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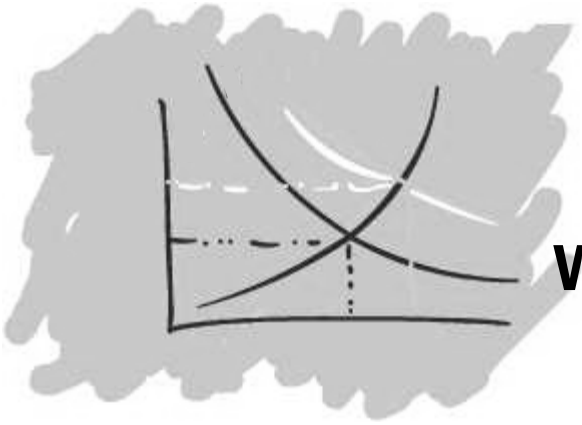

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ACTION PLANS AND SOCIO-ECONOMIC EVOLUTIONARY CHANGE

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ACTION PLANS AND SOCIO-ECONOMIC EVOLUTIONARY CHANGE*

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Abstract: An important challenge to evolutionary economics consists of how to tackle with the dramatic tension between purposeful human action and the 'blindness' of evolutionary processes. On the one hand, economic action, if rational, has to be planned (which implies purposeful ordering of the means used to achieve objectives). On the other hand, an evolutionary process involves both the emergence of novelties (both intended innovations and unintended consequences of actions) and properties that manifest at meso and macro levels. Some recent papers have insisted on these issues. However, few analytical tools are yet available to cope with both, the analysis of intended dynamic action and 'blind' evolution. In this paper we propose the so-called 'action plan approach', a theoretical framework which could be useful for this task. The development of tools that permit us to analyze how individuals construct their plans, the projective (conjectural) and interactive nature of action, and the learning processes involved in 'planning and acting', may help us identifying and understanding new sources of complexity of economic processes. The close relationship of the 'action plan approach' with other systemic conceptual approaches is also highlighted.

Keywords: connections, action plans, novelty, intentionality, evolutionary economic process

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> The creation of the ‘wealth of nations’ depends primarily on the emotional disposition of people to create novelty, in both elements and connections, and to coordinate in production and exchange in increasingly complex and organized ways. (Foster, 2005: 884)

> Carrying out a new plan and acting according to a customary one are things as different as making a road and walking along it. (Schumpeter, 1934: 85)

1. Introduction

Recently, Nelson (2005a) has pointed out an important theoretical challenge for evolutionary economics that consists of how to tackle the dramatic tension between purposeful human action and the “blindness” of economic evolutionary processes. Contrary to biological evolution, economic evolution clearly differs in that “the human and organizational actors are purposeful, they make conscious efforts to find better ways of doing thing, and their efforts to innovate are far from completely blind.” (p. 10). Social evolutionary processes in general and economic evolutionary processes in particular, rest on individual dynamics. It is the interaction of these dynamics that configures evolving processes. This is why any inquiry on the nature and evolution of social and economic dynamics must rely on the analysis of the structure of individual action.

Individual dynamics may be formally represented by the so-called ‘action plans’. An ‘action plan’ is a *projective* structure (system) that *links* (connects) actions to objectives. The specific elements that form this projective structure are important; however, it is even more important how those elements are *connected*. Moreover, an action plan is a system of connections whose elements are linked in a special manner: it is the projective ordering of means to achieve objectives located in ‘future’ time. This concept implies the *direction of action* as a result of rationality and dynamism. Agents determine their objectives and attempt to reach them. For this, they need to order the means (or actions) — according to their knowledge, experience, perceptions, etc.— in order to achieve purposeful objectives. Agents evaluate to what extent their plans are being successful and, if not, revise them accordingly. It is when àction plans’ are actually deployed in reality (transdending the imagination of the individual or the organization) that the outcomes of actions appear and learning processes are activated. Still, an essential attribute of action plans is their projective nature. Thus, this approach naturally introduces imagination, uncertainty, creativity, entrepreneurship, etc.

Action plans may be manifold, with different forms and properties, degrees of complexity, hierarchies of objectives, inconsistencies (in both means and objectives), etc. Furthermore, as a product of interaction between plans a variety of situations that affect them in terms of *achievement* may arise.

This will depend not only on how plans are internally constituted, but on the results of interaction. Depending on how far they are successful in achieving their objectives, they will revise the structure and content of their plans inducing (or not) learning processes. The *ex post* outcome of interaction may be evaluated in terms of gain of feasibility (both internal and external) of the *ex ante* selected planned action. Individuals' desires to achieve certain goals and increase the feasibility of their plans, leads them to revise the plans. We will define this gain of external feasibility as *social coordination*.

The economic process is deployed in a complex environment as a result of the interaction of (a population of) action plans. The continuous generation of novelty disrupts the coordination of the process and prevents it from reaching something like a stationary state. Novelty may emerge from plans themselves —intended introduction of new means, objectives and/or changes in connections—, or as a result of the unintended consequences of interaction. The economy evolves continually in Schumpeter's (1934) sense; it is a restless process (Metcalfe, 2002) resulting from a permanent tension between the tendency towards coordination and the continuous emergence of novelties. We can interpret economic (and social) dynamics as the product of the interaction of action plans. Economic and social reality might be thought of as a network of plans (systems) that configures systems of a higher order of complexity (firms, sectors, economies).

Action plans introduce an element of (bounded) rationality —of *intentionality* within the economic process. Nevertheless, the complexity derived from interaction may lead us to think of economic process as 'blind' (Vanberg, 2006). However, the distance between 'rational' and 'blind' may be considered the result of our lack of knowledge about complex processes where novelty is involved. Whatever the case, the interaction of plans results in an evolving complex system. Agents' intentionality determines, to a great extent, this systemic evolution and its properties.

The originality of the approach proposed in this paper consists of showing how, from very general properties of individual action plans in interaction, different collective possibilities may arise. The paper shows the logical relationship among the above-mentioned concepts and, eventually, it sheds light on the apparent paradoxical relationship between individual intended action and the 'blindness' of economic processes.

The paper is organized in five further sections. Section two will deal with the relationship between knowledge and complexity; section three addresses the analytical structure of individual action and presents 'action plan approach'; section four points out how the interactive deployment of individual plans produces different 'social' dynamics with different degrees of complexity; section five discusses the relationship between intentional action and the 'blindness' of economic processes. The paper finishes with some concluding remarks.

2. Knowledge and the systemic nature of the evolutionary economic process

Systems can be seen as a set of elements and connections. Connections are akin to mathematical operators, which must stay fixed if logical deductions concerning equilibrium outcomes are sought. However, it is essential in a dynamic analysis that connections are continuously changing (Potts, 2000: 5), transforming the 'geography' and properties of the system (Kirman, 1997). Novelties may emerge because of the changing combinations of connections (Loasby, 2001); which may be intended or not (Loasby, 2006).

A very important attribute of a system is that it is a ubiquitous concept: its structure replicates at every analytical level. For example, "knowledge, in the abstract, is a specific instance of association... [And] Knowledge is a structure that can interpret structures." (Potts, 2000: 58) In this perspective, knowledge may be considered as a changing structure. Another important feature of every system is modularity: which it is a system at one level, may be a subsystem at another higher level and vice versa. For example, an economic sector is a system that is part (a subsystem) of the whole economy; at the same time, a sector is built of firms and organizations (now subsystems within the sector). "An appropriate construct to understand systems at all levels is the network. The brain is a network, consumption spending lies in a network of interconnected tastes and interconnected income flows, production is a network, the whole economy is a network" (Foster, 2005: 885). Thus, knowledge may be considered as a system; but also the brain structures that sustain it (Fuster, 2003), which, at the same time, is part of an organism, etc. However, from another point of view, individuals' knowledge is integrated in organizations, sectors, etc., which are higher order systems (Loasby, 2006). This is the case, for example, of the knowledge base of a sectoral system of innovation (Malerba, 2004): the geometry and dynamic properties of this (sub-) system have an influence on the functioning (and achievements) of other (sub-) systems of higher and lower levels.

In economic systems, as well as in science and innovation systems, the relationship between knowledge and the development of the system deserves special attention, to the extent that some economists have claimed that the economic problem is a problem of generating and organizing knowledge (Smith, 1795). Economic growth is the growth of knowledge, the accumulation of a flux of connections (Metcalfe, 2002; Metcalfe & Foster, 2004: *xi*; Dopfer & Potts, 2004: 21). The connections that form knowledge constitute the basis for an individual's action. Acquired knowledge is employed to work out theories about how the elements that configure the natural, technological and social systems within which agents act, are causally connected. These theories are conjectures, in a

Popperian sense (Popper, 1972), and do not need to be scientifically validated to be employed. They configure frameworks that serve as a basis for the expectations of individuals that operate in an environment of uncertainty, and define the set of (imagined) possible events and courses of action (as well as the weightings attached to them). Future courses of action are necessarily imagined and deemed possible (Loasby, 1996) to have any effect on the agents' action. These frameworks provide structures of representation (Loasby, 1999: 10-12) and procedures that, as they are in common use and have proven their efficacy, may constitute routines, institutions, etc. In this way, the study of economic processes is also the study of institutions (Loasby, 1999: 13).

It should be noted, that the connections that configure these frameworks for action are necessarily incomplete (Potts, 2000). That is to say, in a context of true uncertainty (Knight, 1921) it is impossible that agents know all the possible links between the elements (means, actions, and also objectives) that constitute the systems at the present time and in the future.

Economic systems are complex adaptive systems (Foster, 2005: 875). Depending on the role that knowledge plays within a system, we may classify different types of adaptive systems with different degrees of complexity. Foster (2005: 878) distinguishes four types, of which the third and fourth deserve special attention. 'Third-order complex systems' (the *acquired knowledge case*) exist "when a biological system interacts not only with its environment as a data field, but also through images formed of possible worlds, i.e., connections between elements in the knowledge structure that need not have existed in observed reality. Knowledge is no longer just an accumulation of experiences; it is also a source of 'mental models' that can be used to determine aspects of reality. Of course, if this happens, then some mental models also become part of the knowledge set. So, with human beings, some knowledge is imposed and some is acquired. *There is feedback from reality and feed-forward to reality*. (…) Such systems are complex and adaptive, but adaptation is more than natural selection—it involves creativity." Even more interesting are fourth-order complex systems (the *interactive knowledge case*): "such systems come into being when *mental models interact with each other*. My imagination can still mould reality, but knowledge that this is so leads others to imagine what my imaginings might be." Foster adds that as we proceed up through these orders of system complexity, the role of connections and knowledge becomes increasingly apparent and important. The further up we go, the more that knowledge matters, eventually shaping the environment and then becoming part of the environment itself; the 'knowledge' or 'new' economy is really an acknowledgement that fourth-order system complexity has become relatively more important than the third-order system complexity that dominated in less-developed economic systems (Ibid.).

Furthermore, Allen (2001) when differentiating between self-organizing models and true evolutionary models, points out that: "in self-organizing models, it is assumed that the subcomponents have fixed

internal structure, implying that they are not modified by experiences… If the *micro components have internal structure*, and if, in addition, this can change through time, thus changing the behaviour of the individual elements, a complex evolution can take place as the emergent macrostructure affects the local circumstances experienced by individuals. This in turn leads to an adaptive response that in its turn changes the resulting system structure generated. *Changes in the micro components affect system structure and its performance in the larger environment*." (Ibid. p. 327; italics added. Dopfer (2005: 24, Fig. 1) has depicted this idea.) In what follows we will retain these basic relationships between knowledge and the performance of economic systems.

The analysis of the relationship between the elements of a system and their connections is fundamental for examining how a system evolves among adjacent states. Whatever the particular 'knowledge domain' (Malerba & Orsenigo, 2000) of the system we are examining, a central question is how agents (individuals, networks and organizations) within a system organize the existing knowledge; but also it is analyzing how knowledge evolves and, eventually, coordinates efficiently, generating systems of growing levels of complexity. The conceptual basis for the analysis is always the same: knowledge *is* connections, structure *is* connections and dynamics *is* the change in connections. The products of these evolving connections are other systems: organizations, economic sectors, systems of innovation, the economy.

This approach is compatible with the emergence of novelty, and with the conditions for true learning processes. However, not everything is a consequence of cognitive dynamics. Within economic (and social) systems, other factors should be taken into consideration, appart from the mere connections and elements. For instance, the objectives of action plans —which make action rational— make that the system generated by the interaction of individuals' plans acquire a specific character: a *direction* (and because of this, it is not 'blind'). This character become apparent, for example, in emergent properties and products captured in statistical measures. All this is related to individuals' pursued objectives. Allen himself points this out when he assess "that people discover the consequences of their actions only after making them…. As a result there is a complex and changing relationship between latent and revealed preferences, as individuals experience the system and question their own assumptions and *goals*." (p. 317. Italics added.) Before we face the consequences of these arguments, and in order to takcle with the paradoxical relationship between intended action and the 'blind' character of evolving processes, we have to present briefly the so-calles 'action plan approach'.

3. Action plans and the structure of individual action

Economic and social systems face continuous endogenous change: evolution is the result of self-transformation over time (Witt, 2003a: 12-13). This evolution is also seen as the process (or set of processes) that combines the generation of novelty with the retention of some of it (Loasby, 2002: 1227), following the schema variation-selection- retention (Foster & Metcalfe, 2001: 6). To sum up, an evolutionary system is characterized by continuous endogenous change induced by the emergence of novelties that trigger self-transformation processes (Rubio de Urquía, 2003).

Change is continuous; but, what is changing? Which are the selection units and the sources that are continuously feeding this process of selection-retention? What about the causal explanation of renewed variety? Several selection units have been proposed: routines (Nelson & Winter, 1982); institutions (North, 2005; Hodgson, 1993, 2004); knowledge and capabilities (Boulding, 1981; Hayek, 1937, 1945; Loasby, 1999, 2001) are some examples. Finally, Potts claims that, in a broader sense, it is connections that change (Potts, 2000: 57). In order to shed some light on a wide range of complex phenomena the 'action plan' is proposed as an apt unit of selection.

An *action plan* is the agent's projective linkage of actions (means) to objectives (ends): it is a system in which actions and objectives are ordered at a given instant in time in a projective manner. The very nature of action plans is the projective character of the ordering involved. This refers not only to the fact that historic time (and timing) play central roles in explaining human action, but also that actions and objectives need to be imagined before they are deployed by agents. These sets of actions and objectives (the elements of the system 'action plan') can be manifold: material or not; located at any point in time; possible in some physical sense or not; able to be expressed in monetary terms or not; etc. Plans are a pervasive concept and the importance of action plans for economic theorizing is not new, as Encinar & Muñoz (2006: 263f) have shown. Individuals make plans, and planning implies making connections. An action plan consists of a set of connections between actions and objectives. It is a rather general *open structure*: it can include routinized patterns of behavior, strategic designs, monitoring and valuation procedures, etc. A plan can also refer to its objectives at several points in ('future') time; represent hierarchical dependencies among objectives and actions and with as many analytical moments in time as needed; alignments of objectives with other individuals' plans; e.g. as complex as desired. Moreover, using simple graphs can represent the structure of an action plan.[1]

[1] Rubio de Urquía (2005, 2003) and Encinar & Muñoz (2005, 2006) provide further details and formal developments.

Economic behaviour cannot be understood only on the basis of present reality or on past reality. It is also necessary to consider future 'unreality' because it is in the future where individuals locate their objectives (goals). Actions (as producing, consuming, innovating, working, organizing, etc.) are conditioned by agents' desires and pursued objectives (Shackle, 1972) which vary greatly and are subjected to change over time (Cañibano et al., 2006a). As a consequence, diversity and changes in pursued objectives should be considered key explanatory elements of the process of self-transformation of social and economic systems. These are the imagined realities deemed as possible and desired towards which the agent orients his action (Loasby, 1996), and it is also a source of complexity (in a broader sense than Metcalfe & Foster, 2004). Important features of novelty generation and innovation processes may be addressed by focusing on the dynamics of the agents' formulation of goals as will be shown below.

The analytical steps of individual action

An individual's 'real' action constitutes an indissoluble and dynamic whole (that can be observed, or at least its external effects can) which is greater than the selection and deployment of plans. For a deeper understanding of individuals' real activity, it is needed to consider their cognitive and ethical dynamics need to be considered. It is the agents' knowledge and perception of what reality is —cognitive dynamics— and what it should be —ethical dynamics—, that results from learning processes as well as from the creativity they deploy, that shapes their plans. Agents' action plans are the reflection of their own cognitive as well as their ethical dynamics. Obviously, these dynamics are influenced, but not determined, by the cultural dynamics of the society within agents live. In this sense the three dynamics co-evolve; and all three (cognitive, ethical and cultural) configure agents' action spaces: the space that they consider being possible and/or desirable. This kind of spaces has received different names: for example, 'space of representations' (Loasby, 1999); 'space of possibilities' (Allen, 2001: 232); etc. In any case, what agents imagine as possible and desirable states, is essential to understand the future. It is in relation with the above-mentioned dynamics that plans acquire full meaning.

For a deeper understanding of the structure and significance of individual action it may be useful to decompose it in four analytical steps. In simple terms, consider the following sequence of (analytical) steps for an individual *i*: the (1) constitution of the individual's set of action plans, $P_i(t)$; (2) selection of the action plan the individual want to implement, $p_i^*(t)$ —logically $p_i^*(t) \in P_i(t)$—; (3) the interactive deployment of $p_i^*(t)$ within the external (natural and social) environment; and (4) evaluation and revision of $p_i^*(t)$, while and after its deployment, and its implications for the set of

action plans to be constituted in the 'future' —for example $P_i(t+1)$. Steps (1) and (2) are associated with the analytical circumstances of the agent's individuality; while (3) to the interaction with other individuals' action plans. Step (4) deserves a special place, because it is in this step when the agent activates his/her learning processes.

Constitution

The constitution of action plans involves what agents deem possible to do consciously, and why and how they deem it possible. Logically, plans are constituted before there are deployed and evaluated. In this step, agents fix their objectives (and their hierarchy), they lay out (or invent!) the means and estimate the time needed to achieve them, whilst making the connections (links) between all these elements. The constitution of a particular set of plans $P_i(t)$ depends on a complex structure of beliefs, attitudes, creativity, perceptions, values and theoretical and technical representations of reality that evolve over historical time. This complex structure induces what agents conceive as 'be', 'could be' and 'should be' —which include what individuals know, perceive, feel and desire. We may call this structure 'individual assembly'. (Rubio de Urquía, 1994)

'Individual assemblies' are mainly the result of individuals' cognitive and ethical dynamics and the cultural dynamics within which they live. These dynamics generate the *action spaces* of agents, which involve both objective elements (in the sense of perceived as 'real', external to the actor) and subjective elements (like expectations). The sets of means and objectives exist only within these 'assemblies'; and means, objectives and their connections —that is, plans— inherit the formal characteristics of these 'assemblies'. Moreover, while plans are being constructed they are simultaneously being 'rated'.

It is in this step when agents deploy 'bounded rationality': reasoning capabilities for achieving objectives, having at least a partially formed theory about how to achieve them (the 'rationality' part of the concept); and being incomplete, the theory is likely to be revised at least somewhat in the course of the effort, since success is far from assured (the 'bounded' qualification to rationality) (Nelson, 2005b: 3). The bare bone of this perspective is that all entities, agents, organizations, governments, etc., can be conceived of as *carriers of plans*: conjectural schema that allow operations (Dopfer, 2004: 179).

Selection

The selection of the plan that will be implemented is carried out according to the *principle* of *economic behaviour* (PEB): "take the hierarchically ordered set of action plans $P_i(t)$ conceived as feasible by individual *i* in *t*. The PEB states that the agent, invariably, adopts and tries to implement

the action plan with the highest rank among $P_i(t)$." Let $p_i^*(t)$ be that plan —such as $p_i^*(t) \in P_i(t)$— ; then $p_i^*(t)$ is the selected action plan to be deployed.[2] Step (1) provides the 'raw material' upon which this principle operates, and that has to be understood as a *principle of selection* —an *ex ante* selection (Loasby, 2002: 1227).[3]

Deployment, evaluation and revision

While deploying $p_i^*(t)$, and for monitoring to what extent objectives are being achieved, agents evaluate their plans in terms of *achievement*. It is not possible to disentangle steps (3) and (4) in practice; however, it is useful from an analytical point of view. The efficiency criterion that agents employ in practice, is to what degree what has been planned is being executed. Otherwise, the degree of (revealed) inconsistency or unfeasibility of plans is a proxy measure of their inefficiency. Agents will revise parts or the whole plans (or even discard and replace them) if they judge they are not effective enough. This implies to establish new connections between the prior elements (means and/or actions) or with entirely *new* ones; and it also triggers learning processes which, basically, consist of reconfiguring mental connections, and the exploration of adjacent states of the system.[4] The acquisition of new knowledge, new capabilities, etc., is determined by the intention of agents to reach their objectives. Human inclination to imitate the behaviour of others, "human curiosity and the desire to experiment also play a role… [Moreover], some of these 'experimental' behaviours do better than others." (Allen, 2001: 321)

A common concept in evolutionary thinking is 'satisficing', a powerful mechanism that is lacking in biological evolution: a source of endogenous control on the mutation rate of connections. "When things are going well, satisficing favours behavioral stability. When they are going poorly, the satisficing trigger produces search for superior alternatives. The specific consequences of this asymmetric search propensity depend on how 'well' and 'poorly' are defined by the aspiration level adjustment mechanism, on the way the competitive context affects aspirations, on the nature of the space that is searched, and on the quality of the test that determines whether the status quo is rejected in favor of a newly identified alternative." However, in general "satisficing produces a powerful net force for 'improvement' in an absolute sense —upward motion on the same scale on which aspiration

[2] Note that this principle makes sense once $P_i(t)$ is analytically given. That is to say, it is given from a theory of human action that must explain the origin of means and objectives, and that is previous (in a logical sense) to any economic theory (for example a cognitive theory).

[3] A common error consists of identifying the economic principle with a decision theory. In the human case, where little genetic selection has occurred recently, the evolution of the socioeconomic system has lain, precisely, in the *novelty* and *selection* of ideas (Foster, 2005).

[4] "Learning is simply learning about ways of doing things that had not been done before, or at least not seriously explored, and about the performance of these ways of doing things." (Nelson, 2005a: 11)

level floats as a moving target. It does so even if the search itself is totally uninformed as to which alternatives deserve examination. (…) [Thus,] satisficing is not so much about stopping search as about starting it." (Winter, 2005: 21. Italics added)

In quite similar terms, (Foster 2005: 882-883) claims that the role of learning —a process itself— is crucial for understanding complex processes: individuals "have to spend time acquiring knowledge from information stocks and flows in order to make plans. This knowledge gathering is also a process in time. There is satisfaction in the discovery of novel connections, and there is excitement as aspirations form." Moreover, "what is decisive in complex systems is not optimization but, rather, selection. (…) Subjective optimization will produce a range of strategies to reach an aspirational goal, given that assumptions concerning opportunities and constraints (beliefs) will vary across individuals. Processes to achieve an aspiration will depend on particular knowledge structures and the specific interactive skills that exist, and these will translate into unique learning by doing and incremental innovation paths" (Ibid.). The best aspiration/process mix will emerge over time: all learning and creativity must occur in time.

In the complex economy, rules and institutions —past successful courses of behaviour, a product of design or of selection processes— maintain some structural stability; this allows individuals to economize resources (for example, cognitive resources) for introducing strategic considerations in their plans, making experiments, essaying new conjectures. However, for elemental novelty to continue to translate into connected structure there must eventually be failure. All economic evolution stems from this process of creative destruction. This is possible if agents on the one hand are capable of reflecting on the achievements of their own actions and, on the other hand, and as a consequence, they modify themselves —by means of their cognitive and ethical dynamics, changing their individual 'assemblies' and, therefore, their action plans.

In this interactive process, Knightian uncertainty prevails about "how the next attempted stage will play out therefore tends to forestall effective planning and preparation for later stages —and also makes the current evaluation of future promise more problematic" (Winter, 2005: 25). The ex ante uncertainty about such things does not relate to just whether they will happen, but to what they are – because they haven't been seen before. The only alternatives in any plan actually available for surveying are a collection of first steps. The further steps are largely hidden, and so are the attainable final states, or outcomes, and the steps in between. At the same time, only by going forward is it possible to learn what the options are for going further forward. "Throughout this design process, there is a dialectical dance between 'feasibility' and 'desirability,' such that proximate objectives co-evolve

with the technical [and social] achievements." (Ibid., p. 27) And this is because so few of the facts that matter are available ex ante to guide decisions: they emerge as the product of decisions.[5]

Properties

'Social dynamics' is constituted when agents deploy their action plans interactively. 'Social dynamics' depends on —and at the same time, has influence over— the constitution of the set of action plans, $P(t)$, and the assemblies of the individuals that form society. From these interactions *new phenomena and properties* result that affect the sets of action plans on both an individual and collective levels. These properties permit us to classify different social interaction dynamics —an *ex post* selection (Loasby, 2002: 1227). The most important of them are: feasibility, consistency, reflexivity and coordination. The former three refer to individual aspects of plans; the later has a mainly social dimension.

Feasibility refers to the logical and material possibility to implement an action plan. In general, action plans are complex enough to include more possibilities than 'possible' or 'impossible'; which is why we have to consider feasibility in terms of degrees. Thus, *feasibility is the degree to which a plan enablesus to reach the objectives.* Feasibility may be incomplete —the more likely case—; which is when it is said to be rationed, meaning that the agent achieves the objectives included in his plan 'to some extent'. Two types of feasibility may be considered: (a) *ex ante*, or (*R1*); referring to how the plan has been constituted from a logical and material point of view; and (b) *ex post* (*R2*); which is linked to the possibility of the plan being accomplished when interacting with other individuals' plans. The rationed versions of (*R1*) and (*R2*) are, respectively, ($\tilde{R}1$) and ($\tilde{R}2$).

An action plan is **consistent** if it does not reveal *sources of unfeasibility*; i.e. the individual representation of 'the possible' guides him to reach the objectives included in his plan. Consistency may be of two types: (*C1*), consistency of means to objectives; and (*C2*), consistency among objectives —the individual does not consider reaching contradictory objectives (Sen, 1993; Encinar, 2003). Obviously, the consistency of plans is usually partial.

[5] These arguments allow the role of entrepreneurs to be reinterpreted in Economics. Entrepreneurs *construct* plans as possibilities in their minds; they have original creative thoughts about what might form the basis of a business project: these entail making connections; and this connection-constructing process is selective. (Earl, 2003: 114). Learning processes can be interpreted as the reconfiguring of mental connections, and entrepreneurial learning as Popperian process of hypothesis revision. The entrepreneur would be someone with a comparative advantage in making connections. Moreover, the entrepreneur is a disequilibrating agent who opens up opportunity sets in the manner envisaged in Schumpeter's work. By making novel, previously unimagined connections, the entrepreneur creates new elements from which yet further sets of combinations can be made, leading to economic growth and the seemingly infinite variety of products from which modern consumers can choose." (Ibid.) Foster (2005:882) argues in a similar manner claiming that entrepreneurs' activities may involve fourth-order system complexity.

There exists an important relationship between consistency and feasibility: *feasibility is the observable expression of consistency*. They are not simultaneous properties, but successive (the second refers to constitution, the first to evaluation) and, obviously, co-involved. Thus, on the one hand, a consistent action plan guarantees *individual ex ante feasibility*, (*R1*). And on the other hand, *feasibility as coordination* of plans of different individuals (*R2*) is not guaranteed *a priori* because not only are (*C1*) and (*C2*) required to reach the proposed objectives, but also a certain kind of 'social' interaction for the plan to be (*R2*). That is to say, (*C1*) and (*C2*) are necessary but not sufficient conditions for plans to be (*R2*). Moreover, (*R2*) necessarily require the condition (*R1*). As a consequence, there are two sources of unfeasibility —which imply inconsistencies—: (a) violation of physical and/or logical necessities; and (b) inconsistency among objectives.

Reflexivity refers to a feedback mechanism that works (or not) *between* the constitution and evaluation of plans: it is a *bidirectional connection* between both analytical steps. At each moment, the individual is making decisions (and executing actions) that, even though they are his, affect him and all the individuals interacting with him. Insomuch as this interaction is configuring the 'social reality' and he is 'balancing' his action in terms of achievement, and this 'social reality' reverts to the agent's process of configuration of renewed plans —which may imply redefining or creating (*ex novo*) action plans that take into account. This property —that we will denote as (*F*)— would allow the theoretical analysis of the connection between individual and 'social' dynamics, because it refers to the *dynamic nexus* between them. (Examples of this in Economics are expectation models.) In general, we may consider this property as a prerequisite for learning processes.

Finally, in order to understand how knowledge shapes productive activity, it is necessary to understand **coordination** above all (Winter, 2005: 38). An individual's plans deploy, when interacting with other individuals' plans, domains of complementarity, competence, etc.; not only because of scarce resources, but because of the timing of actions and objectives. The action of an individual within society depends on the action of others. In relation with the above-mentioned properties, we may define coordination as a *gain in feasibility*; or, using a negative definition, as a reduction in the degree of unfeasibility of agents' action plans. We should remember that (*R1*) is a type of feasibility associated with the evaluation that the individual makes of his own action plans; whereas (*R2*) corresponds to the inspection of the feasibility resulting from the concurrence of plans. It is when the agent does not observe (*R1*) that he, eventually, addresses (*C1*), (*C2*) and/or (*R2*). That is, he examines both *ad intra* and *ad extra* properties of the plan deployed. The key point here is the evaluation of the plan made by the agent in terms of (*R1*). From there, the feasibility 'balance' (achievement) reverts (or not) to the constitution of plans, which implies a more or less thorough revision of plans depending on (*F*). This is the meaning of individual and 'social' dynamics: it is a feedback process of interaction,

where the external reality of the agent is caused and is the cause of the internal process of constitution and (attempt of) deployment of individual action —a process that goes on transforming both the external and internal reality of the agent.

As a consequence, *coordination gain*s may be caused by: (a) the (re-) constitution of plans in which the interrelationships between means and objectives and among objectives are such that inconsistencies (both *C1* and *C2*) decrease or even disappear; (b) (re-) constitution of plans such that the 'balances' of plans previously deployed are taken into account. In the first case, coordination refers to an ex ante gain of feasibility, (*R1*); whereas in the second case it refers to ex post feasibility, (*R2*). In both cases the connections within action plans change because of the 'failures' observed.

In any case, coordination needs reflexivity. This property —which may be displayed in different ways depending on the nature of feedback mechanisms at work— is essential to effectively trigger the revision of the plan (its constitution). However, it should be noted that (*F*) does not imply coordination itself, but what is perfectly possible a type of revision which leads to a *discoordination* of individual and 'social' processes because the mechanism may reinforce some biases in the action.

4. Interaction of plans and 'social dynamics'

In order that action plans are deployed, they must first convert from plans into effective possibilities. It is in this transition from *planned* to *effective* when dynamic processes activate. The consequences of the interaction among action plans become apparent in the processes of *coordination* of individual and social action. It corresponds to each agent to evaluate the degree of fulfilment of their plans, in terms of *achievement*. Evaluation consists of the examination of the 'type of correspondence' between 'social' dynamics —as a result of the concurrence of his plan with other agents' plans— and his particular individual dynamics of constitution of plans. When individuals constitute their action plans, they do this from their cognitive, ethical and cultural dynamics, which are present in their own 'individual assemblies'. Because of this, action plans are essentially a reflection of some of the properties of consistency in both actions and objectives which carry a certain 'balance' of intrinsic or individual feasibility.[6]

[6] Schenk (2006: 246-247) dealing with the problem of routines coordination within complex systems refers to the relationship between the 'challenges' individuals have to cope with and their 'capabilities' to do so. Disequilibria between them give rise to a dis-coordination of collective action (in an organization, for example).

The (attempt of) execution of a plan *already involves* concurrence and interaction: the deployment of individual plans is in connection with other individuals that, at the same time, are deploying their own action plans, As a consequence, the interactive deployment of individuals' plans creates a particular 'social dynamics', within which processes of individual (and social) evaluation are simultaneously being deployed. Otherwise, the (attempt of) execution (deployment) and evaluation of the individual action plans are *intricately linked* with the same operations that are being carrying out by the rest of the agents around him. Other agents' actions may encourage, hinder, ration, cancel out, etc., the actions of our analytical agent. Thus, after the genuine individual moment of the constitution of plans, another follows which coincides with deployment (execution) and evaluation that transcend the individual and border on the 'social' —i.e., the product of multiple concurrence.

On some occasions, the analysis of 'social' dynamics assumes that 'social' processes may be analyzed as an independent and distinguished entity from individual dynamics. This is equivalent to claiming that individual dynamics are not affected by the social result that they themselves generate. Thus, 'social' dynamics is something like a mere conglomerate of individual dynamics or a being with an autonomous life that deserves attention in itself. A different way of inquiring on the nature of 'social' dynamics departs from the concept of reflexivity. From this perspective, *achievement* is seen as *consequence and cause of plans.* 'Social' dynamics are themselves *complex phenomena* in the following sense: they are both consequence of the interaction of the concurrent individuals' dynamics and inductors of certain influences over those concurrent individual dynamics.Given this, a natural question is which kind of 'complex mechanism' would explain the interconnection between individual and social dynamics. The goal of the inquiry on the 'mechanism' would be to puzzle out the (possible) interactions between both types of dynamics, individual and social; the latter would now have enough entity to, being *multiple*, interfere with the *individual* and vice versa. Analytically and formally, we are considering a complex system, 'social dynamics', in which the different levels of organization are generated by the interaction of units and subsystems of lower levels: the action plans which result of individuals' dynamics.

As has been said, in the presence of reflexivity the agent has the capacity of being modified himself as a result of his own actions. This capacity is, together with the deployment of individual action, a determinant of individual and 'social' action. That is to say, the mechanism of interaction between individuals' and 'social' dynamics will be discernible only if the individual is, analytically, considered capable of modifying himself, reflecting, redirecting and renewing his actions —his plans— in the light of what he perceives as the results of his actions in the 'social' milieu within which he operates.

Property (*F*) is central to exploring the different configurations that 'social' dynamics may show; furthermore, several theoretical hypotheses may be drawn from (*F*). Depending on this, Encinar and Muñoz (2005) have presented a catalogue (not exhaustive) of 'social' dynamics. Table 1 shows several 'social' dynamics implied by different properties of individuals' dynamics. Reflexivity (*F*) 'operates' over several properties in the action plans, revising them (or not) in some direction, which, at the same time, has effects on the 'social' result in terms of coordination. For instance, $F\left[C1, C2, R1\right] = R2$ means that (*F*) operates over (*C1*), (*C2*) and (*R1*), working out (*R2*).

[Table 1 about here]

In this Table we may distinguish the following types of 'social' coordination; the two firsts refers to full 'social' coordination (*R2*) and the other, more interesting cases, to partial coordination ($\tilde{R}2$):

1. **Tautological coordination.** The full coordination of all individuals' plans as well as their complete social feasibility (coordination) are due to their own constitution of the individual plans, which are consistent *a priori*, with both (*C1*) and (*C2*), leading inexorably to (*R1*) and, through the concurrence of such plans, to (*R2*). This is the case with General Equilibrium Theory, where (*F*) is strictly tautological; as a consequence, no 'new elements' or 'unexpected' may emerge.
2. **Absolute coordination.** It is an almost impossible case to be observed in reality, but logically possible. The operation of (*F*) is such that *any* source of unfeasibility disappears. It is the most radical expression of this property.
3. **Adequacy of (*R1*).** In this case (*F*) would lead the individuals to adapt the individual feasibility of their plans so that they incorporate the fact that social dynamics is rationed, without questioning their consistency —both (*C1*) and (*C2*). Thus, individuals' plans, once (*F*) has operated— would be individually feasible, which did not happen ex ante. Examples of this kind are the Keynesian entrepreneur, and macroeconomic models of rationed equilibria: agents do not change their plans, they ration them.
4. **Adequacy of (*C1*).** Individuals think that the 'social' rationing is due to a deficient disposition of means to goals and so they focus on consistency of type (*C1*) —from both a logical and physical point of view. It is a process of *operative learning* that permits the discovery of possible errors and/or lack of knowledge, and thus allows means (actions) to be more suitably accommodated to the achievement of (given) objectives. Obviously, after reflection, individual action gains individual feasibility and, thus, 'social'. An example of this kind is 'medical errors' in Mises' *Human action* (Chap. 1).

5. **Adequacy of (*C2*)**. Another possibility is that in a rationed environment individuals attempt to accommodate their *hierarchy of objectives*, independently of other kinds of considerations about their individuals' dynamics. An instance of this type is the difficulty of reconciling family life with professional promotion. As a consequence of 'social' rationing, individuals may decide to accommodate their hierarchy of objectives to the rationing social environment.

6. **Full revision of individual action, both (*C1*) and (*C2*).** Finally, (*F*) may be deployed in two different ways: in a (6.a) **operative** fashion, when (F) is merely directed to accommodate both (*C1*) and (*C2*) to the rationing environment; and (6.b) **structural**, which leads to the production of a *structural change* that eliminates, removes or changes the rationing imposed by 'social' over individuals' dynamics. This latter case (6.b) is especially important, because it refers to a process that alters the morphology and content of action plans in a radical manner. An example of this would be Schumpeterian entrepreneurship. Moreover, this is the sole substantive development within the catalogue: any other deployments of (*F*) are merely operatives in the sense of 'accommodating' some element of individuals' dynamics in order to make them compatible with the 'social' one, but without inducing changes in, or simply taking as given, the 'social' dynamics.

To the extent that an economic process may be understood as the dynamic interaction (and its 'products') of a population of (heterogeneous) action plans, and depending on the characteristics of these, a mix of types of coordination will be deployed, mainly of types 3 to 6. In particular, a certain density of coordination of type (6.b) is a source fourth order complexity (Foster, 2005).

5. Intentional human actions and socio-economic evolution

In a recent paper, Vanberg (2006) discussing Witt's position on the role that human intentionality plays in the explanation of cultural evolution, has highlighted some problematic aspects of the relationship between individual intentionality and the 'blind' nature of social evolutionary processes. In Witt's words, "culture, institutions, technology, and economic activities evolve according to their own regularities" (Witt, 2003b: 8) Moreover, "humans have sufficient intelligence and incentives to anticipate and avoid selection effects. The selection metaphor may therefore divert attention from what seems crucially important for economic evolution —the role played by cognition, learning, and growing knowledge" (Ibid. 4f.). Because it is driven by intentional human actions, Witt concludes that cultural evolution cannot be adequately analyzed in Darwinian terms. Vanberg claims that it is because of the special emphasis that a Darwinian approach puts on the 'blindness' of variation, that

Witt (and others) find inappropriately applied to the socio-economic or cultural realm where intelligent human beings act on insight and pre-meditated plans. “Because humans respond to the selection forces they face by deliberately designed and intelligently chosen strategies rather than by ‘blind’ random-trials, accordingly Witt does not confront the crucial point of Darwinian Theory namely “the absence of a systematic feedback between selection and variation.” In the presence of systematic feedback, as is the case of economic evolution, the distinction between variation and selection, which is a fundamental premise of the neo-Darwinian theory, is no longer valid, because human purposeful action introduces an element of ‘directional change’ (Ibid.). Thus, a paradoxical relationship between purposeful action and ‘blind’ social processes arises.

Despite Vanberg’s attempt to make both positions compatible, and that his analysis is quite close to our own position,[7] we believe that the approach proposed here may offer an alternative (and perhaps complementary) interpretation on this point. Contrary to biological evolutionary theories (mainly Darwinian) we agree with Witt that socio-economic evolutionary change involves human creativity and cognition, and that the driving force of recombinatory search for novelty here is human endeavour (Witt, 1997: 14). Moreover, the fact that humans respond in a deliberate and planned manner to the problems they face is perfectly compatible with a view that emphasizes the conjectural nature of their problem-solutions and the open-endedness of the process in which the validity of their conjectural solutions is tested.

Important endeavours have been made to cope with this challenge. However, what in our opinion is still missing is a clearer analysis of the role that agents’ ethical dynamics and intentionality play. It is here where the action plan approach may make its contribution. This ‘action plan’ approach opens the way to objectives by naturally introducing their role in the explanation of action. Thus, the conception of objectives (ends) —and not only knowledge— also arouses purposeful behaviors and actions, by means of intentionality and will. At the same time, the temporary and ‘social’ dimension of action means that while individuals act in order to reach determined objectives —e.g.: rationally—, their motivations, desires and aspirations may change, thus altering their initial goals and/or their hierarchy. Assuming that intentionality is the tendency towards a goal (objective) and that neither goals nor intentions of the individuals are given *a priori*, this ‘analytical openness’ of goals and intentions permits us to reinforce the dynamic consistency of evolutionary theorizing. Take for instance the evolutionary analysis of dynamic capabilities; here we found that a causal relationship between the formulation of certain goals or objectives (for example: acheaving higher efficiency, or new forms of

[7] Vanberg’s analysis also departs from the hypothesis that human actors seek *what they consider success*, and they use their accumulated knowledge to come up with strategies [plans, we would say] which they expect to be successful. In this sense deliberate human problem solving is always, to be sure, *looking ahead*; and such ‘looking ahead’ should not be confused with pre-adaptedness.

comparative advantage) and the development of the necessary capabilities to reach them. In this sense, intention plays the role of activating the process of capability building (Cañibano et al., 2006b). The development of capabilities permits dreams or desires (the imagined) to become objectives (goals). Intentions and goals evolve over time and thus induce changes in agents' capabilities; additionally, these changes may result in the formulation of renewed goals and intentions and because of that, changed and renewed capabilities. Individuals are heterogeneous in relation to knowledge and capabilities; *but they are also heterogeneous because the objectives they pursue*. Moreover, individuals are heterogeneous mainly because they conceive different objectives and develop different capabilities, as well as deploying specific interactive learning processes in order to fulfil their plans. Summing up, individuals may introduce a great variety of changes into within the environment when deploying their action plans, thus altering the spaces of action (and the plans) of others. A practical (and strategic) problem in organizations consists precisely of aligning their members' objectives (at least part of them) in order to increase the effectiveness of the collective action.

Now we know that ethical dynamics (the dynamics of objectives) are also linked to the observed 'balances' of actions, the specific operation of (*F*) and the types of accommodation (*C2*) that may, eventually, arise. The analysis of dynamics as (6.b) *supra* is especially important. The changes induced by this kind of ethical dynamics alter the structure (both *connections* and elements) of action plans, which generates the renewed variety that feeds the evolving process. In this sense, it *is source of novelty*.[8]

In our opinion, evolutionary theorising should contemplate the fact that new objectives of action may arise and their hierarchical orderings may change; that already reached goals may be erased, and those never reached may be replaced with others, and so on. These changes imply learning processes, like the emergence of completely new actions that cannot be explained solely by mere acquisition of knowledge: these special connections between new objectives and (eventually new) actions are also a source of novelties (Cañibano et al., 2006a). Ethical dynamics do not only play a central role in the explanation of individual action, but also in the explanation of the direction of collective ('social') action —through the mechanisms of coordination— because they are a source of novelties. Moreover, it is the invention and selection of new objectives which determines the content and direction of the opportunities for action. Consequently, individual processes are intentional, but the social consequences of these are not 'blind'.

[8] An interesting paper that explores in a rather formal way the impact of changing goals on project planning and project success is Dvir & Lechler (2004).

The ‘action plan’ approach does not eliminate the unintended (nor the unconscious) aspects of individual (and ‘social’) action. In fact, the selected courses of action may become regular, predictable, routine, etc. New individuals within the organization may possibly adopt these patterns of behaviour (routines), even if they do not understand their origin or the initial intention from which they emerged. In this sense, routine actions may be considered unintended ones, because they do not include elements of intentionality and deliberation. Nevertheless, these patterns are the result of an evolutionary process that has its origin and explanation in an earlier pursued objective that triggers learning processes in the past.

6. Concluding remarks

The approach presented here seeks to be a contribution to the analysis of the relationship between rational action and general direction of the (evolving) socio-economic process. We have stated that human action, if rational, obeys plans that individuals make in accordance with their intellectual capabilities, their reasoning and willpower, their experiences and feelings, etc. Once the different courses of action that are imagined and deemed possible and desirable conform to individuals’ values (and their hierarchy), they select one of them and thereafter deploy purposeful actions in order to execute their plans. The interactive deployment of these plans transforms both the external (physico-natural and ‘social’) and internal reality of individuals, becoming a source of complexity. ‘Social’ dynamics is the result of this concurrence of individuals’ dynamics. Additionally, individuals’ dynamics are the cause and consequence of ‘social’ dynamics. The emergent properties of ‘social’ processes —consequence of the interactive deployment of individuals’ dynamics— operate on the individuals’ ‘assemblies’ in different ways—mainly through reflexivity (*F*)— and these ‘assemblies’ to the extent that they generate plans, provide renewed variety to the evolutionary process.

We have also shown that ‘social’ dynamics are not ‘blind’. Of course, not every change in a society is consequence of purposeful actions; in fact, not every individual action is an intended one, as is shown in the literature on organisational routines. Neither is every result of an individual’s action sought; the unintended consequences of actions may be very different from what is originally intended. However, even though not every action was intended and not every novelty the consequence of pursuing particular goals, the evolution of individuals’ intentions and of their pursued objectives is a key process in explaining many important features of socio-economic evolutionary change, the direction of that change being not the least of them.

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Table 1

‘Social balance’	Reflection	Social coordination	
(*R2*)	$F\left[C1, C2, R1, R2\right] \equiv R2$	Tautological	
	$F\left[C1, C2, R1\right] = R2$	Absolute	
($\tilde{R}2$)	$\boldsymbol{F\left[R1\right] = \tilde{R}2}$	adequacy of (*R1*)	
	$\boldsymbol{F\left[C1\right] = \tilde{R}2}$	adequacy of (*C1*)	
	$\boldsymbol{F\left[C2\right] = \tilde{R}2}$	adequacy of (*C2*)	
	$\boldsymbol{F\left[C1, C2\right] = \tilde{R}2}$	full revision both (*C1*) and (*C2*)	operative
			structural