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Theme E

«ETHICAL INNOVATION»: A NEW APPROACH TO INNOVATION PROCESSES

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Abstract:

The analysis of learning processes in an evolutionary environment permits to state that agents must keep ongoing processes of factual as well as normative learning in order to adapt to an ever-changing environment. The key conceptual element «ongoing learning processes» is explored in this paper linking it with the proposed concepts of cognitive and ethical dynamics. This latter link allows to reflect about the emergence and the role of ethical innovations in the explanation of economic change: the creation, removal and reorganization of agents' objectives, not merely explained from cognitive dynamics, are also sources of economic change.

Keywords: Novelty, Cognitive and Ethical Dynamics, Self-organised transformation

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«Ethical Innovation»: a new approach to innovation processes

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1. Introduction

«There is nothing invariable in the economy except its constant **change**. Technological change and the corresponding restructuring of industry are obvious examples.» (Witt 2003b, p. ix)

Any explanation of economic change requires the existence of some kind of regularity within change. Only then we can identify certain general and permanent principles that may explain the evolution in the economic domain. A first step towards the finding of these principles, as proposed by Witt, is the fulfilment of an «heuristic task». The latter consists in formulating concepts and instruments that permit one to describe and analyse economic change. This paper should be understood as an attempt to approach this heuristic task.

A central focus of evolutionary dynamics are processes which have the capacity of expanding their state space through the generation of not previously existing states. In this sense, evolution is seen as «the **self-transformation** over time of a system under consideration.» (Witt, 2003b, pp.12-13) «Self-transformation can be split into two logically (and also usually ontologically) distinct processes: the *emergence* and the *dissemination* of novelty.»¹

The distinction between emergence and dissemination of novelty as well as the role of learning in the explanation of self-transformation processes, implies, according to Witt, two main explanatory problems. On the one hand, there is a necessity to provide explanations for the phenomena and conditions without knowing the meaning of the (next) emerging novelty. This kind of problem gives rise to what Witt calls *pre-revelation* analysis. On the other hand, another kind of problem arises once novelty has revealed its meaning: this is the *post-revelation* analysis. As a result, any theory of evolution has two tasks: «(1) to explain how, under what conditions, novelty is being generated within the explanatory domain of theory; and (2) to explain what happens as a consequence of

¹ Witt's quotation continues: «in the economic domain, given the discipline's focus on human action, novelty is usually seen as emerging from a newly discovered possibility for action which, once taken, is called an innovation. However, any attempt to innovate is likely to trigger, and be accompanied by, learning. When the news of the innovation spreads the innovation can disseminate by imitative learning.»

novelty having emerged within the domain. The bulk of explanatory efforts usually focuses on the second task.» (Witt, 2003b, p. 13)

This seems to be the case with **innovation** studies. In fact, over the last two decades innovation studies have seen important advances based on the contributions of Evolutionary Economics. In the framework of evolutionary analysis of economic change, and more particularly of innovation systems, the emergence of technical and institutional novelties and learning processes that take place at the individual and organisational level have been considered the most important processes that characterise innovation (Lundvall, 1998, 2004; Edquist, 2000).

The approach proposed in this paper assumes the importance of these works. However, it focuses primarily on the first task: that is, in developing a conceptual framework to analyse economic change. This task would belong, in Witt's terms, to pre-revelation analysis.

This approach is based on the concept of (economic) **action plan**, defined as the *projective* adaptation of means to ends. The concept of action plan –as well as the methodological foundations involved– will prove to be useful in the understanding of economic change, as it reveals the different sources of innovation to be aware of. The proposed concepts of **cognitive dynamics** and **ethical dynamics** as well as their consequences in terms of novelties, are integrated into the notion of action plan as an heuristic model to represent economic dynamics.

On the one hand, «cognitive dynamics» refers to the evolution in agents' perception and understanding of reality.² This perception is based on accumulated knowledge through passed experience, on the present environment where action takes place and on expectations of future phenomena or events. Cognitive dynamics should therefore be understood as the evolution in agents' perception of what reality **is** or **might be** in the future. Knowledge –codified as well as tacit knowledge- and learning processes play a major role in this development. On the other hand, «ethical dynamics» refers to agents' conception of what reality **should be**.³ It will be argued in the paper *how* both cognitive and ethical dynamics are linked to the emergence of novelties.

The so called «action plan approach» will perform two main tasks: (1) it will serve as a conceptual framework to *explore* the processes generating economic change (heuristic task); and (2) it will prove to be useful to *illustrate* how under certain conditions novelty is being generated within this conceptual framework (*analytic* task).

² Throughout the paper, «agents» should be understood as persons (individuals) as well as organisations.

³ The distinctions between the concepts of cognitive and ethical dynamics is due to Rubio de Urquía (see for example, 1998, 2003). It will be further explained below.

The first main hypothesis of this paper is that *the evolutionary tradition has contributed to establish the links between what has been defined as cognitive dynamics and economic change*. However, another source of economic change different from cognitive dynamics and related with ethical dynamics is considered here: **ethical innovation**, understood as the creation of new objectives (ends), the removal of existing ones and/or their hierarchical reorganisation.

The conceptual framework proposed enables us to establish our second hypothesis: *ethical innovation is another source of technological and institutional innovation, that is, of economic change*. The assumption and discussion of this second hypothesis (analytic task), would not be possible without a conceptual framework that provides a heuristic base (heuristic task).

The second hypothesis leads to the fact that agents' rationality also depends on the ends and motivations that they pursue. Thus, what gives an impulse to economic activity is then not only economic calculus but the true possibility of developing an «open rationality», the rationality of the unexpected.

The paper is organised as follows. Section 2 considers the role of learning processes in the explanation of economic change; in this context we define cognitive and ethical dynamics. Section 3 presents the action plan approach in the context of innovation processes. Given the conceptual framework it is possible to illustrate how novelty and, in particular, «ethical innovation» can be treated. Section 4 shows the relationship between the action plan and novelty. Section 5 is dedicated to examining in what sense ethical innovation is a source of economic change. Finally, the paper includes some brief conclusions and points out possibilities for further research.

2. Learning processes

Knowledge and learning processes play a major role in the explanation of economic change. Therefore this section will present a brief discussion on this role starting with the questions of *why* and *what* do agents learn.

A succinct and immediate answer to these two questions from an evolutionary perspective could be the following one: agents have «bounded rationality» (why) and because of this they have to deploy factual and normative learning processes that allow them to implement, also, factual and normative knowledge (what). The approach to both questions is going to be presented as follows: sub-section 2.1 presents the elements of learning processes in evolutionary economics, developing the answers to the previous questions (why and what do agents learn). Moreover, sub-section 2.2 introduces the

concepts of cognitive and ethical dynamics. As will be shown, these concepts permit us to go into fine detail concerning learning processes, and will also play a key role in the action plan approach.

2.1 Learning in evolutionary environments

In an evolutionary model, agents have bounded rationality and have processing capacities and an imperfect understanding of the environment and the future conditions of the economic system.

Bounded Rationality or *why* do agents learn in evolutionary environments

Agents are supposed to be boundedly rational (Simon, 1983, 1970), behaving according to the so called «behavioural model» instead of according to the Olympian one of subjective expected utility theory. Simon proposes that «rationality could focus on dealing with one or a few problems at a time, with the expectation that when other problems arise there would be time to deal with those too.» (Simon, 1983, p. 20)

What the mechanisms are for this kind of rationality is equivalent to asking about the characteristics that an organism needs to be able to bear bounded rationality. Simon proposes that *it* needs:

- first, some way of focusing on the things that need attention at a given time;⁴
- second, it needs some mechanism able to generate alternatives: the main part of the problem consists of searching for good alternatives;⁵
- and third, a certain capacity to acquire facts about the environment in which we find ourselves and a modest capability for drawing inferences from these facts is required.⁶

All these considerations mean that agents come up with standard operating procedures and routines that rule their daily activities.⁷ These routines are rather stable, practical and accurate in giving meaning and response to a very complex environment.

Simon points out that this bounded rationality version of human thinking and problem solving shows how people effectively act. There is a strong empirical base for asserting this. Simon takes into

⁴ «[S]ometimes you're hungry, sometimes you're sleepy, sometimes you're cold. Fortunately, you're not often all three at the same time.» (Simon, 1983, p. 19)

⁵ Simon (1983) offers a description of some of the mechanisms based on Simon (1970).

⁶ This capacity would permit to generate alternatives as well as to assign them their probable consequences.

⁷ «Most of the time in our society we don't have to be out looking for food, but every so often we need to be reminded that food is necessary. So we possess some mechanism that arouses periodically the feeling of hunger, to direct our attention to the need for food. A similar account can be given of other emotions.» (Simon 1986, p. 21). The analytic value of bounded rationality is that it bears itself attached the concept of routine. This concept is reformulated later in evolutionary perspective by Nelson & Winter (1982) as is suggested by the lecture of the Darwinian metaphor proposed by Witt (2003b, pp. 10-11).

account that agents have a modest computational ability compared to the complexity of the world around them. Finally, he points out that this rationality does not optimise: «[n]or does it even guarantee that our decisions will be consistent» (1983, p. 23). In fact, it is rather easy to show that agents' choices depend on the order in which the alternatives have been presented. To summarise: for Simon, the behavioural model would explain how agents' actions evolve in a world far more complex than the one considered from the Olympian viewpoint.

As Dosi et al. (1996) have shown, an important issue is the characterisation of the origins and nature of the «boundedness» itself. «It is not all irrelevant whether it relates mainly to limitations on the memory that agents carry over from the past, or to algorithmic complexity, or to limited ability of defining preferences over (expected) outcomes. (...) Or, more radically, couldn't it be due to the fact that agents get it basically wrong (in terms of representation of the environment, etc.)?» (Dosi et al, 1996, p. 8)

Different theoretical alternatives have been pointed out by Dosi et al. (1996) to this respect. These alternatives are:

1. The most usual alternative is the one that –mainly in game theory- assumes hypotheses of bounded rationality well-fitted to the mathematics the author knows and to the results one wants to obtain.
2. Another alternative refers to the recognition of an empirical discipline upon the restrictions one imposes on the rationality of the agents: it should be recognised that rationality is bounded depending on the nature of the decision problem on the one hand, as well as on the base the agent decides and the set of previously learned elements that other agents take into account.

We come back then to answering the initial question of *why* do agents learn. Agents learn because they do not know everything; or in Witt words, «agents have bounded rationality. Because they lack perfect knowledge these agents are likely to try to improve their knowledge.» (Witt, 2003a, p. 79). We will come back to this question in sub-section 2.2; now it is necessary to examine *what* do agents learn.

What do agents learn in evolutionary environments

As Witt (2003a, p. 79) has shown, «[agents] learning takes time, bounded rationality transcends the boundaries of a static representation of choice problems.» For improving knowledge agents deploy learning processes; in this sense, Dosi et al. (1996) say that learning may occur either due to: (1) a lack of information about the world; (2) an imprecise knowledge of its structure; (3) when the agents have a limited set of actions in order to cope with problems they face; (4) when agents have a changing and

blurred understanding of what their goals and preferences are.

It should be noted that reasons (1) and (2) are related with the *imperfect* understanding of the environment. However, reason (3) points out to what could be called *insufficient* understanding in contrast with the imperfect understanding of the world by agents.

Dosi et al. (1996) propose that learning has three inter-related meanings (related with the classification of different kinds of knowledge classified according to tacitness -as in Winter (1987)). These are: (1) acquisition of more information, (2) various forms of augmentation of knowledge *stricto sensu*, and (3) the articulation and codification of previously tacit knowledge. These precisions permit to the author to establish that a property of learning processes is the diversity of learning modes and sources of knowledge (in the context of different technologies and sectors, these can be, for example, learning-by-doing and learning-by-interacting).

Different degrees of imperfect understanding and imperfect path-dependent learning implies persistent heterogeneity among agents, even when they have identical opportunities and information. Learning acquires great importance in evolutionary environments where heterogeneous agents display various forms of bounded rationality.

The remaining question is: what do agents learn? Dosi et al. (1996) point out four classes of objects of learning: (a) the «states-of-the-world», (b) other agents' behaviours, (c) how to solve problems and, (d) one's own preferences. From an appreciative perspective, Witt (2003a) states, in relation to policy making, that «[i]n an evolutionary perspective, (...) the positive and normative knowledge that informs the actions of the agents involved can change through experience and induced inventive learning.» That is, agents incorporate factual *and* normative knowledge derived from learning processes. These elements constitute the foundation from which the actions that the agent deploy are shaped. As a result what agents learn are two sets of elements: factual and normative knowledge.

2.2 Learning in a wide conceptual categorisation

From subsection 2.1 above, we could state that in evolutionary environments agents must retain ongoing processes of factual and normative learning in order to adapt to an ever-changing environment. In this section we propose a conceptual framework to approach «ongoing learning processes». The approach is based on the *analytical* distinction between:

- a) the evolution in agents *perception* of reality, that is, in agents perception of what reality **is** or **might** be in the future; and
- b) the evolution in agents *conception* of what reality **should be**.

We propose the following definitions:

Definition 1: cognitive dynamics is the process of accumulation of factual knowledge. It refers to individuals and organisations' (agents') perception and understanding of reality. This perception is based on accumulated knowledge through passed experience, on the present environment where action takes place and on expectations of future phenomena or events (Rubio de Urquía, 1998, 2003). Cognitive dynamics should therefore be understood as the evolution of agents' perception what reality **is** or **might** be in the future. Cumulative knowledge, particularly tacit knowledge and learning processes play a major role in this development.

Cognitive dynamics might be identified with factual learning and factual knowledge. It is an important element of the *ongoing learning processes* deployed by agents in order to adapt to an ever-changing environment. However, cognitive dynamics does not exhaust the possibilities of learning in evolutionary environments. Evolutionary economists recognise the role of values, beliefs, attitudes, etc., in explaining economic change (Dosi & Nelson 1994, p. 159; Dosi et al., 1996).

Definition 2: ethical dynamics refers to the evolution in agents' *conception* of what reality **should** be.

Ethical dynamics is another element of ongoing learning processes deployed by agents in order to adapt to an ever-changing environment, but in this case related to normative learning and normative knowledge.

Witt, who has explored the role these conceptions, distinguishes between what he calls «positive» knowledge and «normative» knowledge. In the context of economic policy, Witt states: «In an evolutionary perspective during the process of policy making, and in its aftermath, the positive and normative knowledge that informs the actions of the agents involved can change through experience and induced inventive learning.»⁸ (Witt, 2003a, p. 78)

⁸ Accordingly, at each of the different levels of the theory of economic policy making the time horizon in tracking causes and effects and in assessing means-ends relationships needs to be extended to account for the repercussions of the changes induced in the agents' knowledge constraints (...) borderline between economics and moral philosophy and leads to some philosophical reflections on the implications of evolutionary though more generally. In each of the sections the focus is on the process of learning about facts on the one hand and values or goals on the other.» (Witt, 2003a)

3. The «action plan» approach to innovation processes

From the definitions of cognitive and ethical dynamics it is possible to present the so called «action plan approach». This is the base for the heuristic task, that is, the proposal of concepts and instruments that permit us to describe the ongoing processes of factual and normative learning. As has been pointed out, evolutionary economists do recognise the roles of values, beliefs, attitudes, etc., in explaining economic change -at least in the appreciative theorising (see, for example Dosi & Nelson 1994, p. 159; Dosi et al., 1996; Witt, 2003a). The «action plan» is an analytical tool that will permit us to represent and integrate all these elements.

It will be shown in this section that this approach has not only an heuristic, but also an analytic value in understanding economic processes, in particular, of economic change.⁹ In the sub-sections that follow a brief summary of the concept, and the properties and relations between different elements of «action plans» will be presented.¹⁰

3.1 «Action plan» definition: its morphology and properties

Definition 3: an **action plan** is the agent's projective adaptation of actions to objectives. An «instantaneous action plan» is a system of actions and objectives that are ordered at a given instant in time.¹¹

An action, in this sense, should be understood as a means that can be an activity as well as an object. For example, driving a car, or a car itself, could both be means to reach the objective of travelling somewhere. An objective is an end, a goal or a target that the agent pursues.

The very nature of action plans is the **projective** character of the orderings involved. This refers not only to the fact that time -and timing- plays a central role in explaining human (economic) action, but also that actions and objectives need to be imagined. Moreover, the set of actions and objectives

⁹ The approach proposed is to be considered as appreciative theorising.

¹⁰ The implications of the «action plan» approach are wider than those presented here. The interested reader can consult Rubio de Urquía (1998, 2003); Encinar & Muñoz (2004a; 2004b), and –in an Austrian perspective– Rodríguez (2002).

¹¹ The concept of «action plan» is not new in Economics. It can be found in economists of different traditions such as Keynes (1936), Hicks (1939), Stackelberg (1946), Eucken (1939), Debreu (1959), Malinvaud (1999), Boulding (1991), etc. In some authors, plans are merely a name (Debreu, Malinvaud). In others, especially in Eucken and Rubio de Urquía, it is a central concept -a keystone- of their works. In his recent works –which inspires this one- Rubio de Urquía (1998, 2003, 2004) has proposed the following definition of Economic Theory: «we understand Economic Theory has the following object of study: (1) how and why economic agents who interact in an environment adopt some action plans –projective linkages of actions (means) to objectives (ends) and (2) which results are produced, and why, on the agents and the environment.» (Rubio de Urquía, 2004)

can be manifold: material or not; located at any point in time, although obviously not all at the same point; possible in some physical sense or not; able to be expressed in monetary terms or not; etc. The action plan is therefore a rather general open structure.¹²

The **morphology**, that is, the structure, of an action plan can be represented by using simple graphs. For example, Figures 1 and 2 show the basic structure of an action plan in very simplistic terms.

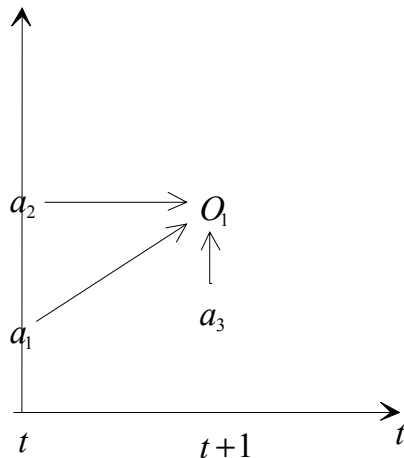


Figure 1

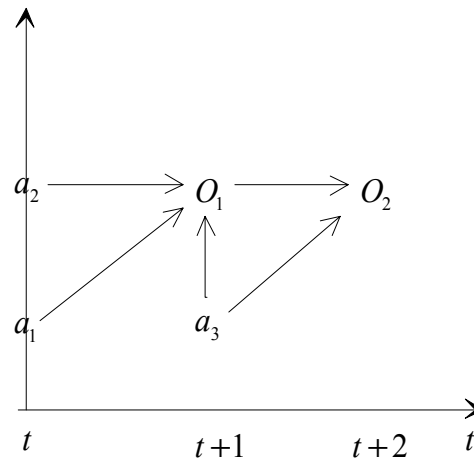


Figure 2

In Figure 1 we have the following elements. On the one hand, three actions ($a_i, i = 1,2,3$) and a single objective O_1 are considered. On the other hand, we have two analytical points in time, t and $t + 1$, upon which the action is defined and is carried out.¹³

The relationships between the actions and the objectives are indicated by arrows. Actions a_1 and a_2 are carried out in t , and action a_3 is carried out in $t + 1$. For the case at hand, the three actions are perceived by the agent that produces the action plan as necessary and sufficient for objective O_1 to be achieved. A very simple example of this plan could be the following: the agent plans to buy a car (O_1). In order to get it, he/she buys a car catalogue ($a_{1,t}$) and compares the possible options

¹² A very close concept to (economic) action plan is the concept of routines (Nelson & Winter, 1982; Becker (2000). It would be interesting to analyse the concept of routine within the action plan approach. Routines in this context can be seen as parts of plans. A plan admits routines: a routine is a «mechanised» part of an action plan. Whereas the basic characteristic of action plans is the *projective* nature of action. This discussion is part of the ongoing research by the authors of this paper.

¹³ This time dimension can be expressed using indexes; in particular, $a_{i,t}, a_{2,t}, a_{3,t+1}$ and $O_{1,t+1}$. For simplicity of notation, whenever it is evident, we will not make use of these time indexes.

according to his/her preferences and his/her earnings ($a_{2,t}$); in the next step ($t + 1$) he/she buys it ($a_{3,t}$).

Figure 2 represents a slightly more complex plan: actions a_1 and a_2 lead to the achievement of objective O_1 at time $t + 1$, and this objective, together with action a_3 — which also influences O_1 as is indicated by the broken arrow — determine the achievement of objective O_2 at time $t + 2$.¹⁴ A variation of the previous example will be useful to illustrate Fig. 2: the agent plans to buy a car but has not enough liquidity. Then, he/she proposes as an intermediate objective, to obtain the money; thus O_1 that leads to O_2 in the next period. In order to get the money that permits him/her to reach O_2 , he/she goes to the bank and asks for a credit -action a_1 - and he/she compares the alternative cars -action a_2 -. Now, action a_3 cannot be taken in $t + 1$; he/she has to wait to get the financial support in $t + 1$ -objective O_1 - in order to finally buy in $t + 2$ the car and therefore reach O_2 , that is to fulfil his/her plan.

Naturally, action plans can be more complex than the simple ones represented here, and as has been shown they can refer to their objectives at several points of time.

These basic concepts make it possible to represent any type of action plan imaginable, with hierarchical dependencies among ends and actions (as in Fig. 3 and 4) and with as many analytical time moments as needed. Given the above elements (actions and objectives), it is possible to carry out a morphological analysis of the action plans and their **properties**. A first important characteristic is that *the action plans considered do not necessarily have to represent successful or even feasible ones*.

On the one hand, actions could lead to the attaining of pursued objectives or not: for example, the orderings can violate logical or scientific laws: in this sense we would say they are *inconsistent from a logical or material point of view*. For example, let the objective of a person O_1 be «to fly», and a_1 the physical and human means, and a_2 «to jump» from a window.

¹⁴ The representations can be of «static» problems or «dynamic» ones. Figure 2 could represent a dynamic problem –perhaps mathematically expressed as a dynamic optimization problem.

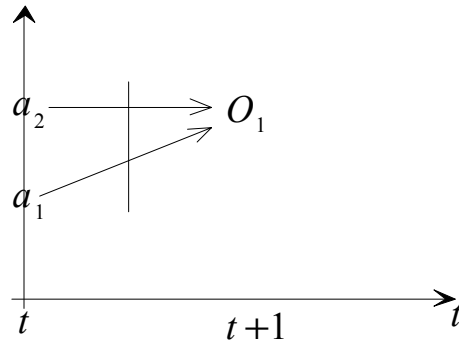


Figure 3

This represents an inconsistent plan due to technical unfeasibility: the violation of a physical law. The inconsistency is of a general physical character. In cases like this the actions involved are not efficient in reaching the pursued ends.

Moreover, *objectives could cancel each other out* because of a logical contradiction or because of competition for actions (means) needed to reach them. For example, consider Figures 4 and 5 below.

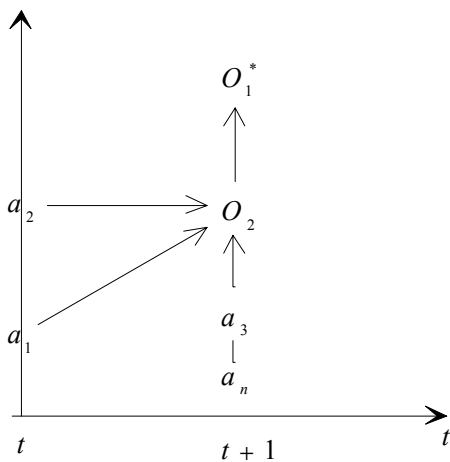


Figure 4

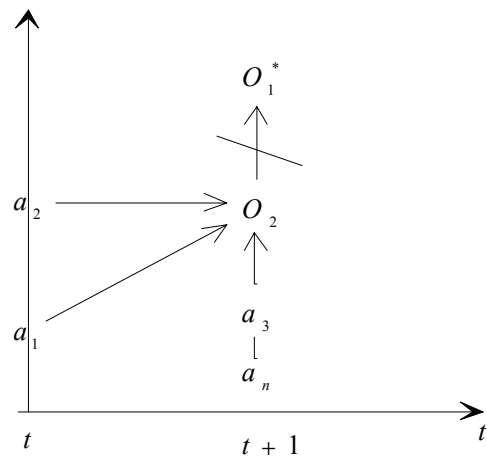


Figure 5

In Figure 4 the action plan described contains an objective O_1^* such that it has the particularity to be fundamental in the scale of valuation of the agent. Let it be to take good care of his/her *family life*. This is the main end pursued and thus, the rest of objectives and actions should lead to it and be consequent with it. In this example, suppose that the agent proposes a second objective O_2 , that operates as a means to an end: to have a good job, which implies a set of actions (a_1, \dots, a_n) in

different or the same periods of time. This gives the agent the possibility to reach a certain level of income and to assure a certain standard of life for his/her family.¹⁵

In Figure 4, the actions carried out will lead to the objectives proposed being achieved. However, let's take a variation of this example, illustrated by Figure 5. Here, some elements appear that make it impossible to fulfil the plan in which good family life is the main objective. On the one hand, the agent maintains the strict preference of O_1^* over O_2 , on the other hand, he/she allocates a growing number of hours to work, in such a way that he/she has no time for his/her family life. When the agent devotes a maximum number of hours each day to work and to complementary activities (dinners, etc.) and, at the same time, he/she maintains the hierarchy of O_1^* over O_2 , then he/she is formulating an internally inconsistent plan. This means that the agent pursuing O_2 in the way just described is intrinsically denying the possibility of reaching O_1^* , which constitutes a flagrant paradox.

All this results in what is referred to as «internal inconsistency» of action plans.¹⁶

Another source of cancellation of pursued objectives which should be considered and which is different to that mentioned above is «external inconsistency». External inconsistency is linked to the *interaction among plans*. Two different sources of external inconsistency arise: (1) the agent's action plan does not take into account relevant information about the social environment in which it interacts with the action plans of other agents; or (2) the objectives and demands for means lead by other agents collapse the feasibility (and so the performance) of the plan the agent is trying to deploy. Concepts as co-ordination, lock-in effects, etc., are related with interaction of plans.

The proposed examples do not require actions or objectives to be given. That means that in action plans framework, actions (means) and objectives (ends) are *not given* in the Robbins (1933) sense. Considering actions and objectives as *given* enables to only treat static problems; however economic change is by definition a dynamic phenomenon.¹⁷

¹⁵ The symbol * in O_1^* is intended to represent the hierarchical primacy of this objective over others.

¹⁶ The interested reader can consult Rubio de Urquía (1998; 2003), Encinar (2002) and Encinar & Muñoz (2004a, 2004b).

¹⁷ The essence of economic dynamics cannot be approached through the theory of scarce resources. This is true to the extent that often economic theory is identified with a system to describe a *technology* that increases the efficiency of resource allocation. This theoretical exercise of the «technology of choice» has been developing ever since the systematic analysis and application of the optimisation principle. In the neoclassical model, which is consistent with the maximisation of an objective function used to structure the alternative level in a «hierarchical manner» subject to restrictions that reflect the restriction of «feasibility» of the plan. This has been criticised from several different fields, such as game theory (Rubinstein, 1998).

As a result, action plans are «living» and dynamic economic elements, because they admit any type of change in their elements (actions and objectives). The approach provides an analytical structure that can adopt the «vitality» of the agent's action plans, in the sense of *production of action plans*, and their elements.

3.2 On «action plans» and Economics

Economic Theory has been understood as the science which studies the process of the constitution of an action under which scarce means (or, more generally, actions) are allocated to alternative ends (or, more generally, objectives).

How can we make compatible this view of Economic Theory with the approach based on the concept of action plans?

The understanding of the agent's activities, might be explained, in the simplest possible case, as follows. Let's assume the following sequence of analytical moments of the action plan at t :

- (a) **constitution** of the set of action plans, that is, the construction of the set of possibilities of action as perceived by the agent and which refers to what the agent will do, why he/she will do it, and how he/she will do it; (this is a fundamental moment, as it will be shown below);
- (b) **selection** of an «action plan» from the set of action plans previously constructed;
- (c) **attempt to carry out** the selected action plan;
- (d) **evaluation** of the result by the agent in terms of the objective, once the plan has been carried out. Note that once the evaluation has taken place, the agent may be able to *revise* the structure of his/her set of action plans, which is a process that has to do with *learning* -either positive or negative learning.

The analytical moments (a) and (b) are clearly different from (c) and (d). In fact, the constitution as well as the selection of action plans has to do with the individuality of agents. Moment (c) is related with interaction, and (d) with learning processes. The rest of this sub-section deals with these matters.

From a logical point of view, plans are constituted -analytical moment (a)-, that is, they are produced by agents before they are selected and put into interaction. Then, the first question that arises is: where do plans come from? It is here where cognitive and ethical dynamics play their essential roles: *it is the agent's knowledge and evolution of the perception of what reality is and what it should be, that results from learning processes* as well as from the *creativity* he/she deploys, that shapes his/her plans. This analytical moment (a), summarises all the previously discussed

elements (cognitive and ethical dynamics, evolution of perception, learning processes, etc.). This is why it is a fundamental analytical moment.

Cognitive and ethical dynamics constitute the agent's **action space**: the space that he/she considers as possible and within which plans have full meaning. This space is essentially a projective one.¹⁸

Once the plans have been produced, the agent selects -analytical moment (b)- the one(s) he/she perceives as the better one(s) in the projected (imagined) circumstances he/she thinks that will prevail. Note that this selection operates just after the plans are constituted.

Those selected plans are the ones that agents try to carry out in interaction with other agents' plans -analytical moment (c). Agents interact while carrying out their plans.¹⁹ The development of plans is an *interactive process*. The performance of the interaction of plans and their results in terms of achievement of objectives, generate the information that agents evaluate and introduce in a feedback process into their future plans: that is, induce a learning process.

The differences between the planned and the effective or, in other terms, the *ex ante* and the *ex post* results induce this learning -analytical moment (d).²⁰ It is during the evaluation of agents in terms of the achievement of their objectives where the eventual inconsistencies (internal as well as external) of action plans arise.

From the interactions and induced learning processes arise new phenomena and new characteristics that might affect the sets of plans of the agents individually as well as collectively considered: all this constitutes a complex process. It is in this last sense that we state that the interaction of (selected) action plans give rise to economic processes. Changes in the content or morphology of action plans as well the interaction among them are the reasons for economic change.

At this point, the fundamental part of the heuristic task of the paper has been developed. A conceptual framework for the analysis of economic change has been proposed. The second goal of the paper is to describe how under certain conditions novelty arises within this framework. This analytic task permits us to approach the analysis of economic change.

¹⁸ It is in this analytical moment when the pre-revelation analysis, proposed by Witt (2003b), should be done. The rest of the analytical moments belong to what Witt's calls post-revelation analysis.

¹⁹ This analytical moment (the attempt to carry out the selected plan and its consequences) or post revelation analysis is the one that has attracted the attention of researches and the one that is most present in the literature. However, as has been said, it is essential to consider not only this analytic moment but all four in order to have the whole picture of dynamic processes.

²⁰ This learning can be *positive* as well as *negative*. Positive learning increases coordination among plans; on the contrary, negative learning diminishes it.

Where could novelty be located? How can it produce economic change? In which sense? Sections 4 and 5 are devoted to these questions.

4 Action plans and novelty: the case of «ethical innovation»

The starting point for this section will be the discussion of the concept of novelty within the evolutionary approach. Based on this discussion, a definition of novelty will be proposed and integrated into the action plan approach. Ethical innovation will be, in this context, a type of novelty.

4.1 Novelty in evolutionary perspective: the basic ideas

By virtue of the key role of learning in evolutionary models, the typical processes analytically generated in these models involve the continuous appearance of various forms of novelty.

Definition 4: *novelty* is the *appearance* of something previously *unheard of*.

Indeed, if novelty refers to the appearance of something previously unheard of (new technologies, and products new institutions, new firms, new markets, etc.), it is difficult to see novelty as the outcome of search activities driven by optimising calculus. The outcome of search activities cannot be fully anticipated and the search costs cannot be known in advance (Witt, 1994). However, the idea that underlies the evolutionary models is that searching for novelty always responds to the perception of opportunities to reach better results than those reached through the actions deployed in past and present. In this sense, some factors that bring novelty are, for example, the taste for the search of new experiences and new alternatives of action as an inherent tendency of the human being (Scitovsky, 1976). This tendency would be reinforced according to the favourable reaction of the environment when these new possibilities arise -and, accordingly with the hypothesis of satisficing behaviour. The activation of activities that search for novelty takes place when certain levels of satisfaction (psychological, profits, etc.) are not reached. (Winter, 1984)

Anyway, it is assumed that searching for novelty or inventive learning processes are costly and strongly influenced by the specific capabilities of agents (reached through cumulative processes of adaptive practical experience). Thus, learning processes take place in a path-dependent localised way. This means that although they are essentially unpredictable, not everything can happen (Dosi, 1988).

Novelty generates variety and collective interactions (both within and outside markets) performed as selection mechanisms giving rise to differential growth of entities. Therefore, evolutionary change encompasses both the emergence of genuine novelties and the comparative diffusion of competing alternatives in markets (Metcalfe 1995; Foster & Metcalfe 2001). Market competitive processes are seen as the main collective interaction mechanism, extra-market interaction networks also constitute an essential element in the process of creation of novelty and so, they are a key element in any evolutionary process (Dosi, 2000).²¹

4.2 Novelty in action plan perspective

A last (but surely not the least) question needs to be examined: Where to look for novelties? Or in other words, where do novelties emerge? And related with these questions, *how can we make novelties* –which are, by their very nature, something not predictable- *analytically tractable*? These questions have to do with the analytical task we are engaged in.

It is at this point where the action plan framework may turn out to be useful in relation with this topic. If novelty is the appearance of something previously unheard of, then it can be stated that the key analytical moment in which novelty appears is when the agents' action plans are constituted or produced. This analytical moment -the constitution of the action plans- is the only moment in which it is possible to identify «something previously unheard of.»²²

As a result, novelties emerge because (a) economic agents learn or invent new objectives (ends); and/or (b) economic agents learn or invent new ways of action or new means.²³ Focusing particularly on objectives, some possibilities are: (1) the introduction of an entirely new one (a radical understanding of novelty –see Witt, 1996), (2) a hierarchical change of already existing objectives; (3) the incorporation of an objective via learning processes (imitation, etc.).

The emergence of novelty can be represented, for example, as follows. Figures 6 and 7 represent, respectively, the sudden appearance of a new objective, O_2^* , that is hierarchically superior to O_2

²¹ Aggregate phenomena are explained as emergent properties in these evolutionary models. They are the collective outcome of the previously stated forms of interaction and heterogeneous creative learning. Examples of these emergent properties are the growth paths of factors productivity or of the GDP, the evolution of the indicators of industrial concentration, the change in the relative importance of different productive activities in multisectoral models (structural change), etc. (Allen 2001; Chiaramonte & Dosi 1993; Metcalfe 1999).

²² This does not mean that novelty cannot be the result of interaction and learning processes. It *means* that within the action plan approach novelty is analytically located at this stage.

²³ Note that the action plan approach focuses precisely on the «production of action plans», which is the key to the incorporation of the idea of «novelty» into economic processes. The «technology of choice» approach does not allow a consistent theoretical explanation for novelty, as this phenomenon remains external to the analysis, except as an exogenous element (Romer, 1990).

(Fig. 6), and its consequences on the action space (Fig. 7): O_2^* alters the nature of objective O_1 , converting it into O_1' . This affects action a_3 which no longer leads to objective O_1' . Action a_3 is replaced by action a_3' , which now does lead to O_2 . Action a_3 does not longer lead to O_1' (crossed out arrow). Also, linked with O_2^* there appears a completely new action, a_4 .

It is important to take into account that, in this perspective, the appearance of action a_4 ; the transformation of a_3 into a_3' and of O_1 into O_1' , are all changes explained by the appearance (emergence) of a new objective (O_2^*).

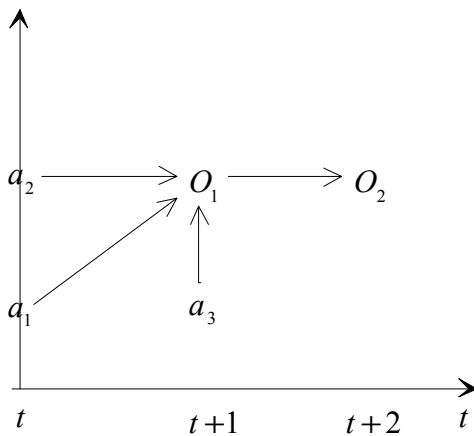


Figure 6

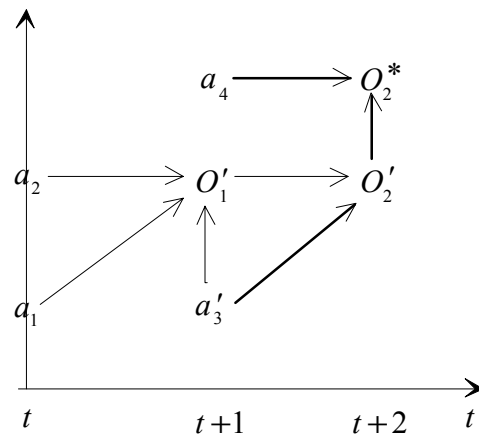


Figure 7

As an example, consider the impact on production and consumption spaces, and on the relationships between agents, of an electoral campaign with the lemma «Internet for everybody».²⁴ In this case, «Internet for everybody» is a new and hierarchically superior objective, O_2^* .

Let a_1 be the human, a_2 the financial, and a_3 the technological capital employed to reach O_1 «to develop the infrastructure for communication». This objective is the intermediate step to reaching the general objective «social communication» (O_2) (Fig. 6).

The emergence of the new objective O_2^* transforms the initial plan. Now social communication is linked to a particular technology: Internet. Therefore, new needs for infrastructure arise. What is required is «communication via Internet», O_2' . Action a_3 is redirected to the design of the new kind of communication technology. In Fig. 7 above, this change is represented by the emergence of a_3' .

²⁴ This lemma appeared for the first time in the Spanish election campaign in 2000.

But reaching the new objective O_2^* «Internet for everybody» requires new actions (a_4) to disseminate a special kind knowledge consisting of skills for Internet use. The policy measures to disseminate the necessary skills also open new possibilities of interaction among agents.²⁵ New ways of interaction might emerge transforming the spaces of action of agents and producing economic change. The new action plan is depicted in Fig. 7, and it is much more complex than the previous one.

Novelties operate in economic systems because economic agents incorporate them into their decision space through their action plans, thereby *producing* choice *ex novo*, and altering their action space. Novelties are distributed by the interaction of diverse agents' plans. Given that agents evaluate and learn, the dynamics of interaction is complex. So, economic change is the consequence of the deployment, via the dynamic and complex interactions, of economic plans of agents that contain an aspect of novelty -or, in other words, the change in agents' action space.

The action plan approach permits us to place novelty within the theoretical economic discourse, making it analytically tractable. Furthermore, it permits us:

- 1) to point out the key analytical moment in which novelty appears: when action plans are constituted;
- 2) to suggest that novelty enters in several ways: as new means (actions) or as new ends (objectives), or combinations of both.

Thus, novelty is integrated, or in a sense endogenized, into the theory. However, it should remain clear that novelty is *not* explained from within economics. But rather the intention pursued from the action plan approach is to locate (and so, «explain») its exact place and role: what novelty is from the point of view of an action plan, its nature, and to forecast its consequences when it appears.

The most up-to-date theories thus have far mainly addressed that final point: they focus on novelty consequences.²⁶ From the action plan perspective we can no longer conclude, as Schumpeter does (1932, paragraph 6) that «[n]ovelty is the true centre of everything that must be accepted as indeterminate in the most profound sense». Novelty is only indeterminate as far as its precision or

²⁵ An example is the programme developed in the Spanish region of Castilla La Mancha consisting of installing technical facilities (networks, computers, etc.) in small villages and giving Internet courses to their inhabitants.

²⁶ These theories insist in what Witt calls «post-revelation» analysis, leaving, by contrast, «pre-revelation» analysis an open (or unsolved) question. See below the relation between this idea and the approach here proposed.

content is concerned, not its structure nor its properties. It is possible, therefore, to open to some extent the «black box».²⁷

A special kind of novelty is *ethical innovation*, which will be treated in next sub-section.

4.3 Ethical innovation

Cognitive dynamics might lead, for example, to the introduction in action plans of newly discovered or invented means or to the discovery of new relations between means and ends. Indeed, cognitive dynamics is at the origin of a substantial number of innovations.

However, as has been argued, changes in ends pursued by individuals and organisations also lead to innovation and economic change. When these changes *cannot* be completely explained by cognitive dynamics, because they are statements that refer to ends or objectives themselves, we refer to these changes as ethical innovations.²⁸

Definition 5: ethical innovation consists of the creation of new objectives, the removal of existing ones or their hierarchical reorganisation.

Ethical innovation applies, in this context to creation of new objectives, removal of existing ones and reorganisation in their hierarchy, all of them not merely explained from cognitive dynamics. These changes are the result of what has been stated as **ethical dynamics** (sub-section 2.2 above). Cognitive dynamics has been defined previously as the evolution in agents' perception of what reality is or might be in the future. On the contrary, ethical dynamics refers to agents' conception of what reality should be.

Innovation in this sense can be represented as in Fig. 6 and 7: the introduction of O_2^* «Internet for everybody», a *new* and hierarchically superior objective, O_2^* , reorders the morphology of the action plan.

Consider the following two examples to clarify ethical innovation.

²⁷ The precise character of a novelty is revealed *after* its appearance: it is then a question of historical character and so not very useful for theory. However, it is its general *form* that is theoretically tractable.

²⁸ Some authors might argue that everything can be reduced to a problem of knowledge. This would sum up the position of certain leading Austrian economists, although they are not the only ones to defend this idea. Hayek, (1945), Kirzner (1992, pp. 152- 162), Huerta de Soto (1992). See also Palermo (2002).

Example 1. An agent (in this case a firm) decides to become the industry world leader. «Being the industry world leader» is the objective that articulates the action plan of the company and that arranges the structure of intermediary actions. Research and development activities may lead to the discovery of a new technology as seems to be the case of IBM System 370 that Bresnahan & Malerba (1999) present. The introduction of this system would then be used as a means to approach or maintain market leadership, and the introduction of the new technology is the condition imposed by the new objective now pursued. How can this «innovation» be understood from a cognitive point of view? As a consequence of «learning» without any other qualification? In our view, this statement is, in part, a result of cognitive dynamics, linked perhaps to the discovery of the possibility of becoming an industrial leader. However, the formulation of the objective «being the industry world leader» is itself a creative action: the company is inventing its end. And the invention of this new end constitutes a genuine example of an «ethical innovation» as defined in the action plan approach. And it is a historical (and cultural) fact that individuals and organisations are genuine end inventors!.

Figures 1 and 2 could be reinterpreted as an illustration of the action implemented by IBM in the 60s and 70s, the strategic period to consolidate their entrepreneurial position (Bresnahan & Malerba, 1999). Thus, Figure 1 could represent the following IBM action plan: «consolidation of world leadership». That is, in the 60s, IBM employed all its human (a_1), financial (a_2) and technological capital (a_3) to fulfill the objective of keeping the world leadership in the industry (O_1), represented by IBM System 360.

Figure 2 could represent another IBM's action plan: «continued innovation of dominant firm». That is, once the objective (O_1) at time $t + 1$ is achieved, this objective together with action (a_3) (incorporation of technological capital) determines the achievement of (O_2) at the time $t + 2$: to introduce an innovation by a dominant firm, the new 370 family of computers. Observe that (O_2) would be impossible without having reached (O_1).

Example 2. The introduction of environmental values in the performance of a multi-national company is another source of change in the action space of the company. The assumption of the (nine) principles for human rights, labour standards and the environment of UN's Global Compact program²⁹ at COLOPLAST is an example.

The commitment with to environmental target 2002/2003 «research and operations to reduce the waste from RCC by 6%» (action a_i) is linked to the objective 2002/2003 (O_1) «reduction of polymer

²⁹ See <http://www.unglobalcompact.org>

waste» in all production plants in the targeted proportion. Technical process is revised or changed in order to adapt the waste treatment to reach this objective (COLOPLAST 2002, pp. 7-33). Are the technological changes required completely explained as a result of a mere cognitive dynamics internal to the company? Are they the consequence of a learning process? If not, how could it be better explained?

We propose the following explanation. The targets and objectives above are considered in the following objective hierarchically superior to all of the others and that also articulates them: «COLOPLAST takes responsibility for contributing to a sustainable development.» (COLOPLAST, 2003, p. 66) This main objective (O_2^*) connects the previous actions and objectives involved, with O_2 , a more specific objective, «environmental evaluation of all products [new and not new].»

Additionally, this action plan is compatible with the seventh and eighth Global Compact principles: to «support a precautionary approach to environmental challenges» and «promote greater environmental responsibility.» (COLOPLAST, 2003, p. 72)

The technological level and the changes inside this level are *not merely* explained by factual learning processes and factual knowledge. The promotion and fulfilment of the hierarchically superior objective (O_2^* in this example) is the key reason for explaining the logic of the action plan, as it generates new spaces for action.

It is important at this stage to clarify that we use the words «ethics» and «ethical» in a very technical sense. Actually, in this context «ethics» refers to the creation, destruction and hierarchical organisation of ends of action (being the industry world leader, giving birth to a healthy child, maximising income, fighting poverty, flying to Mars, etc.). Obviously, Economics is not about understanding the origin and changes in ends which would belong to the field of study of other disciplines such as Psychology, Anthropology or History, for example. However, it is an undeniable fact that ends change over time as means do. These changes have economic consequences and, as Schumpeter (1934) stated, these consequences are themselves an object of study of Economics. Our claim here is that it is also important to locate the origin of changes in ends within the structure of human (personal and organisational) action. It is important, for example in the exploration of economic processes which involve changing preferences.³⁰

³⁰ See how Witt poses, in different but indeed related contexts, these questions for consumption problems (Witt, 2001) and for political economy topics (Witt, 2003a). For consumption in evolutionary perspective, see Bianchi (1998).

5. «Ethical innovation» and economic change

One major topic -if not the main one- in evolutionary economics is economic change. How economic structures, sectors, preferences, technologies, institutions, etc., evolve are phenomena that need true economic explanation.

In this section we explore how to connect the notion of action plan to the explanation of these phenomena under the general idea of economic change. The logical link between ethical innovation and economic change will be explored. *The hypothesis here is that ethical innovation is another source of technological and institutional innovation, that is, of economic change.*

5.1 Economic change as self-transformation³¹

First, it should be established what is understood by economic change in this paper.

Definition 5: by **economic change** we mean (economic) «dynamic endogenous structural change capable of inducing or generating novelties.» (Rubio de Urquía 2003, p. 64) Such a definition demands further specifications about what is the meaning of «structures» and «novelties».

The main argument is presented in a rather formal way. Let be G_t a society formed by successive contemporaneous groups of agents (persons and organisations). These groups deploy their action plans in mutual interaction. There is also at every point of time a state of the environment U_t . The action of each agent can alter the dynamics of other agents, and it can alter U_t as well; and the reverse is also true.

The idea of global dynamic transformation of a social system could be represented as follows.³² At any given instant, consider the diverse **structural elements** that characterise the whole system G_t : the cognitive dynamics of each agent i , his/her ethical dynamics, the cultural and informational dynamics of the whole society, as well as the state of the environment, U_t . The global dynamics of the whole society, denoted $\Delta(G_t)$, is, in general, the iterative dynamics of transformation, instant to instant, from G_{t-1} to G_t .

³¹ The main argument as well as the notation in this sub-section is taken from Rubio de Urquía (2003).

³² For further explanations see Rubio de Urquía (2003), specially the Section III.

In this context, **structural change** refers to processes that transform these structural elements, and **novelty** refers to the occurrence of something that has not previously happened inside any of them.³³

The global dynamics of the whole society $\Delta(G_t)$ is **self-organised** if it generates:

- 1) structural endogenous changes in G , and
- 2) unpredicted occurrences, from time to time, in the action plans of the agents of the structural and non-structural elements of the states G_t in G .³⁴

Given the above presented elements, two conditions are imposed in order to assure *self*-transformation. First, it is necessary that –at least from time to time- agents' mutual interaction –that is, mutual interaction of their action plans- generate endogenously structural changes. Endogenous change means changes in the *agents' dynamics*: not only in their cognitive dynamics, as has been mainly recognised by evolutionary economics, but also in their ethical dynamics as is our claim in this paper. And second, that, at least with certain frequency, «novelties» are produced.

5.2 Ethical innovation as a source of economic change

«Economic evolution clearly distinguishes itself from biological evolution. Whereas in the latter mutations are completely random, in economic evolution *intentions* of agents and thus, intentional behaviour, are important as well as the collective effects of those intentions.» (Cantner & Hanusch, 2002, pp. 192-193) How could be this assert be defended if ethical dynamics –and its corollary ethical innovation- is not taken into account?³⁵

³³ Rubio de Urquía (2003), p. 65. It is interesting to compare this approach to that of «development perspective»: «[b]y “development perspective” we mean the explicit consideration of the generation and diffusion of novelty.» (Cantner & Hanusch, 2002, pp. 183-184). In a parenthesis they add: «For the following we restrict this novelty to the phenomena of technological change and innovations – well aware of the fact that also the analysis of the generation of institutions, cultural change or the development of law could be analysed in a similar fashion (Nelson 1995) or even as a phenomenon of co-evolution.» (Ibid., p. 184)

Note that this view is compatible –and in our opinion more general- than the Three-stage Scheme that Foster and Metcalfe (2001, p. 6) propose and that gives rise to the following logical chain: (economic variety + market co-ordination) → differential growth → structural change → differential accumulation of knowledge → renewed economic variety (Ibid., p. 13). Our approach points out the origin of «variety».

³⁴ Rubio de Urquía (2003, p. 68). Note that not every system that evolves is a *self*-organised one. What is important to stress here is that the impulse is endogenous and open in the sense that true novelty arises and change the nature of the whole system. This is why it is very important to stress the role of novelty in the explanation of economic change.

³⁵ As, however seems to be the case with these authors when they say that «[i]n the economic sphere the most important components of novelties are technological innovations. These innovations are no longer, or at least not only, the result of optimal *exploitation* of an already known *ex-ante* opportunity space. They derive much more from the *exploration* of new opportunities as a consequence of human creativity and entrepreneurship (...). Thus, one specific task of evolutionary theory is the explanation of the emergence of novelty in its genuine sense, and of its prerequisites: because agents are assumed to be endowed differently

It has just been mentioned above (5.1) that cognitive dynamics as well ethical dynamics are sources of structural change. Throughout the paper several kinds of novelties or innovations, attached to these dynamics, in particular the ethical ones, have been signalled. And given the special relation of these with economic change, it could be said that both cognitive and ethical dynamics are the true elements of «traction» of human –and thus economic- action. It is the combination of both what produces the whole planning activity of (economic) agents.³⁶

The main argument can be summarised as follows:

- If economic change is «dynamic endogenous structural change capable of inducing or generating novelties»,
- structural change refers to processes that transform these structural elements,
- novelty refers to the occurrence of something that has not previously happened inside any of these elements, and
- if novelty could be produced by ethical dynamics producing ethical innovation,
- then, *ethical innovation generates economic change*.

Obviously, assuming all these elements, a deeper inquiry on the nature and consequences of all these processes would be necessary. But the objective of this paper is a more modest one: to point out the logical connection of all these elements in order to articulate or complement an organic theory of economic change, and in particular to point out the role of ethical dynamics in this explanation.

6. Conclusion and new research questions

The main lines of the argument can be summarised as follows: (1) ethical dynamics and ethical innovations are recognised in the literature; (2) ethical dynamics has an influence on economic change; (3) ethical dynamics has not been explicitly worked out in the literature; (4) however it can be treated as the «action plan» approach has shown; (5) this treatment allows a deeper

with imperfect abilities and incomplete foresight, time –and resource-using experimental and learning processes (..) are of foremost analytical interest. The individual here is seen in its historical and social context. Thus, heterogeneous structures characterised by different behaviour and know-how induce learning and experimental activities which feed back on behaviour and incentives, and thus on the structures. By that, cumulative developments characterised by structural change and path dependencies are to be expected – historical time enters the analysis.» (Cantner & Hanusch, 2002, pp. 188-189). «Ethical innovation» seems to be absent.

³⁶ Although it is impossible to be planning all the time –and thus a form of economising efforts is to routinise human (economic) behaviour-, planning is the activity that operates the «traction» of human action. Some authors deny that agents make plans (Langlois (1995), it is a matter of fact that they do make plans. How to explain, then, the strategic behaviour of agents?

understanding of economic change phenomenon, because it provides a framework in which novelty can be identified and located and that allows to establish the link between novelty and economic change.

The analysis of learning processes in an evolutionary environment permits to state that agents must keep ongoing processes of factual as well as normative learning in order to adapt to an ever-changing environment. The key conceptual element «ongoing learning processes» has been explored in this paper linking it with the concepts of cognitive and ethical dynamics. This latter link allows us to reflect about the emergence and the role of ethical innovations in the explanation of economic change: the creation, removal and reorganization of agents' objectives, not merely explained from cognitive dynamics, are also sources of economic change. In our opinion, this approach offers a comprehensive perspective of economic change.

Some new research lines are suggested by these considerations: the relationships between routines and action plans; normative issues involved in the action plan approach; the implications of this approach on economic policy making (Pelikan, 2003); the «political entrepreneurship» (Witt, 2003a) as a type of entrepreneurship attached to changes in agents' action plan objectives. These are being explored by the authors as topics for further research departing from the approach presented.

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