FIRST DRAFT

Regional Science at the turn of the century: reflections on its epistemological status

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ABSTRACT

As a contribution to the current debate on the state-of-the art of regional science, this paper presents some reflections on the epistemological and methodological status of the discipline as we approach the turn of the century.

First of all, we present the three bases for this reflection: our philosophical position (with reference to different schools of thought), our view about relationship between society and science, our opinion about the guideline of modern science (the science of complexity).

On the basis of these assumptions we approach the following six questions:

- two related to epistemology: the scientific/artistic nature of regional science and the suitability of use of mathematical language;
- two related to theory and method in Regional Science: the problem of rationality in planning and the increasing importance of creativity in (regional science);
- two concerning the planning praxis: the problem of balance between innovation and ecology and the meaning of strategic planning.

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1. Introduction

While, in the recent debate on the "crisis" of Regional Science, there are numerous papers on the relevance of this doctrine, there are far fewer on the systematic setting, namely the scientific foundation of urban and regional analysis and planning. The reason is the antiscientific attitude among regional scientist, which is fastly widespreading, despite the fact that this can undermine the effectiveness of analysis and planning. In the present paper we wish to examine the scientific foundation of the discipline, with the aim of presenting the most recent developments of this approach.

We intend to state this emerging system of ideas (in our own re-elaboration) as a set of theses. These, which cover the classical themes of the current debate on regional science, deliberately exclude some important dimensions such as aesthetics and, above all, ethics. This is partly for reasons of space and our own incomplete development of these themes, but mainly because of the lack of non-resolution of these aspects of the cultural paradigm, (useful elements are provided for interpretation, but not prescriptive guidelines (Crook, 1994)).

Foundations of this paradigm or, to be more precise, postulates of our weltanschauung, are:

- in relation to the nature of knowledge, a position definable as critical genetic realism (Piaget, 1970, Popper, 1981);
- in relation to the theoretical and methodological basis of the sciences (including territorial sciences) a synergetic-evolutionary type axiom (Delbruck, 1986, Haken, 1977, Prigogine, 1980);
- in relation to the specific character of the current socio-economic scenario (subject and container of urban planning) an interpretation in terms of the cosmo-creative society (McLuhan, 1970, Laszlo, 1972, Andersson et al., 1993).

Even though necessarily in a synthetic and incomplete way, it could be useful to make some elements of these assumptions more explicit.

As regards the first (the epistemological framework), it seems to us that a good starting-point is the mind-brain problem. Almost all neurobiologists nowaday think (and we share their opinion) that the mind (and probably the consciousness) are the expression of the activity of a very large number of neurons (the brain). This biological naturalism (Searle, 1992) means that mental phenomena must not be dealt with as something metaphysical, but at the same time it does not mean that they are nothing but mechanisms, in a simple and mechanical sense. Therefore any counterposition between culture and nature is artificial, they are two systems which evolve and coevolve. In this context, although the truth of an argument does not necessarily consist of what human evidence and human

means of investigation can show, the conclusions reached in this way are not necessarily the determining factors of this truth. So there is a space between the utopia of classical absolute rationality and the irrational nihilism of hermeneutically closed linguistic systems, for the development of a Popperian style of knowledge which is objective but not dogmatic (true but not certain) and always self-critical in a evolutionary way. And this applies, according to Piaget, to the highest levels of knowledge, where epistemologies and scientific theories coevolve with retroactive feedback.

Finally, we should mention the problem of scientific progress (that is to say the definition of the best or fittest theories and epistemologies in the evolutive comparison). Personally, we think that the question, which has still not been resolved in the debate among post-Popperian epistemologists (Laudan, 1977), has to be considered within the paradigm of critical realism. This point of view provides a solution to the problem.

As regards the second assumption (the theoric framework), the natural starting-point is the deep change which is taking place in the scientific theories. Most people perceive this radical enough to suppose a complete break with classical science and the birth of a new paradigm (the complexity paradigm) focussing on self-referencial, hologrammatic principles Morin,1990). Even though it is disputable whether it is a true paradigmatic breaking-point, this view is particularly effective in explaining why in the past:

- large interactive systems were analysed in the same way as small ordered systems, mainly because the method formulated had proved itself very effective for simple systems;
- we were convinced that the behaviour of large interactive systems could be anticipated by studying its constituent elements and analysing the microscopic mechanisms individually;
- in default of a better theory, we supposed that the output of the large interactive systems was proportional to the perturbations, hence the dynamics of these systems could be described in an equilibrium state, disturbed from time to time by an exogenous force.

Over the past decade it has become more and more evident that:

- in large interactive systems, global properties can emerge (so-called because they appear only from the whole system), requiring non traditional methods of analysis;
- the unexpected appearance of these properties derives from the interactions between local subsystem behaviour and the global behaviour (the so-called micro/macro relations);
- this usually involves conditions of irreversibility and disequilibrium. Large interactive systems never reach an equilibrium state, they evolve from one metastable state to another.

In this synergetic (and also intrinsically evolutionary) approach to systems, we should perhaps specify that Darwinist principles still have a place - no longer however as a mere biological metaphor, but in the form of the so-called neo-neo-Darwinist systems theories (see for instance Casti, 1989). Rather at random, and left to the intuitive understanding, we mention some key concepts relating to these theories:

- the concept of window (limited horizon) of observability of the system through the subsystems (with the consequent focus on heuristics, robustness, satisfaction etc.);
- the mechanism of trial and error and differential selection in the evolution of the system (with the consequent importance of coevolution between system and subsystems, the uniqueness and similarity of the subsystems, their phenotype and genotype);
- the blind and imperfect character of evolution (with its serendipity, creative but without any finalism).

We should also specify that today's evolutionism, far from being a monolithic and complete construction, is a living science, with objections, unsolved problems and lively diatribes over basic matters. But everybody now admits that these are internal affairs and that the essential truth of evolutionism is never in doubt (Gould, 1987).

As regards the third and last assumption (the context of urban planning, i.e. the character of our civilization), we need to consider aspects such as high technology, the media as well as the various social phenomena associated with them. To describe the importance of innovation and the diffusion of its effects, the expression, we often hear the expressions the information society, technopolis etc. Many of these linguistic symbols however do not seem to go beyond a mechanistic vision of society. To be consistent with the two previous assumptions, we prefer to speak of the cosmo-creative society, since this catches a salient feature of the present civilisation, the explosive spread of creativity in all its manifestations throughout our culture (especially, but not only, the scientific world). The trigger of this process is coevolution, the positive self-accelerating feed-backs between culture, science and technology (see for instance Cini, 1990).

Firstly, in the relationship between technology and science, there has been an enormous increase in the speed of transfer of scientific advance to technological products and growing scientific added value in these same products. Technology, on the other hand, has been able to provide scientific research with investigation and measurement instruments of greatly enhanced performance. There is a decreasing distinction between science and technology. It is increasingly difficult to differentiate complex technology projects from pure scientific research. Technological progress has also opened immense potential and influenced the style of research due, for instance, to the possibility of

computerized data processing. Armed with this accumulation of science and technology our society, already deeply changed but still rapidly evolving, is facing:

- transformation in its own demographic structure;
- redefinition of the basis of organization;
- and, above all, growth in its culture.

So ours is a more deeply and more widely educated society (and for this reason more complex and varied), which wants to be creative per se and expresses this creativity through science, technology and art. We should note that, being an educated society, it accompanies this with self-critical reflection. It remains to say that the city, as the place where the above system of interactions are manifest (Mela, 1985) is the natural seat of modern civilization (the common etymology: city <=> civitas <=> civilization is more valid than ever). And as the scale of civilization is now planetary, the city is everywhere!

It is on the basis of these assumptions that we approach the following six questions, two related to epistemology, two related to theory and method in Regional Science, and two concerning the associated planning praxis. The paper concludes with a final observation, which derives logically from the reasoning presented.

2. Regional (Science): Art, Science or Profession?

Sciences are usually cited in terms of concepts (fractals, neural nets etc.), with which the name of some scientist is connected, while in the arts we tend to cite personalities (Hopper, Warhol etc. and similarly Christaller, Losch, Weber ...) with whom a cultural movement or cultural position is associated. It is a small sign that reveals, despite the widely held opposite view, how rooted is an artistic conception in regional science (in french and italian schools, particularly). So a reflection on the nature (artistic or scientific) of the discipline is not obsolete.

Some results (now unanimously accepted) of cognitive psychology concerning types of knowledge (see for instance Bara, 1990) help to clarify the issue. Summarizing, we can say that:

- a map of the types of knowledge and their interactions is as follows:

K - TACIT _____ K - ESPLICIT

Analogical and procedural (Images, productions) | Declaratory and linguistic (Frames, semantic nets)

K - MODEL

(Mental models)

- the first type is so-called explicit knowledge (K-explicit). This corresponds to the intuitive concept of knowledge, it is what we know we know, i.e. an aware knowledge, about which we can voluntarily reflect and that can be linguistically expressed. The characteristic representation of this type of knowledge is that of logic formalism, in particular classic logic; but when the limits of this emerged other systems of logic have been proposed - default logic, self-deductive logic etc. - or other approaches, such as semantic nets or frames);
- the second type is tacit knowledge. It corresponds to knowing how to interact effectively with the world, even if we are not able to make such knowledge explicit(i.e. describe it directly and reflect on it). Examples are: being able to ride a bicycle, to recognize a wine, to be at one's ease, be able to sing, paint, write poetry etc.; all things that the expert can do well, but can only express verbally approximately, with analogies and metaphors. This type of knowledge is represented through the so-called rules of production, procedural codes which allow us to know how to act;
- the third type of knowledge, model knowledge, is a specific

model which integrates the two previous types of knowledge. It is a set of partial configurations of the theoretical knowledge imbedded in K-tacit and K-explicit knowledge; it is the aspect of knowledge which the thinking person is effectively using in a specific moment. The analogical representation of this form of knowledge is the mental model (Johnson-Laird, 1983). This is made up of elements and relations which represent a particular condition of things, already structured in a appropriate way for use).

It should add that the relationship between K-tacit and K-explicit knowledge is complex and elusive, corresponding roughly to the connection between the that which is experienced and that symbolized.

From tacit knowledge we can try to build a propositional theory and from explicit knowledge to organize procedural codes. However, while K-explicit is by its nature trasmissible or teachable (and therefore socializable), K-tacit knowledge is personal, and learnable only by doing.

On this basis, we think we can formulate the following thesis:

- in analysis and planning (in regional science, as in human actions in general) art and science cannot be put in antithetic terms. In every action or professional activity (to include science and art), to proceed by means of mental models inevitably involves merging the two types of knowledge: tacit (which is the essential, but not exclusive, base of artistic creation) and explicit (which specific, but not exclusive, to scientific research);
- society, in its growing cosmo-creativity and consequently growing and increasingly aware participation in planning processes (both as informed subject and direct actor), necessarily requires explicit (transmitable) knowledge in order to be able to participate. So the development of scientific skills in urban studies, and achieving a higher K-explicit content is necessary for its own raison d'ˆtre (and survival as a recognizable academic discipline).

3. Technical Languages in Regional Studies

Strong languages (that is to say propositional theories and K-explicit knowledge) do not seem to be particularly appreciated in current regional science.

Let us consider the criticisms of the mathematical approach (i.e. the systemic and formalized method) as the case par excellence of K-explicit knowledge, not forgetting the general validity of the considerations that follow.

While the radical ideologic objections of the seventies have now been exhausted (note: the history of evolutionist thought and of historical materialism is full of consonances and misunderstandings; see Rosser, 1991) and many of the objections formulated on a hermeneutic basis in the eighties having failed (see Vozza, 1990) with the diffusion of the critical rationalism, the most virulent attack on the mathematical method has come from post-structuralist deconstructionism (Derrida, 1967). The accusation is that its application in this field does not correspond intrinsically to the principles usually given as justification for its use (or its preference in relation to other languages): its universality (i.e. its validity at any time and in any place); the logical rigour (which make it possible to deduce consistent theories); its objectiveness (which excludes individual and collective cultural bias); the simplification (to read the complexity of the world) and the exactness (which eliminates ambiguities). To be precise, we have to say that the criticism is directed towards a classical rationalist conception of the method; but it is also a useful exercise for critical rationalism.

As Barnes (1994)argues, from a deconstructionist point of view, the mathematical method does not keep any of its promises because of contradictions from which he claims there is no escape:

- universality is always founded on local assertions;
- logic is unable by itself to justify the use of logic;

- the argument of objectiveness is in itself a judgement of value;
- simplification is obtained only through complexity;
- precision is expressible only through the inaccuracy of ordinary language.

These contradictions are proved in the following way:

- it is shown (by means, for instance, of the Russell's logical paradox and G"del's theorem of formal incompleteness) that attempts to found mathematics all fail to build a closed self-explanatory system;
- there is therefore always a residual meaning rooted in local institutional practices that arose historically, that is in the social dimension of knowledge (Bloor, 1976);
- this determines the inaccuracies, arbitrairness, contingencies etc. that are the basis of the above contradictions.

This reasoning, in the epistemology which we accept, seems to be biased by an inconsistency:

- we implicitly assume that the analyst, in order to be able to declare failure in the test of self-explanatory nature of mathematics, must have a strong rationality;
- but the analyst cannot at the same time be free of the declared great cognitive fallacy (of knowledge as a social activity), so ...

On the other hand, if:

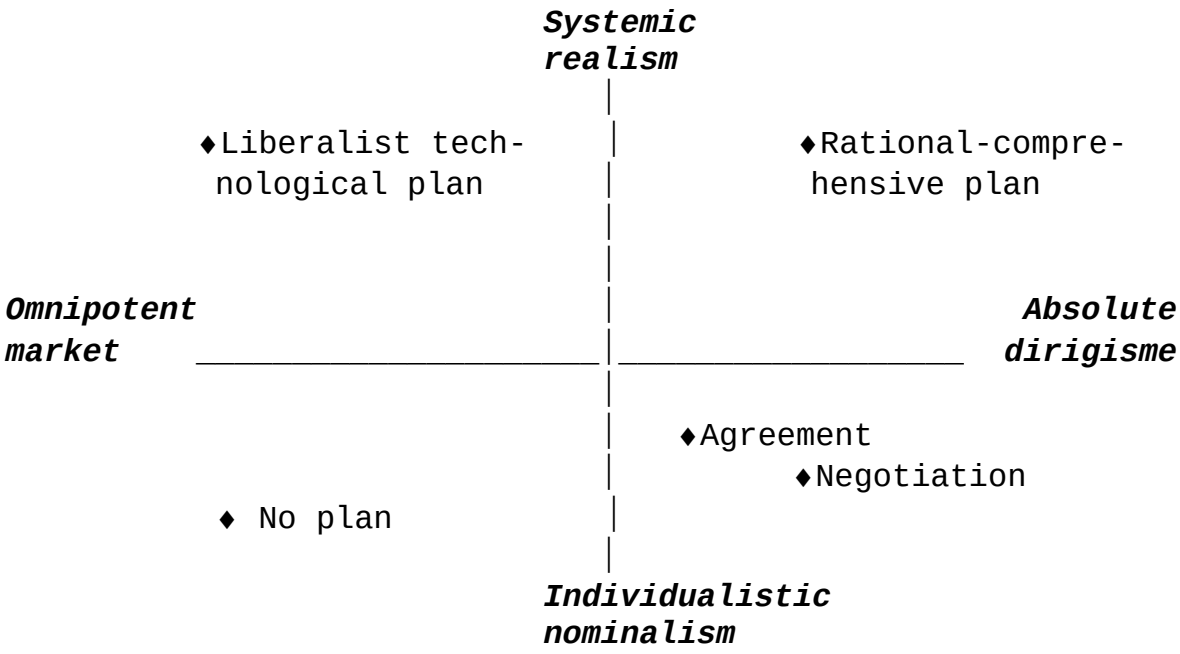
- without the axiom of strong rationality, the analysis confines itself to the proposition of mathematical language as an open programme (see, for instance the developments on Russell's paradox) inspired by principles of logic, precision etc. which are understood in a relativistic way;
- and knowledge, without denying its contextualization in society, appears with naturalistic objectivistic conditionings (reinforced by the same use of strong languages);

instead of an antinomy, we have a virtuous (evolutive) circle that qualifies mathematical language in comparison with other languages.

The conclusion is a solicitation to regional scientist "to cultivate the necessary, cumulative and provisional certainties of technical languages" (Mazza, 1994, p.158). I personally would put no exceptions on this invitation and give an emphasis, among strong languages, on the systemic formalized one.

4. The Myth Of Irrationality

Following up on Mela and Preto (1990) and Camagni (1988), a useful diagram relating concepts of planning (understood in the broad sense of the capacity to govern the territory through appropriate actions) is given by:



The two variables that define the space of this chart pertain to the forming dimension and the cognitive dimension of the plan. The first considers the degree of coordination among the system of actors. At one extreme there is total reciprocal autonomy, where the government of the territory is left completely to the operational mechanisms of the system (i.e. the market has free play). At the opposite extreme there is complete coordination among the actors (by agreement or by hierarchical structure) who can, together, totally guide the system (absolute dirigisme). Naturally, the degree of coordination between decision-makers can vary and be differentiated according to how it is achieved. Therefore, in reality, there is a wide range of intermediate possibilities.

The second variable concerns how the planned system can be known, in other words, the degree to which it can be interpreted. At one extreme, we have a system made up of physical, economic and social entities with an objective reality for which we have strong explanatory theories describing their essence and interrelations (classic systemic realism). At the opposite extreme we have the weak concept of thought which considers the objects of the plan in terms of nominal categories of complex realities which elude definition and, at best, can be referred to by metaphor and analogy

(this we refer to as individualistic nominalism). In this case too, there are numerous intermediate positions, which reflect the view of reality and the role and characteristics of the observer in the analysis.

As can be observed in the chart, by combining these two variables we can represent the main positions taken in the debate on planning: the denial of the possibility of planning, the rational-comprehensive plan, planning by agreement, the negotiated plan etc. This is why the chart is undoubtedly a useful tool for describing the evolution of urban planning. We are, however, perplexed when this evolution is explained in terms of a causal nexus between the two variables (the evolution of the knowledge-action nexus examined by Friedman, 1993 among others), i.e. the hypothesis of a simple and direct connection between rational systemic knowledge and strong action, moving towards more complex and weaker forms of action corresponding to weaker thought.

Only a visual illusion (or gross simplification) can reduce the vast constellation of theories regarding the capacity to know, or the complexity of the system of interactions between actors to a one-dimensional axis. Quite independently of any epistemological reflections, the weakening of planning actions is also the result of the growing education of the population in planning matters. People are taking on more direct involvement, and making it necessary to redefine (reinvent?) forms of coordination, also to innovate the role of the planner, who previously has acted as the benevolent prince's right arm! (I should like to point out that this is a general phenomenon gaining vast importance. It is currently affecting the international political order as well as the organization of Italian politics, for instance. The mechanism outlined, cultural growth leading to role crisis, is necessary and providing a suitable terrain for the autonomous development of planning practice and academic reflection with the gradual professionalization of the latter.

It should be added that the illusion referred to above has operated historically in the opposite way. Faced with the transformation of society and the crisis in planning, there was a tendency to reduce the causal factor to a single axis (rationality/irrationality) overlooking the variety of epistemological paradigms and including all questions, ontological, semantic etc., in this simplified dichotomy. In this regard the debate of the eighties on rationality is significant. As observed by Reade (1985), planners did not refer to rationality in the limited sense adopted for instance by economists, but they reasoned on the basis of functional rationality and substantive rationality , touching on but never delving deeply into the epistemological issues that this raises. For this reason the debate turned out to be inconclusive and left as an aftermath a vague (yet painful) sense of the irrationality of planning, that still pervades all concepts of planning except the traditional one.

An alternative to this state of things is to deal more thoroughly with epistemological matters and theoretical and methodological questions. In fact advances have been made in knowledge about the nature of rationality by scholars such as Rapoport, Tversky and Harsanyi in disciplines like psychological economics and mathematical game theory (see Barry and Harding, 1982).

5. Revealed Creativity

The thesis of this chapter is that creativity (the act, individual or social, displaying varying degrees of ingenious inventiveness, leading for instance to the urban project or plan), which has long been the centre of scientific attention, is a phenomena whose mechanisms are now being clarified and explained scientifically. This does is not imply that we are nearing a mechanical reproduction of the creative act (even though that may happen in the long run), but that even the most hidden component of 'knowing how to do things' - tacit knowledge - which permits the planner or designer to considers himself such, is becoming explicit knowledge.

In the past, with respect to creativity, there were two opposite attitudes (not connected on levels of erudition or by an opposition of the two cultures, humanities and science) (see Melucci, 1994):

- one, mysterious, which emphasized the uniqueness of the creative genius (Einstein, Leonardo etc.), the fortuitousness of the event (Newton's apple, Archimede's eureka etc.) and the connection with the irrational (the association of genius with disorderliness, the stereotype of the absent-minded professor, etc.);
- the other, rationalizing, which underlined the normal character of creative activity (the sweat of research, the mediocrity of much work of famous geniuses), the regularity of the event (the creative act as inevitable in given historical, cultural and economic settings, the possibility of 'learning' creativity (the lateral thought of Gardner, 1983) and, even it is highly complex and not yet fully understood, the mechanistic nature of the phenomenon (creation appears at the end of a process, almost naturally, as an inevitable consequence of certain passages).

This is the context of the diatribe about the procedure of systemic planning (by McLoughlin and Chadwick). While this approach is criticized for its supposed clain to absolute control over the system (an unfounded criticism, given the space left for creativity in defining alternative policies), it is defended too weakly as a being a merely informative - analytical and evaluation - phase of the planning process. In reality, it had begun to address the problem of clarifying the creative mechanisms in planning.

The latest evolutionary theories of creativity cast some light on the problem. In the differential selection process (mutation of genotypes and environmental selection) these theories reconciliate

the two aspects of the creative act. It is the serendipity of invention, which derives not only from problem solving (generally speaking, the phase of selecting the most suitable from among various alternatives), but also from the factors operating in the problem formulation (the phase of generation of alternatives through suitable mechanisms). It is in the problem solving process (made into a social activity through the clarification of the mechanism involved) that systemic planning has a precise connection (shown for instance by the particular attention given to the nexus between simulation models, performance indicators and evaluation methods, Bertuglia, Clarke and Wilson, eds., 1994).

Problem formulation is the subject of current studies in the field of creativity. If we reject the idea that the creative act is only the new combination of old ideas (that it does not follow simple mechanisms like random mutation or ideas such as gene-crossings), but involves the expansion of a field of endeavour through ideas that do not emerge simply by following the usual rules, it nonetheless does not suffice to rashly break the rules. A careful examination of creative work reveals the presence of constraints (various kinds of metarule). It is the interaction between the representations of the problem (i.e. the field of endeavour) and these metarules that generates a series of possibilities which may eventually produce a radical change, or creative invention. Artistic and scientific creativity thus seem to belong to the properties of the large interacting systems cited in the introduction.

These problem-solving processes are now, in simple versions, captured in software programmes - computers are at the dawn of creativity (Matthews, 1994).

6. Technological Innovation and Ecological Planning

Among the current topics being debates among planners, two of the most important are the relationship between territorial systems and technological innovation, and the ecological orientation of planning (both underlie many other matters being discussed, from the amendments of normative land-use laws to the evaluation of large infrastructural projects, renewal and rehabilitation policies, and so on).

Regarding the former, among a large number of studies and projects, the Megaride Charter 94 (Beguinot, 1994) stand out. This contains, very briefly, the following proposal:

- to invert the logic of the relationship between technological innovation and territorial transformation (from innovation as an exogenous and uncontrolled factor of transformation to innovation that is functional to transformation);
- to build a liveable city (a beautiful city, of peace and of science) specifically means of innovation.

Regarding the theme of ecologically-oriented planning, almost the entire urban planning community has made an effort, though some more specifically (see, for instance, in Italy, Magnaghi, 1990) coming up with a proposal that can be outlined as follows:

- to pursue sustainable development as an alternative to destruction, sacking and impoverishment of the territory caused by the search for unlimited economic growth (IUCN, 1980);
- and, to this purpose, to aim for a form of local development which takes into account all specific and unrepeatable features of a place and therefore values all differences.

The two proposals seem similar in many ways; they are certainly not conflicting. Both emerge from the complexity paradigm (in contrast with the classic paradigm) cited in the introduction. Nonetheless, between the two schools of thought there is an evident contrast. The thesis put forth here is that the conflict arises from the lack of examination of complex thought in both proposals. They attribute, more or less explicitly, a positive or negative moral value to technological innovation. This moral value derives from criteria of judgement of a society that still thinks to a large degree according to the canons of classical rationality. To be precise, it is acknowledged that the scholars involved in the Megaride Charter 94 have sought motivations for their proposal in the science of complexity (see for instance Rabino, 1993) but:

- the arguments on complexity often lend themselves to ambiguous interpretations; that is, they tend to be interpreted according to classical rationality (see the proclaimed principle of simplifying complexity or the controllist nature of planning that the proposal seems to reveal);
- the science of complexity is used more as an analytical method for criticizing the present urban situation than as a planning tool (the objectives of the proposal emerge in general as an antithesis to the status quo determined by the usual way of interpreting the situation, rather than a new way of perceiving problems).

At this point, it is fair to say that in the most recent studies (for instance, Beguinot, 1995) care has been taken to avoid the kind of misunderstandings mentioned above. As far as the ecologist planning school is concerned, it should be said immediately that it is difficult to recognize in the whole ecology movement any single clear theoretical basis. Completely different cultural positions, such as bourgeois naturalism, eco-industrial technocratism, total romantic ecologism, neo-Malthusianism, one-worldism etc. appear to be grouped together. This lack of foundation has been denounced within the ecology movement itself (O'Connor, 1988) as the germ of its own destruction. As a result of this confusion at the theoretical level, we can ascertain in authors belonging to this school:

- the persistence of a classic mentality (for instance, the enunciation of the principle of sustainable development in terms of functional extremals - minimizing, constraining etc., which is typical of the absolute rationality);
- the logical shortcuts, free inductions, metaphorical jumps etc. in deriving indications for planning from the principles of complexity, often containing errors, such as the counterposition between local and global (which in complex thought are in fact always connected through the hologramatic principle).

It is therefore no wonder that misunderstandings occur between the two schools.

7. Strategic Planning and Evolutionism

Another theme of the current urban planning debate is strategic planning. Derived from economics and management, like many other topics (from urban marketing to networking, the problem of sustainability itself and technological innovation), strategic planning is characterized by the following elements (Gibelli, 1993):

- it gives priority to perspective and scenario analysis;
- it is dynamic and flexible with respect to the selection of objectives and implemental choices;
- it identifies opportunities and challenges in the outside environment, and the strong and weak points inside;
- it operates in an openly pragmatic dimension;
- it proposes systemic analysis, uses learning processes and repetitive revisions and prefers negotiating interaction rather than conflicting opposition;
- it promotes consultation and extended participation;
- it attributes strategic importance to the implementation phases of the plan;
- its predominant role is one of persuasion and marketing.

To emphasize the complex and organic view that underlies these features of strategic planning would be superfluous: from the irreversible dynamics of the environment, to the limited rationality of the actor, and his flexible and satisficing behaviour. What we wish to emphasize is that these characteristics, going beyond pure contextualization and mere biological metaphor, introduce into planning an environment, actors and mechanisms typical of evolutionary complexity; for instance:

- the co-evolution between the environment and the planning process (the role of persuasion, consultation and participation, the importance of the implementation phase etc.);

- the internal structure (genotype) of the actors that changes in relation to the interaction between its behaviour (phenotype) and the environment (identifying the strong and weak points, prefering negotiating interaction etc.);
- the centrality of trial and error in the mechanisms (learning and revision processes , scenario analysis, operative dimension openly pragmatic etc.).

What has been said should not be surprising since evolutionism seems to be the theoretical reference which dominates modern economics (Nelson and Winter, 1982) and management (Hannan and Freeman, 1989). The message of this chapter for strategic planning, and urban planning in general, is to root its investigations directly in such theoretical foundations instead of adopting them from other disciplines. In this way, we feel, the analysis could be more correct and productive; certainly more original.

An addendum is appropriate here. The above might seem to imply that evolutionism is in opposition to mechanicism (and that we have abandoned the latter for the former). In fact, evolutionary theory is a more general theory that includes mechanicism as a special case. In such relationships, the principles which define the conditions under which the general rule degenerates to the particular case are particularly important (e.g. Bohr's theorem for quantistic and classic systems and the K.A.M. theorem for chaotic and regular systems). Between evolutionism and mechanicism the correspondence principle is the theorem of evolutionarily stable strategies which, generally speaking, states that: in a constant environment certain behaviour strategies are better than all the others and cannot be improved (Maynard Smith, 1982). These behaviours, seen from the outside, may seem like mechanical relationships between the factors by which they are determined. On the other hand, real systems, though evolutive, must be fairly constant (otherwise we would not be able to talk about them). Mechanicism is therefore certainly an approximation, but it often remains the best available cognitive hypothesis.

8. Conclusions

Throughout this entire paper we have argued in favour of scientific - but not scientistic - regional science (both analysis and planning): a scientific approach, renewed as a consequence of the (justified) criticism raised by the so-called weak school of thought, but not succumbing to the anti-scientific vein of much post-modern thought.

Space does not allow, and it was not in any case the intention of this paper to make a detailed presentation of the operational principles of the proposed style of planning (even though some

general principles have been proposed in sections 6 and 7), but the interested reader can find an initial attempt in Rabino, 1996, concerning the planning of the transportation subsystem and a post-modern transport model. Although only a tentative approach, the soundness, validity and promise of this direction of work seem to be widely shared and not only the subjective opinion of these writers.

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