to a changing environment, second, organizations learn because of some recurrent interactions between individuals belonging them and between different organizations, and third, individuals learn without knowing that they do.

Most often, learning in economics is analyzed from a behaviorist point of view (Garrouste, 2000a). However an important literature is based on the idea that it is necessary to take into account the fact that individuals have beliefs on their environment and, first that those beliefs are determining the way individuals are

behaving, and second that the individuals' beliefs are evolving. This second point is essential as far as learning processes are concerned.

As an example, Walliser (1998) defines two kinds of learning processes based on two types of rationality⁸. The first, *behavioral learning* is based on the idea of an instrumental rationality. Instrumental rationality “deals with consistency between given opportunities and fixed preferences, in order to derive intended strategies from previous expectations” (Walliser, 1998, p. 68). Behavioral learning is then the individual's capability to improve this consistency between given opportunities and fixed preferences. As an example an individual can learn to play those strategies that have been given to him the best results in the past.

The second kind of learning, the *epistemic learning*, is based on the idea that cognitive rationality which “deals with consistency between available information and constructed beliefs, in order to form expectations about the relevant environment” (Walliser, 1998, p.68) can be improved when not perfect..

This second kind of learning is essential inasmuch as it is not far from the Austrian conceptions of knowledge. Even if the models of learning in economics are often based on some behavioral considerations, it is possible to look at some of them as rooted in a cognitive conception. In game theory⁹, learning can be linked with cognitive processes. For example in “fictitious play” models as well as in “reinforcement”¹⁰ ones, where individuals revise or update¹¹ the beliefs they have on the others' strategies, it is possible to assimilate the learning process to a cognitive one. Indeed in “fictitious play” “each player assumes that every other players are choosing according to a fixed probability distribution and that these distributions are independent among players. Thus the player in role i (‘player i ’ for short) computes the observed frequency distribution of the actions taken by each player j up to time t , adopts this as a maximum likelihood estimate of the distribution player j is actually using, and then chooses a best reply to the product of these estimated distributions.” (Young, 1998, p.31).

Such models can be considered as too strong in terms of the assumptions they share concerning individual rationality. However some recent contributions tend to relax those assumptions.

In order to illustrate such an evolution I will take the Young's contributions (1993, 1996, 1998). Indeed Young introduces a model characterized by "four key features: *boundedly rational responses* to forecasts of others' recent behavior, which are estimated from *limited data* and are perturbed by *stochastic shocks*." (Young, 1998, p.43).

Then if the individuals have the possibility to make errors with a given probability ϵ , that is to say that they choose their actions in the set of their best replies with probability $(1-\epsilon)$; if they have a limited memory (m the number of the past rounds they remember); and if they are determining their actions on the basis of information by looking at a part s of the population, then some interesting results follow. Indeed some conventions are able to emerge that are characterized by the following properties:

- They are linked with a *path dependent process*, that is to say that in two societies where the initial conditions are the same, «there is a positive probability that at any given future time, they will be operating different conventions. » (Young, 1996, p. 111).
- A convention is *not necessarily an optimal solution*. In fact, it is not because a solution is selected that it is the best one.
- There is a *local conformity effect*: « if all agents have a positive probability of interacting, if they have sufficiently incomplete information and if random deviations have sufficiently low probability, then most of the time, most of the population will be using the same convention. » (Young, 1996, p. 111).
- A *global diversity effect*. In others words two societies can « choose » different conventions.
- There is a possibility for a convention to change radically and rapidly. This *punctuated equilibrium effect* is important because it excludes a lock-in effect that traditional analysis of technological competition? *à la* Arthur (1985) shows.

Such an approach can evidently be criticized from an Austrian point of view. One of the main shortcomings as far as knowledge is concerned is due to the following assumptions: first individuals have all the same memory, second their rationality is bounded because they can make errors (a random choice) with a *given* probability and play the best response with the complementary probability.

However it can be useful to introduce those kinds of phenomena inasmuch as they explain the emergence and evolution of conventions in a way which is not too far from the one Austrians do. All the models listed above are considering that individuals are learning because they interact but they are not analyzing the possibility for organizations to learn too.

The idea that is at the basis of organizational learning process is the following. The fact that individuals are interacting locally and recurrently produces some “composition effects”, that are making the evolution of the all organization independent on the individuals’ actions, but strongly dependent on the architecture of this organization.

Concerning this learning process, its “conformity” with the Austrian tradition depends on the way it is conceived. If the idea is to say that an organization as such is learning, it is difficult to accept that an entity that is not self-conscious can be considered as a subject and can act as an individual does. If the idea is to consider that, because individuals are interacting recurrently they develop progressively some specific collective knowledge, this kind of learning process is much more acceptable from an Austrian point of view. This kind of learning process is able to explain why firms are different even if they are belonging the same kind of economic activity, that is to say why something like a corporate culture emerges which is “the stock of knowledge which is common to substantial portion of the employees of the firm, but not to the general population from which they are drawn.” (Crémer, 1990, p.54). This kind of learning process is analyzed both by game and by evolutionary theorists. Indeed according to game theory the fact that individuals interact with their neighbors and not with the all population implies some interesting results (Young, 1996; Mailath, Samuelson and Shaked, 1997).

In a very different way evolutionary theories of the firm as well as organizational economics explains why some collective knowledge emerges from the accumulated competence of the firm (Marengo, 1992; Dosi, Marengo and Fagiolo, 1996). This kind of organizational learning is differently conceived but such ideas as complementarities between activities, synergies between individual knowledge, positive externalities between assets are all at the basis of this type of conception of learning processes. The now important literature on the routines of an organization

(Cohen and al., 1996) is emphasizing on the emergence (Egidi, Narduzzo, 1996) and the evolution (Nelson and Winter, 1982; Dosi and Egidi, 1991; Nelson, 1995) of some collective behavior which is fundamentally dynamic and organically linked with an organizational learning process. Eventually the so-called knowledge-based theory of the firm (Conner and Prahalad, 1996) is one of the last example of this developed and still developing literature. The drawbacks of those models are due to the lack of any references to the incentives¹². Although individual learning models are explicitly or implicitly assuming that individuals learn in order to improve their own wealth, organizational learning models are considering that “all agents are ‘angels’ as their motives are concerned.” (Dosi, Levintahl and Merango, 2001, p.5).

It seems very fruitful for the Austrian theory of the firm to integrate the results of the theories listed above. In fact as far as the evolution of dispersed knowledge is concerned the idea that learning is essential needs to be analyzed seriously by the Austrian tradition. Even if some of the assumptions are too strong it could be interesting to amend them in order to propose a much more satisfying theory of the firm (see below section IV).

IV. Including incentives into an Austrian Theory of the Firm

Holmström (1982) writes that «Orthodox economic theory has little to offer in terms of understanding how nonmarket organizations, like firms, form and function» (Holmström, 1982, p. 324). He adds that this problem is due to the fact that such a theoretical viewpoint pays very «little or no attention to the role of information». One of the main interests of the “contractualist” theories is then to analyze the way incentives are built up when opportunism, asymmetries of information and uncertainty are taking place.

In a recent paper, Holmström and Roberts (1998) analyze the way contractualist theories of the firm are able to explain the boundaries of the firm. They present the way agency theory defines the boundaries of the firm. They interestingly write that «information and knowledge are at the heart of organizational design, because they result in contractual and incentive problems that challenge both markets and firms. Indeed, information and knowledge have long been understood to be different from goods and assets commonly traded in markets. In light of this, it is surprising that the

leading economic theories of the firm boundaries have paid almost no attention to the role of organizational knowledge. » (Holsmtröm and Roberts, 1998, p. 90). It can be assumed that this kind of evolution is linked with the fact that agency theory borrowed some interesting elements from the Austrian tradition. It is for example symptomatic that all those theorists are often quoting Hayek (1945) *The Use of Knowledge in Society* in their works.

Adverse selection and moral hazard as well are the starting points of some interesting analysis of the firms inasmuch as the incentive systems are determined by the possibilities of the existence of pre or post contractual opportunism. In fact, agency theory, property rights theory, incomplete contract theory as well as transaction costs economics bring to the fore the problem linked with the transfer of knowledge and information.

However knowledge is usually assimilated to information and the problem is limited to the difference in the capacity to obtain information. Such a conception of knowledge is too far from the way Austrians use to analyze it. Indeed according to Langlois and Garrouste (1997) knowledge cannot be reduced to a stock of information but need to be conceived as a structure inasmuch as “the neural system of the brain (and, more generally, the nervous system as a whole) creates, with experience, a semi-permanent structure or ‘map’ that guides action –not only in response to new stimuli but also through processes of internal reclassification and recombination”. (Langlois, Garrouste, 1997, p. 289). However as far as knowledge is concerned the problem is to look at the way the firm is organized. One of the basic Austrian idea is that the entrepreneur needs to be the one who has the relevant knowledge to organize the activities of the firm. In other words the more an individual knows the higher he has to be in the hierarchy. Indeed such an Austrian and Knightian conception is shared by those who develop an Austrian theory of the firm. However the problem is open for what is concerning the way the right to decide is assigned and how the decision-makers are controlled. Witt (1998) says that the entrepreneur needs to persuade his actual as well as potential employees to adopt his ideas. In a way that is not far from Demsetz (1990), Foss and Foss (2000) considers that ownership needs to be given to the individuals with the more important part of relevant knowledge. Those

conceptions are interesting but they do not solve completely the problems we identify behind.

Indeed, even if they both analyze the relation between the unequal dispersion of knowledge and the allocation of authority, they solve neither the problem of the repartition of the authority to decide inside the firm nor the way the decision-makers are controlled.

Some interesting propositions are coming from agency theory as well as from property rights theory and are based either on the idea that the organizational structure of a firm is linked to the kind of knowledge concerned (Jensen and Meckling, 1992) or on the allocation of the authority to decide (Hart and Moore, 1999).

Jensen and Meckling (1992) is on some points close to Foss and Foss (2000) and starts from the famous Hayek (1945) *The Use of Knowledge in Society* in order to analyze the relations between the kind of knowledge, specific or general, and the organizational structure of the firm. Their point is to say that specific knowledge is costly to transfer although general one is not. "Because it is costly to transfer, getting specific knowledge used in decision-making requires decentralizing many decision rights in both the economy and the firm. Such a delegation, in turn creates two problems: the rights assignment problem (determining who should exercise a decision right), and the control or agency problem (how to ensure that self-interested decision agents exercise their rights in a way that contributes to the organizational objective)." (Jensen and Meckling, 1992, p. 251). Then they define ownership as the right to decide along with the right to alienate that right where alienation is the right to sell a right and to capture the result of the exchange. If they agree with the Hayekian idea that the distribution of specific knowledge in society calls for decentralization they consider that he never discusses how "market automatically move decision rights to the agents with the relevant knowledge" and why "those agents will use the decision rights properly" (Jensen and Meckling, 1992, p. 252). Their idea is to explain what is the consequences of the unequal dispersion of knowledge on the collocation of knowledge and decision authority (moving knowledge to decision authority or authority to knowledge) when alienation is absent (as it is the case inside the firm). Their point is to say that there is a trade-off between "cost owing poor information" and "agency costs". Indeed the manager has to assign the decision to those with the

relevant knowledge, but doing so he increases the cost due to the potential inconsistency of objectives. They show that there is an optimal location of decision right as far as this trade-off is concerned. Such a conception is not too far from the Marengo's model (1992) that present a trade-off between centralization, that is low coordination costs but low learning capability (because knowledge is homogenous) and decentralization that is high coordination costs but high learning capability (because knowledge is heterogeneous).

In a quite different way Hart and Moore (1999) present a model where hierarchy is a way to allocate authority to decide. The idea is to say that the owner of the assets has the right to decide how those assets are going to be used. Because he has limited capacities and time to set up a decision, he can delegate to some subordinate who have the same constraints and can delegate, and so on. There is then a "command chain" where individuals are located from the point of view of their right to have an idea concerning the use of a sub-set of assets. Thanks to some strong assumptions they show¹³ that an optimum organizational form is characterized by the following conditions: first the probability to have an idea is increasing as the right to have an idea is decreasing and second criss-cross organizations are never optimal. This kind of model of hierarchy is not too far from the Aghion and Tirole's (1997) one even if Hart and Moore assume that there is no possibility for the one who delegates to choose to whom he delegates.

Those two ways of analyzing the relations between knowledge and decision rights are very interesting for those who, as Austrians do, consider that the unequal dispersion of knowledge is determining the way the hierarchy is organized inside the firm. This is by no mean to say that Austrians need to integrate those models as they are, but the idea is to consider that it can be powerful for it to be inspired by them. In this way Foss and Foss (2000) attempt to propose a model that shows why the ownership needs to be linked to the individuals with the relevant knowledge is an example of direction of research that try to conciliate both the specificity of the main Austrian assumptions and the capability to propose formal models.

V. Linking learning and incentives into an Austrian theory of the firm.

In the previous two sections I have shown that it was interesting, if not necessary for the Austrian Theory of the firm to integrate some results coming from the “economics of learning” as well as some coming from models that are analyzing the relations between the dispersion of knowledge and the assignment and control of decision rights. In this section I want to present some directions of research that seem interesting when one is interested with the relations between the growth of knowledge (that is to say learning) and the problem of incentives. According to Dosi, Levinthal and Marengo (2001) “we find that there is an important interaction between problems of knowledge and problems of incentives.” (Dosi, Levinthal and Marengo, 2001, p. 6).

Those relations are of two types:

First as far as learning (that is the increase of knowledge¹⁴) is concerned it is interesting to look at the reason *why* learning is important for firms. In other words, what are the incentives for firms to induce some learning process.

Second if the firm has some interests to induce learning processes, it has to solve two problems that are 1) *how* it is possible to deal with the problem of the workers’ incentives to learn, and 2) *what* the individuals belonging the firm have to learn. According with the first problem, the answers are depending upon the kind of approach one proposes. According to the evolutionary conceptions of the firm learning is increasing the firm efficiency. The notion of routines in its dynamic significance (Dosi, Teece and Winter, 1992) is conceived as inducing a search behavior from the firm in order for it to become more efficient. However, such an increasing is neither monotonic nor going without problems. Indeed, Egidi and Narduzzo (1996) show that any changes in the routines of a firm provoke in a first time a sub-optimal outcome because of the modifications induced both on the individuals’ actions level and on the level of the coordination of individuals’ actions. Those modifications destroy the old routines and a period of time is needed for the new routines to take place.

According to the contractualist theories of the firm, 1) learning is usually assimilated with the effects of training inasmuch as those theories are only able to deal with comparative static problems and 2) training is conceived as a mean for firm

to increase the abilities of its workers or to screen those abilities, and for the workers to signal their real abilities. The problem is here only an agency one and inasmuch as knowledge is an unobservable variable it is not at all considered as an important phenomenon but it is dissolved in the effective workers' behaviors.

According with the second problem, it is possible to accept the idea that the growth of knowledge inside a firm is in part not possible on its own without the individuals' agreement. If then learning is not a natural phenomenon (due for example to classical agency problems) it is therefore necessary for the firm to solve the problem of *how* it is possible to motivate the individuals' learning activities. In other words the firm needs to stimulate the individuals to learn by designing some incentives contracts (Weiss, 1995; Statt, 1998) or by providing the appropriate environment for them to learn. (Nonaka, Takeuchi, 1995). In the contracts the firm propose to its employees, the possibility, not only to stipulate an increased wage depending on the results of their ability after the learning process, but also to define a reallocation of the decision rights is an important aspect which is in complete coherence with the Jensen and Meckling (1992) point of view.

Such a problem of incentives is also analyzed in an evolutionary perspective. As an example, Coriat and Dosi (1995) show that routines need to be conceived as a locus of conflict, of governance as well as a way of codifying incentives and constraints. Accordingly the constitution of a routine inside a firm is sustained by some incentive or control mechanisms. Dosi, Levintahl and Marengo (2001) analyze this problem when they propose a model that links the performance and the rewards to the "fitness value of the entire policy string, or some partition of this boarder string." They use the Kauffman (1993) landscape model in order to analyze the relation between the real decomposition scheme and the organization decomposition, and they define the rewards in terms the proximity of the two decompositions.

However, it is also important for a firm to know *what* individuals' capabilities are essential to develop and consequently *what* kind of learning processes it is interesting to sustained. In this way the notion of "core competence" is linked with the idea that a firm needs to develop and then to support the development of those knowledge that are compatible with the competencies that are belonging this "core" (Cohendet, Llerena, 1999). Such an idea is not too far from the Hayek's one when he

writes that the performance as well as the existence of a firm is “often bound up with the preservation of at least a certain continuity in its personnel, the preservation of at least an inner core of men right down the line who are familiar with its peculiar traditions and concrete tasks.” (Hayek, 1960, p. 302). However such a compatibility does not imply that the diversity inside an organization needs not to be promoted. Indeed Loasby (1989) and much more precisely Marengo (1992) show that in order to be efficient a firm needs some variety between individuals’ characteristics to exist. According with Marengo (1992) the manager of a firm has to deal with a trade-off between i) low coordination costs, a low dispersion of knowledge and low learning capabilities, and ii) high coordination costs, a great dispersion of individuals’ competencies and high learning capabilities.

All those different aspects, which are usually not taken into account by the Austrian conceptions of the firm may end up in the following consequence: is an Austrian conception of the firm always necessary to develop? In fact if many different theories are able to propose solution to Austrian problems is there any place for a so-called Austrian theory of the firm? Indeed my point is that the answer is yes. In fact what distinguishes the Austrian approach of the firm and what cannot be integrated in the contractualist theories of the firm is first that knowledge cannot be reduced to information and second that learning is a process. In this way, it is not possible to reduce the incentives to a sum of rewards and punishments defined on the basis of the actual individuals’ outcomes but those incentives need to be defined looking at the evolution of the outcomes as based on a learning process. Indeed the Austrian theory of the firm has to take account the relations between the growth of knowledge and the system of incentives, but it needs not to reduce those relations to its static dimensions.

VI. Conclusion

The Austrian theory of the firm is based on the idea that knowledge is important because it is unequally dispersed and that the coordination of individual plans of action is consequently a complex phenomenon. However such an idea needs to be completed by some developments concerning two of the main characteristics of knowledge inside the firm. The first is that knowledge is evolving due to the fact that individuals are learning. The second is that as far as knowledge is dispersed the

structure of the organization, particularly the distribution of the decision rights, can depend on this dispersion. In this contribution my aim has been to examine the content of the extensions that the combining of those two phenomena, that is to say learning and incentives, are able to induce as far as the Austrian Theory is concerned.

References

Aghion, P. and Tirole, J. (1997) "Formal and Real Authority in Organizations", *Journal of Political Economy*, 105: 1-29.

Arthur, B. (1985) "Compeyting technologies and lock-in by historical events. The dynamics of allocation under increasing returns", CEPR discussion papers, Standford University.

Bush, R. and Mosteller, R. (1955) *Stochastic Models of Learning*, New York: Wiley.

Cohen, M.D. (1984) "Conflict and Complexity: Goal Diversity and Organizational Search Effectiveness", *American Political Science Review*, 78: 435-51.

Cohendet, P. and Llerena, P. (1999) "La conception de la firme comme processeur de connaissances", *Revue d'Economie Industrielle*, 88: 211-235.

Conlisk (1996) "Why Bounded Rationality" *Journal of Economic Literature*, 34, 2: 669-700.

Conner, K. R. and Prahalad, C.K. (1996) "A Resource-Based Theory of the Firm: Knowledge vs. Opportunism, *Organizational Science*.

Cohen, M., Burkhart, R., Dosi, G., Egidi, M., Marengo, L., Warglien, M., Winter, S. (1996) "Routines and Other Recurring Actions Patterns of Organizations: Contemporary Research Issues", *Industrial and Corporate Change*, 5, 3: 653-698.

Coriat, B. and Dosi, G. (1995) "Learning how to govern and learning how to solve problems: on the evolution of competencies, conflicts and organizational routines", IIASA WP 95-08.

Crémer, J. (1990) "Common Knowledge and the Coordination of Economic Activities", in Aoki, M., Gustafsson, B. and Williamson O. (eds) *The Firm as a Nexus of Treaties*, London: Sage Publications.

Demsetz, H. (1990) "The Theory of the Firm Revisited", in Demsetz, H. (ed.) *Ownership, Control and the Firm: The Organization of Economic Activity*, Oxford: Basil Blackwell.

Dosi, G. and Egidi, M. (1991) "Substantive and Procedural Uncertainty", *Journal of Evolutionary Economics*, 1: 145-168.

Dosi, G., Levinthal, D. and Marengo, L. (2001) "Bridging Contested Terrain: Linking Incentive-Based and Learning Perspectives on Organizational Evolution", contribution to the DRUID's Nelson and Winter Conference, Alboorg, June 2001.

Dosi, G., Marengo, L. and Fagiolo, L. (1998) "Knowledge in Evolutionary Environments", CEEL, University of Trento, WP 1996-05.

Dosi, G., Teece, D., Winter, S. (1992) "Toward a Theory of Corporate Coherence: Preliminary Remarks", in Dosi, G., Gianetti, R., and Toninelli, P.A. (eds) *Technology and Enterprise in a Historical Perspective*, Oxford: Clarendon Press.

Dulbecco, P. and Garrouste, P. (1999) "Towards an Austrian Theory of the Firm", *Review of Austrian Economics*, 12, 1: 43-64

Egidi, M. and Narduzzo, A. (1996) "The Emergence of Path-Dependent Behaviors in Cooperative Contexts" *International Journal of Industrial Organization*, 5: 677-709.

Erev and Roth (1998) “Predicting How People Play Games: Reinforcement Learning in Experimental Games with Unique, Mixed Strategy Equilibria”, *American Economic Review*, 88, 4: 848-881.

Foss, N. (2000) “‘Thin’ and ‘Thick’ Bounded Rationality in the Theory of Economic Organization”, Workshop “Cognition, Evolution and the Theory of the Firm”, Jena, 25-27 September.

Foss, N.(1996) “Firms, Incomplete Contracts, and Organizational Learning”, *Human Systems Management*, 15: 17-26

Foss, N. J. (1994) «The Theory of the Firm: the Austrians as Precursors and Critics of Contemporary Theory », *Review of Austrian Economics*, 7, 1: 31-65.

Foss K, and Foss, N. (2000) “Property Rights, Austrian Economics, and Economic Organizations”, Second meeting of the Association des Historiens de la Tradition Economique Autrichienne, Paris, 27-29 May.

Fudenberg, D. Levine D.K. (1998) *The Theory of Learning in Games*, Cambridge: MIT Press.

Garrouste, P. (2001) “The difference between order and organization and the foundations of Hayek’s liberalism”, in Aimar, T., Birner, J. and Garrouste, P. (eds) *Hayek as a Political Economist*, London: Routledge.

Garrouste, P (2000a) “Learning in Economics: the Austrian Insight”, SEA/SDAE meeting Washington, 10-12 November.

Garrouste, P. (2000b) “A simple model of learning with similarity”, Workshop on Cognitive Economics, Workshop on Cognitive Economics, Torino-Alessandria, 15-18 November 2000.

Garrouste, P. (1999) “La firme hayekienne entre organisation et institution”, *Revue d’Economie Politique*, 109, 6: 885-902.

Hayek, F. (1945) “The Use of Knowledge in Society”, *American Economic Review*, 35: 1-18.

Hayek, F. (1988) *The Fatal Conceit; the Errors of Socialism*, London : Routledge.

Hart, O. and Moore, J. (1999) “On the Design of Hierarchies: Coordination versus Specialization”, Harvard Institute for Economic Research, Discussion Paper # 1880.

Holmström, B. (1982) «Moral Hazard in Teams » *Bell Journal of Economics*, 13: 324-340.

Holmström, B., Roberts, J. (1998) «The Boundaries of the Firm Revisited », *Journal of Economic Perspectives*, 12: 73-94.

Ioannides, S. (1998) “Towards an Austrian Perspective of the Firm”, *Review of Austrian Economics*, 11, 1-2.

Jensen, M.C. and Meckling, W.H. (1992) “Specific and General Knowledge, and Organizational Structure”, in Werin, L. and Wijkander, H. (eds) *Contract in Economics*, Cambridge: Basil Blackwell, 251-274.

Klein, P. (1996) “Economic Calculation and the Limits of Organization”, *Review of Austrian Economics*, 9: 3-28.

Langlois, R. (1997) “Rule-following, expertise, and rationality: a new behavioral economics?”, <http://www.lib.uconn.edu/Economics/Working/RATIONL2.HTML>

Langlois, R. (1993) "Capabilities and Coherence in Firms and Markets", Paper for the Conference on Evolutionary and Resource-based Approaches to Strategy, Copenhagen.

Langlois, R. and Garrouste, P. (1997) "Cognition, Redundancy and Learning in Organizations, *Economics of Innovation and New Technology*, 4: 287-299.

Lewin and Phalan (2000) "An Austrian Theory of the Firm", *Review of Austrian Economics*, 13, 1.

Loasby (1989) *The Mind and Method of the Economist; a Critical Appraisal of major Economists in the twentieth Century*, Hants : Edward Elgar.

Mailath, G.J., Samuelson, L. and Shaked, A. (1997) "Endogenous Interactions", mimeo.

Marengo, L (1992) "Coordination and Organizational Learning in the Firm", *Journal of Evolutionary Economics*, 2: 313-326.

Menger, C. (1976) *Principles of Economics*, New York : New York University Press.

Nelson, R. (1995) "Recent Evolutionary Theorizing About Economic Change", *Journal of Economic Literature*, 23, 1: 48-90.

Nelson, R. and Winter, S. (1982) *An Evolutionary Theory of Economic Change*, Cambridge: Harvard University Press.

Nonaka, I. and Takeuchi, H. (eds) (1995) *The Knowledge Creating Company*, New York: Oxford University Press.

O'Driscoll, G.P. Jr, et Rizzo, M.J. (1996) *The Economics of Time and Ignorance*, London: Routledge.

Rubinstein, A (1998) *Modeling Bounded Rationality*, Cambridge: MIT Press.

Statt, A-L. (1998) "Great Prospects: Employer Provided 'Training' as Credible Screening Device", mimeo, Department of Economics, University of Stirling.

Vanberg, V. (1996) *Rules and Choice in Economics*, London: Routledge.

Walliser, B. (1998) "A spectrum of equilibration processes in game theory", *Journal of Evolutionary Economics*, 8: 67-87.

Walliser and Zwirn (2000) "Can Bayes Rules be justified by Cognitive Rational Principles?" Workshop on Cognitive Economics, Torino-Alessandria, 15-18 November 2000.

Weiss, A. (1995) "Human Capital vs Signaling Explanations of Wages", *Journal of Economic Perspectives*, 9, 4: 133-154.

Witt, Ü. (1998) « Imagination and leadership-the neglected dimension of an evolutionary theory of the firm » *Journal of Economic Behavior and Organization*, 35: 161-177.

Young, H.P. (1998) *Individual Strategy and Social Structure; an Evolutionary Theory of Institutions*, Princeton: Princeton University Press.

Young, H.P. (1996) « The Economics of Convention », *Journal of Economic Perspectives*, 10: 105-122.

Young, H.P. (1993) « The Evolution of Conventions », *Econometrica*, 61: 57-84.

¹ It is not my aim to explain such a growth but it can be linked, on the one hand to the consequences that the main characteristics of the Austrian tradition have on the way economics is actually conceiving what the firm is (Foss, 1994), and on the other hand to the theoretical effects of the introduction of the New Technologies of Information and Communication that are based on the transfer of information and knowledge

² Foss and Foss (2000) and Witt (1998) are some important exceptions.

³ See for example, Langlois (1993), Vanberg, (1996) or Garrouste (2001)

⁴ See Garrouste (1999).

⁵ The way the agreement is obtained and the kind of commitments that are taken are important but are only analyzed below.

⁶ In fact an important literature is trying to justify that some hybrid forms are existing.

⁷ We do not take into account some important part of the literature in the domain of learning that is devoted to individual learning without strategic interactions which is close to decision making theory. See for example Garrouste (2000b) for a “Austrian” model of individual learning without interactions.

⁸ Our aim is not here to analyse the notion of rationality. For some interesting contributions see, Foss, (2000), Langlois (1997), Conlisk (1996), or Rubinstein (1998).

⁹ See Young (1998) or Fudenberg and Levine (1999).

¹⁰ Young (1998) considers that reinforcement learning is a behavioral one. In fact it usually considers that individuals adopt past actions that yielded a high payoff and avoid the ones linked with a low payoff (Young, 1998, p.28). However, while the initial reinforcement models are based on those assumptions (Bush and Mosteller, 1955), Fudenberg and Levine (1998) show that a probabilistic versions of fictitious play where individual’s probability to choose an action is linked to its expected payoff according to beliefs that individual forms as in fictitious play are identical to reinforcement models (depending on how the expected value of an action is calculated). See also (Erev and Roth, 1998).

¹¹ In fact, it is necessary to distinguish «the revising context where the message completes or contradicts the initial belief about static world, and the updating context, where the message gives some recent information on a dynamic world.» (Walliser and Zwirn, 2000).

¹² Dosi, Levinthal and Marengo (2001) constitute a recent exception (see below).

¹³ Their results are much more important than this one but it is not my aim the reconstitute here all their arguments.

¹⁴ It is important to emphasize on the fact that learning, in an Austrian perspective needs to be fundamentally considered as linked with the growth of knowledge and not only with the improvement of the individual or collective behaviors. The improvement of the behavior is a consequence of the increase of knowledge.