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Why the social sciences should be based in evolutionary theory: the example of geoeconomics and intelligence studies

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ABSTRACT This article gathers arguments for why the social sciences should be based in evolutionary theory by showing the shortcomings of the current paradigm based on the study of physics. Two examples are used, the study of intelligence studies and geoeconomics. After a presentation of the geoeconomics literature and an explanation of what the organic view of the social sciences is, we follow the study of economics as it developed after the Second World War to see where it went wrong and why.

KEYWORDS Economics, evolutionary theory, geoeconomics, geopolitics, intelligence studies, social sciences

1. INTRODUCTION

The development of theory is essential to any science. A little more than a century ago it looked as if the study of economics was going to be based on evolutionary theory. Then focus shifted with the *methodenstreit* and then after the Second World War it was decided that the new brave social sciences would be based on the study of physics.

The victors of the Second World War were aware that the struggle for theory was more important than the military struggle. With a military you may win the war, but to win the peace you have to convince people of your moral high ground. Oakeley, in her book "History & Progress" (1923), expressed it this way:

> The principles which England and her allies are opposing is not merely one that claims moral worth (…) It is (…) a theory of history (from chapter "German though: The real conflict", pp. 136-7). The great struggle seems then ultimately to be more accurately expressed as the struggle whether ideas have a sway in life.

The allies were fighting German materialism, evolutionary thinking, the idea of history as physical power, as expressed by Treitschke (1898), and at the end simply the notion of power (Macht) in the literature altogether. This was done to avoid "Prussian world-dominion".

Instead we got American world dominion, but without the theories that said so or explained how. We got in its place a set of unrealistic and idealistic theories such as individual free choice, equilibrium theories and free open markets. But reality finally caught up with the theory. The gap between them became too big at the end of the Cold War, bringing the physics paradigm in the social sciences to a definite impasse. Germany had never shown any enthusiasm for the new social sciences. Now the new Chinese superpower made it clear it was not going to adopt Western values. In Russia the news was welcomed as a relief. Instead the social sciences now have to

distinguish between on one hand explaining human and social behavior as it is and on the other hand thinking about how the world could be. This development may also lead to a revival of romanticism.

1.1 The example of intelligence studies and geoeconomics

Not all disciplines had adopted the new paradigm. Some, such as intelligence studies, have lived their lives largely outside of the ivory towers of academia. Others, such as the study of geopolitics, never left the old paradigm. Those disciplines that embraced the *Realpolitik* assumption found themselves to be popular again (they had been relevant all along, but now others rediscovered their relevance). The new version of geopolitics, called geoeconomics, automatically looked to the study of biology rather than physics. The aim of geoeconomics is to present intelligence (e.g., economic, political, or social) in the form of maps, wisdom and maxims that help explain current events and make predictions (For examples see Søilen, 2012, pp. 140-295). It is a discipline adapted to the world of globalization and multinational enterprises which shifted the power balance from the nation state to private organizations. The methodology of geoeconomics is similar but not exactly the same as the study of geopolitics (Søilen, 2012; Søilen, 2010; Søilen, 2016; Wigell and Vihma, 2016). Geopolitics was defined as an evolutionary science right from the start with Kjellén (1914) and had only to continue.

The new study of intelligence studies, with its focus on information and its tradition in the practical work of intelligence organizations may also be based in evolutionary theory, even though most contributions in competitive intelligence, market intelligence and business intelligence do not take this approach. Like so many other management disciplines they focused on solving practical problems and as a consequence have been seen as less valuable as academic disciplines. Critics fail to see that these disciplines left theory because the existing scientific paradigm seemed unrealistic and to change it seemed an impossible task.

While intelligence studies is often concerned with the micro level, geoeconomics is primarily occupied with the macro level. This then is how the two studies fit together, theoretically, methodologically and in the content they study. But unlike the study of geopolitics, intelligence studies is at the very beginning of its theory development, mainly because it has lived its life largely outside of academia and gained its legitimacy as a distributor of valuable practices to professionals. For geopolitics and geoeconomics it is a question of sticking to their roots, adjusted for a number of biases identified during the past half a century, which can be summarized as the seduction of maps (i), the seduction of history (ii) and the seduction of current events (iii) (See Søilen, pp. 21-35).

The study of geoeconomics is what we today should call a multidisciplinary field building on the study of history, geography (maps) and political science (the study of power based on *realpolitik* assumptions) to explain current events and try to predict future action by organizations. Intelligence studies is also practiced as a multidisciplinary field, in fact all relevant social sciences today are forced to become multidisciplinary, meaning simply to revert the failures of specialization by the current scientific paradigm in order to become more relevant again. The overspecialization and over-compartmentalization that was the physics paradigm has led to entire disciplines like economics and political science becoming ever more irrelevant.

The next section of the paper is in large part a reprint from the book "Geoeconomics" (Søilen, 2012)[1] which explains the relevance of geoeconomics, its methodology and how it fits with evolutionary theory and the evolutionary approach to the social sciences, but it also presents current research in geoeconomics.

2. GEOECONOMIC THEORY

2.1 The geoeconomic literature

There cannot be any politics without political realism, and economic issues lie at the core of politics. The person, company, or nation which possesses economic wealth has resources, and resources are power; where power is defined as the ability to control the actions of others, thus increasing one's own opportunities for creation of further and future wealth. We find this same notion in Klare's understanding of geopolitics as the study of "the contention between great powers and aspiring great powers for control over territory, resources, and important

[1] Thanks to Karin Jakobsen at Ventus Publishing for permission to reprint parts of the book for part 2 of this article.

geographical positions, such as ports and harbors, canals, river systems (fresh water supply), oases, and other sources of wealth and influence" (Klare 2003: 51; see also Klare 2001), but today it's no longer the nation states who are driving these processes, but corporate interests which answer to different logic: thus the importance and relevance of Geoeconomics (Søilen, 2012, p 104).

Cowen and Smith (2009) have previously shown how there is a recast from geopolitics to geoeconomics as the globalization ideologies from the turn of the 21st century have faltered. Instead events have been understood with a geopolitical and geoeconomic logic. At the same time there has been an auto-destruction during the last decade of the relevance of critical geopolitics as presented by Dalby (1991) and Tuathail (1996). More constructivist criticism against geoeconomics comes from other geographers like Sparke (2007). Much of the interest for Geoeconomics is coming from authors and topics outside the Western world, for example from Russia (Cf. Alexander, 2011; Anokhin and Lachininskii, 2015; Lachininskii, 2012; Rozov, 2012), the Russian-German relationship (Szabo, 2014) and former Soviet states (Scekic et al., 2016), but first of all China (Cf. Ciuriak, 2004; Holslag, 2016; Hsiung, 2009, Huotari & Heep, 2016, Kärkkäinen, 2016; Khurana, 2014; Søilen, 2012 B) and comparisons inside of China (Schlevogt, 2001), as if the political struggle is also a struggle for ideas, and more precisely for a new scientific paradigm. There are also those who see the geoeconomic logic as a new balance of power between East and West (Couloumbis, 2003), and those who argue that the US policy was geoeconomic all along (Mercille, 2008), or still is (Morrissey, 2015). As shown by Barton (1999) the system of Flags of Convenience can be seen as one of the oldest examples of geoeconomic flexibility, or a logic of geoeconomics. The first writings on geoeconomics had a focus on natural resources (Kärkkäinen, 2016), realizing that the third world could have greater strategic importance than Europe (Hudson et al., 1991), and the West (oil, water). Resources would in many cases have a larger meaning and include the financial system (Sidaway, 2005), and infrastructure like oil and gas pipelines (Vihma & Turksen, 2015). Also the notion of geography as space of economic importance has reemerged, not only concerning the new passages by the North Pole (Moisio & Paasi, 2013).

What is largely missing in the current literature is the attempt to build and explain geoeconomic theories. In this article we suggest how this is done through a paradigm shift, by shifting attention from the study of physics to biology and evolutionary theory. The shift itself is not new, but has been suggested at numerous intervals for more than a century. As a consequence the focus in the next section is just as much to explain historic events in the history of the social sciences, and more precisely for the study of economics and business.

2.2 The organic view of the social sciences

The organic view of the social sciences says in essence that we human beings are not so much in control of our behaviour as we think we are. We are predominantly emotional and not particularly rational creatures. We learn not by theory, but by trial and error, that is through failures. Consequently, we should seek to understand human behaviour more by personal experience and by studying values, which are the basis of character-formation, rather than by losing ourselves in the uncharted waste of abstract theories and assumption of rationality. The latter may be intellectually interesting, but do us little practical good. All living organisms are nowadays studied in the light of evolutionary theory, except for Man. We have to ask why. Why should the social sciences be any different from zoology in this respect, unless we hold that Man stands outside biology? If we do hold that, as some Christians do by advocating creationism, then at least we are being consistent; but that is not the position of the social sciences today. Yet these sciences continue to define themselves as not part of biology. The intention here was good: this line was taken partly in order to emphasize that Man has moral obligations. But a problem arises when the morality and values assumed are ones which belong to and favour one particular civilization or viewpoint. Then we are facing not morality but moralism, the attempt of one person or culture to impose its values on others. We see this clearest today in the struggle between Western and Eastern values. In the light of claims about value-neutrality of the social sciences, it is problematic that most social-science journals support Western values. The validity of Western values must be questioned, if the social sciences are to have any credibility in the

21st century. Or alternatively, the study of human behaviour must revert to the humanities, where moral positions are less problematic.

It is no more than a century ago that we eliminated the moral component from the study of economics. At the beginning of the twentieth century, but particularly after the Second World War, the discipline of economics decided to assimilate itself to physics and its logic of "dead material" (non-organic). The original motive for this was that physics was and is a successful science, and the social sciences needed greater rigour. It was also seen as a way to solve the normative problem, by literally taking the moral component out of the equation. Furthermore, it was an inevitable consequence of splitting the discipline of political economy into two instrumental parts, political science versus economics and, later, management. Over the past two decades, there has been criticism of this approach, and of the lack of results produced by ever greater specialization. Over specialization seems to have shifted much of our research away from reality and towards obscurity, abstraction, and dogma. The phenomenon of interdisciplinary studies can be seen as a reaction against this development; so we saw a significant growth of interest in interdisciplinary scholarship around the turn of the 21st century. But this only solved parts of the problem.

Another characteristic of twentieth-century social-science research and methodology was a tendency towards linear thinking. Everything in economics seemed to be explainable in terms of the intersection of straight lines on x and y axes. Our linear way of thinking – as opposed to the cyclical ideas of Ferdinand Tönnies (1887) and the pendulum ideas of Hegel (1820), his thesis, antithesis, and synthesis – can be traced back to the Old Testament and the introduction of Christianity to Europe. The notion was reinforced in the period we call the Enlightment. The linear paradigm peaked with the contempt for the historical method on the part of the social sciences following the Second World War. That is the direction that is here being questioned. We must question not only the lack of useful results, but equally the claim of objectivity. So what are the alternatives?

The discipline of geoeconomics is founded on an organic understanding of social behaviour. This is also a method borrowed from the natural sciences too, but from the discipline of biology. By "organic" we mean that Man and human organizations function rather like living organisms. They too are brought into life, grow, and fade away, some sooner than others. Evolutionary theory is a powerful explanatory tool for any science, including the social sciences. That does not mean that all social behaviour can be understood by studying evolutionary theory, but this is the model with greatest explanatory strength and most potential to explain and predict human behaviour.

This line of thinking is not novel within economics. Evolutionary thinking got off to a good start in the discipline of economics in the USA with Thorstein Veblen in the closing decades of the nineteenth century. But economists chose to abandon evolutionary theory at the turn of the twentieth century, in part because it did not correspond to our political convictions about how Man should think about himself and society. The new slogan of the time was liberalism, individualism, and free choice – ideas that had been seriously challenged by evolutionary thinking, which had a more deterministic perspective on human life. The newly liberated discipline saw that as infringing on our ability to think of ourselves as free individuals with almost unlimited choices. Furthermore, a new world power needed to make a break with the existing scientific tradition, especially to the extent that it was associated with German thinking. The change of scientific paradigm corresponded in time to the rise of the American Empire and continuation of English-speaking world dominance under new leadership. Thus, although the original thought underlying the new empiricist paradigm was largely European (Austrian, French, British), its development was mostly American.

The organic view of social behaviour in fact goes back far further than the nineteenth century. A Venetian ambassador to France once said "States are like men in that their vigour and prosperity does not last forever; they mature, they grow old, they succumb" (quoted in Ross and McLaughlin 1981: 305). The Venetian diplomatic corps wrote some of the finest geopolitical analyses of all time, and their city's dominance lasted for more than three centuries. The methodological focus was not on algebra, 3×3 matrices, and Cartesian co-ordinates, such as we see so often in the social sciences today, but much broader. It covered observations on national character, ways of life, natural resources, and military strength and tactics. This methodological tradition later

spread to Rome and to the Catholic Church. We find it, for instance, in the writings of Olaus Magnus, Archbishop of Uppsala, who in 1555 published an extensive book on the history of the Nordic people (Magnus 1982).

The methodology was representative for the time; readers wanted books to give clear answers to real problems. A modern-style empirical article would probably have provoked outright laughter – "How long did you live there? Where did you travel? Do you speak the language? You mean to say you know because you questioned 250 people at a supermarket?" Even if you put half a dozen of these research articles together it can still be difficult to say anything specific about a given social problem. Often it will be more useful to read a good magazine, like the *Economist* or some *Quarterly Review*. Consequently companies often complain that they get too little value from modern social-science research. If business-school academics largely ignore this critique that is largely because they are safe to do so: it does not threaten them. They are responsible not to the world of real-life business but to a promotion system which is based on the type of research that businesspeople are complaining about. So companies often look for the social data they need among other sources, by piecing together gleanings from geography (maps), history, and current events (Søilen, 2012, pp. 107-109).

2.3 Evolutionary theory versus environmental adaptation

In order to apply evolutionary theory to the social sciences we need to distinguish between a number of different issues. One problem is that people mean different things by the word "evolution". The term is often used to refer to the fact that all living organisms are linked by descent from a common ancestor. Alternatively, it is sometimes used to refer to ideas about how the first living organisms appeared; that might instead be called "abiogenesis". We also use "evolution" when we really mean natural selection, which is just one of the many mechanisms of evolution.

François Perroux (1983: 23) defines evolution as "changes that are interlinked, as opposed to a 'random' succession of events and structures occurring in irreversible and historical time". These changes are what we may call genotypic changes.

In a strict sense then, non-heritable changes are not part of what we call evolution. Instead we may call them environmental adaptations. To many social scientists it seems that environmental adaptation is more relevant than evolution to their own subjects. Evolutionary theory is relevant chiefly to the natural scientist, who studies behaviour over generations. Not even the long-term business cycles of Schumpeter and the Kiel School bear much relation to evolution. What seems to be most relevant for evolutionary economists is therefore Man's phenotype, where phenotype is defined as the morphological, physiological, biochemical, behavioural, and other properties exhibited by a living organism. An organism's phenotype is determined by its genes and its environment.

At the cultural level mutation is not uninteresting to economists either: Chinese and Pakistanis are at least two mutations apart, Europeans and Africans perhaps as many as six or more. There are particularly many mutational differences within the African continent as this is where Homo sapiens first evolved. We need to consider what role, if any, these particular genetic differences have for economic behaviour. As a comparison, modern neuroscience is showing a genetic basis for behavioural differences between the sexes: for instance, females communicate more sensitively than males.

Then there is the variable of change. We acquire new customers, develop and buy new computers, and communicate with one another using new tools and behaviour. We must distinguish between those changes which are "evolutionary" and those which are not. Evolution in biology refers to (i) "the biological process in which inherited traits become more or less common in a population over successive generations", recognizing that (ii) "Over time, this process can lead to speciation, the development of new species from existing ones" (Wikipedia article on "evolution"). Under (i), we need to discover whether, say, a travelling salesman's son becomes better at selling, whether younger people today are able to use computers more efficiently than older people, and to what extent the content of our communication and way of communicating are changing with each new generation. Under (ii), we need to discover how rapidly these inherited changes occur. What biologists disagree about is not whether these changes occur, but whether they are continual or happen in occasional bursts (so-called *punctuated equilibrium*, advocated for instance by Stephen Jay Gould). The extreme case of change, in which an animal's lineage diverges into

separate species, seems to have little relevance for the study of economics, for the foreseeable future at least (ii above). What cannot be ignored by economists is the modification of "inherited traits" (i). What we need to discover is whether these changes have any implications for our economic models, and how significant they are. In other words, we need to ask what are inherited traits and what are explanatory factors to be accounted for in economic theory? It should be possible to begin coming up with answers to these questions soon thanks to the advance of genetic research. Without ever forgetting the contribution attributable to Man's free will, we should be able to explain how a given individual will behave, based on his or her genome together with what we know about how he or she has acted in the past (habit). When we achieve this we are starting a real scientific study of Man, not before.

For evolution to continue, there must be mechanisms to create or increase genetic variation, and mechanisms to decrease it. The mechanisms of evolution are mutation, natural selection, genetic drift, recombination, and gene flow. These can be grouped into two classes: those that decrease genetic variation and those that increase it. We can treat the physical properties of the world as constants. Human behaviour is changing. It is Man's appreciation of how the physical properties can be exploited which evolves. Then there are the other limitations as to Man's action related to his resources; the material, capital and what man is capable of doing.

What are then the fundamental building-blocks of geoeconomics? From a materialist perspective these could be material, capital, people, and actions. By acting on material mankind initiates an evolution which is proper to his species. Since mankind has chosen not to share material in common, but to control it through the institution of private property, capital is another building-block. Capital and private property are products of political law. Other man-made limitations include social rules and ethics, whether these are causes or effects.

The first question is why Man acts as he does? The answer will tell us what kind of actions to expect, which will help us foresee the direction of our evolution. When facing a decision, man participates in the process as a whole being; his interests are not only economic, but aesthetic, sexual, and humanitarian. These other interests cannot be assumed away if we are to understand the underlying causes or motives for human action and to suggest realistic answers. Or, as Veblen (1899: 10) puts it: "Changes in the material facts breed further change only through the human factor. It is in the human material that the continuity of development is to be looked for; and it is here, therefore, that the motor forces of the process of economic development must be studied if they are to be studied in action at all". This is a materialist approach, without necessarily being a Marxist one.

We appreciate the complexity of the task when we consider that we must list all the possible motives for action Man can have, and decide which motives are strongest for each set of possible actions. We would need to do this for all human beings and all their economic actions every day. And it will be difficult to decide which actions are economic and which are not, since an economic action may be caused by a non-economic action. Unless we can achieve this, which at this point seems well-nigh impossible, we will not achieve complete certainty about our evolution.

The question then becomes, how accurate an estimate can we make of a person's, a company's, or a nation's evolution, based on what we can observe? And will it be accurate enough to be worth our undertaking? We can always describe economic actions in terms of basic principles of evolutionary science and make them serve as examples without pretending that they have predictive capabilities, in much the same way as case-studies are written today: as descriptive data that resemble real life. One thing is clear: the better the knowledge we have about a subject's actions, the greater the likelihood of getting accurate predictions. It will not do to sit at a desk and draw general conclusions from small data-sets. This is a major difference from the mechanistic approach, whose advocates believe that useful conclusions can be drawn from mathematical reasoning once a number of limited variables are found and defined. The major problem here is that they are way too few to be of much value.

The natural sciences nowadays are concerned with "dynamic" relations and series. Unlike chemistry, which was able to move away from its taxonomic stage and develop into a modern science, economics ignored new developments in the study of biology and chemistry and clung instead to the idea of natural rights, with its roots in the writings of the eighteenth-century French physiocrats,

men such as Quesnay, Baudeau, Le Trosne, and Mirabeau, but also Condorcet, Gournay, and Turgot (cf. Veblen 1899: 2). These men laid the groundwork for the British development of economics, which evolved into the Lausanne school with its refinement of the mechanistic programme as applied to economics, and that in turn led to the blossoming of the new approach in the USA with the neoclassical school, first of all the Chicago school of economics, setting so the standard and the definition of what the Nobel Prize in economics should reward.

It may be that the marginalist school will fade away as the American empire declines, or because the number of remaining marginalists drops below some critical mass, rather than as a consequence of the persuasiveness of evolutionary arguments. Others would argue that the marginalist school will wither when other schools can make better predictions about economic behaviour. And these possibilities are not exclusive.

This is a constructivist perspective on social-science paradigms. Identifying the limitations of the marginalist approach, criticizing its assumptions, in a word "deconstructing" it, is only a first step, and will not be enough to make geoeconomics a real alternative. Besides, many marginalists would agree with their critics to an extent: "our approach is an over generalization of reality, but it is the only way we know to develop an economic science". If evolutionary economists want to offer an alternative, they must develop an alternative method which yields answers to real-life problems. Instead Geoeconomics can succeed where Evolutionary Economics or the evolutionary approach to Economics has failed by developing a coherent methodology.

The deconstructionist critic argues that marginalist economics typically assumes perfect competition, meaning that all parties have equal ability to compete. This assumption is refuted by what is called the *Matthew principle*, from the words of the evangelist: "for whosoever hath, to him shall be given", implying that it is easier for the rich to accumulate than the poor (Boulding 1981: 75). This is relevant to evolutionary economics since economic development is almost bound to increase inequality, particularly in its early stages (*op. cit.*: 77). The great evolutionary development of the last two hundred years has undoubtedly increased world inequality (*loc. cit.*), even though more people are enjoying a higher standard of living. These facts in themselves will put further pressure on the marginalist school.

"The activity is itself the substantial fact of the process, and the desires under whose guidance the action takes place are circumstances of temperament which determine the specific direction in which the activity will unfold itself in the given case. … The economic life history of the individual is a cumulative process of adaptation of means to ends that cumulatively change as the process goes on, both the agent and his environment being at any point the outcome of the last process. His methods of life today are enforced upon him by his habits of life carried over from yesterday and by the circumstances left as the mechanical residue of life of yesterday". (Boulding 1981: 75–7)

In mainstream economic theory these forces are assumed away. Another important assumption in marginalist economics is the maximization of gain. In reality, do we try to maximize gain, or to minimize the fear of loss? Do we compete against all alike, or less against certain groups, family, and neighbours? Marginalist economics also assumes free choice. This is questioned by a number of physicists and neurobiologists (Cf. Nicolas Gisin in Brunner, Gisin, and Scarani, 2005). Research by Angela Sirigu showed that experimental subjects formed a conscious intention to perform an action only slightly after they had in fact started to perform it. If that is true, it puts the whole of rational choice literature into question. Possibly the most convincing argument for an evolutionary approach in the social sciences was propounded by the Russian scientist Petr Kropotkin. Kropotkin (1902: vii–x) observed two aspects of human life which may help to explain behaviour. One was the extreme severity of the struggle for existence, and the great loss of life when food is scarce (the law of Mutual Struggle). The other was the fact that bitter struggle for the means of existence fails to occur among animals of the same species (the law of Mutual Aid). When food was plentiful he observed the phenomena of mutual aid and mutual support. Thus individuals who enter the market economy from a situation of mutual struggle are often more motivated to work and succeed. The concept of struggle for existence as a factor in evolution was introduced by Darwin and Wallace. The idea of the law of Mutual Aid was suggested by Kropotkin's professor at the university in St Petersburg, Karl Kessler, who was also dean of the

university. Kropotkin essentially took up Kessler's side as and proved both of them empirically. When Man has more than enough money to live he sets out to help his fellow man. This observation speaks against the assumption of constant competition, but fits well with observations of billionaires' behaviour, for instance in the USA recently, at least on the face of things. Bill Gates and Warren Beatty, like Rockefeller and Carnegie before them, have decided to give away large parts of their fortunes to charity. The problem can also be seen from a more selfish perspective: it is easy to spend a million dollars on consuming, but difficult to spend a billion dollars. There are only so many things to buy. Our needs may stay constant, but we want different things. Giving may still be an expression of pure self-interest, as when it results in greater power and an enhanced reputation.

The problem from the perspective of economic theory is that we have constructed our economic models with the individual as the reference point, acting to maximize his own self-interest at the present moment. Our models have been set up to portray economic life as a matter of seeking to maximize satisfaction of our wants, assuming that the individual knows what is best not only for himself, but indirectly also for others. All these assumptions must be questioned.

The discipline of economics has been imposing individualist assumptions, not only at the cost of thinking about society, but also at the cost of thinking for the long term. Attempts by economists like Nicholas Georgescu-Roegen to discount for future generations were rejected since it was thought – justifiably – that this would make our economic models very complicated. But perhaps even more important was that it would call into question the way we live. Georgescu-Roegen was a mathematician, so he did not object to the complexity, but it was argued that the models would be difficult to explain to a non-mathematical audience and to practising businesspeople, and difficult to apply. His ideas about discounting for future generations were seen as a political statement which broke with existing utilitarian practices. They were seen as a threat to our modern liberal democracy built on free trade. Thus, from being the favourite student and follower of Schumpeter, he soon became an outsider, and went to teach at minor universities. But in reality, of course, the accepted margin a list or neoclassical models are just as political as the models advocated by Georgescu-Roegen. But worse, and as I will show in more detail, they are leading Man's development in the wrong direction, encouraging the consumption of future generations' resources.

Some will see this as implying a rather sombre outlook on human existence, but there is another element to consider, as mentioned before: our ability to shape our own evolution. We have the ability to change our nature by altering our ideas and actions (habits). In the short run we can adopt new habits, in the long run we can expect changes through genetic modifications and mutations. That is, we are not necessarily the pre-programmed competitive machines we are sometimes made out to be, but a complex competitive organism where only one aspect is mechanical. Thus, to be considered truly human in today's world one requires a good portion of empathy and an interest in others' wellbeing. These values are already becoming part of our nature. Science has shown that we have become more human just by living closer together in cities. These findings refute the idea, held by some, that we were more social and more caring when we lived in small isolated groups. The fact that we can include empathy in our equations, however, does not mean that we must abandon evolutionary theory or our biological explanatory models. Empathy is part of nature, and can be explained as such.

Social ideas have influenced us for millennia, but they first had significant impact on our lives during the period we call the Enlightenment, in the eighteenth century, through the writings of philosophers such as Voltaire, Montesquieu, Rousseau, Hume, Kant, and Schiller. To ignore the values bequeathed to us by these men and others would mean to close our eyes to human evolution. We should not allow ourselves to be reduced to mere animals, not even when we get bored with the entire project of civilization (as sometimes seems to happen) and decide to inflict massive destruction on our own kind. Afterwards we wake up full of remorse.

This, then, must be the full perspective of any introduction to the theory of competitive advantage, if we are to address the interests and concern of all mankind. The biological perspective is important not only because it gives us scientific data (since we indisputably are a part of evolution), but also because it helps us to realize our limitations. When evolutionary theory was abandoned at the turn of the last century (economics) and again at the

end of the Second World War (political science), we swapped realism for elegant models and politically-correct opinions about the world, which have merely ended by making our studies less useful and putting our species in greater danger. Instead we need more realistic models that can incorporate the idea of change (Søilen, 2012, pp 107-114).

2.4 Theoretical foundations and academic influences for the evolutionary approach

The study of economics has two objectives; first, to develop theory to attempt to explain and predict human economic behaviour (economic theory), secondly to provide economic actors or agents with tools enabling them to conduct business and public operations more efficiently (applied fields). Of these, the second is the less problematic. The discipline of economics is continually providing economic agents with practical working tools to enhance organizational performance and efficiency. Much of this is done under the heading of management, and in close collaboration with practising businesspeople. It is the former objective which is a cause for concern. The larger methodological question is what basis we can found the discipline of economics on, to give its models predictive power. Are there any such models?

The choice of physics as a model for the development of economic theory, a methodological direction which has been particularly dominant since the Second World War, has increasingly been criticized by economists, and not only by evolutionary theorists, but by members of a variety of schools. Many of these critics see biology as an alternative methodological direction that merits investigation. Modelling economics on biology is not a novel idea; it is an attempt to revisit a number of questions which were left behind at the turn of the twentieth century. Thus the fundamental question is whether the concept of evolutionary economics was abandoned prematurely, or for good reasons.

The French philosopher and mathematician René Descartes inspired two lines of scientific thought. One was abstract, mathematical, and mechanistic; it led to significant advances in knowledge thanks to men like Leibniz and Newto[2]. The other approach explored the development of our living world with everything in it, from insects to animals. This second approach was taken forward by men like Buffon (1749), Lamarck (1809), Cuvier (1812), Wallace (1876), Darwin (1872), and Wegener (1915). In these terms we can say that evolutionary economists are trying to show where the former line of thought falls short when applied to the understanding of economic behaviour, and where the second line may be of help.

Adam Smith (1776) is often used as a reference by the neoclassical or marginalist school of economic thought. We shall argue that Smith, Thomas Malthus, and Alfred Marshall (1890) were in fact all inclined towards the evolutionary approach. If that is so, it means that the neoclassicals are not so much "classical" as "neo". The "marginalist school", which is a better term for the neoclassicals, might also be called the "mechanical approach", as compared with the evolutionary approach. The marginalist school, or marginalism, studies marginal concepts in economics: problems related to marginal cost, marginal productivity, marginal utility, the law of diminishing rates of substitution, and the law of diminishing marginal utility. Marginal calculations were a natural direction to follow once the physics paradigm had been selected.

The evolutionary model is implicit in Marshall's *Principles of Economics*, even though he did not incorporate the idea into his more formal theories. That was part of the problem for evolutionary economists at the turn of the century: they had not succeeded in producing applicable theories and models, but mostly left their analyses on the descriptive level. So when it came to building a scientific platform on which the positivist study of economics could stand it was the French economist Léon Walras who was chosen. Walras and his successors had mathematicized the Newtonian system[3]. They could offer the discipline of economics a rigorous methodology which promised to deliver elegant answers, all in the spirit of the natural sciences. The underlying assumption was that if this method had worked wonders for the natural sciences then it should do the same for the social sciences. In other words, their answers promised to be more precise than what

[2] Newton is said to have been inspired by Descartes after having read his "geometry".

[3] Their primary tool was elementary and linear algebra.

economists had delivered before; and that promise was delivered. The fact that the new models and their predictions often failed to correspond to actual economic behaviour was mostly due to their assumptions. They were nevertheless far better than nothing (a point which continues to be a main argument for the marginalists), and hence the evolutionary perspective was gradually lost from the discipline of economics (Boulding 1981: 17). However, it soon became clear that the problem was no longer one of precision, but of relevance. In other words, the answers were detailed and elegant and might have been correct, but they did not correspond to the economic realities.

Later, with Paul Samuelson – whose models essentially involved stable parameters and a dynamics based on stable differences or differential equations – economics became even more Newtonian, less Darwinian (Boulding 1981: 84). If it were not that current economic theories have still not demonstrated themselves to be the relevant predictive tools that economists had hoped for, our scientific journey would probably have ended here. But it continues.

The best philosophical foundation for economic research seemed to many to be a renewal of utilitarianism. The rehabilitation of economic theory was due to the Austrian Carl Menger – known to students today for his theory of supply and demand. Menger's essential aim was to discover the laws determining prices and to initiate discussions of supply and demand, human needs and marginal utility (Schumpeter 1992: 84). The biggest flaw in his assumptions is that Man is not entirely hedonistic, his nature is not wholly fixed and predetermined:

He is not simply a bundle of desires that are to be saturated by being placed in the path of the forces of the environment, but rather a coherent structure of propensities and habits which seeks realisation and expression in an unfolding activity (Veblen 1898: 11).

Both Karl Marx and Menger were much influenced by Ricardo. Menger gave rise to what has today become mainstream economics, but that was not his original role. Menger was at one time the outsider, at a time when Marx and the German historical school led by Gustav von Schmoller represented the consensus within the discipline of economics[4]. Critique of the "mechanistic approach" is by no means new either. In his 1875 book *The Character and Logical Method of Political Economy*, the Irish classical economist John Elliott Cairnes disputed Jevons's idea that economic truths are discoverable through mathematical reasoning (*op. cit.*: vi). What maths can do is illustrate and simplify conclusions that have been reached by other methods, or in his words:

> I have no desire to deny that it may be possible to employ geometrical diagrams or mathematical formulae for the purpose of exhibiting economic doctrines reached by other paths. (*op. cit.*: vii)

The reason why mathematics can have only limited application to economics is twofold. First, "its close affinity to the moral sciences brings it constantly into collision with moral feelings" (*op. cit.*: 3). The second is even more fundamental: maths is ultimately by nature just another language, even if of course much more precise than ordinary languages[5]. But precision by itself does not help. In the same way as we do not solve a problem by translating it into a foreign language, maths by itself cannot solve economic problems. It can only express what is already there in a simpler and clearer form. Progress using maths in the social sciences only comes through our ability to see and handle ideas more easily. The advantage is the same that came from the development of symbolic logic[6]. Both mathematics and symbolic logic are very helpful in summing up what we have already discovered, but we have to draw the inferences for ourselves.

Why has physics not provided a successful cornerstone for the social sciences? When we compare the results of the social sciences to those of the natural sciences, we find that social phenomena are more difficult to study, less tangible, less physically observable. Social systems are just too complex if we hope to pin down individual behaviour; they contain too many variables, with too many possible and often irrational outcomes, to be explained via physics and mathematics alone. More important, our mathematical approaches are not capable of treating the element of change –

[4] It was they who called Menger and his followers the "Austrian School", to distinguish them from prevailing thinking among German economists.

[5] This point is discussed clearly by Bertrand Russell (1903).

[6] Unfortunately, the success of symbolic logic has reduced interest informal logic, a subject with much greater applicability in everyday life.

what is often referred to in the scientific literature as the dynamic aspect. Newtonian and Cartesian numerical mathematics, which has dominated the study of economics for a century now, is unsuitable for the more structural and topological relationships found in evolutionary systems, except insofar as the topological relationships can be mapped and converted into numerical relations (Boulding 1981: 86).

Economic theory as developed in the twentieth century builds on a number of mechanistic assumptions. These assumptions were first criticized by Herbert Spencer in his 2 volumes book "the principles of sociology" (In Peel, 1972: 6), who held that they must be wrong because "it assumes the character of mankind to be constant". Or put differently, the problem is that "existing humanity" does not exist, but is constantly changing. Change is the law of all things, true equally for a single object as for the entire universe; all things are mutable: shells into chalk, sand into stone. "Strange would it be, if, in the midst of this universal mutation, man alone was constant, unchangeable" (op. cit.: 7). Everything is in a state of continual change or fluctuation, even the things we think of as most stable. Dynasties and private fortunes seldom last more than a few centuries; even a stone monument has a limited life. We seem to have a cognitive difficulty with change, probably because we constantly need to find order in our everyday lives. We have a strong need to live and find our balance in the present, hence we prefer to think in terms of constants rather than of fluctuation. This seems to be the way we are born. In much the same way, we do not feel the earth speeding round the sun, and that is good: if we did, we would not be able to concentrate on anything else. In other words, we seem inclined to think in the linear terms of a static, mechanistic world perspective. Likewise, we think we can have knowledge of the future, but we cannot. Instead we are continually surprised; and to top it all we are not surprised that we are constantly surprised. Within rational choice theory we might define these observations as a set of rationality errors. They mark a biological limit to our understanding of the real world, i.e. of Kant's *Ding an sich*.

From the above one might take it that we are confronted with an either/or choice between marginalist and evolutionary approaches. To the extent that these premisses are not contradictory, the method used should be whichever method has the strongest predictive power in each particular case of economic behaviour. It is not a question of either Newton and physics or Darwin and biology[7]. So far as we can tell to date, the evolutionary approach to economics is not necessarily, and not necessarily always, a replacement for neoclassical economics. For instance, it seems that it is more suited for studying economic behaviour over the long term, when the element of change becomes most significant. There are many problems, e.g. of production that are simple enough for marginalist calculations to be of value, but they seldom include problems of social complexity like international business.

To complicate the question further, in many cases marginalists and evolutionary economists will both espouse the same methods or theories. So for instance game theory is seen as a marginalist contribution by some, because it can be highly quantitative, but as an evolutionary approach by others, because it is dynamic and does not seek to maximize a given set of variables. Game theory can also be studied from either a mathematical or a non-mathematical perspective, as in the writings of von Neumann and Morgenstern (1944) on one side and Axelrod (1984) on the other (Søilen, 2012, p. 119).

2.5 On the European continent: from Buffon to Lamarck, Cuvier, and Darwin

Much attention is given to Darwin, but mechanisms of evolution had already been set out by the French naturalist Jean-Baptiste Lamarck in his classic 1809 work *Zoological Philosophy*. Lamarck began as a botanist before becoming a professor of invertebrate zoology, and he is known for having developed the first positivist theory of evolution for living organisms, but also for the influence he had on Darwin[8].

Others would want to mention Buffon as a pioneering figure. His contributions established the scientific foundation and the

[7] Paul Krugman (1996) calls neoclassical economics and evolutionary science "sister fields" (though he will not give up the maximization and equilibrium approach).

[8] Darwin learned about Lamarck through a fellow student while studying medicine at the University of Edinburgh.

scope for natural history, a subject which he himself thought always leads back to a reflection on oneself (Buffon [1749] 1984: 39)[9]. Buffon called this the first truth:

> ...that man must arrange himself in the class of animals, of which he resembles above all in what is material, but even his instincts may seem more certain than his reason, and his industries more admirable than his arts. (*op. cit.*: 45)

He reckoned that, when mankind becomes aware of the true possibilities contained in his intellect, "he could make his nature perfect, morally, as well as physically" (*op. cit.*: 247). This project, to improve mankind morally, has given rise to a whole series of normative, politically-correct studies in the social sciences, in connexion with topics such as gender, sustainable development, immigration, and human rights. Putting it differently, many university departments today, especially in our newer universities, are not so much asking what the truth is, as what it ought to be, based on what kind of human beings we want to create. This becomes a new form of positivism whereby politicians steer science in an intended direction instead of letting it be free. It may also be seen as an evolutionary approach, but we must then distinguish normative from positivist evolutionists.

Unlike other animals, man can decide the direction of his own social development. In other words, he can elevate himself. This is done by creating an ideal, not by accepting what is "natural". The problem, when we move away from the notion of natural truths, is to know which ideal is the right one to follow and who should decide which it should be. Some academics go so far as to claim that the "natural" as such does not exist. One can then argue that the sciences can never really escape from the domain of politics, since all scientific findings have political consequences, whether we are talking about Stalinism or the atom bomb. On the other hand one might argue that more politics will not make university life any more manageable, as became apparent on campuses all over the Western world in the 1960s and 1970s. It is true that we can never become fully objective in the sense that we can escape our own subjective minds, but we can develop scientific methods to reduce our biases. To argue otherwise is in a sense to be a methodological fundamentalist.

One might ask what a book about zoological philosophy has to do with the study of human behaviour. The fact is that when Lamarck wrote about living organisms in general he actually had mankind in mind, as we see in a passage such as:

In order to give a living body the ability to move without impulsion from a communicated force, to be aware of objects outside of himself, to form ideas, to compare or combine these ideas, and to produce opinions which to him are ideas of another order, in one word, to think; not only is this the biggest of all miracles which the forces of nature have attained, but, in addition, it is the proof of the employment of a considerable time, as nature has achieved nothing but gradually. (Lamarck [1809] 1994: 122)

We might see Lamarck's contribution to evolutionary economics as implicit in his writings, even though it was Herbert Spencer who first developed the idea explicitly: namely, that societies are like organisms, in that they (i) augment in mass, (ii) gain in complexity, (iii) their parts gradually acquire a mutual dependence, and (iv) society is independent of each of its component units, i.e. is not affected by individual deaths. These similarities are often referred to as the four parallelisms (Peel 1972: 57). There are other parallels to human life as well. In Chapter VII of his book Lamarck discusses the influence of different circumstances on the actions and habits of animals, and the influence of those actions and habits on their living bodies, as causes of modifications to their structure and anatomy (Peel 1972: 206). Habits become a second nature. Lamarck reminds us that for a long time we have observed the influence that different states of our organism have on our character, our inclinations, our actions, and even our ideas. But he also notes that no-one has yet recognized the influence of our actions and our habits on our structure. Our whole organism changes when our behaviour changes. These changes are so slight that we hardly notice them. They are hard to notice because they only become apparent after a very long time. To demonstrate this, look at an old photo of your grandparents. Not only the clothes are different: their facial expressions

[9] Buffon wrote his magnum opus over the years 1749 to 1788. A summary edition appeared the following year, in 1789.

are different too. The implication is that we have become our own evolutionary machines, even though the changes that we can observe are very small. What is driving this machine forward so fast is a system of technological development and economic growth. The changes in our organisms are initiated by needs. "If these new needs become constant or long lasting, the animals take on new habits, which are as constant as the needs which brought them to life" (Peel 1972: 208).

Lamarck notes that the great diversity of animal life must be understood against the background of the great range of diverse needs that appear when new species encounter one another in an ever-changing environment. Basic human needs for food, clothes, and shelter are much the same now as they were in the Stone Age, but their expression is changing because of the fact that we as human beings create new needs through a social mechanism called in everyday life "fashion" and the constant struggle for ever-higher living standards (again a form of social competition) in the shape of better and more diverse food, more clothes, and larger and more expensive houses than others have, than our neighbour has. In marketing we call this last form wants, to separate them from needs, which are more constant). We do this because we are always seeking greater comfort or because we want to impress our fellowman, out of some version of a struggle to survive but also out of habit and perhaps because we do not always know how else to express our will. This creation of new forms and degrees of need is a human characteristic, because we have the time and the resources to indulge in it.

Our needs are seemingly endless and depend only on our imagination. But the strength of some needs decreases as others are fulfilled. Man is always looking to maximize his satisfaction (the marginalist perspective). We know too that types of need change: from basic human needs to luxury and what are understood as projects for self-realization, as we ask what the meaning of life is (evolutionary perspective). The discipline of marketing, we recall, is largely about how to register and communicate these needs and wants.

As human being we act when there is a need to change something, to improve something. Or putting it differently, a person who is satisfied with everything will seldom find a motive for pursuing truly great endeavours. "In human beings and in the most perfect of animals, life cannot be conserved without irritation in the parts which must react..." (Peel 1972: 344). This phenomenon can be observed in business life too, as when the son or daughter of some great industrialist is too happy with life as it is to take on the hard work needed to develop his or her father's business. Often such individuals feel they have nothing to prove; all needs are satisfied, there is no irritation. This is noticeable when we consider the contrast between entrepreneurs and executives. The former are often less risk-averse, more adventurous and curious, while the latter are typically more concerned with stability and a steady flow of income. From a biological perspective these characteristics may be seen and understood as different types of psychological irritation, results of environment and upbringing as well as inheritance. Teaching entrepreneurship from an evolutionary perspective then becomes largely a matter of making the student aware of these irritations and maintaining them.

Darwin was also indebted intellectually to the French naturalist and zoologist Georges Cuvier. In a famous letter to Ogle in 1882, as a thank for a gift, Darwin described Linnaeus and Cuvier as his "two gods". Cuvier set out to tell the history of our planet by showing all of the changing processes it has been through, continually giving life to new species. One example is the different types of shell found in separate marine strata (Peel 1972: 150). Cuvier noted that among all the thousands of fossils he had investigated, there was never a single human bone, which led him to conclude that mankind is a relatively young species. Cuvier's endpoint is Darwin's starting point: if all those other species had a predecessor, then the same must be true for mankind. We must have evolved from other species.

Darwin begins his *Origin of Species* by drawing a difference between *natural* and *domestic* variation (Darwin [1852] 1994: 5). Even though Nature continues to bring about changes in mankind, these variations are considerably smaller than those of the domestic or self-imposed kind. This starting point has a parallel in modern evolutionary economics, with the contrast between those who focus on universal Darwinism, represented by Hodgson and Knudsen, and those who focus more on domestic variation, represented by Nelson, Winter, Cordes, and Witt (Witt 2006: 473–6). Thus it is problematic to speak about a single school of evolutionary economics. Instead what we have are different

varieties of theory with different starting points. Rather than one school, there are various schools which all share an evolutionary approach. If we accept the arguments for the evolutionary approach, it follows that all social sciences that claim to be scientific must adhere to this method. Also the study of history, which is part of the humanities, can be understood as following the methods of evolutionary theory.

Man's "self-imposed" variation has increased significantly over the past hundred years. This domestic variation is governed by complex laws:

> Variability is not actually caused by man; he only unintentionally exposes organic beings to new conditions of life, and then nature acts on the organisation and causes it to vary. (Darwin *op. cit.*: 410)

Rather, we select among the variations given to us by Nature, accumulating them in any manner desired. The same principles that act in circumstances of domestication also act in Nature (*op. cit*: 412). The individuals selected are those which find a competitive advantage in the environment within which they live and function. Finding such an advantage depends on the individual's ability to adapt. Since numerous individuals are involved and only some can succeed, competition is often fierce. These are very much the same forces that are involved in economic life.

In Nature males try to win females by being vigorous, by struggling, by acquiring special weapons, means of defence, or charm. In economic life mankind tries to gain an advantage in very similar ways. What this means is that the theory of natural selection is valid also for the discipline of economics; but, more, that it is being enhanced by the free-market economy, which in turn is the product of our philosophical ideals, such as freedom of the individual. In economic life Man struggles to satisfy human needs in very much the same way as animals struggle to survive: first by adapting, then by competing and trying to find a competitive advantage, a niche from which he can fend off competitors and sit undisturbed.

The most common form of domestic variation is indefinite variability. These are changes that last for a limited time only, like coughs or colds resulting from a chill (*op. cit.*: 6–7). Habits, inheritance, and the use or disuse of particular body parts are other reasons for variation. It is hard to distinguish clearly between individual differences and minor varieties, or between more plainly marked varieties and subspecies, or between subspecies and species (*op. cit.*: 212). These are all different degrees of variation. Nature preserves these differences with the same keenness, hoping they will result in a competitive advantage. These ideas are relevant to and would find a natural place in the discipline of economics, if economists would accept them. "Differentiation" is one of the generic strategies in Porter's model of competitive behaviour. Porter's contributions, although ignored by mainstream economists, in fact amount (probably unintentionally) to one of the more successful blueprints for a new discipline of evolutionary economics.

What we have seen so far is that a first academic grouping developing the ideas which would eventually underlie evolutionary economics was well established in France with men like Buffon, Cuvier, and Lamarck, long before Darwin. Darwin belonged to a second grouping, but we will postpone discussion of this (and take it up in conjunction with the fourth grouping), because its influence on economics occurred mainly in North America. Before looking at that we shall consider a grouping that historically came third, and was located in German-speaking Europe.

2.6 Germany and Austria: Austrian versus historical schools

Economics as defined by marginalists is the study of a particular range of social facts to do with how we produce, distribute, exchange, and consume scarce resources. As anyone who has considered the matter will have noticed, it has also a lot to do with money, or wealth. When economics and political science was a single subject, about a century ago, the study of political economy was defined as the science of wealth (Cairnes 1875: 8). The laws of this phenomenon of wealth were "simply the facts of wealth, such facts as production, exchange, price; or again, the various forms which wealth assumes in the process of distribution, such as wages, profits, rent, interest, and so forth" (*op. cit.*: 18–19). This definition, however, was inappropriate for the new group of economists who wanted to turn economics into a true science after the model of the natural sciences. The new definition needed to be value-neutral, and could not include factors such as power or the natural status that results from having different starting points in life. The assumption had to be that all human beings in principle have the same possibilities. The new,

more specialized science of economics, which was to replace political economy, was to be "positive" rather than "hypothetical" like its predecessor; and the tools which were to achieve that was the discipline of mathematics and empirical research. This soon created an academic and scientific culture based on small, narrowly-defined empirical projects, such as we today find in most highly-regarded economics and management journals.

This would not be a problem, if it were not for the fact that, well over a century later, we have not made the advances we hoped for in terms of theory building. We are however wiser by many experiences. For one thing, we have refuted Marxism, and we have also tested the limits of the mathematical method. In the words of the Japanese economist Michio Morishima, in his Introduction to the posthumous book by Schumpeter and Takata[10]:

> Since the second world war economics has become mathematicised to what could be deemed an excessive degree (…) economics has become isolated; the isolation has in its turn promoted mathematical inbreeding. (Schumpeter and Takata 1998: vii)

The reasons why mathematics has prevailed ever since as the dominant paradigm must be sought elsewhere. Some critics argue that the study of economics has become a political tool, a means of defending free trade through the use and abuse of statistics. And the heavy use of mathematics in economics helps keep its critics at bay, rather as Latin preserved the Catholic Church from its critics in the days of Erasmus of Rotterdam. Today a whole class of bureaucrats and experts are putting forward figures and calculations that only a minority can understand and few can question.

Specialization within the discipline of economics, furthermore, has not always benefited the subject. After all, human beings do not only perform economic actions. A person also performs religious, political, and social actions, and, more importantly, these various actions have direct influence on each other. Thus, a practising Muslim may avoid earning interest. This more complex range of human actions as the starting point for the German sociologist Niklas Luhmann. Luhmann (1985) saw human behaviour as a set of distinct and interacting social systems. Accordingly his framework is well suited for an evolutionary approach to the social sciences, although to date his theories have chiefly inspired numerous interdisciplinary and multidisciplinary studies.

When economics parted company with the disciplines of history, politics, and social investigation in general, its models and academic forms became simpler and more refined, but the discipline did not become better at predicting future events:

The role of politics and sociological elements in explaining economic phenomena has gradually diminished, until finally pure economics (neo-classical school) has come to be regarded as the most important tool for elucidating economic problems. (Schumpeter and Takata 1998: ix)

This is the same neo-classical school which Schumpeter once helped to found in Europe based on the ideas of Eugen von Böhm-Bawerk[11]. In fact, initially Schumpeter's work was seen as too mathematical and too theoretical for most English and American economists. It was not until after Schumpeter had gained a secure academic position in the USA that he began changing his views, and drifted away from the use of maths towards the evolutionary approach, just as Boulding did after him. Unfortunately for us, this came rather late in his life. Schumpeter was never able to complete his ideas on evolutionary economics. The closest he got to describing his method was in the outline at the end of his *History of Economic Analysis*, a book he never finished. Today Schumpeter's contributions to economics are mostly associated with the study of entrepreneurship, an area which was to be taken forward by a fellow Austrian emigré, Peter Drucker. Unlike Schumpeter, Drucker never made any real attempts to set his theories within a broader methodological perspective so he was mostly ignored by fellow academics. His fame stems almost entirely from the fact that CEOs and managers found his books relevant. The same can only be said for a few economists who have won the Nobel prize.

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[10] This book was a response to Böhm-Bawerk's 1914 book Macht oder ökonomisches Gesetz ("Power or Economic Law"). Takata and Schumpeter met for discussions in 1931. Whereas Takata wanted to incorporate power into the study of economics, Schumpeter wanted to leave that aspect to the discipline of sociology

[11] Böhm-Bawerk in turn drew his inspiration largely from Carl Menger.

Schumpeter looked to a range of different disciplines for inspiration. This is confirmed not only by his wide general reading, but by his affiliation and sympathy with the Kiel school of economics and by his academic training in the Austrian school. In his theory of economic development, Schumpeter attempts to offer a theory of economic change in purely economic terms. In the Japanese edition of the book he says that his aim is the same as that of Marx's economic teaching; he places his concept of economic evolution in a Hegelian setting: "He concentrated his analytical powers on the task of showing how the economic process, changing itself by virtue of its own inherent logic, is incessantly changing the social framework – the whole of society in fact" (Schumpeter 1952: ix). What distinguished Marx from his contemporaries and predecessors in economics was a vision of economic evolution as a distinct process generated by the economic system itself (*loc. cit.*) and a deterministic certainty about future economic events and their consequences[12].

Although trained in the Austrian school, Schumpeter's convictions lay elsewhere, influenced not so much by Eugen von Böhm-Bawerk as by adherents of the historical school – Marxists like Hilferding and Kautsky, but above all evolutionary economists of the Kiel school such as Lowe and Lederer, with their focus on "structural" theories of growth and business cycles. Together with the Kiel-school economists, many of whom ended up at the New School in New York, Schumpeter represents the third academic grouping in evolutionary economics. However, when they moved to the USA it was the physics paradigm and their mathematical contributions to the marginalist school that were wanted, not their evolutionary ideas. The young continent also approved of the laissez-faire doctrines of the Austrian school, the very same doctrines which has just turned the Western world close to bankrupt. The evolutionary ideas were abandoned with much of the rest of the intellectual baggage European emigrés carried with them from a Nazi-infested Europe. American evolutionary thought was soon a thing of the past, associated with men like Veblen and later with isolated mavericks like Boulding and Georgescu-Roegen, who were treated as unsuitable to teach at the great universities. Those who conformed to the new methodological plan for the discipline of economics could advance in their careers; those who did not were at best ignored. The new paradigm was established.

2.7 The USA: from Veblen to Boulding via Spencer

Many economists had been inspired by Herbert Spencer's introduction of the evolutionary approach into the social sciences. An American economist of Norwegian extraction, Thorstein Veblen, is often seen as the first real evolutionaryeconomist on that continent, but also as the last of the classical evolutionists (Peel 1972: xlvii). In his famous 1898 article "Why is economics not an evolutionary science", Veblen wrote that economics was "helplessly behind the times". Biology as a science was on its march forward. The social sciences needed to follow. It is likely that Veblen had read and was influenced by the British economist Alfred Marshall, fifteen years his senior, who in 1890 pointed out that economists had much to learn from the recent history of biology when developing their science. "Darwin's profound discussion of the question [in *The Origin of Species*] throws a strong light on the difficulties before us", wrote Marshall (1890: bk 1, ii). He felt strongly that it was biology, rather than Newtonian mechanics, which should be the model for the study of economics.

> It is commonly thought that evolutionary economics is an attempt by economists to adapt economics to the principles of the natural sciences. In fact one might well argue that it was the other way round: Darwin is said to have got the idea of natural selection by reading Malthus. (Boulding 1981: 84)

When we look more closely at the history of economics we find that most useful progress has been achieved within the applied fields, such as the study of marketing or management, which are more concerned with real-life situations and applications than with theory building. Yet it is the theoretical advances which have been rewarded, for instance with the Nobel Prize. An important question is how far the discipline of economics

[12] The Foreword to Schumpeter's book by his widow Elisabeth Boody explains the essence of his philosophy even better.

really needs theory-building in order to justify its existence. Many business schools, especially graduate schools and master's programmes, are perfectly satisfied with teaching students how to do things (know-how), developing their skills and giving them "tools". This matches Heidegger's notion of the future of the social sciences and the humanities as *Steuermannskunde* or *Kybernetik* (etymologically, "the art of the helmsman"), focusing on the ability to solve practical problems. These ideas have been shaping business schools for decades now.

There is a another point here too, as mentioned before. There seems to be no real correlation between economic theory-building and economic success among industrial nations. Thus countries like Germany, South Korea, Japan and China are highly competitive nations economically, but have contributed little to the development of modern economic theory, particularly as compared to English-speaking countries. The latter have lost much of their industry over the last few decades while those theories were being created. Their economies have shifted from a society of craftsmen and industrial production to one of knowledge production and services, a shift which has been very much supported by their own economic theories. Both the USA and Britain, which are producing most of these theories, are now suffering from general economic decline.

We talk of "economic theory", but mean very different things. How often does phenomenon *A* (cause) have to lead to phenomenon *B* (effect) for the relationship to be called a theory? Some talk of theory if they have done a small empirical experiment which gives answers that go in one direction. Others avoid the term altogether. There is less confusion about the term "economic law": few economists today would claim to have discovered any economic laws[13]. R. F. Harrod, one of the founders of the Oxford Economics Research Group, may have come closest when he put forward a law of evolutionary economic behaviour summarized as "Nothing for nothing" (Perroux 1960: 8), but such common-sense theories are of little value. The evolutionary perspective on human behaviour leaves little place for a formulation of natural law in terms of definite normality. Nor does it leave room for that other question of normality, namely what should be the end of the developmental process under discussion (Veblen 1899: 12). The best way for the evolutionary approach to demonstrate its value is to produce theories with greater predictive success than those produced by alternative schools of thought, or else to reject the idea of theories in the social sciences altogether.

> One of the real challenges to evolutionary economics is how to define and measure change. Early evolutionists discovered that the differences in traits and species increased with geographical distance, and they sought to classify change into (i) change of stations, and (ii) change of habit. A habitat is a special environmental area inhabited by a particular species or organism. Similar animals may be found at many stations, but only within one habitat (Wallace 1876: 4).

There are a number of reasons why comparable research projects are troublesome in economics. First there is the globalization argument: economic agents travel extensively and live all over the world. They cannot be defined as belonging to one geographical location. Secondly, any research that points to differences in economic performance between human groups is likely to meet serious criticism. One of the advantages of marginalist theory is that it is politically correct, since it complies with human-rights ideals and assumes that all men have the same economic abilities and possibilities initially, regardless of upbringing, cultural background, or genetics. This in turn is what makes differing economic outcomes fair, from the marginalist's point of view. We know this is not so: for instance, children born in wealthy families have a better than average chance of economic success themselves, not least because they can expect to inherit their parents' fortune. In that sense it could be argued that neoclassical economics is a convenient tool for the rich to defend their property.

Veblen's definition of evolutionary economics does not ignore cultural differences, nor does it ignore the notion of power:

> [evolutionary economics is] the theory of a process of cultural growth as determined by the economic interest, a theory of a cumulative sequence of economic

[13] An economic law may be defined as a case where a phenomenon A invariably leads to a phenomenon B.

> institutions stated in terms of the process itself. (Veblen 1899: 13)
>
> ... where man's knowledge of facts may be formulated in terms of personality, habit, propensity/natural tendency and will power. (*op. cit.*: 5)

This is the culturalist position, so heavily criticized by the academic establishment today for its political incorrectness. Men living under different climatic conditions will tend to behave differently. They have simply developed different habits. For instance, in many places on earth the climate is simply too hot to engage in much economic activity. We see this in large parts of sub-Saharan Africa, the Arab world, and South-East Asia. We also behave differently depending on our geographical location. Thus, island people tend to keep to themselves, or make occasional outbursts into the world, but are also inclined to engage in large-scale export efforts to stay competitive. Among competitive Island economics there is always the realization that if they keep to themselves they will decline, even if that is just as true for landlocked countries. We see this not only with Japan, but also with Britain, Sweden (half-island), Taiwan, South Korea (half-island), and Singapore. Our cultures have imprinted their particular traits on us, which again helps to explain our behaviour, including our economic behaviour. This does not mean that individuals cannot break out of these patterns, or that cultures do not change. They do. The culturalist position does not have to be a dogmatic one. Culturalists are also attacked for embracing the scenario summarized as survival of the fittest, implying that some individuals survive at the expense of others. However, it has been suggested that a better phrase would be survival of the fitting, since success is not restricted to a single individual or species, and survival seems to be more a question of finding a niche than of forcing others out (Boulding 1981: 18). In the wild, animals who are not adapted, who have not found some sort of advantage, disappear. Darwin called that the survival of the fittest, a phrase he borrowed from the English philosopher Herbert Spencer (rather than *vice versa*). Again, objections to the doctrine have a lot to do with ways in which it has been exaggerated. It does not necessarily mean aggressive behaviour. We do not want to live in a society where only the fittest survive; that would be inhumane. Instead we have constructed a political and social system in which those who are "unfit for survival" receive some form of help. However, if those who asked for help formed the majority of citizens, the nation would lose its competitive advantage. So the theory does apply and the effects of this phenomenon can be observed in large part of the Western world today. The consequences are economic and social distress. What corresponds to extinction in business life is bankruptcy. Bankruptcy does not mean that the bankrupt actually disappears, it merely simulates disappearance by excluding agents who perform poorly from conducting further business for a period of years. Furthermore, the precise consequences of bankruptcy vary, depending on the social-welfare system in place in a particular country. Thus the metaphor of survival of the fittest does not have the same consequences in modern society as it has in Nature, and the cruelty involved is often exaggerated but on the whole the theory holds.

Spencer, who was greatly influenced by Adam Smith and Lamarck, is one of the more neglected among classical sociologists. The reasons for this neglect are many: in part political, in part due to his outspoken, consequent denial of historic analysis as a method to gain scientific knowledge, and, no doubt, in part due to his notoriously blunt statements. His ideas were frequently utopian. Hence Spencer remained interesting for a long time as a literary figure but (like Marx and Comte) quickly became unacceptable as a scientist. His Lamarckian biology was dismissed in Europe, partly because it was bad timing to present a value-free social science in a Western world marked by high unemployment and great social misery. He was misunderstood, as when he is associated with social Darwinism and *laissez-faire* politics. In reality he argued for increased State intervention. Spencer survived in the USA by virtue of ideas such as rejection of absolute standards of truth and elevation of practice over theory. In the 1920s and 1930s these ideas were taken up by Dewey. Two features were never abandoned in the US: (i) economics-based models of social structure, and (ii) methodological individualism (Peel 1972: xl). He also inspired a whole new school of American anthropologists, including L. H. White, J. H. Steward, Marshall Sahlins, and Elman Service, who saw the task of anthropology as being to trace the path by which cultures "evolve" (*loc. cit.*). This

approach was inspired by the long-established German discipline of *Völkerkunde*. A similar approach is familiar in linguistics – as when we can trace the Indo-European languages back to Sanskrit – and we see something similar when scholars trace the development of mythologies (Cox 1870). The movements of populations suggested by such investigations are being confirmed today by genetic research. If sociology is not to be value-free, it must have a moral basis. This moral stance was widely accepted in sociology following Spencer, but has since been largely forgotten. As Spencer saw it, the chief role of evolutionary sociology was to reconcile Man to the inexorable processes of Nature. He wanted to describe a theory of social change. Economists who have worked to unite economics and sociology along these lines have included Schumpeter, Vilfredo Pareto, and Ferdinand Tönnies, a German sociologist who taught economics at Kiel University (Schumpeter and Takata 1998: xxxiii). Tönnies is perhaps best known for having reintroduced Thomas Hobbes into the social sciences. This strengthened the evolutionary approach to economics. The notion of power is vital in understanding human behaviour because we live in social, hierarchical systems. Had Tönnies not died in 1936 he would probably have had to flee Germany, as his children and so many of his colleagues did because of the rise of Nazism. The Nazis made a short process of anyone criticizing their movement. Tönnies was considered a social democrat, but this was also the fate of many conservative German intellectuals like the Manns and Carl Schmitt.Daniel Defoe's Robinson Crusoe represents life at the opposite extreme to the world of economics as portrayed by Hobbes. Economic marginalists reason very much as if Man were created as an isolated individual in Nature, like Robinson Crusoe on his island, and Crusoe is therefore a favourite trope among marginalist economists. Their critics argue that we do not live like Crusoe, so that any such comparison is a gross oversimplification bound to give false answers. Evolutionary economists argue that (whether we like it or not) the world is more Hobbesian than we care to admit, and that the task of a science is to describe reality.

For significant new discoveries in the study of Man and human behaviour, we are reliant on future work by psychologists, biologists, and neuropsychologists to show us how we reason and why. This is an argument in favour of more interdisciplinary research in economics. A sensitive specialist pursuing his investigations in any field, Boulding reminds us (1950: viii), finds himself on the frontiers of other disciplines. That was also very much a watchword in Boulding's own research. How can you study economics in mediaeval times without considering religion, and how can you study economics during the Industrial Revolution without considering the class distinctions of that period, Boulding asked (Perroux 1960). In the same way, how can you study the economics of today without considering the phenomenon of globalization – probably the greatest accelerator of change ever known on this planet, leaving aside natural catastrophes.

Every age, every nation, every climate exhibits a modified form of humanity (Peel 1972: 7). This universal law of physical modification is also the law of mental modification (*op. cit.*: 9). According to Spencer all imperfection is unfitness. Progress, therefore, is not an accident, but a necessity (*op. cit.*: 13). Rather than civilization being artificial, it is a part of Nature. Spencer thought that this imperfection would end and Man would attain some sort of completeness. Thus according to Spencer the law of evolution may be expressed as a change from a less coherent homogeneity to a more coherent heterogeneity. There is and can only be one evolution, as all the different existences are component parts of the same cosmos. Why should mankind be different, why should he follow different laws from all other living organisms? That is the question that every social scientist must ask himself. Furthermore, towards what form is Man evolving? For Peel the ultimate man is seen as one whose private requirements coincide with the public ones (*op. cit.*: 26). Considered over a large time interval, we find that Man's character is growing more civilized, less violent, shaping into what we might call "social man". The further we come away from violence, the more successfull we seem to evolve. This development in our character can be seen for instance in styles of leadership over recent centuries – a shift from the boss to the leader, who gives fewer orders and instead aims to be a role model through his actions; from the military commander type associated with the early days of industrialization to the team player of today. This is also reflected in the terms "social intelligence" and "emotional intelligence", which have become a focus today. We also

speak of "people skills", but seem to mean the same thing. True, others say that Man is becoming ever more selfish, a result of his striving for ever more independence. But that may represent more a backlash than an actual long-term trend. The evolution of our character can rather be plotted as a rising curve, so far as present data indicate at least.

Taking human actions as a starting point for the human sciences, instead of theories or ideas, has given us some of the most useful techniques or methods available in the social sciences today, including game theory and rational choice theory. But these contributions are not necessarily marginalist or even neoclassical. We shall rather argue that game theory relates more closely to informal and formal logic than to mathematics. In fact it is really a non-marginalist approach, with no fixed number of variables to be optimized. And yet arguably game theory, invented by the German economist Oscar Morgenstern and the Hungarian-born mathematician John von Neumann, is one of the better analytical tools available to describe and analyse social dynamic realities. It is also interdisciplinary, meaning that it is equally applicable in any of the social sciences, and in the humanities.

So long as scarcity is a major problem, the economic forces that constrain us will be very real. On the island of Utopia there is no need for the discipline of economics, because everything that people need is available in plenty, and people do not ask for more than they need. In Thomas More's book the character Peter Giles believes that:

Till property is taken away there can be no equitable or just distribution of things, nor can the world be happily governed: for as long as that is maintained, the greatest and the far best part of mankind will still be oppressed with a load of cares and anxieties.

More draws this conclusion from his experience of early sixteenth-century England, ruled by Henry VIII, where "all things will fall to the share of the worst men" and where "all things are divided among the few". From a national perspective this situation improved dramatically with industrialization, which allowed a large proportion of the poor to rise into the middle class, like in today's China. From an international perspective the problem is more complicated, since what we have been doing is largely exporting low-wage jobs to other, less developed countries: as the saying goes, out of sight out of mind. The possibility of continual improvement in standards of living is limited, since it is those who already have money who have the best chance of making more. That is a consequence of the efficiency of financial markets, which has brought us to a point where the free-market system is once again being criticized as unfair because it is to the advantage of those who are already ahead. The result of these mechanisms in the Western world has been a poorer middle class.

More's Utopia is a land where leisure is to be used for reading books, playing chess, and engaging in gardening. But the problem of who will do the work if everyone lives a life of ease is solved by slavery; as More says, "All the uneasy and sordid services about the halls are performed by their slaves...". In modern times the work these slaves contribute with can be compared to our taxes. To take a current example, a universal or citizen's salary to replace unemployment benefits is mere relabeling and will not change the problem as to where the wealth will come from in a world free of slaves.

Man is always a child of his time, and the social scientist can seldom ignore the values of his time. Being a successful social scientist is to a large extent a question of writing in conformity with the values of one's time. Those who do not do that are choosing to live the hard way. One economist who places in that category was Nicholas Georgescu-Roegen, Schumpeter's favourite student. Few if any have done more to advance the evolutionary approach in the study of Man.

2.8 Georgescu-Roegen : the right man at the wrong time

Bioeconomic analysis sees new technology as a set of Man's most sophisticated *exosomatic organs*. A stick picked up in the woods as a club meant a stronger arm, one of the earliest examples of an exosomatic organ. According to Georgescu-Roegen (1980: viii), Man's exosomatic evolution has brought with it three "predicaments", or unpleasant situations from which escape seems difficult. The first is conflict between various human communities or cultures. Thus *Homo indicus* is different from *Homo americanus*, in that the former travels more by foot and the latter by car. The predicament may also reflect differences in taste. The second predicament is the conflict between the two social classes of governors and governed. The third predicament is ranges of technically-sophisticated equipment, such as PCs, the Internet, and mobile phones today.

This equipment is continually changing, and creating problems about haves and have-nots. We see this today in the area of e-commerce, where certain countries including Japan, South Korea, the USA, and Sweden are ahead of the field and the companies are becoming bigger and fewer.

Georgescu-Roegen's bioeconomics builds on one major principle: mankind must not discount the future. By this he means that the price of a resource should be determined by all potential buyers, including those who are not yet born. "And since future generations cannot be present now, we should bid in their place" (*op. cit.*: xii). This problem is highly relevant today, since past generations have raised their standard of living by imposing debt burdens on future generations. Thus, we may say that our current degradation of the environmental and the living conditions on the planet is in part a result of our economic theories.

Georgescu-Roegen begins from the assumption that mankind is going to be around for a long time: "the dinosaurs lasted hundred and twenty millions years"[14]. If this assumption is correct, or so long as we do not know how long mankind will exist, we should manage our natural resources with care. Marginalist economic theory typically models economic problems as if each generation were the last. When economies are put under heavy strain, the chances of war will increase. Georgescu-Roegen (*op. cit.*: xi) reminds us that "all major wars have had no main objectives other than the possession or the control of natural resources". We have seen recent proofs of this whether it is in the form of America's war on Iraq (geopolitical logic) or with Chinese investments in Africa (geoeconomic logic). The difficulty with the discounting problem is that we have no way of knowing what resources future generations will need and how long they should be discounted for and, we could add, at what rate. To help resolve this question the aim of Georgescu-Roegen is:

a world organization whose role be to decide the acceptable rhythm of depletion of mineral resources and their distribution among all nations according to a rough criterion of hierarchical needs. (*op. cit.*: xii)

This is the idea of the World State, a project which will become relevant in the 22nd century at the earliest. It is in turn largely a question of human political and social evolution.

Georgescu-Roegen follows Schumpeter's idea that the evolutionary approach is not an economic "theory" in the marginalist sense of the word, but must be more of an "analysis". His first book (Georgescu-Roegen 1966), in which he outlines his thoughts on evolutionary economics, is entitled *Analytical Economics*:

> … theoretical science is logically ordered knowledge. A mere catalogue of facts, as we say now a day, is no more science than the materials in a lumber yard are a house. (p. 15)

And:

> ... if the cornerstone of science is the dogma that all phenomena are governed by mechanical laws, science has to admit that life reversal is feasible. (p. 83)

Instead Georgescu-Roegen suggests that economic analysis should follow the formula set by Cuvier: *nommer, classer, décrire* (name, classify, describe) – what is called a taxonomic process, or filing system. This same search for a universal principle of classification once led to the birth of formal logic. Theoretical science is a logically ordered description. Marginalist economic theory is an attempt to show that mathematics can be the logic for the study of economic phenomena. But, whereas the purpose of economics is to understand economic facts, the purpose of pure science is not prediction, but knowledge for its own sake (Georgescu-Roegen 1971: 37). This is the excuse science gives for not always producing realistic findings. Georgescu-Roegen rejects all accurate predictions in the social sciences: "No analytical device can allow you to describe the course of your future actions" (*op. cit.*: 335). He instead agrees with the Hegelian approach we find in Schumpeter: "If economics is to be a science not only of 'observable' quantities, but also of man, it must rely extensively on dialectical reasoning" (*op. cit.*: 337). Dialectical reasoning cannot be exact, but can be largely correct. It implies that we attempt to express ourselves in numbers, weights, or some other measure. "Hence careful reasoning and analysis should be the backbone of economics", as Marshall suggested" (*ibid.*). Dialectical reasoning opened the way of literary economics, where both sides of each argument

[14] G-R wrote this some years ago, 165-185 million years is probably a closer number today

are weighed up. That is also very much the tradition of critical theory applied in geoeconomics.

In his next major book Georgescu-Roegen discussed the law of entropy, based on ideas of the German physicist Rudolf Clausius, who held that change undergone by matter and energy must be qualitative change (197: 1). Georgescu-Roegen argued that an economy is a biological process governed by the law of entropy, not by the laws of mechanics. The book is a critique o*f Homo economicus*, in which Georgescu-Roegen takes up the objection that economics as a science strips Man's behaviour of every cultural propensity, which is to say that Man is treated as acting mechanically (*ibid*.). Georgescu-Roegen's thermodynamic approach to economics is based on Carnot's work on entropy from 1865 and Boltzmann's from the 1870s:

A cultural propensity may be a factor in economic growth, as when cultural activities in countries such as France, Spain, or Italy encourage the growth of tourism. It might have been similar observations that led Spengler to the thesis that economic growth depends upon the degree of compatibility between the economic components of the respective culture (*op. cit*.: 362).

> Evolution appears so mysterious to us only because man is denied the power of observing other planets being born, evolving, and dying away. And it is because of this denial that no social scientist can possibly predict through what kinds of social organizations mankind will pass in its future. (*op. cit*.: 15)

> Had economics recognized the entropic nature of the economic process, it might have been able to warn its co-workers – the technological sciences – that "bigger and better" washing machines, automobiles, and super jets must lead to "bigger and better" pollution. (*op. cit*.: 19)

Economic theorists like Robert Solow, Joseph Stiglitz, and Paul Samuelson have praised Georgescu-Roegen's mathematical contribution, but none of them have shown any interest in his ideas on evolutionary economics and bioeconomics. None could have failed to notice that Georgescu-Roegen was Schumpeter's favourite student at the Harvard Graduate Seminar. So it was impossible to ignore him; but his thoughts deviated too much from existing theory.

Herman Daly (1999) has asked how long neoclassical economists can go on ignoring Georgescu-Roegen's contributions. For instance, what will future generations say about the fact that we are systematically denuding the planet of oil and gas, resources which may be needed for more important tasks in the future when alternatives are not available? Faced with the threat of global warming, environmental deterioration, and now the financial crisis, Georgescu-Roegen's economics are long overdue for a review.

Solow and the marginalists assume that natural resources can always be substituted. His well-known work in growth theory is based on an aggregate production function in which resources do not appear at all: it takes production to be a function solely of capital and labour (Daly 1999: 15). This is like expressing improved cuisine as a function of a cook and a kitchen, forgetting the ingredients. The Solow–Stiglitz variant of the Cobb–Douglas function including resources is expressed as:

$$Q = K^{a1} R^{a2} L^{a3}$$

– where Q is output, K is stock of capital, R is the flow of natural resources used in production, L is the labour supply, $a1+a2+a3=1$, and $a>0$. In reality, increase in capital implies depletion of resources; and if $K \rightarrow \infty$, then R will rapidly be exhausted by the production of capital (Daly 1999: 17). Georgescu-Roegen calls this a "conjuring trick". Land and resources have been eliminated, on the argument that capital is a near-perfect substitute. If so, then resources could equally be substituted for capital (reverse substitution). To do that would run counter to the whole direction of neoclassical theory, which is to deny any important role to Nature (*op. cit*.: 18).

None of Georgescu-Roegen's ideas on the biophysical foundations of economics were ever canonized by inclusion in Samuelson's famous textbook. There has been no interest in Georgescu-Roegen's ideas at MIT, the American Economic Association paid little attention to his death, and hardly a trace of his influence is left in the economics department of Vanderbilt University, where he taught for twenty years (*op. cit*.: 13). One reason may be that few economists understood his ideas with their emphasis on advanced mathematics,

physics, and biology[15]. He may also have been too interdisciplinary for his own time. A further reason may be that he is said not to have been easy to work with. A deeper explanation would be that if one accepted Georgescu-Roegen's ideas, the consequence would be a complete paradigm shift in economics. The political and economic implications of accepting his theories would amount to nothing less than a revolution in the way we organize our lives, and it is perhaps one we are not yet ready to undertake.

Georgescu-Roegen's own explanation of why his ideas were never accepted was in terms of a Romanian proverb: "In the house of the condemned one must not mention the executioner". After arguing his case for decades without ever getting much response, Georgescu-Roegen gave up on standard economics and resigned from the American Economic Association (*op. cit.*: 15). In his own words "I was a darling of the mathematical economists as long as I kept contributing pieces on mathematical economics" (Georgescu-Roegen 1992: 156).

Schumpeter too had come to the United States as a two-edged sword, like Georgescu-Roegen later. Influenced by Léon Walras and W.S. Jevons, economics departments in the USA, especially after the Second World War, decided to base development of their discipline on the mechanical perspective. To many critics this system quickly came to look more like a church than a community of independent thinkers. However, despite enthusiastic espousal of the mechanical approach in the USA, one American economist was never willing to abandon Georgescu-Roegen's ideas: namely, Kenneth Boulding, a strong independent thinker among American economists.

2.9 Parallels between Boulding and Luhmann: cybernetics and scial systems

In his 1968 book *Beyond Economics*, Boulding identifies some of the methodological limitations of economic theory:

(i) the *ceteris paribus* assumption, associated with Marshall, involves isolating a problem by assuming that all other variables are held constant. The problem with this assumption, Boulding argued, is that it leads to results that are true only in a very limited domain, and there is a danger of over generalization.

(ii) the method of simultaneous equations, associated with Walras and the Lausanne School, based on the proposition that any system of variables, each of which can be written as a function of all the others, yields *n* of these equations that are consistent with one another (Boulding 1968: 10). This method often gives results that are mathematically correct but economically meaningless, such as negative prices.

(iii) the study of macroeconomics, as associated with Keynes[16], consists essentially in using wage aggregates of economic variables as the basic parameter of simplified models, the exact properties of which can be fairly easily determined. The Problem lie in the generalizations within these models, such as the "level of employment", and the "price level". Furthermore, society has not become classless[17]. Economic theory assumes that all individuals have the same starting point, the same possibilities. Only then can it be fair. This ignores such factors as (family) contacts, culture, and nationality, relevant to the competition to win business contracts, and parental income, relevant to receiving a university education. It also ignores the phenomenon of contracts won through bribery, which means that much business conducted outside the Western world must be excluded from the theory. Perhaps the problem is that economics in fact remains a moral science, as in the old Cambridge Tripos, "in spite of all attempts to dehumanize the science of Man", Boulding concludes (1968: 12).

[15] This is an odd trait among many fellow economists, they argue for mathematics, by which they imply the right amount of mathematics, enough to separate them from academics studying the humanities. But, when someone with a physics background comes along, it becomes evident that they know too little mathematics, and then the physicists end up in the wrong.

[16] Macroeconomics began to emerge in the models of Irving Fisher and Knut Wicksell, but culminated in the work of John Maynard Keynes.

[17] The essence of the term "class" as used today has to do with income differences. The Marxist proletarian–bourgeois–capitalist distinction has become less relevant today, in the West at least. Instead we have other, newer class divisions, as in "new class theory".

Boulding takes as his starting point the ideas of a theory of change outlined by Schumpeter. As any pioneering scientist would necessarily do, he begins by asking what types of change occur in economics; and he concludes that there are two types: long-term and short-term. The biggest form of social change would be called a revolution. Revolution can be understood as a social reaction to a situation where there has been no hope of change for too long.

Boulding's social-dynamics perspective is inspired by Georgescu-Roegen's ideas. If economics is to be a science, it must use dialectical reasoning. But whereas Georgescu-Roegen thinks this relationship must be "extensive", Boulding holds it to be "relatively insignificant" (Boulding 1981: 20).

Boulding argues that there are two types of process at work in human history: one dialectical, involving conflict and the victory of one group over another; and one non-dialectical – incidental, cumulative, evolutionary, and continuous (Boulding 1970: v). Of these two he sees the dialectical process as merely waves and turbulence on the great historical tides of evolution and development. One of the problems with the dialectical process is that it focuses on conflict likely to lead to even greater conflict (*op. cit.*: 52). The process of biological evolution seems on the whole to be non-dialectical (*op. cit.*: 55). Boulding believes in the historical method, but whereas Boulding thinks that the future can in part be understood by studying history, Georgescu-Roegen disavows any predictions about the future (Georgescu-Roegen 1971: 335)[18]. Boulding himself acknowledges that the ability to predict is less robust than the ability to understand.

Boulding defines four processes through which we suppose that we might be able to gain knowledge of the future. These are: (i) random processes, such as throwing dice. For this method, recorded information is irrelevant. (ii) Deterministic mechanical processes, as used for instance when estimating future population figures; (iii) theological processes, in which movement through time is guided by some image or information-structure of the agents in the system at the outset; and (iv) the evolutionary process. Boulding (1970: 19) chooses to see human history largely as an extension of the evolutionary process from the biological into the social domain (an idea which goes back at least to Spencer). These methods are relevant for the discipline of intelligence studies within such areas as early warning, signal analysis, scenario analysis and just general prediction.

According to Boulding (1981: 11) the evolutionary perspective presupposes that at any one point in time and space there will be an ecosystem, and with a given set of parameters this will move to an equilibrium where the rate of growth of all populations within it will be zero. This seems to conflict with his later critique of the equilibrium approach[19]. However it is possible that Boulding, like Schumpeter before him, changed his mind. Boulding also criticized neoclassical economics for not having incorporated time and space as factors in their theories, even though obviously "all productive processes involve space and a fine vine will turn into vinegar" (Boulding 1970: 19).

"Bioevolution is characterized by constant ecological interaction, which is selection, under conditions of constant change of parameters, which is mutation" (Boulding 1981: 12). Put differently, mutation takes place in the egg, selection in the chicken (*op. cit.*: 65). The parametric changes can be physical, such as a change of climate, but the basic source of change is genetic mutation, that is change in the DNA sequence. Evolution is not a deterministic system, like celestial mechanics, because it is not an equilibrium system. It involves inherently unpredictable changes of parameters because of the long-run importance of improbable events (*op. cit.*: 69). As economic life is a subset of human activity, we should expect it to follow the general principles of evolution (*op. cit.*: 16). The principle of ecological interaction is the ultimate foundation of the evolutionary perspective (*op. cit.*: 11).

Like Georgescu-Roegen, Boulding equates human history with the evolution of artefacts. Human artefacts are of three kinds: (i) "things", material objects; (ii) organizations; and (iii) learning processes (*op. cit.*: 15). This is very much the Materialist perspective to economics. Material artefacts have developed from the flint arrowhead to the space shuttle; organizations have developed from the clan to the corporation; and people's minds have

[18] No analytical device can enable you to describe the course of your future actions.

[19] But in Tang et al. (1976) Boulding says that "equilibrium is a fiction of the human imagination and is really unknown in the real world" (p. 3).

developed alongside these. Exchange is the mechanism through which this process is carried on. Exchange, which contains an element of reciprocity, makes the parties involved better off, hence more fit for competition. Labour hours and price are two examples, or forms, of exchange. Price may be seen as the expression of the balance or equilibrium of the social system of needs. Thus the evolutionary approach to economics may be more relevant in times of great transformation, like the one mankind is facing today through the globalization process.

According to Boulding (1985: 7) it was his year at the International Christian University in Japan in 1963–4 that led him to a renewed interest in evolutionary theory, which produced *A Primer on Social Dynamics* in 1970 and *Ecodynamics* in 1978. In 1970 he also wrote a book on *Economics as a Science*, in which economics was treated as an ecological science. We see how both Schumpeter and Boulding were open and akin to Asian ideas and analysis for understanding social economic behaviour through a direct cooperation with Japanese economists.

Even before that, in *Beyond Economics* (1968), Boulding defined a general theory of growth, which said that all growth phenomena have something in common. The phenomena can be classified into: (i) simple growth, the growth or decline of a single variable or quantity by accretion or depletion; (ii) population growth, that is births and deaths; and finally (iii) structural growth, as when a butterfly emerges from a chrysalis (Boulding 1968: 64). Growth phenomena in the real world usually involve all three types (*op. cit.*: 65). In the same book Boulding defines "social systems" as whatever is not chaos (*op. cit.*: 98). The best way to reduce the complexity of human history to manageable, systematic form is to break up the social system into subsystems (*op. cit.*: 101). The same logic is applicable to the human sciences.

The idea of the social world as made up of systems is an idea he held on to. In his 1985 book *The World as a Total System* we find the same idea of the social sciences as systems: "The social system is so interconnected that any division of it is a little arbitrary, but, as we shall see, we can conveniently divide it into the economic system, the political system, the communication system, and the integrative system" (Boulding 1985: 29). The same idea is also central to the philosophy of the German sociologist Niklas Luhmann, who published his classic *Soziale Systeme* the same year. Social evolution is also a central idea for Luhmann[20]: "What evolves is simply meaningful possibilities, each possibility that is selected yielding new eligible possibilities". Only to the extent that money guides our choices does economics have strong predictive power in the social sciences, Luhmann concludes.

Boulding (1985: 31) divides the world into three kinds of system: physical, biological, and social. Social systems are an evolutionary development out of biological systems. They involve biological organisms that have the powers of communication, consciousness, and the ability to produce artefacts (*op. cit.*: 71).

One of the great differences between the socio sphere and the biosphere is the much greater importance of decisions in social systems for determining the future (*op. cit.*: 82). There are many ways of classifying social systems. Luhmann divides them into:

1. Subsystems of society:
   a) Religion
   b) Law
   etc.
2. Social systems proper:
   a) Interactive
   b) Organizational systems
3. Other systems.

Boulding, on the other hand, classifies social systems according to the nature of the relationships (1985: 83), into:

1. The threat system
2. The exchange system
3. The integrative system

The world economic system is seen as interacting closely with the political system and with organizations like the church, families, clubs, and so forth (*op. cit.*: 89).

Another biological idea which interests Boulding is Man's limited ability to understand his own environment. What we know is a function of what we can imagine. That is to say that our brain, not the external environment, controls and sets limits to what we are capable

[20] Boulding wrote about social systems in 1970. Luhmann wrote about evolution as early as 1972, and about social systems as early as 1970. Boulding makes no reference to Luhmann.

of understanding[21]. This view, that we increase our knowledge of the world by studying the brain, not only by studying external reality, may be called a neurological approach to the social sciences. "We construct images in our minds of the world or even the universe as a succession of constantly changing states through time" (Boulding 1981: 9). Boulding shows great interest in this cognitive approach to the social sciences (cf. Boulding 1985: 9; 1956). Today neuroeconomists like Antonio Rangel have made great advancements in this direction (Rangel et al., 2008).

The belief that an image is true often derives from authority, or from evidence. In some cases we resolve the ambiguity of evidence by experiment. That only applies, however, to systems which are stable, repeatable, and divisible, such as chemical systems, where, for instance, all hydrogen atoms are essentially similar. We cannot do experiments on unique events or on the past (Boulding 1981: 10).

Boulding explains (1950: viii) that "the first focus of my dissatisfaction with economics is in the theory of the firm, or the economic organism, and its immediate relationships and interactions". This leads him to a "relationship" perspective on economics. We find the same parallel between the relational perspective of marketing by Gummesson and the Nordic School and Kotler's mechanistic and marginalist perspective on marketing (see e.g. Gummesson 2002). As such this Nordic school is very much founded in the European continental intellectual tradition.

Boulding's second focus of dissatisfaction (1950: ix) was with Keynesian macroeconomics, with "the failure to distinguish between the exchange of payment and the process of production". This led him to the process perspective on economics. Both concepts belong to what we could call evolutionary economics.

We can follow the change in Boulding's perspective on economics through his books, from the more mathematical contributions he wrote while he was in Michigan, to the anything-but-mathematical writings of his Colorado years. What started as mere echoing of the *status quo* in economic thought developed into a strong, highly-differentiated contribution to the discipline of economics, turning him into a strong independent thinker, but also an outsider. Unlike many other evolutionary economists discussed here, Boulding never limited himself to any one perspective but continued to move in many different intellectual directions at once. This may have been his biggest weakness as an economist, in that he was unable to complete and present a coherent system of economic thinking.

To sum up, the academic community of evolutionary economists in America can be divided into two: on one side economists of the Midwest, inspired by the English-language economics literature, such as Veblen and Boulding, and on the other side the European diaspora, including Kiel School economists and men like Schumpeter and Georgescu-Roegen. Of the five groupings defined here, the third, fourth, and fifth can be described as evolutionary economists, while the first and second were groupings which made direct contributions to a discipline of evolutionary economics.

The purpose of this historical trajectory has been to show how the study of Geoeconomics and intelligence studies can be based on the same ideas which are often referred to as an evolutionary approach. As such the studies have a methodological foundation as a part of the study of economics too. This does not mean of course that the evolutionary approach needs to lead to the study of geoeconomics only. Geoeconomics can also be said to belong to critical theory and the normative sciences.

3. CONCLUSION

In this article we have shown why and how the scientific basis and methodology of the study of economics and management can be evolutionary theory and the evolutionary approach.

As an example, intelligence studies is a discipline and an approach to the study of business that sees information as a basic building block for the study of organizations and human behaviour. It is not unique in this sense but shares this starting point with other information sciences after the shift called the Information Age with a focus on information and knowledge, as opposed to the age of the Industrial Revolution with its focus on more narrowly defined tasks and outcomes measured as a function of man hours, capital and material. However, unlike all the other

[21] The first philosopher to set this idea out in detail was Kant, in his Critique of Pure Reason of 1781

information sciences its methodology may be defined as biology instead of physics right from the start.

The study of geoeconomics is a discipline that studies the macro environment of organizations through what we today should call a multidisciplinary approach consisting of history, geography and political science (the realpolitik assumption). The starting point is not Marshall's Descartesian systems à la supply and demand curves, but the world map, resources and cultures. Both intelligence studies and geoeconomics have more to gain as disciplines and sciences by using the evolutionary approach not only to explain their findings but to build coherent theory. So have all disciplines who study man.

As a new study all researchers have not agreed upon clear definitions of geoeconomics yet (Mattlin and Wigell, 2016) and there is a need for analytical methods as suggested by Wigell (2016). It suffices to look at the reference list to see that geoeconomics is new ground. The average article on the topic came out in 2011. The median publication date is 2012. The oldest publication is from 1991 and could be defined as an outlier. The number of researchers with profiles on Google Scholar who say they focus on geoeconomics are less than a dozen, but then many scholars in this field will typically steer clear of the publication haze that indexes promotes. Of course the numbers for geopolitics are much higher.

At the beginning of the 21st century it was clear that neoclassic theory as developed after the Second World War had mostly been a flawed project, now even admitted at their own conferences and declared by conservative media like The Economist. The neoclassic or marginalist paradigm is not able to predict economic behavior and its explanations of current events are too simplistic and narrow to be of much use outside of its journals, even though the committee for the Nobel Prize in economics ("in memory of Alfred Nobel"), which is still the final guarantor of the neoclassic paradigm, do their utmost to convince the public of the opposite. Instead other schools have done better in the meantime, like institutional economics. Keynesianism and Marxism have also seen a revival in past decades and are clearly more relevant directions within the study of economics.

The evolutionary approach was left for the wrong reasons, not because the science itself was flawed, but because of the way it was used, applied, first of all by German national socialists and fascists to dominate other people and countries. This is much like leaving the science of nuclear physics because of what happened in Hiroshima and Nagasaki. It's understandable, but irrational. Besides, the new American superpower needed a new paradigm, its own (the theories were invented on the European continent, but the new science developed on the American continent). Those who deviated from this new paradigm were marginalized in the post-war academic world.

A good example is Peter Drucker who was successful outside of academia among CEOs and corporations. He was more relevant than all the neoclassic scholars put together. Other scholars, who had completely different opinions about economics but could do the necessary math needed in neoclassic economics (econometrics, advanced statistics and calculus), like Georgescu-Roegen, were embraced, at least for a while, but isolated as soon as he openly objected to the paradigm. Other scholars who started out supporting the neoclassic paradigm, like Schumpeter, saw its scientific flaws and deviated from it in later life. Schumpeter went back to evolutionary theory at the end of his "Economic Analysis", published by his wife after his death.

Critical theorists can argue that the neoclassic paradigm has basically served to preserve the power of a certain American and Anglo-Saxon dominated elite. Thus the decline of the neoclassic paradigm coincides with the decline of the American superpower. The fact that it's not scientific arguments that alter scientific paradigms, but geopolitical shifts is itself a confirmation of the relevance of evolutionary theory for the study of man.

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