

**ANALYSIS OF ORGANIZATIONAL ROUTINES :**  
**PROPOSAL FOR AN ANALYTIC FRAMEWORK BASED**  
**ON NELSON ET WINTER AND LEIBENSTEIN**

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Our approach is based on the profound conviction that a clear, well-defined analytic framework is necessary for the empirical analysis of organizational routines. A certain number of concepts and formal theory are required to analyze any concrete economic situation; and clearly the signification of the terms “routine” and “organizational routine” varies considerably throughout the literature (for evidence of this see Cohen et al, 1996).

The production of wealth, with its multiple accompanying decisions concerning management, employment, investment, setting of margins and prices, definition of products, marketing, etc., is most often carried out “by routine”, appearing to follow a largely pre-defined set of rules and schemas. This gives us a first definition of the term routine, signifying directly observable business practices. But the term also refers to a particular theory about the behavior of economic agents, whereby behavior is explained in terms of knowledge and abilities inscribed in a collection of routines. It is the performance of these routines that gives rise to directly observable micro-economic regularities. The work of reference remains Nelson and Winter (1982), in which routines are metaphorically presented as the equivalent of genes. This is the second possible definition of the term “routine”.

Our paper will take this theoretical construction as its basis. The concept of organizational routine can thus be considered part of the long critical tradition of the classical conception of firms’ behavior in terms of production and maximization functions. It opens up a new approach, explaining the diversity of corporate practices and performances and, by means of

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the principle of heredity, their durability and transformation over time. The analysis of Nelson and Winter, however, focuses on the technical and cognitive dimension of the firm. This is brought out in a hypothesis that is crucial to the theoretical construction: the “truce in intra-organizational conflict”. At about the same time, Leibenstein, with his “X-efficiency” theory, rejected the technical dimension and focused on the social dimension of organization, more particularly the wage relations nexus, highlighting employees’ discretion in choosing effort levels on an individual level and the existence of different “conventions” on a collective level.

These authors are, however, dealing with the same problem, with the same central issue concerning organizational routine: the question of coordination. How can we explain the existence of a unified performance of the organization taken as a whole? How can we make the transition from individual to collective behavior, which presupposes that the different individual behaviors are consistently coordinated and coherent with each other? How can we explain the duration of this coordination over time?

This is, of course, a fundamental question. Leibenstein dealt with it in its social dimension, Nelson and Winter in its technical dimension. A detailed comparison of the two analyses is not without interest, as the different approaches turn out in fact to have more of a complementary than a contradictory nature.

We will therefore try to combine the approach of Nelson and Winter with that of Leibenstein, on the level of formal theory, with the aim of drawing up a shared analytic framework for use in organizational routine and performance analysis. Two distinct analytic dimensions will therefore be considered: (1) A cognitive, technical dimension with reference to training, the acquisition of capacities and the development of knowledge, and (2) a social, political dimension that underlies, frames and regulates the expression of individual wills, accompanied at this level by forms of stabilization and transformation that raise the problems of conflict, cooperation, trust, etc.

We will start by discussing these theoretical questions through an examination of the analysis of Nelson and Winter (point I) and then that of Leibenstein (point II). This will then lead us on to the construction of an analytic grid based on these two dimensions (point III). This grid can be used as a guide for the empirical analysis of organizational routines.

## **I. NELSON AND WINTER : THE TECHNICAL DIMENSION TO ROUTINE**

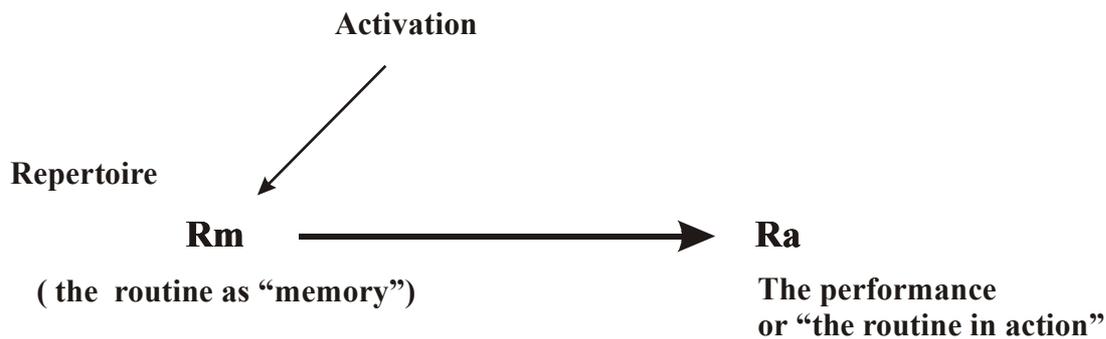
Right from the start of their 1982 work, Nelson and Winter rejected the heterodox critiques of the neo-classical production function bearing on the “motivational aspect of the theory of the firm”. They dealt with “capacities”, with the aim of developing a theory of economic and technical change. On the micro-micro level, therefore, the critique of the neo-classical approach must focus on the “implicit theory of the capacities of the firm in orthodox theory” (Nelson and Winter, 1982, p.59). The notion of the firm-agent choosing (maximizing) between different possible technological alternatives was rejected. In its place, Nelson and Winter proposed the concept of organizational routine, clearly situated in the continuity of “skill”, in other words the know-how of (human) individuals. “Routines are the skills of an organization”, they wrote (p. 124), after having expressed the same idea the other way round: “Individual skills are the analogue of organizational routines” (p. 73).

Skill represents the capacity to respond to a situation and to do something, an ability that is smoothly and unhesitatingly deployed, almost automatically. With this point, the theory of routines is in radical opposition to the theory of decisions, which is based on a clear-cut separation between decision-making procedures and the elements (information or knowledge) on which the decision is based. No such separation exists in the exercise of know-how, as the capacity to choose without prior deliberation is an integral part of know-how (p. 82). The choice is therefore pre-programmed, determined by the capacities of the agent. Routine, as skill, therefore comprises two meanings: “a way of doing things” (the skill itself) and “a way of determining what to do” (skill in terms of choice) (p. 400).

### **The principle of programming and the distinction between repertoire (Rm) and performance (Ra)**

The concept of routine thus posits the existence of subjacent knowledge, which may be explicit (articulated) or tacit. This knowledge is stored, memorized somewhere within the organization. When it is activated in a given context it defines – in a programmed way - a particular response adapted to the situation. This principle for explaining behavior can be represented as follows:

**fig 1 : Routine as programming principle**



There are, therefore, two theoretical moments in a routine, connected by a logical link (of cause and effect). (1) Externally, there is the apparent form of the performance. This is the smooth unfolding of the overall productive process or the implementation of an individual skill. This is routine in action, designated by Ra. (2) Internally, and more fundamentally, at the level of the genotype, lies the group of principles which enable a particular performance to be generated in a given context. This is a group of “items of knowledge” or “capacities” stored within the firm, and more specifically within one or more members of the organization. This group of memories is called the “repertoire” and designated by Rm<sup>1</sup>.

“... an organization member is by definition a unit that can accomplish something on its own... A typical organization member has certain skills or routines. The set of skills or routines that a particular member could perform in some appropriate environment will be called the *repertoire* of that member...” (1982, p. 98)

The Rm/Ra distinction is particularly important both for formal theory and for an empirical analysis of organizational routine. The heredity principle is located at the Rm level and not the Ra level. It is these Rm, as stores of productive knowledge maintained by daily use (“remembered by doing”), that establish a connection between the past of the firm and its present activity. It is also at this level that mutations (innovations) occur. And it is on this level that the question of the coordination of the different organization members must first be focused. For an overall organizational performance to exist, the different repertoires of routines (Rm<sub>1</sub>, Rm<sub>2</sub>, etc.) of the organization members must be coherent with each other and

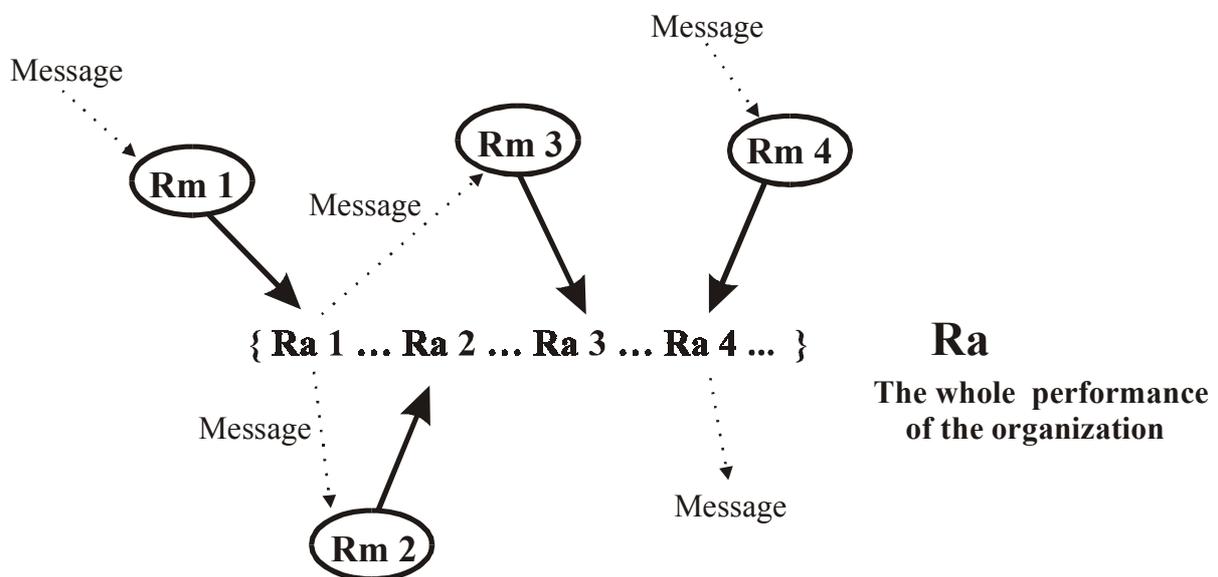
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<sup>1</sup> It must be noted that in their 1982 work, Nelson and Winter never distinguish very clearly between these two aspects of routine – routine-memory (inert) and routine in action – as being two distinct moments in routine. This distinction appears explicitly in certain later formulations of evolutionary economic analysis (“representation/expression”, see Cohen et al., 1996). The presentation of routine in the form of diagrams and the designations Rm/Ra are drawn from my thesis (Mangolte, 1998).

adapted to each other in such a way that they result in a group of coordinated actions ( $Ra_1$ ,  $Ra_2$ , etc.) that generate an overall organizational routine ( $Ra$ )<sup>2</sup>.

Nelson and Winter dealt with this point by evoking the functioning of a totally “routine-driven” firm: - a firm that displays the same behavior from one period to another. This is the “circular flow” hypothesis. For such a situation to exist and persist, each organization member must possess the knowledge of their own work within their repertoire of routines, including the capacity to receive and interpret correctly the “messages” which circulate in the organization. These messages are produced by the activated routines ( $Ra$ ), and they in turn activate other repertoires ( $Rm$ ), generating other  $Ra$  routines within the general circuit. Taken as a whole, these actions, which are coherent with each other, provide the overall performance. The organization functions smoothly when – leaving aside the problem of the “truce” – the appropriate responses to the messages, compatible with organizational coordination, already exist in the different repertoires of routines ( $Rm$ ). According to this analysis, organizational coordination is above all a problem concerning the cognitive coherence of the repertoires.

**fig 2 : "Circular flow" as a consistent repertoires activation**



<sup>2</sup> Another condition is also necessary: the hypothesis of the “truce”. This will be dealt with later.

## **Organizational coordination and the “truce” hypothesis**

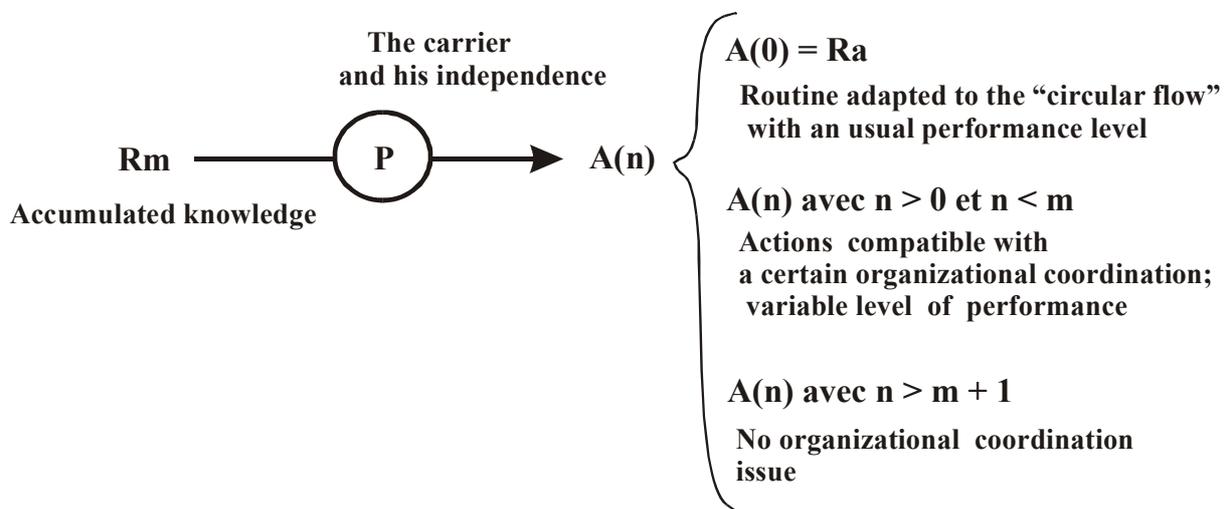
However, this cognitive coherence is not in itself sufficient to ensure the smooth running of the “circular flow”. There must also be a “truce in the intra-organizational conflict” (pp. 107 to 112). The varying degrees of good will with which individual tasks are accomplished and the diverging interests of different organization members can disturb organizational routine (Ra), even in a situation where the different Rm repertoires remain unchanged. The analysis must, therefore, include “motivational considerations and intra-organizational conflict” (pp. 107-108) at the level of the firm’s most routine-driven operations. An explanation must be given for the fact that the coordination of individual actions is possible and effective at any given moment, and lasts over time, despite the presence of a persistent principle of conflict at the heart of the organization.

"Conflict, both manifest and latent, persists, but manifest conflict follows largely predictable paths and stays within predictable bounds that are consistent with the ongoing routine. In short, routine operation involves a comprehensive truce in the intra-organizational conflict. There is a truce between the supervisor and those supervised at every level in the organizational hierarchy: the usual amount of work gets done, reprimands and compliments are delivered with the usual frequency, and no demands are presented for major modifications in the terms of the relationship. There is similarly a truce in the struggle for advancement, power, and perquisites among high-level executives..." (Nelson and Winter, 1982, p. 110)

If the firm operates as an efficient whole and if we can then speak – metaphorically – of the *skill* of the organization (taken as a whole), this is because there exists, in addition to the knowledge stored within the organization, a whole set of mechanisms for controlling individual behavior (“rule-enforcement mechanisms”) coupled with incentive mechanisms (“motivators”). These mechanisms, which can take the form of routines, prevent the appearance of excessively deviant individual (or collective) behavior. However, as Nelson and Winter rightly observed, such a system of control cannot channel all conduct: there are always large areas of discretionary behavior within an organization, giving rise to the possibility of very contrasting results in terms of performance.

Our original diagram must therefore be modified as follows:

**fig 3 : Holders' independence of the carrier**



A third element (the carrier of the repertoire and his autonomy) must now be interposed between the repertoire (routine as memory) and the performance (routine in action). The previous diagram of programming based on the repertoire (fig. 1) must therefore be rewritten, as in a given, unchanged context the repertoire no longer automatically generates the routine  $R_a$ , but may produce a whole range of routines  $A(n)$ ,  $R_a$  now being only one of the possible actions (for  $n = 0$ , for example).

There are certain points that we would like to make concerning this purely logical argument:

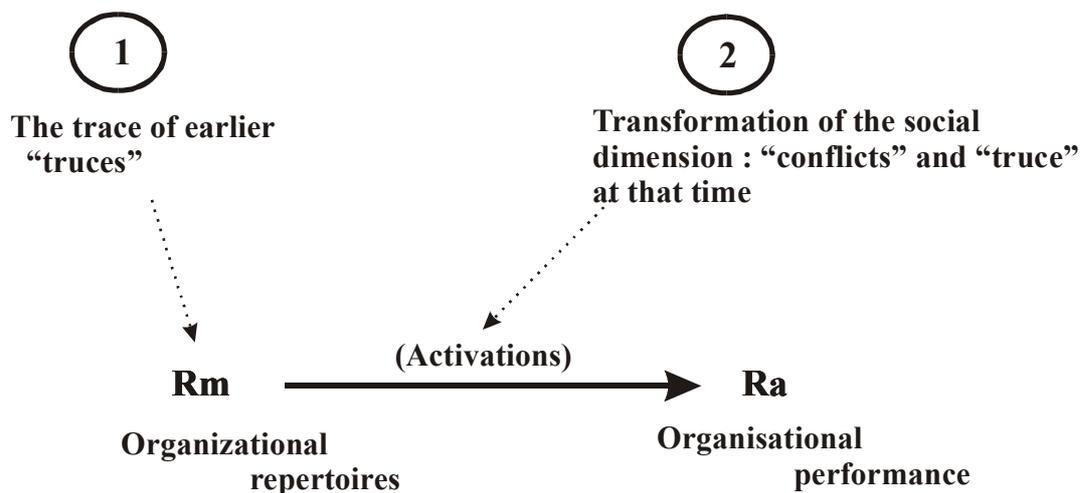
(1) The introduction of different actions  $A(n)$  does not contradict the initial principle whereby a routine is considered to be the activation of pre-constituted repertoires. Any human bearer of a repertoire adapted to the smooth running of the circuit also possesses, in their repertoire of routines, other routines which have nothing to do with the circuit and which can generate the actions  $A(n)$ .

(2) In this formal reasoning the number of actions  $A(n)$  that are incompatible with the habitual level of performance is infinite. In this case certain actions are incompatible with the maintenance of organizational coordination and cause the overall organizational routine to disappear, totally or partially (if  $n > m + 1$ , using our notation)<sup>3</sup>.

(3) Other actions permit the maintenance of a certain organizational coordination, but give rise to a new state of the circuit and a worse or, on the contrary, improved (if  $n > 0$  and  $n < m$ ) overall performance. It can be seen that the introduction of different behavior control mechanisms and the final choice of the truce signifies the *a priori* choice that  $A(n) = Ra$ . This is in fact the choice of one particular truce from the set of truces compatible with coordination, and the choice of one particular organizational performance (as explained in the second part of this paper, a particular “effort convention” has been chosen from the set of possible conventions).

(4) Lastly, knowledge on its own can never engender or preserve knowledge, nor can repertoires alone give rise to other repertoires. It is always necessary for certain routines to be activated, which once again leads back to the problem of the truce (or truces). The  $Rm - Ra$  diagram must therefore be modified to accommodate the place and role played by these pre-established truces. This results in the following diagram:

**fig 4 : Joining cognitive and social dimensions**



Thus we can see how vital the truce hypothesis is to the theoretical construction. The truce overhangs the principle of the gene, considered as the principle of behavioral programming

<sup>3</sup> A worker leaving his post can block a production line; excessive zeal (jamming) can have the same result. Each member reacts according to their routine, but disorganization sets in and productive coordination is (temporarily)

and as memory. By positing the principle that “routine is truce”, Nelson and Winter were firstly affirming a neo-Schumpeterian point of view, according to which economic evolution is primarily the result of multiple changes affecting the technical dimension. As a general rule, therefore, organizational routines can be considered firstly and essentially in cognitive terms, because all other aspects are neutralized (as they are *a priori* judged to be of little importance) by the truce hypothesis. On a deeper level, however, Nelson and Winter were also affirming that two analytically different dimensions exist in all organizational routines; and that the “conflict”, the interplay of interests and motivations, etc. cannot be reduced to the technical and cognitive dimension of the activity. The routine comprises, in fact, two dimensions: (1) there is firstly the cognitive, “problem-solving” dimension, in other words the whole set of practical, cognitive problems confronted by the organization members, including the technical problems involved in coordination itself<sup>4</sup>. (2) But another dimension must necessarily be introduced to explain the motivations, the interplay of individual interests and wills and all the causes of a possible divergence between the actions of organization members, from the moment that these causes are not directly linked to problem-solving.

In this respect one could talk of a “political dimension”, referring once again to the “conflict”. We prefer to use the term “social dimension” - which is less restrictive - to signify all the relations that are built up between organization members (individually or collectively), on condition that these relations play a part in the definition of the economic activities of the firm. The term “social” thus refers to a relational dimension (or “motivational/relational”, Winter in Cohen et al., 1996). Certain relations must be established between organization members for the organizational routine to exist. These relations may be built more or less voluntarily, possibly step by step, by the organization members, but they are most frequently simply inherited, as is a certain amount of knowledge. For every productive organization already in existence contains stable relations, roles and statutes. This set of social rules or institutions, which also constitutes a hereditary principle, channels behaviors and helps to produce a general order that allows the different knowledge and know-how to be expressed in an ordered and coherent fashion.

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paralyzed.

<sup>4</sup> Our use of the term “cognitive dimension” does not signify everything commonly covered by the term “knowledge”. Elizabethan poetry, the adventures of *homo oeconomicus* and ... this paper, are not included in our meaning. What is signified is more specifically the knowledge enabling resolution of problems of production or, more generally, the problems we encounter in our relations with the physical, biological, etc. world. This knowledge is therefore of a practical nature and often takes the form of techniques, including bodily and intellectual techniques.

## **II. LEIBENSTEIN'S ANALYSIS OF ORGANIZATION :**

### **PERFORMANCE, TRUST AND CONVENTION**

Like Nelson and Winter, Leibenstein rejected the standard microeconomic approach. The hypothesis of the production function is not valid and no unique relation exists between input and output. This has been demonstrated by numerous empirical studies comparing the productivity levels of enterprises with identical production techniques, such as the two Egyptian oil refineries which, with the same work force and similar techniques, displayed different levels of productivity (Leibenstein, 1966). Other surveys reveal significant differences in productivity between different members of the same organization. Studies carried out in work psychology have indicated the importance “small numbers”. Small working groups are characterized by higher levels of productivity than larger groups; this could possibly be explained by the emergence of ties of friendship. Other work has shown that enterprises have hidden reserves of productivity, like the British firm which managed to maintain identical production despite being subjected to a strike-related reduction in working hours and a considerable reduction in the level of utilization of capital.

Leibenstein proposed a theory of X-efficiency to explain the origin of these differences in productivity, specifying from the outset that firms never operate at the limits of production, contrary to the position adopted by standard theory. Arguing from a premise of unchanged production techniques, Leibenstein highlighted the social dimension of organization by proposing a procedural analysis of the firm. He then examined coordination, the particular interplay of conventions established within the organization and their connection with overall performance. We believe that this provides us with content for the truce hypothesis outlined above.

### **The social dimension of organization: employment relation and effort convention**

Leibenstein wished to develop a micro-micro analysis of the firm, believing that its basic unit is the “atomistic” individual and not the firm treated as an individual (Leibenstein, 1977, p. 312). Organization is then a tangle, a network of horizontal or vertical relations between the individuals who are members of the organization (Leibenstein, 1987, p. 170). It is these relations that determine the performance of the organization, for the simple reason that labor is a particular commodity (Marx, 1867), a factor of production with variable specifications which gives rise to variable performances (Leibenstein, 1966). In other words, organizational performance is dependent on the principle of cooperation, “*the application of human effort by*

*a number of cooperating individuals each of whom is in part of a separate decision maker”* (Leibenstein, 1977, p. 314).

Managers contractually buy working time and acquire authority over the employees (Coase, 1937; Simon, 1951); but this gives them no guarantee of the effective performance, of the productivity that will be achieved by the firm’s work force<sup>5</sup>. The employment contract is therefore intrinsically incomplete insofar as the members have “effort discretion” that determines the performance of the organization (Leibenstein, 1977)<sup>6</sup>.

Leibenstein emphasizes the importance of this discretionary power, thus challenging the hypothesis of maximizing behavior adopted in standard microeconomic theory. In the organization, individuals do not work for themselves, but for the management, the “principal”. They do not, therefore, have a natural interest in applying the maximum effort that would enable the management to achieve its production objectives. Their own interest lies rather in adopting behavior completely free of constraint, even if this entails low productivity. Thus torn between pursuit of their own interests and satisfaction of management’s interests, Leibenstein (1975) argues that individuals seek a compromise that finally takes the form of an “effort convention”.

In terms of micro-micro theory, this really is a convention between individuals, because labor relations within the organization raise the problem of coordination between the different individual decisions, with numerous possible conflicts (Leibenstein, 1987, p. 61). This explains the following methodology: the use of tools from game theory and the exploration of solutions to the Prisoner’s Dilemma (Leibenstein, 1975). On the one hand, members do not supply the minimum possible effort; they do not behave as isolated individuals in a situation where none of them seek some level of coordination with each other (“parametric maximization standard”). On the other hand, they do not supply the maximum possible effort desired by the firm (“golden rule standard”). Wishing to coordinate, they choose an intermediate level of productivity by respecting an effort convention: - a solution to the Prisoner’s Dilemma (1975; 1987). This explains the “frequent non-optimal conventional behavior” (Leibenstein, 1982, p. 267) evinced by empirical studies. Individuals follow what Leibenstein calls “a regularity of behavior that has a high degree of adherence locally, and a

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<sup>5</sup> There is a distinction here between the conclusion of a contract in the market (the purchase of working time through the intermediary of the market) and the application of the work force in the enterprise (the means implemented to achieve the best productivity) (Garnier, 1986).

<sup>6</sup> The term “effort” should not be understood in a strictly physical sense. Individuals have discretion in choosing the level of their performance in terms of both quantity and quality, and in the information they pass on to management (Leibenstein, 1987).

high degree of expectation that others will adhere to it”, “an agreed-upon regularity of behavior appropriate within a certain set of contexts” (1987, pp. 60, 70).

The convention is thus defined as a “social habit”; a form of repetitive behavior which involves the others in an essential manner, as for example in a decision fixing the taking of breaks within the organization. The convention is described as “a decision procedure” (Leibenstein, 1987, pp. 75-76), or as a “routine that has an interpersonal component” (Leibenstein, 1982, p. 93)<sup>7</sup>.

At the origin of the convention adopted by the employees can be found the positive and negative incentives applied by the management<sup>8</sup>. This latter fixes the wages and conditions of employment: systems of bonuses or lifelong employment in the Japanese style, promotion possibilities or the attribution of various privileges. It also implements sanctions: possible dismissal, disciplinary suspension, demotion or withdrawal of privileges. The greater the importance of incentives, the further employees will depart from minimum productivity levels and adopt conventions of higher effort, leading in the most extreme case to maximization.

Organizational performance therefore depends on the specific effort convention, on the choice of one out of the many possible truces. But Leibenstein never clearly addressed the question of the origin of these conventions. He did touch on the issue: proposing that organizations frequently tend to copy conventions already in use elsewhere (Leibenstein, 1987, p. 68), evoking historical accidents or the capacity of certain actors to deliberately impose rules on the others by means of power or emulation. The principle of heredity then takes the form of a discussion about the stability of the convention, explained partly by inertia. “The basic idea is that there exists a set of bounds say, upper and lower limits, within which any decision maker will follow the convention” (Leibenstein, 1987, p. 73). Newcomers must also adopt the existing effort convention, to avoid being rejected by their peers until they change their behavior. They thus benefit from the protection of the group, for the sanction of a group is more expensive and delicate than that of an isolated individual. Leibenstein had less difficulty explaining how conventions can disappear or evolve. When a “shock” or a “crisis” occurs, individuals can no longer operate in the zone of inertia allotted to the convention, so

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<sup>7</sup> Leibenstein’s “routine”, however, has little in common with Nelson and Winter’s routine in the sense of skill, as it is derived from exploration of the social dimension of the organization. It is a form of repetitive behavior directed at other individuals, unlike a purely individual habit such as always starting with the same foot when putting one’s socks on in the morning. The ultimate form of convention is thus the institution, insofar as the localized character is replaced by a larger dimension, such as that of a town, for example, in which standard working hours are instituted (Leibenstein, 1987, pp. 60-61).

<sup>8</sup> For Leibenstein, these include not only the “external motivational efficiency barriers”, the evolution of the firm in an environment of low competition, taking into account notably entry barriers and monopoly situations that influence performance, but also “intra-plant motivational efficiency” (Leibenstein, 1966, p. 393).

they abandon this routine-driven behavior for new behavior combined with a new convention. An insufficient degree of adhesion by individuals (the principle of indefinable swing) could also result in a convention no longer being observed and hence abandoned.

There is, therefore, a great deal of ambiguity surrounding the term “effort convention”, which is sometimes used to designate the observed regularity of behavior (the “routine” routine  $R_a$ ) and sometimes a pre-existing rule that channels or determines individuals’ behavior (this rule is then, by our definition, part of the repertoire  $R_m$  of the organization).

### **A complex social dimension: trust and organizational performance**

Nevertheless, one important point in this work is that behind the question of the effort convention adopted by individuals lies hidden the degree of trust they have in each other and the level of cooperation given by the different parties. Leibenstein thus establishes a connection between trust and performance, defining trust as the central issue in the problem of coordination. The convention – this routine with an interpersonal component – is dependent on the trust established between the different organization members (Leibenstein, 1978; 1985). Trust, in this context, is of an inter-individual and complex nature.

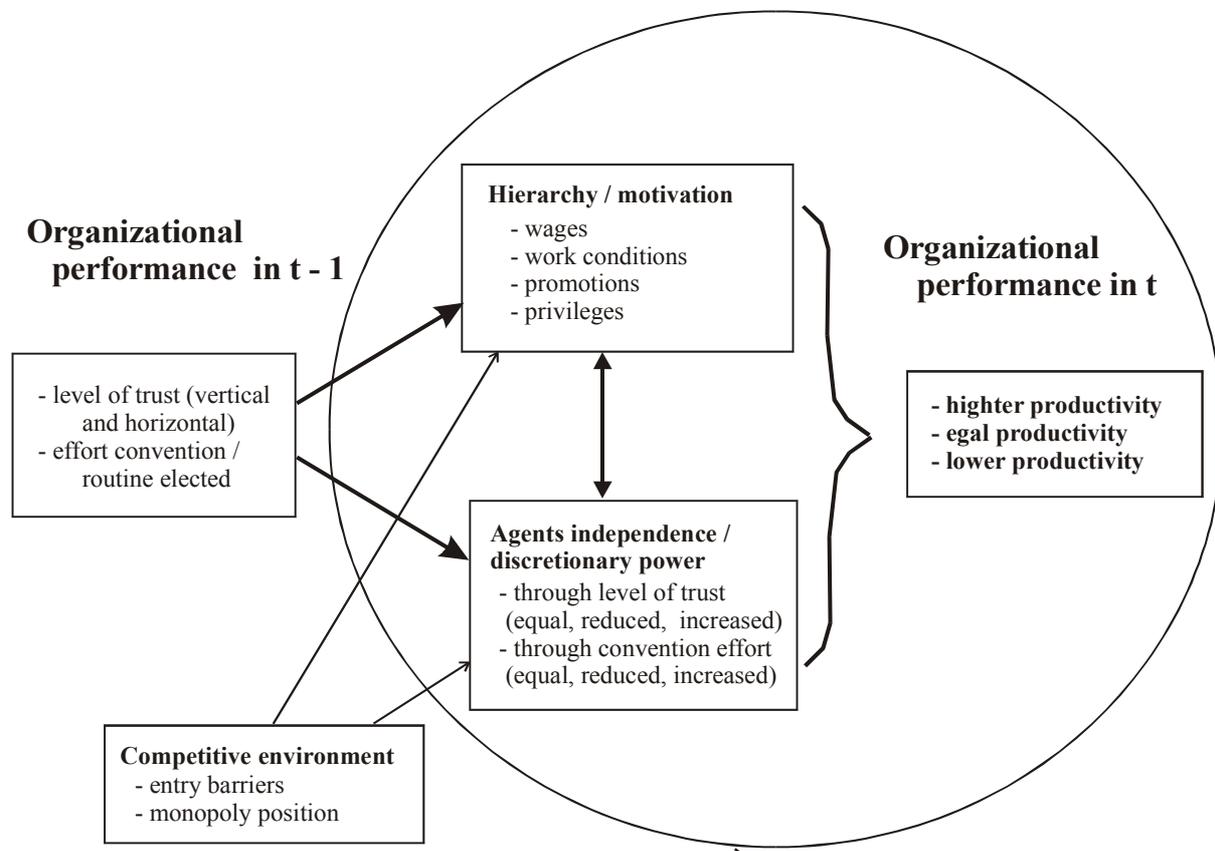
It is inter-individual because the individuals interact within the organization and confront their different interests and decisions, influencing the overall performance level. By comparing social relations in the organization to a type of Prisoner’s Dilemma, Leibenstein (1975; 1987) underlines the importance of what he calls “limited trust” and the necessity of the emergence of trust in a particular context as a pre-condition of the effort convention. Sub-optimal social equilibrium can thus be avoided.

It is complex in the sense that it is situated precisely at the intersection of the vertical and horizontal connections, at the junction of a vertical trust and a horizontal trust, making this trust the most fragile of concepts. It would take no more than a loss of trust, a feeling of mistrust between the management and the employees, between the employees themselves or within management to dissolve the overall trust necessary for the emergence and maintenance of the convention, to the profit of the “parametric maximization standard”. It would take no more than the onset of a climate of suspicion between the workers to condemn to failure any incentive measures implemented by the management, with the further possibility of “free rider” behavior on the part of the workers. Likewise, if mistrust is generated between members of the management (“factionalism”), then vertical trust becomes difficult to construct and the implementation of incentives becomes problematical (Leibenstein, 1987, pp.

171-174). Organizational performance therefore presupposes the achievement of a precarious equilibrium.

In conclusion, while Nelson and Winter approach organizational performance through an exploration its technical dimension, and more precisely the role of routine/skill, Leibenstein for his part emphasizes the social dimension. Consequently, with an “unchanging technical dimension”, behind the truce hypothesis, we find more or less important degrees of trust and individuals collectively choosing a particular effort convention (or routine), with a more or less elevated level of organizational performance, as summarized in the following diagram.

**Fig 5 : The social dimension of organizational performance**



### III. AN ANALYTIC GRID FOR THE STUDY OF ORGANIZATIONAL ROUTINE

From the above we conclude that the concept of organizational routine, necessary for overall performance, involves two dimensions: one cognitive and one social. Without knowledge, without accumulated experience, there is no overall performance. But this is not sufficient. A certain social connection must also be established, founded on conventions, and

these conventions can vary over time. Routine is thus inscribed within a social dimension that we must analyze.

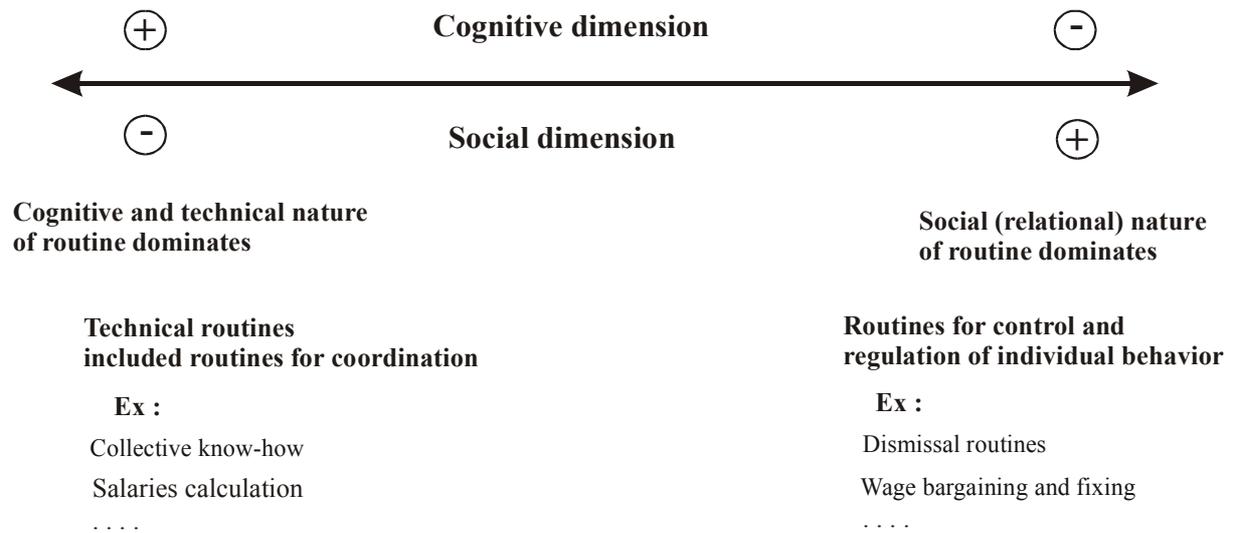
### **The two dimensions of organizational routine**

We consider that the two dimensions – cognitive and social – are analytically distinct. They cannot be combined or expressed one in terms of the other; they do not determine each other in any clear manner. We must emphasize this point. We must distinguish between that which lies in the domain of productive problem-solving (cognitive) and that which concerns relations between people: - not simply to enable us formally to combine two different explanations of organizational performance and coordination, but above all because we are dealing with determinisms of different natures. These two dimensions are analytically distinct, sharing neither the same methods of explanation nor the same evolutionary nature. The logic of the social dimension (and conventions) cannot be combined with that of practical knowledge, that of productive problem-solving. Trust, cooperative will, conflict, etc. cannot be put in the same category as learning, even if the two can easily co-exist. Furthermore, the two dimensions often intervene at different times and in different ways within the organizational activity; and, as Nelson and Winter observe in their discussion of the truce, certain routines are more specifically anchored in the cognitive dimension and others in the social dimension.

“When one considers routine operation as the basis of organization memory, one is led to expect to find routines patterned in ways that reflect characteristics of the information storage problem that they solve. When one considers routine operation as involving a truce in intra-organizational conflict, one is led to expect routines to be patterned in ways that reflect features of the underlying problem of diverging individual member interests. The obvious example of such patterning is the existence of rule-enforcement mechanisms as an ongoing feature of organizational routine, even when serious breaches of the rules are infrequent and most of the sanctions that are nominally available are not applied” (Nelson and Winter, 1982, pp. 110-111).

We thus have the outline of a first analytic grid, a possible classification by which the different routines can be situated on a sort of axis with the routines most anchored in the cognitive dimension at one extreme and those most marked by the social dimension, the evolution of individual behavior, intra-organizational conflict, etc. at the other extreme. Moreover, examples can easily be found to illustrate this approach applicable to very distinct routines or to sub-components of the organizational routine.

**Fig 6 : A first analytic grid**



However, this classification is still too general and unsatisfactory. Most routines (or components of routines) are situated between the two extremes (cognitive and social). How, then, can we classify them? It is certainly not a question of proportion! To go further, we need to distinguish between the two moments in organizational routine: the repertoire (and its formation), and then the appearance of the routine in action.

### **The analysis of repertoires (Rm)**

The repertoires of the organization are memories in which are stored practical knowledge and conventions. These repertoires (Rm) pre-program the behavior of organization members. We have here, therefore, a first step in the analysis of routines, where we seek to identify that which exists before the organizational performance, as the conventions here are just as frozen and stabilized as the knowledge. In addition, it can be difficult to distinguish between that which derives from the cognitive dimension and that which derives from the social dimension; and this distinction is purely analytical. It is equally important to take into account the material form of these memories. We must know, for example, where the memorized knowledge (and conventions) are located, where they are stored, etc.

We are, for example, dealing with: (a) physical resources (machines, equipment, tools, etc.); (b) technical know-how, instructions, files, plans; (c) living bearers of know-how; (d) or combinations of equipment and humans, in particular organizational mechanisms. Often these material forms do not have the appearance of either knowledge or social rules, at least on first sight.

Let us take a very simple example: the gas meter. The installation of such a device can only be carried out (in France) by an approved plumber who, having followed a specific training course, is required to follow a set of instructions defined by the gas company (Gaz de France or GDF). The plumber's repertoire of routines is therefore constituted of physical skill, specific know-how (with a lot of tacit knowledge) and these instructions, which will define his performance. These instructions mainly concern the problem (which is essentially technical) of safety (materials used, type of welding, minimum distance from electrical installations, ventilation, etc.), but there is a rule (the height of the meter from the ground) that has no technical justification, being simply the expression of an internal GDF agreement concerning the working conditions of those employees whose job is to read the meters. We have here the trace of a convention (an element of *truce*) that is conserved in the instructions, and which programs the plumber's routine in action. We could also argue that behind all these safety rules lies a general (uncontested) convention in favor of safety, which pre-regulates and coordinates the actions of all those who may be required to intervene here (electricians, for example).

It can be seen that these instructions cannot be immediately and clearly classified totally in the technical dimension (or in the social dimension). The two dimensions appear to be interlaced and can only be distinguished by analysis. We believe, therefore, that three issues need to be resolved:

(1) First of all, we must recreate the processes of formation of repertoires and the integration therein of knowledge and conventions. The activation (prior to the present time) of a certain number of routines is a pre-condition of the formation of a repertoire *R<sub>m</sub>*. Inevitably, therefore, we will find traces here of mobilized knowledge and of a certain number of previous *truces* or conventions; and some of these traces effectively play a role in the production of the routine in action. This is the most important point. We are therefore concerned primarily with the rules and conventions integrated – either voluntarily or involuntarily – into the repertoire that effectively programs the future routine in action. Thus, in the learning of a skill to be implemented in an organizational context, the technical elements proper to the skill itself are always accompanied by the transmission of certain rules of behavior, which are instilled in the trainee in order to establish in advance his relations with the other organization members, according to their position in the division of labor (belonging to the trade or not) and the hierarchy of the firm. The same holds true for machines, which habitually integrate the social position of their future users into their very constitution, with

the definition of the work station, more or less “qualified”, more or less independent, etc.; the aesthetic of the machine is no doubt of less importance.

(2) We need to define the character and location of the deposits deriving from the past. It is particularly important to know exactly where and in what form can be found the knowledge and conventions crystallized within the organization. For it is not only the particular contents of a given repertoire that are “embedded” in the social dimension but also the supports of this repertoire that are in and have something of the nature of the dimension. There exists a whole institutional framework – frozen or evolving – which reaches far beyond one particular organization. This framework is defined elsewhere and the organization does no more than provide its own particular interpretation: relations of property, industry agreements, employee training systems, laws and customs, international treaties, regulations, etc. The actions (routine-driven or innovative) of certain bodies specialized in the definition and application of these rules may also intervene. This general context (institutional and social) of the organization must be recreated; it is partially inscribed in the repertoires and to some extent defines the manner in which they can be activated (limiting, for example, the number of actions A(n) that disturb the circuit).

(3) Lastly, we need to define which of the firm’s repertoires are stored within organization members who can intervene independently in the activation of routines; we thus return to the problem of programming, of the link between the Rm’s and the overall performance Ra. This involves points (c) and (d) in the list above: living bearers of know-how and combinations of equipment and humans, in particular organizational mechanisms. Behind, of course, are the human beings, who always remain fundamentally independent in the expression of their own repertoires. This is the subject we shall now explore.

### **The principle of independence and the routine in action (Ra)**

There is a common element in the work of Leibenstein and that of Nelson and Winter, which sets them radically far apart from neo-classical theory: the existence of what one could call a principle of independence in human beings. With Leibenstein, this principle can, for example, take the form of the discretionary choice of effort, a key hypothesis in his theoretical argument. Individuals themselves determine their effort levels, and they chose them “freely” in the sense that no equation, function or calculation can precisely fix this effort level. This principle introduces an element of uncertainty (in the sense used by Knight, 1921) into the heart of the analysis of individual behavior. This explains the importance of the factors that tend to limit this independence: institutions, customs, social pressure (peers, management,

etc.), pre-established conventions, etc. (to which can be added, on an individual level, the principle of inertia). We are thus led to study firstly the different determinisms, stemming from society or from the past, which influence the present behavior of individuals, while accepting the idea that these individuals are always capable of challenging hitherto respected rules and conventions. Nelson and Winter accepted this principle, but the independence of individuals in Leibenstein's sense of the word is neutralized in their approach by means of two hypotheses. On an individual level, they postulate a certain "good will" and on a collective level a "political equilibrium" in the organization (the "truce in intra-organizational conflict"). However, they add - in these hypotheses - another form of independence of organization members (who should not be totally equated with individual human beings): this is situated in the cognitive dimension and is founded on the specific and tacit nature of the knowledge deposited in the different repertoires of the organization members (Nelson and Winter, 1982, p. 85 onwards).

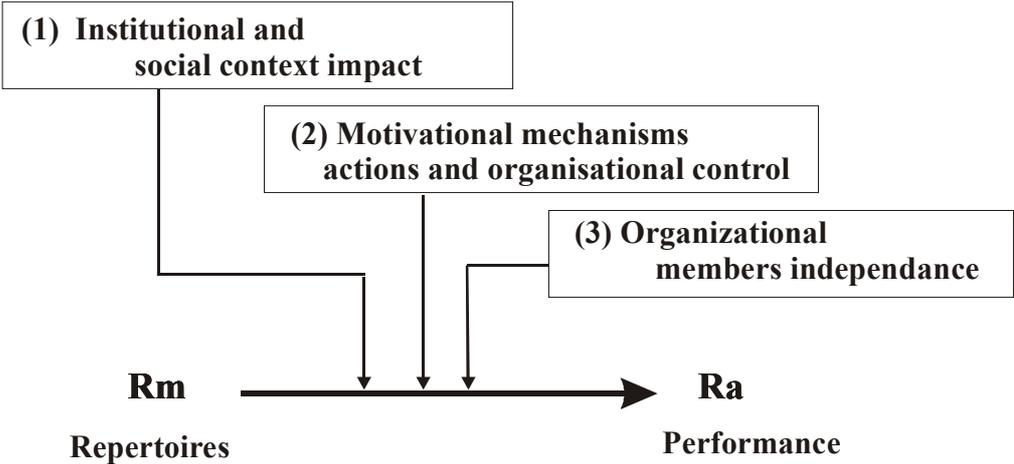
This means that even when a set of duly codified official rules and procedures exist, the productive behavior of the organization members can never be reduced to these rules. It always differs to a greater or lesser degree, for two reasons: (a) Some of the knowledge accumulated in the organization (and in the workers) is generally tacit, in the sense that it is hidden or even totally inarticulable (Winter, 1987). There is always, therefore, a certain difference between the official procedure and the procedure effectively followed (which alone gives rise to the performance), the origin of which is purely cognitive. (b) On top of this cognitive gap there is often a gap originating in the social dimension (motivational/relational), when this procedure, which incorporates a certain state of truce, is contested, for example. In this case, individuals themselves change their effort level, redefining the existing convention (or truce). The source of the gap then lies in the independence of individuals in the expression of their own repertoires, which leads us analytically to the link between  $R_m$  and  $R_a$ . Furthermore, the two gaps may combine and reinforce each other, for the existence of tacit knowledge gives wide margins of independence to the individuals.

When the analysis focuses on the link between  $R_m$  and  $R_a$ , we can no longer approach the problem of the social dimension in the same manner. There are social rules - which generally guide present behavior - integrated into the repertoires, but the actual performance is always based on conventions that we must treat as new, produced at the present moment, even when they exactly reproduce those of the past. The conventions existing up until the moment  $t$  can always, *a priori*, be challenged at the moment  $t + 1$ . It is clearly at this level that the many constraining and/or incentive mechanisms play their role; mechanisms in the firm, industry or

society as a whole whose function is precisely to neutralize the most deviant behavior, although they cannot totally exclude it. We are dealing here with specific routines (varying greatly from one organization to another) whose action and influence must be studied as such.

We can, therefore, propose the following formal framework:

**fig 7 : An organisational routines analysis framework**



We thus bring out – by separating these routines from the others (a separation that is generally instituted in the organizational world) – the specific action of routines (1) and (2) on the overall routine<sup>9</sup>. By adding the independence of organization members and discretionary behavior in terms of human effort (3), we can bring to light the most important elements to take into account in the social dimension in order to understand the transition from capacities (Rm) to performances (Ra).

In the study of organizational routines, whether this focuses on (a) the overall performance of an organization or (b) the movement of a specific organizational routine, we therefore believe that three issues must be addressed:

(1) Analysis of the degree of independence of organization members and their potential influence on overall performance. Situations (of employment) can be very varied. In certain cases, independence (apart from the simple refusal to take part in the productive activity – by striking, for example) is weak or almost non-existent. It may be, for example, the mechanical element that sets the rhythm and defines product quality. In other cases, on the contrary, the quantities produced are a function of the intensity of human work, and the daily variation in

production rates – which can be interpreted as a displacement of the effort convention – determines overall performance. Sometimes, in other industries or other production situations, the product is a function both of the “professional conscience” of part of the work force and of the correct deployment of their know-how.

(2) Examination of the incentive systems and routines of control of employees and processes, each with their own efficiency (or inefficiency); not only at the level of the whole organization but also at the more elementary level of the routines of different organization members. For the elements of control of the performances provided are often integrated directly into the material definition of technical interactions or within the very movement of the routine.

(3) Examination of the general social context and the evolution of this context within the organization (and outside it); because variations in effort conventions may very well originate in causes that are external to the production process itself (in (1) in the above diagram, for example).

#### **IV. CONCLUSION**

We believe, therefore, that one very important point for the analysis of routines is the distinction between repertoire ( $R_m$ ) and routine in action ( $R_a$ ). The analysis does indeed focus on the effective routines  $R_a$ , but we can only understand their potential stability or their evolution over time by identifying the “genes” (practical and technical knowledge, social rules, conventions, etc.) which, within a certain context, produce these routines. We therefore need to examine (a) the repertoires  $R_m$  of the organization, and (b) the coordinated deployment of the routines, i.e. the link between  $R_m$  and  $R_a$ . It then becomes necessary to separate two dimensions (the practical cognitive and the social). It is, of course, possible to concentrate on one dimension (and to neglect the other); this is a choice that can, in certain cases, be of great heuristic value. For example, by assuming a truce hypothesis one can concentrate the analysis on what can be most important in the definition of the phenomenon. One can thus bring to light the power of technical determinisms, the mechanisms that produce technological trajectories, the discovery, for example, through a sort of collective invention, of certain solutions to (recurring) problems faced by men in their relations with nature. By leaving aside the technical dimension, on the other hand, one can highlight those factors that

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<sup>9</sup> We would specify that in general the routines (2) should not be confused with the set of management routines. In any organization of a certain size, management also plays a functional or technical role: organization of production processes, management of interactions and flows, etc.

are determinant in other contexts, such as the importance of institutions, existing conventions, etc., and the logic of social relations (conflicts, compromises, trust, formation of new conventions, etc.). However, in the great majority of situations these partial approaches are fairly irrelevant, for in these cases organizational routine is structured by both technical and social determinisms, and largely dependent on the manner in which the bearers of repertoires exercise (or not) their own capacities.

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