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*A theory of planning horizons (2):
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Frederic B. Jennings Jr.



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Abstract: The concept of planning horizons serves as a measure of many unsettled aspects of economic analysis. First and foremost, the notion is ordinal: we speak of 'horizon effects' as directional shifts in planning horizons without tallying 'wits' or calibrating horizontal axes of change. Second, the derivation of horizon effects is inductive; we simply assert their inherence in the range of factors subsumed within the imagined projections behind all choice. The planning horizon is set wherever surprise supplants expectation; the horizon occurs at the outer range of accurate anticipation, to which we lack clear epistemological access. Planning horizons – horizon effects – suggest a new foundation for an ethical economics of conscience, social maturation and growth.

The idea of planning horizons invites a distinction of foresight from myopia in economic constructions. But time horizons are only one aspect of our planning horizons: to see ahead in time we must embrace all relevant causal effects. Foresight depends on knowledge of how reality actually works, which is a matter more of degree than 'truth'; the planning horizon offers an index of our 'rational bounds.' Our range of anticipation is also related to our internalization of social and ecological externalities in our decisions, so to the scope of our ethical conscience and to our sense of human community. Indeed, the organizational health and integrity of our society is horizontal in this sense.

The aim of this paper is to explore and develop the concept of planning horizons in its intellectual origins and economic concerns. Its philosophic conceptual roots, methodological underpinnings, psychological insights and economic implications are outlined to show why an economics of planning horizons offers an ethical economics of interdependent dynamic complex systems. With standard doctrines seen as a special case in a larger horizontal frame, social

theory embraces an ethical economics with dissimilar institutional implications favoring cooperation.

Keywords: planning horizon, ethics, conscience, complementarity, myopia, horizon effects

Introduction

The first part of this two part discussion of planning horizons and their relevance outlined the microfoundations of this concept along with some applications. This second installment describes their role as an ethical ground for economics. The planning horizon offers an ordinal index of conscience, knowledge, maturity, foresight, patience and perspective. Indeed, the notion entails an 'organizing principle' on which economics will likely restructure, once the implications of this idea are fully engaged. The previous paper explained how planning horizons affect the pricing decision, as an extension of orthodox theory into network contexts of fully interdependent decisions suggesting that cooperation is efficient due to contagious horizon effects and the complementarities of increasing returns (Kaldor, 1972; 1975) and intangible goods. Indeed, the balance of human relations is horizontal in this sense: longer and broader horizons shift our interdependence away from substitute tradeoffs to complementary gains. But what are planning horizons in their relation to other writings and traditions in economics? That is the aim of this sequel to the paper on market design.

First, there is a history of attempts to incorporate time and dynamics into neoclassical theory that will be briefly addressed. There has been a long conversation in economics on how we should integrate dynamic concepts into our models, suggesting that time is not enough for any emergent theory of cost. The methodological lesson is about temporal limits on anticipation as seen in horizontal theory. The planning horizon undoes such cautions, solving the problem of how to conjoin knowledge with pricing in network contexts, shaping economic growth as a horizontal process (Jennings, 2011b).

Once horizontal links to pricing and growth are understood (cf. Part 1), then discussion turns to what the planning horizon brings into sight. Therefore, the next section deals with its epistemological status as an inductive entropic concept defined in ordinal terms: one never reports on number of 'wits'; instead we focus on how horizon effects shape patterns of choice, where a horizontal economics shall involve

ethics at every step. Indeed, the planning horizon as an organizing principle limns how horizon effects shift static constructions. So little is known thus far on how horizons affect behavior, planning horizons open new opportunities for economic analysis.

After recounting its substantive value and meaning, the paper reviews some more interdisciplinary implications of the planning horizon. For example, its social and psychological links open new ways of framing complex options in choice and how these constructs shape our resulting actions and emotional life. Philosophy also will play a role in our economic constructions, showing their relentless selective foci and the restrictive visual blindness so embedded therein. Just as a longer time-horizon is a result of factual learning and knowledge of how things work, horizontal theory is similarly inclusive in its sweep and domain. To bring horizon effects into economic consideration exposes stubbornly isolated doctrines to new realms of phenomena outside disciplined demarcations.

In sum, the paper reports on how the notion of planning horizons shall open new realms of economic effect to research and analysis, showing how equilibrium models standing on substitution assumptions shrink into a special case within a larger horizontal frame. As substitution assumptions cede to complementary interdependence (static and horizontal), then ethics, psychological linkages and common needs swim into view with many novel insights in need of further research. This paper offers a start to unfolding complementarity's secrets, still largely unknown and so inviting greater reflection on generally unexplored domains of vital economic concern.

The basic concept of planning horizons in their historical context

The basic concept of choice from which the planning horizon emerges comes from Boulding (1956), Shackle (1955, 1965, 1966, 1967, 1978) and Simon (1981, 1982-97). The notion is inductive and derived under realistic conditions, so there is no 'homo economicus' seen in any such process. Indeed, one could define any act of choice as 'a normative process of multidimensional causal projection' that is horizontal at its core. Every decision we make is based on imagined projections of outcomes standing on theories of how the world works, so 'if I do this, then that will occur' for a range of fluid choices. The only options on which we ever have any empirical evidence

are the ones we choose; we seldom have any factual information on the opportunity costs foregone in our 'roads not taken,' or even the value thereof in how they would have felt like to wear! The role of theory is important: how we frame and design our alternatives stands on how our theories structure all the imagined projections in choice.

These projections have a horizontal range embracing consequences spreading out in social, physical and ecological space. Their reach goes so far and no further, reflecting all learning and general knowledge, along with one's self-confidence, stress, security, energy and attention devoted to a decision as well as other internal influences, in concert with external conditions at the moment of choice, such as a disruptive venue, unpredictable legal effects or reactions of others (especially in a myopic culture) and many other restrictive factors. Changes in these psychological or existential conditions will lengthen or shorten horizons in their range of focal embrace. There is a relevant difference between a larger regard to the Big Picture and a narrow window restricted to 'what is good for me right now!' This is the realm of horizon effects.

The ethical content of the notion ought to be visible here. In a world of totally interdependent causal links, where any act transmits signals of information and impact to others, 'externalities' seem misspecified and are too often dismissed. These external effects are horizontal in their basic conception; they include all the consequences left out of decisions. The neoclassical attribution of these effects to incomplete markets (cf., e.g., Heller and Starrett 1976, p. 10) should defer to alternative views, such as: "externalities ... reflect conceptual difficulties at the boundaries of microeconomic theory ... where deductive explanation becomes unsatisfactory" (Krupp, 1963:223) due to fully interdependent socio-ecological systems in which our rational limits set the analytical bounds of our representations (Georgescu-Roegen, 1970:2-3). [1]

Indeed, the most serious flaw in neoclassical economics stems from its analytical boundaries. Textbook constructions start with 'given' cost and demand curves as external data and not as imagined projections of foregone, unexplored options. As Simon (1981:103) described this situation:

There is a certain arbitrariness in drawing the boundary between inner and outer environments of artificial systems. ... We might well have considered the business firm's cost function to be part of the inner environment. Instead... The cost function was treated, along with the demand function, as part of the outer environment to which the firm was seeking to adapt.

This is a serious source of error, which has served to forestall understanding and embrace of the subjective foundations of economics and the role of cognitive factors in economic behavior. Expectations – central to all decisions – stand as the key to economic complexity and dynamics, especially in regard to time and learning in economic development (Jennings, 2011b). Some of our greatest economists have foundered on these questions.

There has been a long conversation among economists on the subject of time in relation to cost and pricing, from Marshall (1890) and Knight (1921) through Stigler (1939) and Clark (1940,1955) to Alchian (1959), Turvey (1969) and others. The upshot of this series of papers is that time must be embedded in economic analysis, but its subjective foundations have not been adequately explored and developed. Time and positive feedback (complementarities) should be appended to (if not dominate) the negative feedbacks supposed throughout economics in our substitution assumptions (Senge 1990:79-80). A critical step in this direction is to incorporate planning horizons, where time horizons relate to this broader concept through our interdependence: for real decisions, the way you extend your projections in time is by apprehending effects in social and physical space, since that is where reactions emerge in the form of feedback constraints. So time horizons are reflective of full awareness and knowledge, and they extend or retract in response to our understanding of causal relations. Indeed, 'horizon effects' – ordinal changes in planning horizons – serve as an entropic measure of organizational learning applied to economics in Boulding's (1956) and Georgescu-Roegen's (1971) sense (Jennings, 2009b). They also reflect the maturity of a culture and its citizens, showing the harmful impact of our rivalrous social learning process in its effect on human development. Indeed, competition is keeping us stupid, childish and disengaged, thwarting community and complementary yields (Jennings, 2011b).

Planning horizons defined and discussed

So what is the 'planning horizon'? Boulding (1956:25-26) describes a process of image formation in the way we think, where learning entails an increase in the closeness of 'fit' between image and truth:

... It is the capacity for organizing information into large and complex images which is the chief glory of our species. ... Our image of time ... goes far beyond that of the most intelligent of the lower animals, mainly because of our capacity for language and for record. ... The human being ... is firmly located in a temporal process. ...

Because we are aware of time, we are also aware of cause and effect, of contiguity and succession, of cycles and repetition.

... Because of the extended time image and the extended relationship images, man is capable of 'rational behavior,' that is to say, his response is not to an immediate stimulus but to an image of the future filtered through an elaborate value system. His image contains not only what is but what might be. It is full of potentialities as yet unrealized. ... Because of his extended image, he is also capable of organizing his own experience in ways that will extend the image further. This is the essence of science and the scientific method. ... It has led ... to an enormous extension of [man's] image both in time and space and in relationships in the course of the past two hundred years.

The planning horizon is an ordinal index of these images' range, where it will open or close, broaden or narrow, responding to dynamic change. Boulding (1956:93) characterizes the learning process in this way:

The problem of the transformation of images is of great importance in the theory of economic development. ... The problem here is that of the initiation and imitation of superior processes. Both these phenomena require transformation of the image; a new process always starts as a new image, as a new idea. The process itself is merely a form of transcription of the new image.

Simon (1981:104) offered a similar representation of learning phenomena: "Long-term memory operates like a second environment, parallel to the environment sensed through eyes and ears, through which the problem solver can search and to whose contents he can respond." The planning horizon is a formalization of Simon's concept of 'bounded rationality,' in which the images on which we act have a range that adapts to existential and psychological influences. Simon (1981:132, 223, 228) elaborates on this idea:

The artificial world is centered precisely on this interface between the inner and outer environments; it is concerned with attaining goals by adapting the former to the latter. ... Given a desired state of affairs and an existing state of affairs, the task of an adaptive organism is to find the difference between these two states and then to find the correlating process that will erase the difference. ... Human problem solving is basically a form of means-ends analysis that aims at discovering a process description of the path that leads to a desired goal. ... The notion of substituting a process description for a state description of nature has played a central role in the development of modern science.

The issue here is how we move forward, and how we identify any advance and measure it in direction. Boulding's (1962a:139-40) prescience is uncanny on what we

might do with such an entropic gauge of organization, if we actually had one. He explained that such an index would give us a measure of organizational learning and development, knowledge and economic progress, and – presumably – ethics and value, because:

The value coordinate is clearly a scalar, like organization. ...[B]ecause I have some confidence in the generally monotonic character of the relationship between organization and “goodness” – that is, that both generally increase together – I would argue that the development of a workable measure of organization would at least be a first step toward the construction of an ethical calculus. The want of this measure however may impede progress toward the solution of many problems, not only in biology and in the social sciences, but also in ethics.

This horizontal linkage to ethics stems from a number of features emerging from the general approach. Even a belief in totally interdependent phenomena (which is, after all, the defining characteristic of institutional and ecological economics), where – as Georgescu-Roegen (1971:66) put it – “Time, Space and Nature” are “seamless wholes” without “joints” for a “carver,” implies a quite different economics than mainstream models support. Myrdal (1978:772-74) explained how interdependence shaped his own intellectual growth:

...I came to see that there are no economic, sociological, or psychological problems, but just problems, and they are all mixed and composite. In research, the only possible demarcation is between relevant and irrelevant conditions. ... Our study must take into account the entire social system ... [w]hose dynamics ... are determined by ... circular causation ... There is no one basic factor; everything causes everything else. This implies interdependence within the whole social process. And there is generally no equilibrium in sight.

One important aspect of this process is that most often, although not always, changes which are reactions to a more primary change tend to move in the same direction. ... This is why circular causation may have cumulative effects. Through feedback regularly causing more primary changes to have repercussions in the same direction, the results for good or ill may, after some time, be quite out of proportion to an initial change impulse of one or several conditions.

The point here is that interdependence and complementarity in combination imply that the relevant boundary in economic analysis is *horizontal*. If every act ripples outward forever through social and physical space onto all living creatures with no bound (whether we know it or not), the relevant analytical line between known and unknown effects has to be our planning horizon. In this regard, Georgescu-Roegen

(1970:2-3) discussed the need for a "concept of process" in which how we define – and where we place – our analytical boundaries shall limit what we can see:

...All that exists in actuality at any moment must belong either to a process or to its environment. The basic element of the analytical picture of a process is, therefore, the boundary. No analytical boundary, no analytical process. Now, precisely because actuality is a seamless whole we can slice it wherever we may please. And ... actuality has no joints to guide a carver. ... Only our particular purpose in each case can guide us in drawing the boundary of a process. ... The analytical description of a process ... reduces to recording everything that crosses the boundary in either direction. ...

Georgescu-Roegen (1971:213-14) noted again the role of boundaries in our analysis: "No analytical boundary, no analytical process." He adds (in a Polanyi-type distinction of focal and subsidiary awareness) [2] that "a boundary must necessarily consist of two distinct analytical components. One component sets the process against its 'environment' at any point of time. ... We may refer to this component as the *frontier* of the process. ... The boundary must also contain a temporal component, the *duration* of the process." But total interdependence suggests such components are imposed by us on the seamless Whole of the Universe, so on what basis should we do that? How might we set the frontiers of an integral process, and determine duration? In part, this is an issue of scale in ecological economics (Jennings 2008a): the scope of the analysis should reflect the scale of essential effects within our range of vision, over a time that fits their resilience. But these are matters – centrally – of perception, not just of fact, in a world where everything ripples outward forever without any end to its impact.

This is where planning horizons serve to bound awareness and conscience: effects spread outward forever, but prior knowledge of them does not. The rational limits of human intelligence stand as a 'boundary' between anticipation and surprise, showing a way to deal with interdependence. With no seams out there in the world, the only slices are those we impose: our rational limits seem an appropriate choice of frontier for our analyses, with an implicit duration in the temporal length of planning perspectives.

One of the problems is that we live inside the process studied. The whole system moves in concert: dynamic, chaotic, complexly unfolding in patterns seemingly of their own making, combining components in new ways selectively understood by us. "The new biological conception ... the organismic epistemology ... is a belated recognition of the existence of novelty by combination" that "contributes something that is not deducible from the properties of the individual components"

(Georgescu-Roegen 1967:112, 62; Krupp, 1963). But complex systems – seamless save in our science – show where analysis fails with qualitative variation and dialectic emergence. [3] How might we encompass such an immensity in our research?

Georgescu-Roegen (1971:128-33) saw the Entropy Law as “the only clear example of an evolutionary law ... a proposition that describes an ordinal attribute *E* of a given system ... a ‘time’s arrow’” of entropic direction. The Entropy Law states “that the entropy [disorder] of the universe increases as Time flows through the observer’s consciousness.” Indeed, as Georgescu-Roegen (1967:93; 1971:194) put it, “our whole economic life feeds on low entropy” at the cost of high entropy elsewhere: “life speeds up the entropic degradation of the whole system.” His treatment of entropy is about order and energy, not about organization, as in Boulding’s scheme.

So Georgescu-Roegen’s entropic concept turns on energy usage and its service to purposive human enjoyment. Boulding’s view is more institutional, linked to organizational theories of learning and human activity. Yet both are in need of a unifying conception of entropic change. The interrelation of planning horizons with pricing, growth and efficiency offers a novel look at the entropy problem and our need to assess it through an organizational lens. Some of the most important dimensions of entropy in our relations appear within a horizontal outlook. Starting with interdependence and the challenge of economic analysis in a complex systems setting, the Entropy Law – with respect to energy and organization – can be interpreted as a horizontal measure of organizational ‘slack.’ In this way, horizon effects shift us along an entropic continuum, measurable with respect to improvement in Boulding’s ethical sense (Jennings, 2009b).

Boulding’s statement that horizons are related to “goodness” (ethics) seems in line with their relevance. Indeed, Boulding (1966:22-23) characterized the organizational unit of measure for planning horizons thus:

The question of what is economics can be almost as troublesome as what is knowledge? ... One longs, indeed, for a unit of knowledge, which perhaps might be called a ‘wit,’ analogous to the ‘bit’ as used in information theory; but up to now at any rate no such practical unit has emerged. ... The bit, however, abstracts completely from the content of either information or knowledge... [and] for the purposes of the social system theorist we need a measure which takes account of significance... Up to now we seem to have no way of doing this...

The whole point of introducing the planning horizon is its “significance” in Boulding’s sense. His singular anticipation of how this concept would work,

contributing to economics in numerous ways, is striking and even astonishing in its accuracy and detail. It is as if he saw the need without the concept itself, while Margolis (1960:531-32, as quoted in Part 1) had the concept but didn't see the need. The role of purpose in guiding attention through our selective focal limits suggests a value for reciprocity and trade across sub-disciplines so we all learn from each other.

There is a horizontal reason for that. If models unfit to applications are used to guide decisions, then planning horizons shorten due to uncertainty and surprise. "...The only *raison d'être* of theory is economy of thought," where "the choice of relevant facts ... is the vital problem in economics" and "a 'simple-minded' model may ... be the more enlightening representation of the economic process" (Georgescu-Roegen 1971:15, 340-41). This is why essentiality is as important as realism when matching assumptions to applications: if models steering our actions do not fit the settings in which they are used, inefficiencies – including conflict and wasted resources – result. The closer the fit of theory to fact – the better aligned the assumptions are to the extant truths of their application, in both their realism and the essentiality of their selective focus – the longer can our horizons be for any level of effort. This last is important, as Boulding (1962a:134) explains, since learning is not just teaching (or 'printing') but 'inspiration' as well. The greater our level of faith and confidence – in ourselves and those around us – the more time, money, attention and energy will be invested in choice, so will our range of projection extend. In this sense, social planning horizons serve as a measure of economic cohesion and efficiency in an interdependent economy of independent decisions. Socially, economic coordination is the whole game, but our models must fit to the facts for any assurance of value in outcomes. This is my horizontal answer to the Chicago School approach that favors unrealistic constructions (Friedman, 1953; Jennings, 1968; 1976). And these are not dismissable methodological problems in any event: they underlie some serious errors in economics today. As Georgescu-Roegen (1970:9) so wisely observed: "The history of every science, including that of economics, teaches us that the elementary is the hotbed of the errors that count most."

In this regard, horizon effects should be seen as a measure of organizational entropy and cohesion. When net interdependence is substitution, rivalry is efficient: that is well-known to economists. When net interdependence is complementary, it is cooperation we want and not competition, which is doomed to fail in this setting. Any fragmentation of effort in the presence of complementarity undermines

economic efficiency and social welfare. Indeed, there is a case that competition not only is counterproductive in complementary settings (which Kaldor believed was the general case), but also that competition is keeping our (private and social) horizons short. This is an obvious corollary to the efficiency of integration under complementarity. If longer horizons serve as a measure of organization and evolution, then neoclassical economics stands in the way of advance.

A horizon effect – the extension or retraction of planning horizons – should be seen as an ordinal shift in a complex balance of framed projections, where resultant time horizons are a scalar responding to instant change. Others' planning horizons have a major effect on one's own, as will environmental stability, information and knowledge, learning activity, energy and attention, encouragement, hope, self-confidence and other factors. Most of these are ignored in mainstream models of economics, so introducing them through horizon effects is a novel leap in itself. Furthermore, economic systems – in their efficiency, equity, ethics, ecological health, and organizational evolution – are driven by planning horizons: this strengthens the case for complementarity into a general claim, making cooperation – not competition – our means to social improvement (Jennings, 2011b).

One of the most significant reasons that a horizontal economics is also an ethical economics arises from how externalities interact with complementarity. Orthodox substitution assumptions suggest that phenomena are self-contained, that negative feedbacks simply ensure an attenuation of externalities spreading out from our actions. If so, they can be safely ignored, damping out and disappearing, allowing a partial approach to be used to analyze economic effects. Complementarity, on the other hand – in the form of positive feedback, cumulative causation or reinforcing effects (Berger, 2009) – suggests an amplifying pattern of impact. Here, every action generates growing outcomes spreading outward to all, making interdependence central in our economic constructions. For equilibrium models, standing on substitution assumptions, whatever we do will little upset the balance of forces said to prevail; for frames supposing complementarity, every act matters a lot to everyone else so ethics are relevant here. Indeed, the entire realm of economic activity is so laden with social effects from private decisions that their morality impacts us all. With interhorizontal complementarity, any ethical lapse spreads across society in nefarious ways through role model effects, as Boulding (1962b:234) has so well explained:

...If capitalism is to work successfully, there must be defenses in the society against dishonesty. ...A good part of the burden must be carried by ... the internalization of these moral standards in the individual. This is done ... by the example of those around the individual... For this reason, the building of honesty into a culture in which it does not already exist is a difficult matter, for dishonesty tends to perpetuate itself through the teaching process which it develops. Here again there is a constant struggle between the overt and the covert elements in the value system ... if this results in a collapse of the overt system – in a general lapse into cynicism and the overt acceptance of a dishonest covert system – a society is doomed.

So ethics are an essential part of the planning horizon notion, which measures our personal growth and maturity in its socially conscientious internalization of externalities into our private decisions. One can see this in the horizontal shift of economic relations away from conflict to concerts of interest with horizontal length. The chief failure of competition is that it has spawned a myopic culture, rewarding unethical and immature behavior wrongly founded upon assumptions of independence, substitution, tradeoffs, scarcity and individualistic claims. So if horizons are ethical indices, some meaningful insights emerge from interdisciplinary analyses of their relevance to the relation of economics to other realms of scientific query.

Extensions and implications

Organizational management theorists suggest a relation among conflict, time perspective and materialistic consumption in business systems structured on hierarchic grounds (cf. Simon 1971, p. 204). “Man does not generally work well with his fellow man in relations saturated with authority and dependence, with control and subordination...” (Simon 1971:210). Interhorizontal complementarity means that treating adults like children will bring immature responses. Argyris (1971:262-63, 268-69) said that in these settings mature people will often exhibit signs of “frustration, failure, short time perspective and conflict.” These symptoms of illness will lead to organizational fragmentation through “competition, rivalry, ... hostility and ... a focus toward the parts rather than the whole.” If a wrong model is used to design any institutional incentive structure, we would expect to observe symptoms of organizational stress, such as those Argyris states. The impact of substitution assumptions on our economic and social grasp of organizational process has been nothing short of disastrous, showing costs in awareness and actions. Some of these

costly effects stem from impersonal learning and knowledge. [4] Kaplan (1985:478) drew a connection to positivist information theories:

Here is the shortcoming of applying to interpersonal communication the depersonalized model so useful in the mathematical theory of information. In that model, coding by the transmitter and decoding by the receiver are separable and independent processes. In the life of dialogue, however, there is a continuous interaction... What is happening is not transmission ... but the emergence of a shared meaning... The interchange is not just communication but a species of communion by which alone ... each participant in the dialogue first becomes a person.

In this sense, organizations survive and thrive on cooperation, where reciprocity and a budding respect for each other rule the day. A paper by Katz and Georgopoulos (1971:136-38) shows how the roles of ethics, social values and cooperation are important to organization thus:

The great need of our time is a reformulation of social values. ... In the first place, research and observation show that the norm of reciprocity, of cooperation, of mutual helpfulness, runs wide and deep. Organizations could not exist without many uncounted acts of cooperation which we take for granted. ... In the second place, justice and fairness are not outmoded values. ... It is important to emphasize the importance of justice and fairness in the operation of an organization and to introduce reforms where inequity is the practice. In the third place, social responsibility ... has a potential that remains to be developed. ... All of these values are related to ... the democratic ethic which is still our basic creed. ... Organizational reform needs such a value base both as a set of social principles and as guidelines for action.

The point is about the harmful effects of authoritarian or hierarchic conceptions of organizational structure reducing cooperation. All this says that dominant features of our economic culture result from organizational stress stemming from improper representations in the design of our institutions, showing express psychological symptoms of ill health including conflict, competition, materialism, myopia and disruption of effort. Why is this occurring? As Simon (1981:167) outlined the issue in a more specific context: "A design representation suitable to a world in which the scarce factor is information may be exactly the wrong one for a world in which the scarce factor is attention." Here we have a similar problem of organizational structure resting on substitution assumptions in a context of complementarity, yielding conflicts, short horizons, immaturity and disengagement.

Abraham Maslow (1954, 1968) offers some answers in his theories of self-actualization and stages of human development, in which basic consumption needs (shelter, food, clothing, etc.) are materialistic in nature, that – once satisfied – bring forth higher-order, less tangible needs: this implies our relations shift away from substitutional goods in favor of complementary yields as we mature and grow. In that case, our institutions should also evolve away from competition in favor of cooperation or social advance is stifled due to higher-order need deprivation (Jennings, 2011b); this is a likely source of these symptoms of organizational stress. McGregor (1971: 310-11), a well-known organizational management theorist, described the problem:

The deprivation of needs has behavioral consequences. ... The man whose needs for safety, association, independence or status are thwarted is sick, just as surely as he who has rickets. We will be mistaken if we attribute ... passivity, or ... hostility, or ... refusal to accept responsibility to ... inherent 'human nature.' These forms of behavior are symptoms of illness – of deprivation of ... social and egoistic needs.

McGregor related these symptoms of deprivation to rampant consumerism and materialism, because "It becomes more important than ever to buy the material goods and services which can provide limited satisfaction of the thwarted needs. Although money has only limited value in satisfying many higher-level needs, it can become the focus of interest if it is the only means available."

The major implication of horizontal theory is that the nature of human relations is not substitutional but complementary. If so, competition is not just stifling output of intangibles but is shortening planning horizons in an increasingly myopic culture, revealing insidious symptoms of higher-order need deprivation. But these horizon effects cannot be seen without a horizontal theory; a corollary of selective focus is a restrictive blindness.

Part of the problem arises from the relation of substitution to externalities in its warrant to partial equilibrium models. In a world of complementarity, we cannot escape from interdependence and bounded rationality, so either a systems approach is required or a network conception. Here we find no objective viewer outside the contexts studied; we are enmeshed in the process. When we are part of our analysis, systems subsume mechanistic constructions within network models. So how we analyze social and natural systems from the inside demands further reflection. Nicholas Rescher (1979:46-49) observed that "the network model of cognitive

systematization," as distinct from "its Euclidean counterpart ... dispenses altogether with ... axiomatic supports" and it replaces...

...stratification of these into levels of ... fundamentality by a conception of enmeshment. ...The network appeal is unredutive. ... [It] shifts the perspective from unidirectional dependency to reciprocal interconnection. ... A heavy charge can be laid against the Euclidean model on grounds of the enormous hold it has established on philosophical and scientific thought in the West. Its exclusion of circles and cycles on grounds of their violating ... Aristotelian logic against 'circular' ... reasonings impeded the conceptualization of reciprocal causal models in science for over two thousand years.

As Ludwig von Bertalanffy (1968:45), an early founder of systems theory, expressed it: "In the world-view called mechanistic ... causality was essentially one-way... ...This scheme of isolable units acting in one-way causality has proved to be insufficient. ...We must think in terms of systems of elements in mutual interaction." Bertalanffy (1968:87-88) added that:

The mechanistic world-view found its ideal in the Laplacean spirit – i.e., in the conception that all phenomena are ultimately aggregates of fortuitous actions of elementary physical units. Theoretically, this conception does not lead to exact sciences outside the field of physics... Practically, its consequences have been fatal for our civilization. ... We believe that ... general system theory ... may be destined ... to play a role similar to that of Aristotelian logic in the science of antiquity. The Greek conception of the world was static... In modern science, dynamic interaction appears to be the central problem in all fields of reality. Its general principles are to be defined by system theory.

Where orthodox standards see market failure, systems approaches find theory failure: "...Reasoning which abstracts from externalities cannot be applied to a situation in which they are present" (Nove 1969:852), because: "Market information ... is inaccurate when interdependent activities are decentralized..." (Malmgren, 1961:419). The substitution assumptions so enamored in economics steer attention away from meaningful issues such as interdependence and its sundry implications. Some of our resulting exclusions appear in dynamic complex systems and the analytical lessons we have avoided thereby. One important issue is that a system must be positional in its structured design, so will not conform to rigorous standards (Jennings, 2009a:52-53). An implication of this dimensional aspect of system models is that the whole is not derivable from its separate elements (Angyal 1941:20-27). Substitution assumptions seem an important part of the error. Birch (1990:342-

52), a philosopher, put it thus: "At the center of Western culture... are faulty presuppositions about otherness ... mainstream Western culture views ... otherness ... as adversarial. It presupposes that opposition is fundamentally conflictive, rather than complementary..."

Furthermore, all living systems are open, not closed, demanding another way of thinking on the importance of flexibility and diversity as a means of coping with evolving complexity. As Trist (1985:167-73) put it:

Facing a future of increasing complexity means trying self-regulation within interdependence, learning how to cultivate the new logical type. ... A negotiated order will need to be founded on collaboration rather than competition, collaboration being the value base appropriate for the adaptive cultivation of interdependence. ... This change to a new logical type ... requires a reversal of the customary relations between competition and collaboration.

Systems theory is also adaptive, flexible and dynamic, composed of three basic components (Senge 1990:79-80): substitution or negative feedback; complementarity or positive feedback; and delays or lags in the sense of a time horizon. These central concepts stand in the core of horizontal theory, as addressed above. The 'tightness' of feedback control loops strengthens system efficiency, integrity and stability in the regulation of organization. This, said in a different tongue, is similar to an internalization of externalities through rules and localization of feedbacks, so encouraging greater responsibility and more social engagement. The better our knowledge of causal relations, the tighter these loops will be; organizational learning in a systems analytic context denotes a more expansive view: "Inquiry ... is a reaching out of a human being beyond himself to ... what he ... or ... the world could be." (Churchman, 1971: 275) Is there any better representation of a horizontal process of entropic growth? Churchman (1979:200) described the requirements of a learning environment thus: "the environment which the inquiring system critically needs is a cooperative environment ... because inquiry is evidently needed to create cooperation and cooperation to create inquiry."

Understanding the self-reinforcing character of substitution assumptions and their institutional lessons shall be important too. Believing "that people are motivated by self-interest and by ... power and wealth" will lead to precisely these human traits as "self-fulfilling" effects of organizations so designed (Senge, 1990:274). As Badaracco and Ellsworth (1989, as quoted in Senge) explain:

If people are assumed to be motivated only by self-interest, then an organization automatically develops a highly political style, with the result that people must continually look out for their self-interest in order to survive. An alternative assumption is that, over and above self-interest, people truly want to be part of something larger than themselves. ... When organizations foster shared visions, they draw forth this broader commitment and concern.

As Hawken (1999,19-20; 1994) put it so well: "We are surrendering our living systems, social stability, fiscal soundness, and personal health to outmoded economic assumptions." Walt Kelly (1987) sums it up: "We have met the Enemy and He is Us." Substitution assumptions do not describe the nature of human relations which are mostly complementary. If so, competition is stifling and not encouraging growth in any sense: social, personal, or 'economic' (Jennings, 2011b). Cooperation is what we need to resolve our cultural ills.

Simon (1983: 107) ended his series of lectures at Stanford on "Reason in Human Affairs" with an open appeal for broader horizons and greater responsibility:

Reason ... is instrumental. It can't select our final goals... All reason can do is help us reach agreed-on goals more efficiently. ... It would be quite enough to keep open for our descendants as wide a range of alternatives as our ancestors left for us... In accomplishing [this] more limited goal, will an appeal to enlightened self-interest suffice? ... Success depends on our ability to broaden human horizons so that people will take into account, in deciding what is to their interest, a wider range of consequences. It depends on whether all of us come to recognize that our fate is bound up with the fate of the whole world, that there is no enlightened or even viable self-interest that does not look to our living in a harmonious way with our total environment.

Simon's inspiring close shows the direction in which we must go. Expanding private and social horizons is not a straightforward task, given the culture economists have encouraged through our substitution assumptions and their wrong institutional links showing competition as socially optimal. A horizontal economics of learning and knowledge is one of complementarity as an inducement to cooperation in dynamic complex systems and in network contexts as well. Linearity and convexity are not appropriate tools in this setting, and no longer can norms of closure serve as standards of legitimation (Mirowski, 1986:193); an evolutionary approach is sought to analyze open systems such as confront us in economics. This will lead to a new framework conceived on horizontal grounds.

Conclusion

The main point of this paper is that horizontal economics is also an ethical economics in its basic conception. The planning horizon offers an ordinal index of foresight and conscience in its internalization of ecological and social effects into an agent's private decisions. Indeed, the notion offers an organizing principle for economics, including all learning activity (in Boulding's sense of that term) and time preference (or impatience in its effect on discount rates), personal growth and maturity (in its impact on the balance of interdependence in human relations), the tradeoff between conflict and cohesion in society (which is surely horizontal), ecological health (as an inherently ethical issue), regulation of free market processes (needed in any event), and the value of everyone's welfare to all (implied by complementarity). The role of horizons in an economics of interdependence and complementarity is central; horizon effects solve the institutional issue raised by a network of fully interdependent transactions. Where rivalry and common needs appear in a balance of value relations (substitution and complementarity), interhorizontal complementarity yields the insight that our interdependence is shaped by horizon effects in their contagious spread. The use and abuse of market power is closely related to planning horizons in the incentive for growth and learning over immediate profit. There are many inviting applications for this idea, and new research avenues abound to map its grounds, still largely on *terra incognita*.

The paper reviewed the following points. After a brief outline of what was to come, in the second section the act of choice was characterized as 'a normative process of multidimensional causal projection' of fantasy outcomes standing on theories of 'if I do this, then that will occur' applied to known options in choice. Surprises set the bounds of rationality and define our horizons, with the latter restricted to accurate theories so error reduces their range. As shown in the previous paper, within network contexts substitution and complementarity coexist in nondecomposable tangles of complex interdependency, yielding intractable institutional problems solved by horizontal theory. Interhorizontal complementarity opens to an important result that the balance of substitution and complementarity is horizontal, such that longer and broader horizons shift our relations away from conflict toward a concert of value in all economic contexts. If so, any advancing process of economic development turns the acclaimed efficiency attributes from competition to cooperation due to a change in the composition of output to complementary yields away from substitute goods (Jennings, 2005). A serious source of error in

neoclassical economics shows in a boundary problem between internal and external environments, since cost and demand curves are not thus seen as internal projections of unexplored options by a price-setting agent. A cognitive framing of these alternatives sets the role of time and expectations in bolder relief, forcing concepts of time (and therewith the planning horizon) into the center of economic analysis, as suggested by many economists such as Knight (1921), Stigler (1939), Clark (1940, 1955), Alchian (1959), Turvey (1969) and others. But they concurred that time alone was not enough and was far too simplistic. Consequently, a theory of planning horizons as a subjective frame including cognitive factors should be included in economics.

The third part of the paper turned to what the planning horizon is, starting with Boulding's (1956) image and its transformation echoed by Simon's (1981) theory of 'artifice' centered on a horizontal boundary, making horizons an ordinal, entropic gauge of organization, knowledge, ethics and development (Boulding 1962a, 1966). An embrace of interdependence suggests that our rational bounds are theoretical limits, so serve as an analytical boundary in Georgescu-Roegen's (1970; 1971) sense, since effects spread outward forever but prior knowledge of them does not. There is no external observer; we live inside the process studied, making ethics central to a horizontal economics, spreading effects outward to all.

The fourth part of the paper reported on thoughts from management theorists, social philosophers and other writers showing how an authoritarian structure reinforces symptoms of organizational stress from need deprivation, including conflict, disintegration, materialism, myopia, rivalry, hostility and disengagement. These stresses stem from incorrect theories (substitution and competition) applied to a complementary setting calling for cooperation. This seems an apt description of a sick economic culture, resulting from what Pigou (1922:135) would deem to be "the falsehoods of charlatany" in these substitution assumptions so resistant to reform. In the three realms of 'atoms' (physical goods), 'bits' (intangibles) and 'wits' (horizon effects), substitution only pertains to short-run atoms and nowhere else (Jennings 2011a). So why are economists so enamored of substitution and competition, while learning and understanding so little about the implications of complementarity and cooperation? Management theorists seem to know why cooperation is so vital to organizational function, while we economists simply ignore the research as outside our realm of study.

Yet the founder of systems theory (Bertalanffy, 1968:88) opined that "dynamic interaction appears to be the central problem in all fields of reality. Its general

principles are to be defined by system theory." Economists seem so resistant to other regards – since science survives on open minds – maybe the underdevelopment of economics, so well lamented by Phelps Brown (1972), is from academic competition among complementary yields (Jennings, 2008b). If so, a relentlessly myopic culture – rearing its head to engulf us in ethical losses, ecological crisis, short-term motives and trivial license – is due to economists' stubborn adherence to wrong ideas and assumptions. We have met the enemy. Are we courageous enough to admit this, so to adapt and change? Earl (1983:121) described the dilemma: "If a mature scientist is to undergo a personal scientific revolution she will have largely to dispense with a well-formed world view. Since the choice will not usually be clear-cut, such a transition, if made, would entail a period during which she suffered nothing short of a scientific nervous breakdown." [5] That is what we must face, to be reborn and grow a new economics.

Endnotes

[1] Cf. Krupp (1963: 221-26), who discusses externalities in their relation to composition laws in an insightful way:

Among the axioms that determine theoretical scope are the composition laws. Composition laws govern the extension of relationships derived from the micro-units. ... The type of composition rule which may be applied to units depends on ... their interdependence. ...

The problem of externalities concerns the interdependence that emerges when individual units are aggregated with consequences not predictable under theorems derived from the individual units. ... Microeconomic theory fails to provide an adequate theory of the economic consequences of direct interdependence. ... At present, the difficulty of adapting theorems drawn from axioms about independent units to permit handling phenomena of common interdependence must be recognized as a major structural problem in microtheory.

[2] Any exclusive attention to one thing also ignores all else: selective focus is also restrictive blindness at the same time. Michael Polanyi (1958:56-57) remarked that: "Subsidiary awareness and focal awareness are mutually exclusive. ... All particulars become meaningless if we lose sight of the pattern which they jointly constitute." He expands on this in Polanyi (1961:128-29):

...Particulars can be noticed in two different ways. We can be aware of them uncomprehendingly, i.e., in themselves, or understandingly, in their participation in

a comprehensive entity. ... In the first case therefore we may say that we are aware of the particulars focally; in the second, that we notice them subsidiarily in terms of their participation in a whole. ...

We can formulate this difference in terms of meaning. ... In the first case, unspecificity impedes the analysis of a given meaning; in the second case, it restricts the discovery of an unknown meaning. ...

[3] Georgescu-Roegen (1971, p. 67) remarks:

...The impossibility of defining formally the intuitive continuum is a logical consequence of the opposition between the essential property of numbers to be distinctly discrete and the characteristic property of the intuitive continuum to consist of dialectically overlapping elements leaving no holes.

[4] How economists ever adopted a scientific conception negating consciousness, solely open to objects observed, is simply amazing to anyone not tuned in to positivist theory. Though realism and reason are on the rise in modern philosophy, economists still labor under the spell of Laplace's dream of impersonal knowledge and objectivity in a humanless social science. Polanyi (1958:139-42) offers some insight to this:

The ideal of strictly objective knowledge, paradigmatically formulated by Laplace, continues to sustain a universal tendency to enhance the observational accuracy and systematic precision of science, at the expense of its bearing on its subject matter. This issue [is part of] ... a wider intellectual disorder: namely the menace to all cultural values, including those of science, by an acceptance of a conception of man derived from a Laplacean ideal of knowledge and by the conduct of human affairs in the light of such a conception.

Georgescu-Roegen (1967:104) noted the insidious strangeness of this view, especially in social science:

From time indefinite, the natural sciences have cherished a positivist epistemology... Objectivity ... requires then that a proper scientific description should not include man in any capacity whatsoever. ... However, for a science of man to exclude altogether man from the picture is a patent incongruity. Nevertheless, standard economics takes special pride in operating with a man-less picture. ...

[5] The dominant paradigm in economics is still equilibrium models, surrounded by a protective fringe of zeal like a moat guards citadel walls. Blaug (1976:156-57) characterized Lakatos' view of the hard core of assumptions underlying a research program thus: "*The 'hard core' is irrefutable by 'the methodological decision of its*

protagonists." One cannot challenge or open the gates, since so many alligators swarm out that a critic gives up in despair. And this, of course, is the aim. Nicholas Kaldor (1972: 1240), an advocate of increasing returns and complementarity, expressed frustration with this:

In fact, equilibrium theory has reached the stage where the pure theorist has successfully (though perhaps inadvertently) demonstrated that the main implications of this theory cannot possibly hold in reality, but has not yet managed to pass his message down the line to the textbook writer and to the classroom. ...Without a major act of demolition – without destroying the basic conceptual framework [of orthodox equilibrium economics] – it is impossible to make any real progress.

The challenge of facing and engineering change is addressed in Jennings (1999: 78-79): Organizations shall protect against any threat to their identity; appreciate that self-preservation is their prime directive (Katz and Kahn 1969:97-98). Selznick (1948:276) counts "self-defensive responses or mechanisms" among the methods adopted by organizations to deal with environmental change, including construction of ideologies and cooptation as self-protection. In an intriguing analysis of the process of organizational change, Tannenbaum and Hanna (1985:100-101) address its psychology of "Holding On, Letting Go, and Moving On" as three stages of frequently agonizing and painful adjustment. To ease one's hold upon the familiar, anxiety must be confronted.

As psychoanalyst Ernest Schachtel (1959:195, as quoted in T&H, p.100) insightfully explains: "The anxiety of the encounter with the unknown springs ... from the person's fear ... that without the support of his accustomed attitudes, perspectives, and labels he will fall into the abyss or flounder in the pathless... Letting go of every kind of clinging opens the fullest view... But it is this very letting go which often arouses the greatest amount of anxiety."

Tannenbaum and Hanna (1985:108-15) offer a useful insight on the tenacity of an organizational effort to defend its identity in a situation perceived as a threat to its self-protective values: "All human systems ... have boundaries. ... That which is within the boundary gives the system ... its identity (its ego or its self-definition). This identity ... is experienced by the system as essential to its survival." These two organizational theorists identify a series of steps in "The Process of Letting Go and Moving On" that are: (1) "consciousness raising" (through self-awareness); (2) "re-experiencing" (as a means of getting in touch with the deeper reasons for holding on); (3) "mourning" ("for the loss of the old ways of seeing reality"); (4) "letting go" and then (5) "moving on" ("to new possibilities and new ways of seeing things").

They also note that: "The consciousness raising, re-experiencing, and mourning make possible the letting go, involving a lowering of defenses, a vulnerability, and a receptivity." They further remark that: "Although our focus ... has been on the individual, ...what has been said about the individual has wide applicability (with appropriate translation) to all human systems." The ease with which 'letting go' is achieved depends upon a number of variables, including: "humanistic values ... interpersonal trust ... stability ... realistic patience ... [psychological maturity and centeredness] ... openness ... psychological strength ... [and] a great need for support (particularly psychological support) as a system moves through the process..." They offer encouragement to people in this process, suggesting that though what has been said implies "that this basic change process is rooted in anxiety and pain... as it unfolds, it also releases joy, vitality, and meaningfulness." Tannenbaum and Hanna (1985, pp. 118-20) also ask why this subject has been ignored by organizational theorists, and offer three explanations:

In conclusion, ... it is puzzling (...) that so little attention has been given ... to ... the need to hold on – together with the related facilitation of letting go and moving on. ... This avoidance has ... at least three fundamental reasons to explain it...

First, there is a culturally embedded fear and reluctance to explore elements in the preconscious or unconscious self... And yet consciousness raising is an essential step in dealing with the need to hold on. ...

Second, there is the culturally grounded and pervasive fear of feelings (...), particularly of their expression. Most individuals are fearful of their own feelings, and they are threatened by and not sure how to cope with the feelings of others. ... And yet, the re-experiencing of earlier childhood events, together with associated feelings ... is also an essential step in dealing with the need to hold on.

Third, there is the need to mourn... To mourn means to face death ... in order to make a rebirth possible. ...Our intuitions lead us to the possibility that the avoidance by managers and change agents of the need to let go ... is in part, at least, related to a deep fear that involvement in these processes would bring them too close to a confrontation with their own mortality.

In closing, we can only leave the reader with a gnawing dilemma. ...The area to which we have just given our attention is a seriously neglected one... ...Efforts directed at deep change often fail or fall short of desired results because the need to hold on and its working through seem to be so persistently avoided. At a time in history when the demands for change constantly impinge on organizations, this avoidance carries with it most serious consequences. ... At present, we have little wisdom to offer as to how this dilemma can be resolved. But we do have faith that, with an increasing and more pervasive understanding..., it will be resolved in the best interests of all participants in organizational life.

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