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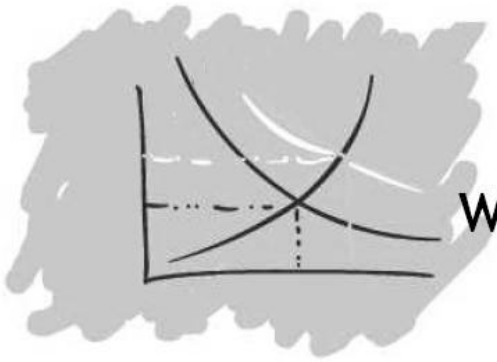

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‘Ethical Novelty’: new insights into economic change

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ABSTRACT: Agents’ knowledge combines their perception of what reality is with their conception of what reality should be. “Ethical dynamics” refers to the evolution in the latter conception. This is a key element to explain changes in agents’ objectives of action, which usually do not result simply from interaction or “cognitive dynamics”. “Ethical novelties” are important sources of economic change. They consist of changes in the structure of action objectives which result from ethical dynamics.

KEYWORDS: knowledge, action plan, ethical novelty, cognitive and ethical dynamics, economic change

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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, 2003a: ix). A central focus of evolutionary dynamics is on processes which are capable of expanding their state space through the generation of previously non-existent states. In this sense, evolution is seen as "the self-transformation over time of a system under consideration" (ibid: 12-13). *'Self*-transformation can be split into two logically (and also usually ontologically) distinct processes: the *emergence* and the *dissemination* of novelty."

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 need 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 novelty having emerged within the domain. The bulk of explanatory efforts usually focuses on the second task" (ibid: 13). This seems to be the case with innovation studies. In fact, over the last two decades these studies have seen important advances. For example, 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). This paper assumes the importance of these works. However, as Loasby has pointed out, only the assumption that some things do not change permits the understanding of change (Loasby, 1999: 14). Thus, any explanation of economic change requires the existence of some kind of regularity within change. Only then can we identify certain general and permanent principles that may explain evolution in the economic domain.

A first step towards the finding of these principles, is the fulfilment of a "heuristic task". The latter consists of formulating concepts and instruments that permit one to describe and analyse economic change. This paper is an attempt to approach this heuristic task, which is necessarily prior to the economic analysis of change. The challenge is to provide the analytical possibility of studying the consequences of novelties in agents' action objectives. Thus, the paper will start with developing a conceptual framework to analyse economic change. The theoretical approach presented in this paper is based on the concept of an (economic) *action plan*, defined as the *projective* linkage between actions (means) and objectives (ends). The concept of an action plan will prove useful in the understanding of economic change, as it reveals the different sources of novelty 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 the action plan as a heuristic model to represent economic dynamics. These two dynamics configure what agents understand things are, what they may be and should be in their "space of representations" (Loasby, 1999), which is to say that cognitive and ethical dynamics constitute the basic elements of projective action. From the so called "action plan approach", it will be argued *how* both cognitive and ethical dynamics are linked to the emergence of novelties. In particular, ethical dynamics give rise to **ethical novelty**, understood as the genuine creation in the space of representations of new objectives of action or their hierarchical reorganisation.

The conceptual framework proposed enables us to establish our main hypothesis: *ethical novelty is another source of economic change*. This kind of novelty will serve as an example of how agents' action plans endogenously generate structural change. Agents' rationality *also* depends on the objectives and motivations that they have. Thus, what gives an impulse to economic activity is then not only economic calculus (Hayek's (1937) "Pure Logic of Choice") but the real possibility of developing an "open rationality", the rationality of the unexpected (Shackle, 1972; Loasby, 1996).

The paper is organised as follows. Section 2 considers the role of knowledge and learning processes in the explanation of economic change. Section 3 presents the "action plan approach". Section 4 shows the relationship between the action plan approach and novelty; how ethical novelty can be treated, and in what sense ethical novelty is a source of economic change. Section 5 presents some concluding remarks.

2. Knowledge acquisition and learning processes

Learning and knowledge acquisition processes are central to the explanation of economic change. Recent attempts to provide an analytical foundation of evolutionary economics describe economic evolution as "a growth of knowledge process" (Dopfer & Potts, 2004: 21). As Metcalfe and Foster (2004: xi) recognise, knowledge acquired by individual agents and the interaction of agents' knowledge constitute the basis for evolution and complexity of economic processes. This section presents a brief discussion of the role of knowledge in economics.

2.1 Learning in evolutionary environments

In the tradition of evolutionary economics, learning processes play a major role in the explanation of economic change. Given the evolutionary assumption that agents' learning processes are ongoing, it is interesting to address the questions of *why* and *what* agents learn. A succinct answer to these two questions from an evolutionary perspective is that agents have 'bounded rationality' (why) and because of this they have to deploy factual and normative learning processes (Witt, 2003b) that allow them also to implement factual and normative knowledge (what). In evolutionary models, agents have bounded rationality, limited processing capacities, and an imperfect understanding of the environment and the future conditions governing the economic system.

Agents are supposed to be boundedly rational (Simon, 1983, 1970), behaving according to the so-called behavioural model instead of 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: 20). What the mechanisms are for this kind of rationality is equivalent to asking which characteristics an organism needs to be capable of dealing with bounded rationality. Simon proposes that it needs: first, some way of focusing on the things that need attention at a given time (Simon, 1983: 19); second, a mechanism able to generate alternatives: the problem consists mainly of searching for good alternatives; and third, a certain capacity to acquire facts

about the environment in which we find ourselves and a modest capability for drawing inferences from them.

All these considerations mean that agents come up with standard operating procedures and routines that rule their daily activities.[2] These routines are fairly stable, practical and accurate in interpreting and responding to a very complex environment. Thus, in evolutionary environments, agents learn because they do not know everything: "[b]ecause they lack perfect knowledge these agents are likely to try to improve their knowledge" (Witt, 2003b: 79) Moreover, "[agents'] learning takes time, bounded rationality transcends the boundaries of a static representation of choice problems" (ibid.). Thus, for improving knowledge, agents deploy learning processes; in this sense, Dosi et al. (1996) claim 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.[3]

Dosi et al. (1996) propose that learning has three interrelated meanings (associated 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 increasing knowledge *stricto sensu*, and (3) the articulation and codification of previously tacit knowledge. These precisions permit the authors 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). Dosi et al. (1996) identify four classes of objects of learning: (a) the 'states-of-the-world', (b) other agents' behaviour, (c) problem-solving, and (d) one's own preferences. From an appreciative perspective, Witt (2003b) 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

[2] Simon (1986: 21). The analytic value of bounded rationality is that it is linked to the concept of routine. This concept is reformulated later in an evolutionary perspective by Nelson & Winter (1982: 14-19) as is suggested by the lecture of the Darwinian metaphor proposed by Witt (2003a: 10-11).

[3] It should be noted that reasons (1) and (2) are related to the imperfect understanding of the environment (world). However, reason (3) highlights what could be called insufficient understanding of the world.

knowledge derived from learning processes. These elements constitute the foundation on which the actions that the agent deploys are based. The acquisition of these types of knowledge makes it somewhat easier to cope with bounded rationality.

Different degrees of imperfect understanding and imperfect path-dependent learning imply 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. However, according to Loasby, this view of bounded rationality does not overcome the problem of knowledge in economics; learning processes are not sufficient to understand how agents deal with complex environments (Loasby, 1999: 3).

2.2 "The problem of knowledge"

In his discussion on "The Problem of Knowledge", Loasby (1999, Chp. 1) explores the economic consequences of uncertainty. He departs from the idea (the fact) that agents have limited knowledge about the world, about the reality within which they deploy their action. He identifies six obstacles to complete knowledge: (1) the insufficiency of induction; (2) complexity; (3) the limits of human cognition; (4) exogenous change; (5) the interdependence of individual initiatives; and (6) conflicting ideas and purposes (ibid.: 1-2). It is possible to cluster these obstacles into 2 main groups, the first referring to limits of human capacities ((1) and (3)) and the second linked to the complexity of the universe ((2), (4), (5) and (6)). As a result of human limitations and the inherent complexity of the universe, agents are located in a context of incomplete knowledge, and therefore of substantive uncertainty. It is necessarily in this context that agents live, make choices, produce, innovate, etc. Novelty plays an essential role in the continuous transformation of this (complex) environment, which makes complete knowledge impossible. This is a key idea for Loasby who sees the economic system as "a prime source of novelty" (ibid.: 2). Although knowledge is seriously incomplete, it might be improved. However, the concept of learning, understood as the "acquisition of information from a pre-specified set, or (as the) convergence on the correct model" (ibid.: 3) is not enough, in Loasby's view, to address the issue of knowledge improvement and creation.

Creating new knowledge is substantially different from discovering knowledge that already exists and *is waiting* to be discovered (pre-specified set; correct model).[4] Moreover, knowledge may be wrong. Fallibility is, according to Loasby, a key characteristic of knowledge. "Knowledge should be considered as conjectural, in Karl Popper's sense (1963) of hypotheses (...) which always remain open to refutation" (Loasby, 1999: 2). As a consequence there is not such a thing as a predetermined correct model on which agents can converge through learning processes. They do, however, need to cope with incomplete and fallible knowledge, taking appropriate precautions against omissions and error. In other words, in order to cope with the complexity of the universe and their limited capacities, agents need to organise their (limited and fallible) knowledge.

How agents manage to organise their knowledge is a major question for economists according to Loasby.[5] A second major question would be how knowledge is improved and co-ordinated. Answers to the second question will give the key to understanding novelty generation and economic change. Nevertheless, this sort of issue should not be addressed before we structure the ideas relating to the first question: the organisation of knowledge. The way in which knowledge is improved and co-ordinated depends on how it is organised. As a result, before addressing the questions of how knowledge is created and diffused through the economic system and how these processes transform the system, economists must organise their knowledge about the ways in which people organise their knowledge (ibid.: 8).

Following Loasby's argument, as knowledge is incomplete and fallible, lacking a complete system of classification, agents need some means of achieving *closure* in order to make decisions – a means of organising their knowledge. Each individual has his/her own perception of reality, his/her own representation of the world. Each develops an interpretative framework that permits him/her to achieve closure and therefore make decisions. "These personal frameworks are substantially influenced by the assumptions, conventions, categories, rules, routines and programmes by which (agents) are surrounded from birth and which develop through a cumulative mixture of deliberation and unintended consequences" (ibid.: 12). Institutions are thus defined as the frameworks and procedures

[4] This seems to be the case, for example, with Kirzner's (1992, Ch 2) interpretation of the market process.

[5] An idea that Loasby himself traces back to Adam Smith (1980 [1795]). See also Hayek (1937, 1945).

in common use within any group. All individual and collective subjective representations of the world form what Loasby calls *the space of representations*: "All action is decided in the space of representations" (ibid.: 10).

Summing up Loasby's argument on the organisation of knowledge, we could state that agents cope with their inherently incomplete and fallible knowledge about the world by building fairly stable interpretative frameworks (closure)[6] and action procedures which permit them to make decisions in a context of substantial uncertainty. Some of these frameworks and procedures are common to groups of agents; in this case they may be referred to as institutions. All frameworks and representations of the world form the space of representations within which all action is decided. The better we, as economists, organise our knowledge about how economic agents organise their knowledge, the better we will be able to answer the questions of how knowledge is improved and diffused and the better we will therefore explain processes of economic change.

Loasby's point is clear and the concepts of "closure", "personal frameworks", "space of representations" and "institutions" provide key elements for constructing a theory of the organisation of knowledge within "pre-revelation" analysis. This can then explain how novelty is being generated within the explanatory domain of theory. However, in order to fulfil the latter task, some heuristic work remains to be done. The next section is devoted to this task.

3. Action plans and knowledge

3.1 Agents' representation frameworks

Taking Loasby's arguments on the characteristics and organisation of knowledge as a starting point, we may construct an analytical framework which provides tools for a systematic explanation of how the space of representations and the agents' frameworks for achieving closure are organised. We may argue that the personal frameworks of representations can be articulated in the context of the following analytical structure:

[6] A very similar idea to "imposing closure" implied in innovation literature is "constructing predictability". The complexity of technologies and the process involved make unpredictability (Pavitt, 1998) a property of technological systems. See also Nigthingale (2004: 3).

each person, at any given instant of time, can be characterised by several attributes, such as his set of beliefs, values, attitudes, and theoretical as well as technical representations about the world. This set includes rational as well as non-rational elements, conscious and non-conscious ones. All these elements which contribute to shaping his personal space of representations are, of course, subject to change (evolution).

Let us consider the following *analytical* distinction between: (a) the agents' *perception* of reality; what it **is** or **might be** in the future; and (b) the agents' *conception* of what reality **should be**. Agents' representations combine their perception of what reality is (or what is possible in any imagined sense) with their conception of what reality should be. Changes in these perceptions and conceptions give rise to changes in what Loasby terms the space of representations. To describe these transformations we propose the following concepts of cognitive and ethical dynamics.

Cognitive dynamics refers to individuals' and organisations' (agents') perception and understanding of reality. This perception is based on accumulated knowledge through past experience, on the present environment where action takes place, and on expectations of future phenomena or events (Rubio de Urquía, 1998, 2003, 2004). Cognitive dynamics should therefore be understood as the evolution of agents' perception of what reality **is** or **might be** in the future. Cumulative knowledge, particularly tacit knowledge, and learning processes play a major role in this development. However, cognitive dynamics do not exhaust the content of Loasby's "personal frameworks". The role of values, beliefs, attitudes, etc., is recognised in the literature explaining economic change (Dosi & Nelson, 1994; Dosi et al., 1996), but has not been systematically analysed. Thus, the space of representations is not only dependent on knowledge – which plays, without doubt, a fundamental role – but also on what agents consider (desire, imagine, etc.) things should be.[7] The concept of ethical dynamics covers these considerations.

Ethical dynamics refers to the evolution in agents' *conception* of what reality **should be**. The ethical content of the agents' representation framework is attached to their system of beliefs, values and attitudes. Ethical dynamics introduce order within the personal representation space, as will be discussed in section 4 (Rubio de Urquía, 2005).

[7] The implications for economic change of other types of 'values' such as aesthetical values, has also been recognised by Loasby (2002: 1230), who quotes Smith ([1795] 1980).

It is important to clarify that the words "ethics" and "ethical" are used here in a very technical sense. The concept of "ethical dynamics" is not based on an *a priori* formulation of normative criteria. It has a simple analytical value aiming at articulating agents' personal space of representations. By stating that agents have a personal conception of what reality should be which evolves over time, we are not giving any particular aprioristic content to that conception.

The above two personal dynamics are supported by a social and more general one: the dynamics of transformation of the agents' environment. This *magna dinamica* includes an important element: the social dissemination of information throughout society that may be referred to as **cultural dynamics**.

From the concepts of cognitive, ethical and cultural dynamics it is possible to represent how agents act. This representation will be based on an analytical 'template' named the "action plan approach". This is the base for the heuristic task, that is, the proposal of concepts and instruments that permit us to organise our knowledge about how agents organise their knowledge. As has been pointed out, economists do recognise the roles of ethical and aesthetical values, beliefs, attitudes, etc., in explaining economic change – at least in appreciative theorising (see, for example, Dosi & Nelson (1994: 159); Dosi et al. (1996); Witt (2003b); Smith ([1795] 1980); Loasby (2002); Shackle (1972); Rubio de Urquía (2003, 2005), Borrás (2004)). The "action plan" is a tool that permits us to represent and integrate all these elements and therefore to see how the defined concepts of cognitive, ethical and cultural dynamics inform action. However, in the following sections it will be shown that the action plan approach has a specific analytic value for understanding economic processes; in particular, processes of economic change.[8]

3.2 "Action plan": definition, morphology and characteristics

An action plan is defined as the agent's projective link of actions with objectives.[9] At any given instant t, the personal action plan of an agent i (p_{it}) is a projective structure

[8] The implications of the "action plan" approach are wider than those presented here. See Rubio de Urquía (2003, 2005), Encinar & Muñoz (2005, 2006), and Rodríguez (2002) in an Austrian perspective.

[9] The concept of "action plan" is pervasive in economics. It can be found in Keynes (1936), Hicks (1939), Stackelberg (1946), Eucken (1943), Debreu (1959), Malinvaud (1999), Boulding (1991), Hayek (1937;

that *links* the agents set of actions (means) $\{A_{it}\}$ with his set of objectives $\{O_{it}\}$. This structure p_{it} generates a subjective time horizon in the personal space of representations (Rubio de Urquía, 2003: 23). Actions in this context should be understood as means that could be activities as well as objects. An objective is an end or a goal 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 $\{A_{it}\}$ and objectives $\{O_{it}\}$ 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. Agents do not possess exact and complete knowledge of all the possibilities that are available to them at any given instant. Ignorance or uncertainty, as well as the possibility of having fallible knowledge, make it impossible for agents to anticipate the consequences of their actions, which are deployed in interaction with other agents' plans.

However, agents are impelled to act, and for this they use their intelligence as well as their knowledge. Given the characteristics of their knowledge, closures and other operations are necessary to set up their action plans. The action plan is a rather general open structure.[10]

1945), etc. In some authors, plans are merely a name (Debreu, Malinvaud); in others (Eucken, Rubio de Urquía, etc.) it is a central concept. It is also recognized in neuroscience: Fuster (2003)localizes "plans of action" in the pre-frontal cortex of the human brain. (See also Fuster (2004) and Hayek (1952))

[10] A very close concept to (economic) action plan is the concept of routines (Nelson & Winter, 1982; Becker, 2003). Routines in this context could be seen as parts of plans. A plan admits routines: a routine would be a 'mechanised' part of an action plan.

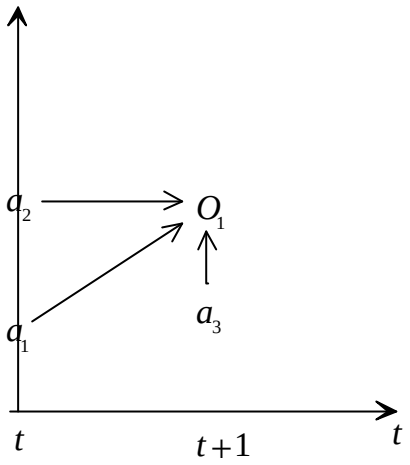

Figure 1

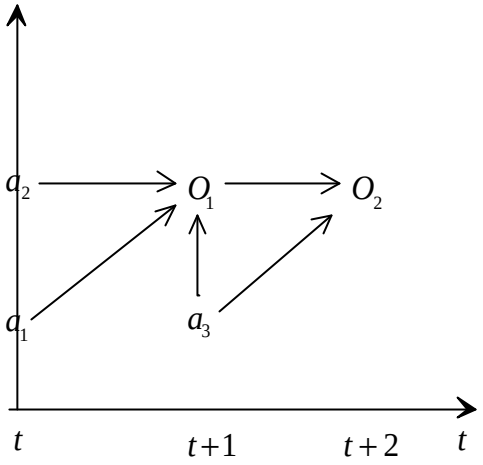

Figure 2

The **morphology**, or 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 Figure 1 three actions, $\{A_i\} = \{a_1, a_2, a_3\}$, and a single objective O_1 are considered. We have also two analytical points in time, t and t + 1, upon which the action is defined and is carried out. (This time dimension can be expressed using indexes; however, to simplify notation, given the simplicity of these examples, we will not make use of indexes.) 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 at t by the agent that produces the action plan as necessary and sufficient for objective O_1 to be achieved at $t + 1$. 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 buys a car catalogue (a_1) and compares the possible options according to his/her preferences and his/her earnings (a_2); in the next step ($t + 1$) he/she buys it (a_3). 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 $t + 2$. For example, now the agent plans to buy a car but has not enough liquidity. So he proposes an intermediate objective: to obtain the money; thus O_1 leads to O_2 in the next period. In order to get the money that permits him/her to achieve O_2, he/she goes to the bank and asks for a credit – action a_1 – and he

compares the alternative cars – action a_2. Now, action a_3 cannot be taken in t + 1; he has to wait to get the financial support in t + 1 (O_1) in order to finally buy the car in t + 2 and therefore achieve O_2, which is to fulfil his plan.

Naturally, action plans can be more complex than the simple ones represented here. Besides, agents may imagine contemporary action plans. If any such plans demand actions or objectives that are mutually exclusive or manifest some incompatibility (I cannot be working in London and visiting a friend in Melbourne at the same time) agents would have to make a choice. But it could also happen that several plans are going on simultaneously (I can drive my car to work and keep myself informed by listening to the news on the radio). 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 moments of time as needed. An important characteristic of plans is that *action plans do not have to be successful or even feasible*: success and feasibility of plans depend on the knowledge the agent uses in forging them, on how the knowledge is used, and on the result of interaction with others agents' plans (there can be mistakes, erroneous information, etc.).

Thus, actions could lead to attaining 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.

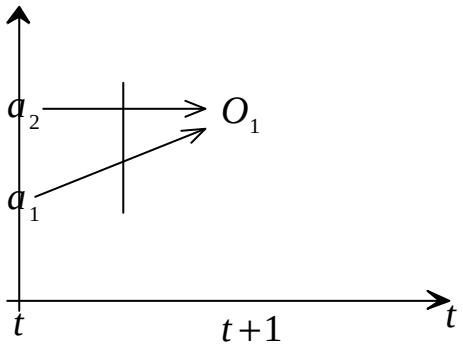

Figure 3

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 achieving the pursued ends. Moreover, *objectives could cancel each other out* because of a logical contradiction or because of competition for actions (means) needed to accomplish them.

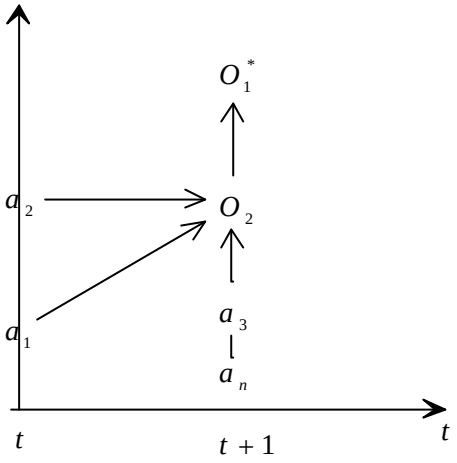

Figure 4

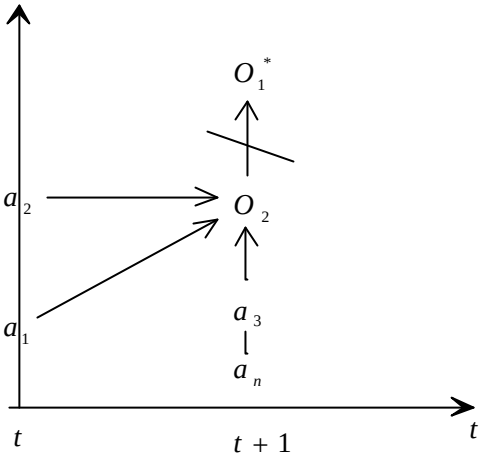

Figure 5

For example, consider Figures 4 and 5. In Figure 4 the action plan described contains an objective O_1^* which is fundamental in the agent's scale of valuation. Let it be *to take good care of his/her family life.* This is the main end pursued and thus the rest of the objectives and actions should lead to it and be in accordance with it. In this example, suppose that the agent proposes a second objective O_2, which operates as a means to an end: to have a good job, which implies a set of actions ($a_1 \ldots a_n$) in the same or different time spans. This gives the agent the possibility to attain a certain level of income and to assure a certain standard of living for his family.[11] In Figure 4, the actions carried out will lead to the objectives proposed. However, 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

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

maintains the strict preference of O_1^* over O_2, but on the other, 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, 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 accomplishing O_1', which constitutes a flagrant paradox. All this results in what is referred to as "internal inconsistency" of action plans.[12]

A different source of cancellation of pursued objectives which should be considered is "external inconsistency". External inconsistency is linked to the *interaction among plans*.[13] 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 action effected by the other agents obstruct the feasibility (and so the performance) of the plan the agent is trying to deploy. Concepts such as co-ordination, lock-in effects, etc., are related to interaction of plans.

3.2 On "action plans" and economics

It is important to insist on the idea that, in the action plan framework, actions (means) and objectives are not given in the Robbins (1935) sense. Considering actions and objectives as given enables one only to treat static problems; however, economic change is by definition a dynamic phenomenon. As a result, action plans are 'living' and dynamic economic elements, because they admit any type of change in their components (actions and objectives). Our approach provides an analytical structure representing the production of action plans, and their elements.

Following Robbins (1935), economic theory has to be understood as the science that 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). In this context, the object of economic theory seems to be the analysis of

[12] See Rubio de Urquía (2003, 2005), Encinar (2002) and Encinar & Muñoz (2005, 2006).

[13] Hayek (1937) draws attention on "conflicting expectations", "mutual compatibility of intentions", etc.

the allocation of scarce resources to given ends. Often economic theory is identified with a system to describe the impact of a technology that increases the efficiency of resource allocation and which may uncover new uses or applications of the resources for given objectives.[14] How can we make this view of economic theory compatible with the approach based on the concept of action plans?

The classical vision, captured in the reduced interpretation of Robbins' definition, might be considered a special case within the action plan approach: it is a "type" of action in which both the sets of means (actions) and objectives are given and are effectively known by agents. With the action plan approach, it is not a pre-requisite that sets of actions and objectives need to be given in any particular order. Action plans are 'open' and dynamic economic entities, so they admit any type of incorporation or alteration of their parts. It is in this sense that the approach leads us to focus on the *production of action* by agents *versus* the standard view based on a mere technology of choice.

In his recent works Rubio de Urquía has proposed the following definition of economic theory: "we understand Economic Theory as the study of: (1) how and why economic agents who interact in an environment adopt some action plans and not others and (2) what effects the adoption of certain action plans have" (Ibid., 2005). This definition is the basis for the approach adopted in this paper. An important remaining task is to explain how the interaction of plans induces economic change. Before this question is addressed it is necessary to go one step back.

The understanding of the agent's activities might be explained, in the simplest possible case, as follows. Let us assume the following sequence of analytical moments of the action plan: (a) the **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 will be shown below); (b) the **selection** of an "action plan" from the set of action plans previously constructed; (c) the **attempt to carry out** the selected action

[14] This theoretical exercise of the "technology of choice" ("Pure Logic of Choice" (Hayek, 1937, 1945)) has been developing ever since the systematic analysis and application of the optimisation principle. In the neoclassical model, this is consistent with the maximization of an objective function subject to restrictions. This has been criticised from different fields, even fromgame theory (Rubinstein, 1998).

plan; (d) the **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 enabled by a process that has to do with *learning*.[15]

The analytical moments (a) and (b) clearly differ 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 to interaction, and (d) to 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 begin interaction. So the first question that arises is: where do plans come from? It is here where cognitive and ethical dynamics[16] 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 deploys, that shapes his plans. Cognitive and ethical dynamics constitute the agent's **action space** or, in Loasby's terminology, personal **space of representation**: the space that he considers as possible and within which plans have full meaning. This space is essentially a projective one.

Once the plans have been produced, the agent selects – analytical moment (b): the one(s) he perceives as the best in the projected (imagined) circumstances that he thinks will prevail. The selected plans are the ones that agents try to carry out by interacting with other agents' plans — analytical moment (c).[17] The development of plans is an *interactive process*. The performance of this interaction, and their results in terms of achieving objectives, generate the information that, in a feedback process, is evaluated and re-introduced into future plans, thus inducing a learning process. The differences between the planned and effective or, in other terms, *ex ante* and *ex post* results induce this (positive or negative) learning analytical moment (d).[18] It is during

[15] An interesting exercise is to compare this analytical sequence with Potts (2000), especially chapter 5.

[16] As well as the collective cultural dynamics.

[17] This analytical moment (the attempt to carry out the selected plan and its consequences) or post-revelation analysis is what has attracted the attention of research and is most prevalent in the literature. However, it is essential to consider not only this analytic moment but all four in order to have the whole picture of dynamic processes.

[18] *Positive learning* increases a coordination among plans; *negative learning* diminishes it.

the evaluation of agents in terms of achieving their objectives where the eventual inconsistencies (internal as well as external) of action plans arise.

From interactions and induced learning processes new phenomena and new characteristics arise that might affect the sets of plans constituted by the agents individually as well as collectively considered: all this makes up a complex process. It is in this sense that we maintain that the interaction of action plans gives rise to economic processes. Changes in the content or morphology of action plans as well as 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: 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 novelty"

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 novelty will be, in this context, a type of novelty that structurally transforms agents' action plans.

4.1 Novelty in evolutionary perspective: the basic ideas

We may define **novelty** as 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 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 get better results than those achieved through actions deployed in the past and

present. In this sense, some factors that bring novelty are, for example, the taste for new experiences and new alternatives of action as an inherent tendency in human beings (Scitovsky, 1976). This tendency would be reinforced according to the favourable reaction of the environment when these new possibilities arise – and according to the hypothesis of satisfying behaviour. Activating this search for novelty takes place when certain levels of satisfaction (psychological, profits, etc.) are not attained (Winter, 1984).

Whatever the case, it is assumed that searching for novelty or inventive learning processes is 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 a principal collective interaction mechanism, while extra-market interaction networks also constitute an essential element in the process of creation of novelty and are a key element in any evolutionary process (Dosi, 2000).[19]

4.2 Novelty in action plan perspective

In order to deal with novelty within the conceptual framework here presented a first question should be addressed: where to look for novelties? Or in other words, where do novelties appear? This leads us to the question: *how can we make novelties* – which are, by their very nature, unpredictable – *analytically tractable*?

[19] Aggregate phenomena are explained as emergent properties in 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, etc. (Allen 2001; Chiaramonte & Dosi 1993).

Considering novelty as the appearance of something previously unheard of, 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 (a) is the only moment in which it is possible to identify "something previously unheard of".[20]

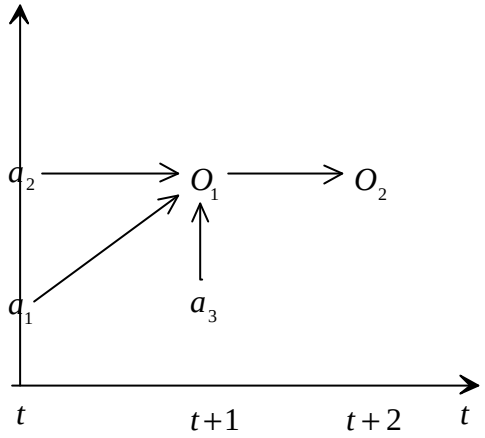

Figure 6

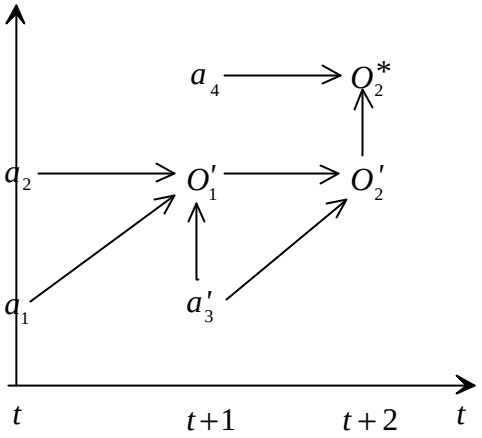

Figure 7

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 (Fig. 6), and its consequences in 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 leads to O_2. Action a_3' no longer leads to O_1' (arrow crossed out). Also, linked with O_2^*, a completely new action, a_4, appears.

It is important to take into account that, in this perspective, the appearance of a new 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 of a new objective (O_2^*).

As an example, consider the impact on production and consumption spaces and on the relationships between agents, of an electoral campaign with the slogan "Internet for everybody". In this case, "Internet for everybody" is a new and hierarchically

[20] This does not mean that novelty cannot be the result of interaction and learning processes. It means only that, within the action plan approach, novelty is analytically located at this stage. Remember that novelty has not yet been revealed.

superior objective, O_2^*. Let a_1 be the human, a_2 the financial, and a_3 the technological capital employed to achieve O_1 "to develop the infrastructure for communication". This objective is the intermediate step to attaining the general objective of "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: the Internet. Therefore, new needs for infrastructure arise. What is required is "communication via the 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'. But reaching the new objective O_2^*, "Internet for everybody" requires new actions (a_4) to disseminate a special kind of knowledge consisting of skills for Internet usage. The policy measures to disseminate the necessary skills also open new possibilities of interaction among agents.[21] New ways of interacting might emerge, transforming the spaces of action (spaces of representation) of agents and producing economic change. The new action plan is depicted in Fig. 7, and is more complex than the previous one.

As shown by the previous example, novelty is integrated, or in a sense "endogenized", into the theory. However, it should be stressed that novelty is *not* explained from within economics. It is rather that the action plan approach aims at locating, and thus "explaining" the exact place and role of novelty (what its nature is from the point of view of the action plan) and also at forecasting its consequences when it appears.[22]

Novelties operate in economic systems because economic agents incorporate them into their spaces of representation, thereby producing choice *ex novo*. "Rational choice is an inadequate explanation for behaviour, because neither the empirical premises nor the objectives of behaviour can be logically derived." (Loasby, 2002: 1231). As Loasby points out, the search for novelty cannot be *rational*, for "no kind of reasoning can give rise to a new idea" (Hume, 1978 [1739]: 164).

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

[22] From this perspective we can no longer conclude, as Schumpeter does (1932) 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 content is concerned, not its structure nor its properties.

The action plan approach is compatible with this view: creating choice is, in the first place, producing new objectives of action. When agents incorporate new objectives into their space of representations they may trigger the discovery of new means to achieve these objectives. This is not incompatible with the possibility of agents also representing new means (actions) within their space of representations. However, this would be a particular case where, given certain objectives, agents incorporate (discover, learn, imitate, etc.) new means in order to achieve them in the best possible way. The most general case is the one in which objectives are produced (imagined, set, etc.) by the agents. Considering novelty in objectives as the most general case enables us to treat other particular cases like novelty in means, given objectives, given means, etc.

Departing thus from the general case in which the agent produces his/her objectives of action, we may find the novelty in objectives appearing in two ways: either with the introduction of an entirely new one in the action plan or the hierarchical change of already existing ones.

4.3 Ethical novelty

Novelty in objectives *cannot* be completely explained by cognitive dynamics. However, what has been defined as ethical dynamics plays a major role in the production of objectives of action. The creation of new objectives or their hierarchical reorganisation in the space of representations which result from ethical dynamics will be referred to as **ethical novelty**. Ethical novelty introduces new order in the space of representations.

Consider the following two examples to clarify ethical novelty. The first one is the introduction of environmental values in the performance of a multinational company is a source of change in the space of representations of a company. The assumption of the (nine) principles for human rights, labour standards and the environment of UN's Global Compact program (http://www.unglobalcompact.org) at COLOPLAST is an example. The commitment to the environmental target 2002/2003 "research and operations to reduce the waste from RCC by 6%" (action a_1) is linked to the objective 2002/2003 (O_1) "reduction of polymer waste» in all production plants in the targeted proportion". The technical process is revised or changed in order to adapt waste treatment to achieve this objective (COLOPLAST 2002: 7-33). Are the technological changes required completely explained as a result of mere cognitive dynamics internal

to the company? Are they the consequence of a learning process? If not, how could they be better explained?

The objective "COLOPLAST takes responsibility for contributing to sustainable development" (COLOPLAST, 2003: 66) is considered superior, and thus articulates the company action plan. This main objective (O_2^*) links 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". (ibid.: 72) The technological level and the changes inside this level are not merely explained by cognitive elements (factual learning processes and factual knowledge). The proposal for the promotion and fulfilment of the hierarchically superior objective (O_2^*) is the key reason for explaining the logic of the action plan, as it generates new possibilities for action.

In the second example, an agent (in this case a firm) decides to be the industry's world leader. This decision can only be explained on the basis of its conception of what reality should be. Therefore, "being the industry's world leader" is the objective that articulates the action plan of the company and that arranges the structure of intermediary actions.[23] Research and development activities may lead to the discovery of a new technology, as seems to have been the case of the 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 "novelty" 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's world leader" is itself a creative action: the company is inventing its end. And the invention of

[23] The firm's statement of the objective: "being the industry's world leader" is an ethical novelty. It is important to insist here on the idea that the term "ethical" is not treated with any particular moral content. It refers to the fact that it is a new objective that gives a new structure to actions (whatever these may be).

this new end constitutes a genuine example of an "ethical novelty" as defined in the action plan approach.

Figures 1 and 2 could be reinterpreted as an illustration of the action implemented by IBM in the 60s and 70s, the strategic period in consolidating 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 maintaining its world leadership (O_1), represented by IBM System 360. Figure 2 could represent another IBM action plan: "continued innovation of the 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 the dominant firm, the new 370 family of computers. Observe that (O_2) would be impossible without having achieved (O_1).

Trying to explain the prior examples without using the "ethical novelty" approach would lead us to focus on interaction or cognitive dynamics as the main explanatory elements. However, considering that learning or interaction processes are the only elements responsible for the appearance or re-organisation of action objectives is falling for the "naturalist fallacy" which means deducing judgements about what things should be from facts alone. As an example, the fact that a man knows that he can walk and knows how to walk does not mean that he knows where he wants to go.

Our claim is that the definition, the choice of objectives greatly depends on particular dynamics: ethical dynamics —which is different and in an important sense independent of cognitive dynamics.[24] In the case of COLOPLAST the environmental values, which are converted into specific objectives, are the result of the company's interplay within the socio-economic environment in which it deploys its activities. These "social values" are assumed as "company values" (and this is crucial) and converted into new objectives which transform and re-organise the company's space of

[24] Borrás (2004: 431) states that the *telos* of an innovation system is directly linked to the *ethos* of the system. She is therefore arguing that the direction and collective objectives adopted by the system are to a great extent explained by the set of collective values and beliefs.

action. The same can be argued about IBM: the company makes the decision to become leader and with this intention it articulates and organises its innovation strategy.

4.4 "Ethical novelty" as a source of economic change

The identification of a source of novelty is of little interest in itself if the consequences in terms of economic change are not explored. In this sub-section we examine, briefly, the logical link between the notion of action plan and economic change. *The hypothesis here is that ethical novelty is another source of economic change*.

Economic change is understood as "dynamic endogenous structural change capable of inducing or generating novelties". (Rubio de Urquía, 2003: 64) Let G_t be 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 in 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; the reverse is also true. The idea of global dynamic transformation of a social system could be represented as follows.[25] At any given instant, consider the diverse **structural elements** that characterise the whole system G_t: the cognitive dynamics of each agent *i*, his ethical dynamics, the cultural dynamics of society as a whole, as well as the state of the environment, U_t. The global dynamics of society, denoted $\Delta(G_t)$, are the dynamics of transformation from G_{t-1} to G_t. In this context, **structural change** refers to processes that transform the structural elements, and **novelty** refers to the occurrence of something that has not previously taken place in any of them. The occurrence of structural change and novelties induces a process that is self-organised (Rubio de Urquía, 2003: 68). It is necessary that mutual interaction of action plans among agents generates structural changes endogenously. Endogenous change means changes in the agents' dynamics: not only in their cognitive dynamics, as has been largely recognised by the literature, but also in their ethical dynamics.

The main argument can be summarised as follows: *if* economic change is "dynamic endogenous structural change capable of inducing or generating novelties"; *if* structural change refers to processes that transform these structural elements; *if* novelty

[25] See, for a formal argument-proof, Rubio de Urquía (2003), especially Section III.

refers to the occurrence of something that has not previously taken place within any of these elements; and *if* novelty could be produced by ethical dynamics producing ethical novelty; *then ethical novelty generates economic change*.

Assuming this argument, a deeper inquiry into the nature and consequences of all these processes would be necessary. But the objective of this paper is to point out the logical connection of all these elements in order to contribute to the theory of economic change, and in particular to bring the role of ethical dynamics into this explanation.

5. Concluding remarks

Agents need to cope with their inherently incomplete, fallible, and therefore conjectural knowledge of the world. For this they build fairly stable interpretative frameworks and action procedures which permit them to make decisions in a context of substantial uncertainty (Knight, 1921). A fundamental economic problem is how agents build these frameworks, that is, how they organise their knowledge (Loasby, 1991, 1999). Agents' knowledge combines their perception of what reality is with their conception of what reality should be. Cognitive and ethical dynamics (as well as cultural dynamics) have been defined as the processes by which the latter perceptions and conceptions evolve individually and collectively. Based on these dynamics agents produce their action plans; the projective links from means (actions) to objectives. Changes in the agents' objectives transform their plans. These changes are not merely explained by cognitive dynamics: they are mainly linked to ethical dynamics and are referred to here as ethical novelties. Ethical novelties consist of the creation of new objectives of action or their hierarchical re-organisation which result from ethical dynamics, and not merely cognitive dynamics. Thus, ethical novelty is a source of economic change because agents' mutual interaction of action plans generates endogenously structural changes.

Some new research lines are suggested by these considerations: the implications of this approach for economic policy-making (Pelikan, 2003); entrepreneurship linked to changes in agents' action plan objectives (Metcalfe, 2004; Witt, 2003b), and the role of intentionality in the explanation of innovation processes (Cañibano, Encinar & Muñoz, 2006).

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