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Towards a better understanding of metaphorical networks in the language of economics: the importance of theory-constitutive metaphors

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Abstract: Many researchers on metaphors in the field of economics have shown interest in the press coverage of economic events; some have included the discourse of textbooks, research articles or businesses in their investigations, and all have underlined frequent references to the economy as a machine or a human being. In this paper, I will endeavour to show how important it is to consider the recurring networks of organic or mechanistic metaphors in connection with theory-constitutive metaphors in economics. The diachronic perspective will show that metaphors can be seen as a reflection of the evolution of economic thinking over centuries, and can thus offer new insight into the field of economics. The heuristic function of metaphor will be discussed at different levels – those of economic thinkers, ESP teachers and students. I will argue that, as far as terminology is concerned, many a metaphor that is considered as dead is actually just dormant and can be revived at any time to give birth to new metaphors branching out. Metaphors that seem to lose ground, disappear or re-surface, are worth paying attention to as they may reflect a turning point in theory, and spur new approaches to economic problems. In this respect, I will venture to plead for an observatory of metaphors, modelled on neology observatories, with a view to monitoring the emergence of new metaphors. Metaphor could then either be considered as a motor or a barometer of scientific progress and social evolution as well.

Introduction

The overall goal of this paper is to suggest another approach to metaphor in economics that may help researchers into and teachers of ESP and their students gain new insight into the field. Actually, many researchers working on metaphors in ESP seem to focus on the most recurring metaphors used by the semi-specialized press in order to help their students understand figurative expressions, enrich their style and retain vocabulary (Resche 1999, Boers 2000, Charteris-Black 2000, Resche 2001). This approach is quite natural insofar as teachers of English for economics have not been trained as economists. However, as is the case with terminology that helps to gradually visualize how a field of knowledge is organised in conceptual networks, it seems possible to hypothesize that metaphors can open a new path for the lay person. Precisely, by trying to understand the origins of current metaphors and how they belong to logical networks, in a bottom-up approach as it were, one can discover the history of economic thinking and find interest in learning more about how economics has been evolving as a science. Going back to the roots then enables one to look at metaphors from a different angle, realize the impact of theory-constitutive metaphors on fields of research and better understand the different metaphorical networks that gradually seem to fit into a well-structured picture. This top-down approach does not exclude the former bottom-up approach: both approaches are complementary.

Metaphor has always been treated with both veneration and suspicion, and this is particularly true in the realm of sciences. The first part thus discusses metaphor as a controversial matter and underlines the efforts made by economists to have their “soft” science recognized as a full-fledged scientific field. The second part analyses the main sciences which economics has been tempted to borrow from – physics and mechanics on the one hand, biology on the other

hand – as evidenced by the main metaphorical veins running through the history of economic thinking. The third part discusses and illustrates the benefits that can be derived from looking at a larger map of the metaphorical landscape in economics. It insists on the heuristic function of metaphor for a number of actors – theoreticians in the field of economics, teachers of ESP and researchers in the field, and students. The conclusion will discuss metaphor as a barometer or motor of scientific progress and social changes.

1. Metaphor: a controversial issue

Space is unfortunately too limited here to review the rich literature on metaphor, but it is worth reminding the reader of the main positions that have been expressed on the topic. Since Aristotle, metaphor has been hotly debated, as a result of its ambivalence. Actually, neither its qualities nor its shortcomings should be overlooked. Depending on how Aristotle's works have been read and interpreted, different conclusions have been drawn. Focusing on *Poetics*, people have regarded metaphor as the privilege of the happy few who have a gift for creation. As a means for embellishing reality, metaphor has been said to be well-suited to the field of arts, but not to other fields, as it might distort the truth. In a word, metaphor has been blamed for being irrational. However, in *Rhetoric*, Aristotle underlined the role of metaphor in helping one to understand what is unknown through the lens of what is already familiar. Still, the critics of metaphor have emphasised its use as a rhetorical device, and claimed that its suggestive power could be used to influence, persuade and manipulate. The argument that, by using a particular metaphor, one can emphasize some traits and leave others in the shadow — thus hiding part of the reality — has been put forward to advise against using metaphors. The advocates of the substitution theory, for example, have argued that metaphors can always be stated literally and are therefore replaceable. If this is true, however, substitution can only be achieved through a long paraphrase; metaphor undeniably has a synthetic power, and its iconicity has been underlined. Besides, the paraphrase — as is argued by the defenders of metaphor as an indispensable cognitive tool — can only be produced *ex post facto*, i.e. once the metaphor has filled its role of providing new insight. Metaphor is thus irreplaceable. As Wittgenstein (1966) put it using a very telling image, metaphor can be viewed as a ladder which you need to climb to embrace new horizons; it is only after you have seen the new landscape that you can kick the ladder away. Metaphor is then indispensable, insofar as it can help one understand and discover new situations. As far as thinkers and researchers are concerned, it can certainly encourage them to venture into untrodden territory. Another important point about metaphor is that it can play a catachrestic role (Black 1962; Boyd 1993), filling a lexical or terminological void. Natural language was first used for referring to objects or basic activities, so that its resources are limited as regards supporting abstract thought: metaphor seems to be a means to enrich these limited resources, by activating secondary meanings. Metaphor is thus a means by which language develops and thought is enriched.

In short, the abundant literature on metaphor either considers it as an abuse of language that obfuscates the truth, a deceptive ornament that disguises the literal and corrupts thinking (Hobbes 1962 [1651]) or, in sharp contrast, as a “fountain of meaning” (Grey 2000), a dynamic phenomenon essential to creative thought and discovery. Obviously, the modern cognitive approach (Fauconnier and Turner 1998), which insists on the new mental spaces that can be opened by metaphor, supports the latter view.

1.1. Science and metaphor

The position of scientists towards metaphor has mirrored the debates mentioned above. For those who consider that science must deal with facts and be rational, metaphors should be avoided: Aristotle himself demanded that metaphor be eliminated from the discourse of natural science. The argument often put forward is that metaphor is a literary device spurring one's imagination so that it cannot perform a useful service in sciences, which require rational thinking. Scientists might even lose credibility if they resorted to metaphors: unlike literary style, which is by nature flowery, scientific style cannot tolerate any embellishment. Yet, metaphor stimulates creation and plays an essential role in the construction of theory. As Cortezzi & Jin (1999: 154) insist, quoting Sutton (1994: 64): "[Out of metaphors] many new thoughts have arisen, and new areas of subject matter have been developed". Scientists themselves cannot deny that metaphors may have helped them on the road to discovery; simply, they may avoid them when reporting their results, but this does not mean that metaphors were absent from the process which led to their discovery. Actually, metaphor does play a heuristic role, helping the researcher envision a new approach to a problem, pointing out new paths that would not have been investigated otherwise. Even those who maintain that metaphorical discourse is unscientific concede the benefits of metaphor in educational settings. Admittedly, they seem to restrict the use of metaphor to a separate category of what Kuhn (1993) calls 'exegetical metaphors'. However, as every scientist and every teacher must be trained, these metaphors undeniably shape their minds and probably play a very important role in the way they themselves transmit knowledge to future generations.

In this respect, it does not seem irrational to state that a scientific field not only reproduces itself through metaphor, but also evolves and is enriched thanks to metaphors, since metaphorical association provides a conceptual seed which may grow into a new discovery or theory. In addition, since scientific fields are not isolated, it is only natural that cross-fertilization should take place, which is best achieved through metaphor: thinking of one domain in terms of another helps the scientist and researcher consider problems from a new angle. This is what Lakoff and Johnson (1984: 193) have called "metaphorical thought", labelling metaphor "imaginative rationality", which seems to reconcile science and metaphor. So, we may assert with Henderson (1982, 1994) and Klamer (2003) that metaphor holds a legitimate place in the discourse of specialists and is not only reserved for educational purposes or the popularization of science.

1.2. Economics and metaphor

The case of economics is particularly interesting as far as metaphor is concerned, because, as a soft science, it had to acquire credibility and establish a niche alongside other sciences that were considered more noble, rational and respectful. Under such circumstances, one might have expected economists to shun metaphors altogether. Yet, unlike other scientists, economists can neither test their hypotheses in the real world, nor carry on their experiments in laboratories. For this reason, they devise models, write equations and draw graphs, all of which are illustrations that economic thinking is at root metaphorical (McCloskey 1992: 12). Actually, from the beginning, the "father" of economics, Adam Smith¹, resorted to a metaphor, the Invisible Hand, to refer to the self-regulating power of the market. Economic theory is strewn with metaphors associated with their inventors: Quesnay's² economic circuit,

¹ Adam Smith (1723-1790)

² François Quesnay (1694-1774)

Walras's³ auctioneer, Marshall's⁴ pair of scissors or billiard player, Keynes's⁵ beauty pageant, Okun's⁶ leaky bucket metaphor, Lucas's⁷ islands, to name but a few.

Much has been written about the most-often quoted metaphor in economics, the Invisible Hand metaphor, and how to interpret its three explicit occurrences in Smith's works (1976[1759, 1776]), and I will return to this later but it is particularly interesting for the present purpose to mention this metaphor as emblematic of the idea that a metaphor can play several roles at once. It is a heuristic metaphor that helped its author visualise the market mechanism; it is an iconic metaphor which synthesizes a system that could only be described through a long sentence otherwise; it performs a catachrestic role, filling a terminological gap and it is an exegetical metaphor that has become familiar to every student of economics. In addition, it can be considered as a theory-constitutive metaphor (Boyd 1993), which has given birth to a school of thought and inspired many thinkers. It also illustrates the debate around dead metaphors. Many terms which have entered the terminology of a science seem to lose their metaphorical origin to the eyes of their users. They are often considered as dead, although 'dormant' might be a more accurate adjective. Actually, the Invisible Hand metaphor has given birth to so many different, sometimes diverging branches over time that it becomes obvious that a metaphor that seems to have disappeared as such can always be revived to inspire new research.

The language of economics abounds in such dormant metaphors which are worth paying attention to as they reflect the scientific domains which economics has borrowed from in order to structure itself. "Inflation", "growth", "the economic cycle", "equilibrium", "leverage", "market mechanisms", "financial instruments", "the circulation of money", "velocity", "elasticity", "liquidity", "capital inflows and outflows", are but a few examples of terms borrowed from physics or natural science. Both veins were virtually present in the original Invisible Hand metaphor and, as we shall see presently, they have surfaced at different times as economic theory developed.

2. Two main metaphorical veins running through economic theory

As I pointed out elsewhere (Resche 2005), the Invisible Hand metaphor can be given a number of interpretations, especially if one remembers that Adam Smith was not an economist in the modern sense of the term. In the eighteenth century, economics was one of the branches of 'moral philosophy' which dealt with social sciences, as opposed to 'natural philosophy' – the realm of 'physical' sciences. Adam Smith himself taught logic and rhetoric, morals and ethics, and he was interested in many areas of knowledge. As a consequence, depending on whether one thinks of the teacher of morals, or the man with a natural curiosity for biology, one may well consider that the Invisible Hand could refer to God, or to Providence – also named the Great Arranger or the Great Coordinator. In the *Theory of Moral Sentiments*, implicit references to the Invisible Hand seem to point at it as embodying the wisdom of nature, whether this means the wisdom of nature's Creator, man's natural wisdom, or simply a natural order. Another favourite interpretation of the Invisible Hand is just a mechanical force regulating the system. It is obvious that two types of metaphors can be said to derive from the Invisible Hand metaphor: on the one hand, static metaphors inspired from

³ Marie-Esprit Léon Walras (1834-1910)

⁴ Alfred Marshall (1842-1924)

⁵ John Maynard Keynes (1883-1946)

⁶ Arthur Okun (1928-1980)

⁷ Robert Lucas (1937 -)

physics, with forces coming into play to achieve equilibrium, and, on the other hand, dynamic metaphors supporting the idea of a natural order. Both metaphorical veins have been running through economics since then, and their paths have crossed. Sometimes, one would prevail while the other would almost disappear, only to surface again and thrive according to how technical or scientific progress developed.

2.1. Metaphors inspired by mechanical physics

It is always difficult for a young discipline to gain its legitimacy as a science. Accordingly, it seems that the best way for economics to acquire the status of a scientific discipline was to model itself on a discipline that had already formed its cognitive and institutional identity. Economics therefore sought to emulate physics, which imposed itself in the nineteenth century as the standard by which the scientific nature of other fields of knowledge could be judged. According to Mirowski (1991), the emergence of marginalist economics in the 1870s was intimately connected with the rise of energetics. Although the natural laws of economics conveyed by the Invisible Hand metaphor may have been inspired by metaphysics in the eighteenth century, they are very likely to have been translated into mechanical laws a century later by neoclassical economists like Cournot⁸, Walras, Jevons⁹ or Pareto¹⁰, among others, who had initially been trained either as mathematicians or engineers. Nadeau (2003) suggests that the latter just substituted economic variables for the variables in physics and thus imposed notions like “optimisation”, “forces”, “leverage”, “equilibrium” and “energy” which characterize the neo-classical school. What physics called “energy” was coined “utility” by these economists. The protagonists of the neoclassical revolution were themselves quite explicit in their writings about the sources of their inspiration for their new theories. Jevons, who is known to have attended Faraday’s lectures and read Joule’s writings explained utility as follows:

Utility only exists when there is on the one side the person wanting and on the other, the thing wanted [...] Just as the gravitating force of a material body depends not alone on the mass of that body, but upon the masses and the relative positions and distances of the surrounding material bodies, so utility is an attraction between a wanting being and what is wanted. (1866: 284)

Walras also claimed that “the pure theory of economics is a science which resembles the physico-mathematical sciences in every respect” (1969: 71). The most pugnacious proponent of the physics metaphor was certainly Pareto:

[...] Men have not freed themselves from these daydreams which people have gotten rid of in the physical sciences, but which still burden the social sciences. [...] Thanks to the use of mathematics, this entire theory, as we develop it in the Appendix, rests on no more than a fact of experience, that is, on the determination of the quantity of goods which constitute combinations between which the individual is indifferent. The theory of economic science thus acquires the rigor of rational mechanics. (1971: 36, 113)

Working on a synthesis of the principles of classical economists like Smith and Ricardo¹¹, and the principles of the aforementioned marginalists, Marshall seems to have wavered between physics and biology in his approach to economics:

⁸ Antoine Augustin Cournot (1801-1877)

⁹ William Stanley Jevons (1835-1882)

¹⁰ Vilfredo Federico Damaso Pareto (1848-1923)

¹¹ David Ricardo (1772-1823)

The Mecca of the economist lies in economic biology. But biological conceptions are more complex than those of mechanics, a volume on Foundations must therefore give a relatively large place to mechanical analogies (1920, xiv)

Characteristically, the Latin subtitle to his book on *Principles of Economics* (*Natura non facit saltum*) stresses the idea that nature does not proceed by leaps, but undergoes a process of slow evolution. So do metaphorical veins: one may seem to outshine another at a given period, and then recede, depending on how receptive the scientific community is to new findings or how dependent on the former generation's metaphors it is. Very often, several sources of inspiration are at play at the same period.

Still, the few examples above explain what has given birth to the proto-metaphor THE ECONOMY IS A MECHANISM and many economic terms which are commonly used can be seen as surface metaphors to be related to the theory-constitutive metaphor that is itself rooted in the history of the discipline. The non-interventionists will be satisfied with the idea that if the mechanisms work well, the machine will run on its own; however, for the tenants of government intervention, the machine metaphor is also appropriate: simply, the role of those in charge is to keep an eye on the engine in case it should need maintenance and repair. A telling illustration of the mechanistic metaphor is the Phillips machine, which can be seen at the London Science Museum. It was conceived by a New Zealand-born engineer turned economist, who is better known for the Phillips curve¹². Phillips designed the machine to demonstrate in a visual way the circular flow of money within the economy and his machine was used as a teaching aid at the London School of Economics. The machine, which is composed of tanks, pipes, sluices, pulleys and valves is a material representation of the mechanistic metaphor. It also illustrates the impact of Fluid Mechanics on economics.

It is worth noting that, at one point, in the corporate world, a company was also considered along mechanistic lines, as a rigid structure, and workers were just seen as cogs in the wheels. Things have evolved, of course, but not so long ago, “reengineering” and “restructuring” were still used as euphemisms for job cuts, a sign that the mechanistic metaphor was not dead.

2.2. *Biological and dynamic metaphors*

Biology is the other source domain in economics, which gave rise to the proto-metaphor THE ECONOMY IS A LIVING ORGANISM. As already mentioned, this metaphor has run through economics from the beginning, and some researchers have traced it back to Adam Smith. Although Grey (2000) mentions that an autobiographical text intended by Darwin (1887) for his grandchildren seems to point out that the theory of evolution by natural selection occurred to him after he had been reading Malthus¹³, Gould (1993) claims that Smith's economic model and metaphor were Darwin's real sources of inspiration. Smith argued that if everybody is left to pursue their own self-interest, the result will be the best possible outcome of distribution of goods and services for all. Darwin adapted this theory to the biological world, considering organisms as individuals pursuing their own reproductive interest. Wherever the truth may lie, the relationship between economics and the biological world has long existed. Smith's division of labour is a case in point. Another eighteenth-century economist, Quesnay, who had studied medicine and trained as a surgeon, contributed to the metaphor, first because he believed in natural laws governing the economy, but also

¹² Bill Phillips (1914-1975),

¹³ Thomas Robert Malthus (1766-1834)

because he drafted his well-known *Tableau économique* (Economic Table) which was meant to represent the circulation of riches in the economy; the phrase “circulation of money” actually stems from Harvey’s discovery of blood circulation in the body (Viner 1937), and Quesnay’s diagram is said to have inspired other flow diagrams, based on the analogy with the circulation of blood in the human body. Since then, the liquid element has become natural when dealing with money in terms of “inflows and outflows of capital”, “pools of liquidity”, “the drying up of liquidity”, or “fluctuations”.

Obviously, connected with the metaphor of the economy as an organism, we can find THE ECONOMY IS A HUMAN BEING metaphor. In this context, when there is a problem, a doctor is called in, who can diagnose the illness, cure the “ailing economy”, and “inject liquidity” into the system to help the patient “recover”. The human being metaphor then allows analogies with all the situations a human being can ordinarily face. Examples are easy to find in macroeconomics (“growth”, “economic cycles”, “economic development”) as well as in microeconomics (“the life-cycle of products”, “the cradle-to-cradle approach”, “competition for market shares”, “adaptation”, “change” and “mutation”). The modern theory of the firm seems to have also evolved from mechanistic to biological analogies (Penrose 1995[1952,1959]): reengineering has now been replaced by “slimming”, “downsizing” or “rightsizing”; “Lean management” is taken for granted; Teams have become cells that can grow or shrink to adapt to a given situation; “Corporate DNA” can be scrutinised to diagnose the deficient genes; Competition means adapting to a new context by innovating; There are “parent” companies and “infant” industries with “teething” problems; Firms come to life, grow, mature, decline and die, just as human beings. To survive in our competitive environment, a company needs to be supple, flexible, agile; it must avoid overweight if it is to be fit. Perhaps under the influence of fashion, fitness and leanness seem to have become linked in people’s minds, and this is reflected in the corporate metaphors, as pointed out by Syrett and Lammiman (1997: ix).

[W]hen a team of industrial researchers published a book in 1990 in which they termed new production methods pioneered by Japanese car companies as ‘lean’, the word struck a chord with a developed world that had recently espoused healthy eating, competitive sport and working out as an ideal.

As Figure 1 points out, life, health, the environment and the living organism all produce offshoots of one and the same metaphorical branch.

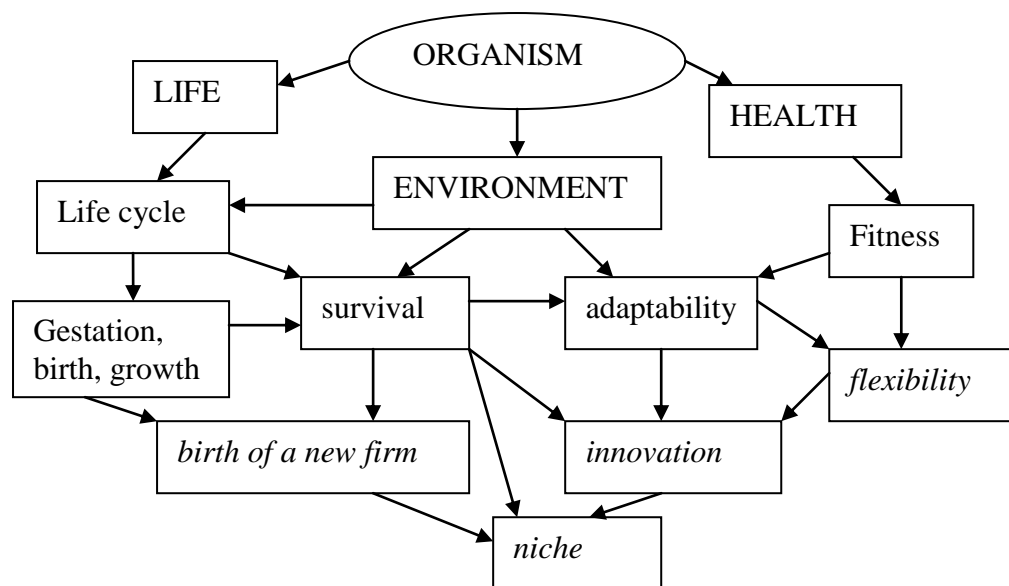


Figure 1. Offshoots of the economy-as-an-organism metaphor

It is interesting to see how the financial instruments sector has also been influenced by the living organism metaphor: one speaks of “the life of an option”, which one may choose to exercise when it comes to “maturity”, unless one prefers to let it “die” or “expire”.

Over time, economists have been influenced by the possible analogies between their discipline and natural sciences. Apart from Marshall who resisted the temptation, but still viewed economic development as an evolutionary process, economists like Veblen¹⁴ or Schumpeter¹⁵ were, in their own times, attracted by evolutionary metaphors. Veblen was influenced by Darwin and Spencer (1890) and he saw economic organization as a process of ongoing evolution (Cordes 2007). In his essay “Why is economics not an evolutionary science?” (1898: 403), he claimed that “modern sciences are evolutionary sciences”, adding “Economics is helplessly behind the times, and unable to handle its subject-matter in a way to entitle it to standing as a modern science”.

Schumpeter clearly stated that “the essential point to grasp is that in dealing with capitalism we are dealing with an evolutionary process” (1962: 82). His chapter on “creative destruction” is quite telling:

The opening up of new markets, foreign or domestic, and the organizational developments from the craft shop to such concerns as U. S. Steel illustrate the same process of industrial mutation – if I may use that biological term – that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism. (1962: 83)

¹⁴ Thorstein Bunde Veblen (1857-1929). The 20th century evolutionary economics he developed was based upon the description of economic behavior as socially rather than individually determined. He argued that economics could move away from a static, individualistic perspective.

¹⁵ Joseph Alois Schumpeter (1883-1950) offered a dynamic theory of innovation, entrepreneurship and competition.

Another direction in which the biological metaphor branched out is worth mentioning: bioeconomics. It was born a few decades ago, under the influence of advances in molecular biology and it has opened a new avenue in the field of economics (Resche 2002). Though it has triggered mixed feelings among economists, it seems to have aroused real interest among managers in the corporate world, allowing them to think of organization in a new way. Bioeconomics is based on the principle that any living organism is an autonomous agent, ceaselessly seeking to survive by evolving in order to adapt to its environment and to change. This suggests a dynamic system, best exemplified by a bacterium that moves to find nutrients, to survive and reproduce. Reproduction, however, is more complex than just a question of matter or energy: when a cell reproduces, it does so according to a specific organisation, which prevents anarchic evolution. Constraint construction is thus the first key notion. The second key idea is that of the membrane, which determines what must be left out, what must be kept in, and what can be allowed to go through the membrane. If these notions – derived from the theory of non-linear dynamics, synergetics and the concept of self-organisation – are used as a lens through which to look at the economy differently, it can help to consider men, markets and firms as autonomous agents that have to adapt to survive.

With the new technologies, the relationships between individuals and between firms have multiplied and thick networks have appeared, which offer a lot of advantages, but also involve risks. It is true that it is important to build incubators for new ideas by connecting people, but the more people and ideas there are, the more necessary it is for a firm to assess the flows of information it can manage, the amount of innovation it can sustain, the right environment it must provide to make these innovative ideas profitable. In other words, it must achieve the right balance between stability and innovation, control and disorder, efficiency and experimentation, standardisation and diversity. It is precisely at this level that the simulation methods used in biology can be of interest as they enable the firm to assess the right dose of change it can bear and to measure the effects of a particular innovation. The new “econosphere” – a term coined after “biosphere” – suggests another order, that of “bionomics”:

Needless to say, this thinking bears little resemblance to conventional economics. Two centuries of economic thought, both capitalist and socialist, are based on the concept of “economy as machine” rather than “economy as ecosystem”. Nonetheless, history has demonstrated that no economy behaves like a simple, cyclical machine. Like ecosystems, economies are spectacularly complex and endlessly adaptable. Consequently, it is bionomics – which studies economic relations among organisms and their environment – that offers the best vantage point for a total rethinking of the received economic wisdom. [...] The traditional notion of government’s economic role – pushing the buttons and twisting the dials of society’s economic machinery – is replaced by a vision of government as the astute cultivator of society’s economic ecosystem, patiently nurturing the natural processes of growth. (Rothschild 1990: 4)

Observing how root metaphors have branched out into new directions can undoubtedly draw our attention to another function of metaphor, that of introducing or signalling a turning point in theory; metaphor can then be seen as a mediator, and perhaps a rebel, questioning the status quo, forcing people to reconsider their approach to problems. Metaphor can open the way for theoretical mutation. Such is the case in the field of neuroeconomics. Going one step further than behavioural economists who had used insights from psychology, neuroeconomists are turning to neuroscience to better understand what goes on in the brain while decisions are being made, with a view to explaining seemingly irrational behaviour. Though criticism has

been levelled at this new school of economics, on the ground that what matters are the decisions people actually take – their “revealed preferences” – and not the process which leads to these decisions, neuroeconomics has supporters. It should be noted that the forefathers of neuroeconomics can be found among economists themselves. Characteristically, shortly after Jevons insisted that there was no way one could find out how the human brain’s “black box” functioned, in 1881, Edgeworth¹⁶ called for the creation of a “hedonimeter”, the ancestor of a brain scan, that could measure the utility one gained from one’s decisions (Colander 2007). Other economists, like Fisher¹⁷, Ramsey¹⁸ or Hayek¹⁹ (1978), also developed an interest in the inner workings of the brain. Ramsey even mentioned a machine that could measure utility, which he called a “galvanometer”. Who knows what would have become of the orthodox model of rational, utility-maximising decision-making in economics if MRI (Magnetic Resonance Imaging) had existed in the nineteenth century!

3. The importance of understanding the origins of metaphorical networks

The proto-metaphors which have been mentioned so far have inspired theoreticians from different schools and different times, tempting and convincing some, influencing or discouraging others. It is important to point out that, in contributing to the construction of the theory of economics, they have followed routes that were sometimes parallel, sometimes diverging; though the root metaphors may even have seemed mutually exclusive at times, to such a point that one may have developed at the expense of the other, they have both endured, and regularly resurfaced.

It is therefore not surprising to find metaphorical networks overlapping, with some of their branches intertwined, so that the outsider may feel confused. Figure 2 illustrates this point showing the metaphorical networks used when dealing with the risks to the economy.

¹⁶ Francis Ysidro Edgeworth (1845-1926) He developed utility theory, introducing the indifference curve.

¹⁷ Stanley Fisher (1943 – today)

¹⁸ Frank Plumpton Ramsey (1903-1930) Although a mathematician by training, he made significant contributions in philosophy and economics.

¹⁹ Friedrich August von Hayek (1899-1992) As well as his seminal work on economics, he also made significant contributions in the field of cognitive science. For example, he suggested the connectionist hypothesis, which inspired much of modern neurophysiology.

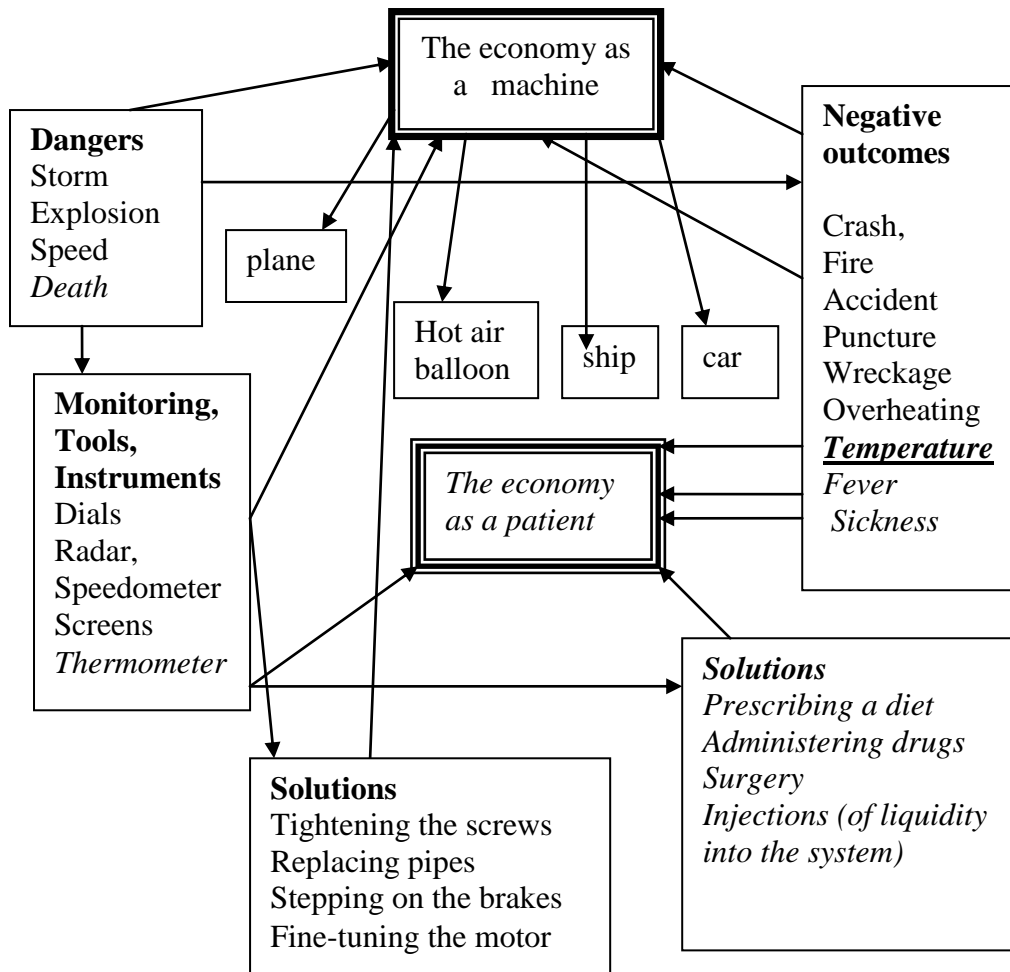


Figure 2. How metaphorical networks can overlap

The economy is first seen as a means of transport, in the context of the mechanistic metaphorical vein. Depending on which vehicle is concerned, the risks and negative outcomes of an overheating economy will be different. The pilot of a plane caught in turbulence will have to land safely and the notions of “fastening one’s seat belt” to prepare for a “hard-landing” and a “bumpy ride” will immediately come to mind; but the passengers will applaud the pilot all the more if he manages to ensure a “soft landing”. If the car metaphor is used, then the driver will have to step on the brakes and drive cautiously; as for the captain of a ship caught in a storm at sea, he will have to avoid navigational errors and look for a “safe haven”. The terms “safe-haven currency”, or “anchor currency” do stem from this branch of the metaphorical network. Many crises are indeed described as storms, and phrases like “a rising tide lifts all boats” have become leitmotifs under such circumstances. When the economic engine has problems, “fine-tuning” is in order and the mechanic will have to do his best to use the appropriate “economic tools” to “tighten the screws on the economy”. The metaphors mentioned so far all stem from the same mechanistic source domain. However, Figure 2 also shows that it just takes a notion like overheating and high temperature to conjure up the idea of body temperature or fever, opening the way for an altogether different source domain. Temperature can then be seen as a node, with two branches going in different directions: the economy as a machine or the economy as a human being, as a patient. While careful monitoring of the economy will be achieved by keeping an eye on dials and screens in the

mechanistic context, it is the clinical thermometer that will be used in the biological context and the patient's blood pressure will be monitored. Depending on the metaphorical branch that is chosen, the specialist will be a mechanic, a driver, a captain, a pilot, an engineer or a doctor. Remedies will also vary; soft ones might be enough, like stepping on the brakes, tightening or changing some screws or prescribing a given diet, but in some cases, remedying the problem will consist in replacing a worn-out part or operating on the patient. New instruments, those of the surgeon, will then be called for. Another telling example of mixed metaphors is the aforementioned Phillips machine: as a machine, it is inspired by the mechanistic root metaphor and as a hydraulic model of income flow in the national economy, it can be said to derive from Fluid Dynamics; but the liquid metaphor is also associated with the circulation of blood in the human body, which is itself an extension of the biological metaphor.

3.1. The heuristic function of metaphor for researchers and teachers

The heuristic function of metaphor for researchers in the field of economics must now be evident: metaphor offers a new vantage point from where to look at what seemed to be a familiar landscape. Undeniably, as was the case in the past when economics was structured, recent progress in other sciences has opened the way for new developments. Thus, fields like evolutionary economics, cognitive economics, complexity economics, consumer theory, as well as ecological and environmental economics have significantly benefited from research in the biological domain. However, this does not mean that economics now disregards physics for inspiration. For example, development economics, that studies the trade relations or capital flows between cities, regions or countries, has borrowed from Newton's gravity theory to build its peripheral capitalism model. Other examples of a new approach to economics through the lens of physics are illustrated by relatively recent fields of research known as econophysics²⁰ and thermoeconomics²¹. Whatever the negative reactions triggered among mainstream economists by research carried out in these fields, the metaphorical approach allows researchers to see economic phenomena in a new light. The important point is that metaphor can then play its heuristic role by generating new and potentially fruitful questions, even though it may not answer existing ones.

For a language teacher who has not been trained in economics, the first entry door into the field of economics is of course through terminology, as terms denote the scientific concepts, whose definitions can be found in textbooks. As these terms are structured in conceptual networks, discovering these networks can help the novice to grasp the relations between concepts in one particular domain. However, it is obvious that a language researcher's attention will be caught by terms whose metaphorical connotation or origin may be lost to economists, but retains its flavour for the uninitiated. Out of curiosity, he/she will try to understand the reason why these terms have made their way into the theory, and be particularly sensitive to the metaphorical networks that can be built around them.

²⁰ Econophysics refers to the principle of applying statistical mechanics to economic analysis. In the mid 1990's physicists who were not satisfied with the economists' answers to the complex problems posed by financial markets, applied tools and methods from physics including uncertainty or stochastic elements as well as nonlinear dynamics. The term 'statistical finance' has its roots in statistical physics.

²¹ According to thermoeconomists, human economic systems can be modelled as thermodynamic systems.

Terms with a metaphorical connotation seem to play a focal role for journalists as well, who may or may not have been trained in economics and who develop extended metaphors around the core metaphorical terms. Actually, many metaphors used for popularising economics derive from these terms with a metaphorical ring and have not been chosen at random. Thus, liquid metaphors will be fully exploited when dealing with money, but may not be clearly related to the circulation of money in the economy – or blood in the human body – which inspired the flow diagrams that can be found in every economics textbook. Understandably, a currency crisis will be translated into a storm at sea, and all the attributes of a storm will naturally come to mind (winds, dark clouds, waves, a ship caught in the storm, a maelstrom). Though the language teacher will have no problem understanding the extended surface metaphors, he/she may well just consider them as a generic code among journalists. Trying to understand the concepts they refer to is a first step towards acquiring some background knowledge in economics, but understanding what lies behind these recurring metaphors will obviously broaden his/her cultural and scientific background, and open new horizons in terms of grasping how economic reasoning functions and how economics was built as a science. In this respect, it can be said that starting from the surface metaphors and going back to the root metaphors helps the researcher into and teacher of ESP adopt a more holistic approach.

An appropriate test might consist in trying to understand what the “Goldilocks economy” and partying may have in common in an economic context – for example, when encountering the phrase “take the punch bowl away just when the party is getting going”. Incidentally, the latter phrase was coined by a former Fed Governor, William McChesney Martin, which shows that specialists themselves coin metaphors that are then echoed by the media. Reading more closely, one may understand that the Goldilocks economy, a metaphor which has also been used by Alan Greenspan, is “neither too hot, nor too cold”, but “just right”. As for the party, it refers to the idea that any “host” should see to it that his party shall not be spoilt by people who might overindulge in drinking: the longer they overindulge, the worse the eventual hangover. Both metaphorical situations refer to the need to avoid any extreme and to aim at “the right dose”. For the economist, clearly, the reference is the context of economic policy, whose aim is to sustain growth while avoiding overheating. On the one hand, it is important to fuel the economic engine, to make sure it keeps going; on the other hand, it is vital to be ready to step on the brakes if necessary, while avoiding causing the economy to come to a halt. The underpinning root metaphor is obviously a mechanistic one.

The idea of a continuum between the root or theory-constitutive metaphors and their various branches across time and place seems to echo the idea of a continuum between specialized discourse, semi-specialised or popularised discourse and common language. Journalists take their inspiration from the core metaphorical terms stemming from the root metaphors and extend the metaphors by choosing elements from everyone’s experience of everyday life. Obviously, surface metaphors as developed by the press need to find an echo in every reader.

Another example of how important it is to have a larger picture of the metaphorical networks and their *raison d’être* can be found in the metaphors that were used by the advocates and critics of the European Monetary Union (Resche 1999) before the euro was born. Figure 3 shows that the notion of a “Union” immediately triggered the marriage metaphor, with all the associated notions of courtship, the wedding ceremony, etc. For some, marriage might also connote a religious ceremony, a very official pledge to stay together, “for better, for worse”. Actually, marriage is also a familiar metaphor for mergers so that it is easy to think of the single currency as a merger between different currencies. In addition, seen as the happy end of a long process of relationship building, “union” also conveys the idea of construction as well

as that of a journey. For the religious-minded, the journey may even be considered as a quest. “Life is a journey” is a familiar metaphor (Lakoff & Johnson 1984), and it might well be all that the surface metaphor could mean for those who fail to be conscious of the root metaphors. “Union” could also commonly refer to a group, a team, a club. But all these metaphorical branches share a common denominator: personification. CURRENCIES ARE PERSONS, not machines. It is also important to point out that, when the likelihood of failure or break up is mentioned, the favourite metaphors will logically revolve around the themes of divorce, battles, or war. Beyond the surface metaphors, fighting for one’s life and survival is at stake, and the underpinning biological root metaphor should be obvious. In times of crisis, turbulence is a commonly-used metaphor (White 2004), and the risks to the monetary union are therefore described in terms of a ship or a plane caught in a storm. If one remembers the main extensions of the mechanistic metaphor to describe the risks to the economy, it is impossible not to draw a parallel with the way the risks to the European Monetary Union are mentioned metaphorically. Associations with other catastrophes like a building crumbling as a result of an earthquake are easy to imagine.

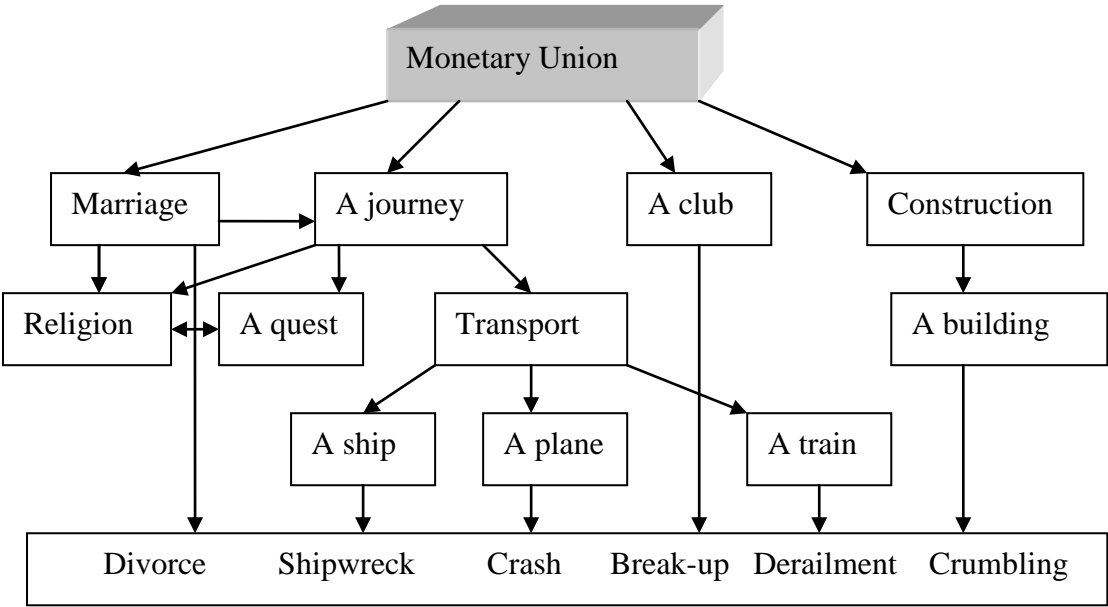


Figure 3: metaphorical networks around “Monetary Union”

Again, the metaphorical networks around the euro evidence interferences between organic (human beings) and mechanistic metaphors (vehicles, structures).

3.2. The benefits of root metaphor awareness for students in the ESP field

Metaphor use in the classroom (Holton 1984) is often related to the characteristic need to explain the unknown by referring to what is familiar. Teachers and textbook authors naturally use exegetical metaphors to support their explanations. However, as Debatin (1995: 2) insists, “underneath the surface level of obvious pedagogical illustrative imagery, there is always a deeper layer of fundamental metaphors, which control even the logic of seemingly non-metaphorical discourse and therefore lie in the blind spot of theoretical reflection”. Being able to paint a larger, clearer picture of the metaphorical landscape can therefore help the language teacher in several ways in the classroom. For example, students of English as a foreign



language may not be aware of the metaphors contained in the following examples from current textbooks:

If output is growing rapidly and inflation is rising, the Federal Reserve Board is likely to raise interest rates as this *puts a brake* on the economy and reduces price pressures. (Samuelson & Nordhaus p. 531)

No market *mechanism* provides *an automatic pilot* that can quickly eliminate macroeconomic *fluctuations*, and governments therefore take responsibility for moderating the *swings* of the business *cycle* (Samuelson & Nordhaus p. 550)

The Fed could *inject* some money into the economy by buying some government bonds from the public in open-market operations. What happens after such a monetary *injection*? (Mankiw 1998: 613)

Economists set themselves too easy, too useless a task if *in tempestuous seasons*, they can only tell us when the *storm* is long past, the *ocean will be flat*. (Keynes, quoted by Mankiw 1998:355)

The role of the language teacher will first consist in sensitizing the students to the metaphorical domains at stake in these various extracts and activate the heuristic function of metaphor to push them to go further into their investigations of the concepts and the metaphorical fields that sustain them. Specialised reading can certainly be improved by enhancing the students' awareness of metaphor (Boers 2000). Besides, retention of unfamiliar figurative expressions is obviously facilitated if lexical items are organized along metaphorical themes or source domains. Grasping the underlying logic, the students can become familiar with a growing number of phrases pertaining to a particular field, and adopt them, improving their style. Ordinarily, in one's mother tongue, the use of a given term triggers the use of related words, but this is not so obvious for foreign language learners. Greater awareness of the metaphorical networks and their origins will surely make the collocational patterns which the metaphorical terms enter into easier to retain.

Figure 4 illustrates this point with the metaphorical network around mergers. It underlines the fact that, once established, a metaphor can be realised through an indefinite number of metaphorical expressions. If the students can be made aware that a merger can either be regarded as a love story or, in the case of unfriendly dealings, as a hunting ground or a battlefield, they will find it easier to concentrate on the phrases commonly used in the various situations. Incidentally, it will also be worth insisting on the fact that, in spite of their metaphorical nature, "poison pills" are actual strategies in finance, and that the "white" or "black knights"²² are terms officially used by the specialists and not mere allusions to the tournaments of ancient times of chivalry. Obviously, the metaphorical ring and the remarks triggered by the explanations of these terms will help students remember them more easily.

²² It should be obvious that a white knight is not so generous as the term might suggest: of course, it refers to an investor who means to rescue a firm threatened by a predator or "raider" - the black knight. The latter's goal is to put his hand on the "Crown jewels". But actually, the white knight does not come by mere chance and is no philanthropist.

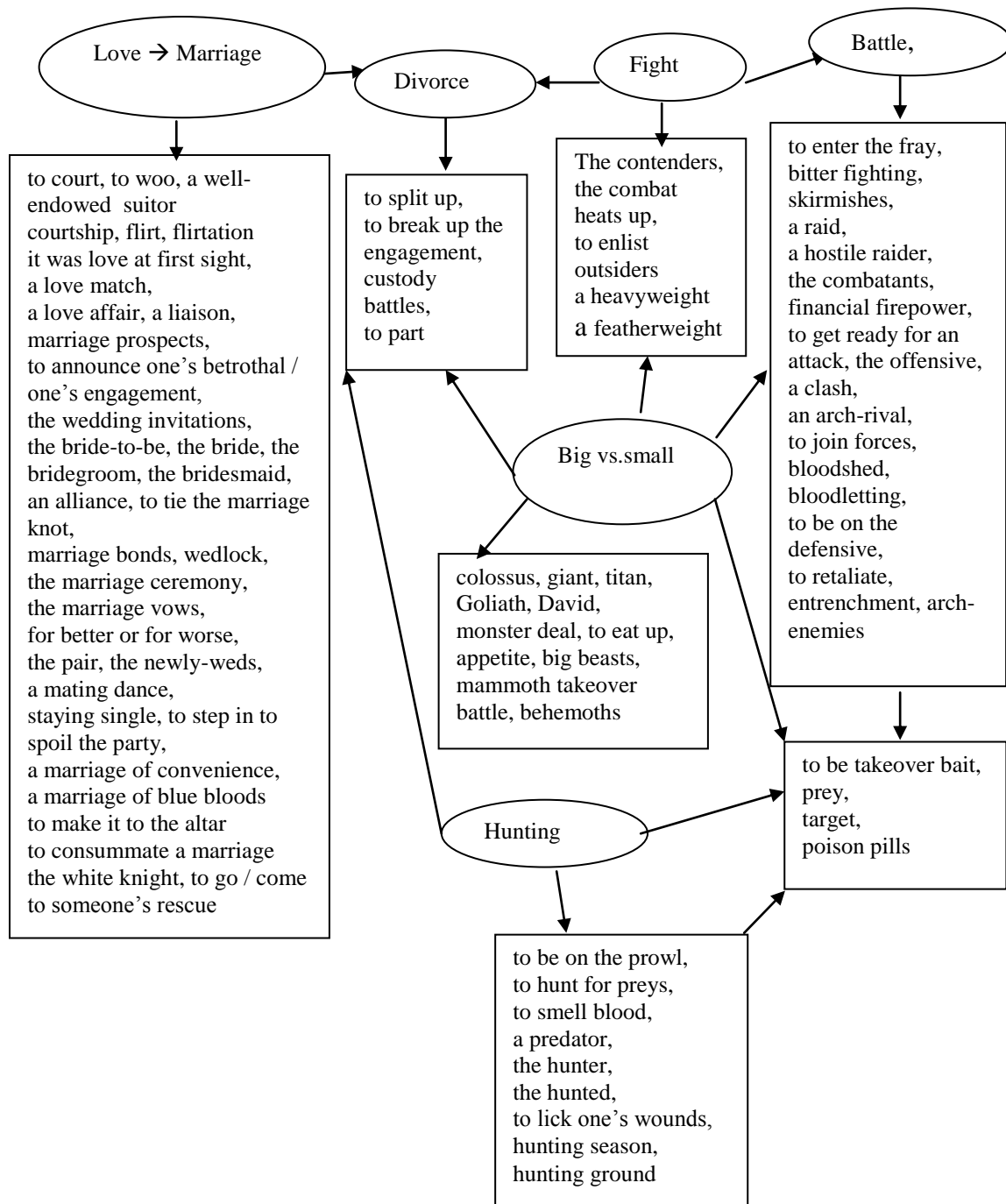


Figure 4. The metaphorical networks around mergers and their lexical deployment (these metaphors were collected from articles from the Wall Street Journal, The Financial Times, BusinessWeek and The Economist).

Secondly, raising the students' awareness of metaphorical networks will be an opportunity to insist on the fact that language and culture should not be dissociated: many students of economics tend to disregard the history of economic thinking and only focus on mathematics and econometrics. Insisting on the theory-constitutive metaphors and the cross-fertilization of sciences may arouse interest in metaphor as a fundamental means of conceptualization. This may open the way for a new approach to theory through its linguistic expression, showing that language translates viewpoints and is rooted in culture, history and civilisation. Instead of

being confused by the way lexis is deployed figuratively, they will themselves have a more complete view of the economic domain, understanding that the different metaphorical branches are just manifestations of the vitality of the root metaphors.

Thirdly, studying metaphors and linking them to the root metaphors may help to develop a critical mind: pointing out that metaphors may not be innocent may draw the students' attention to the reason behind the choice of a particular metaphor and the potential meaning that can be derived from it. Students of economics are familiar with the theory of opportunity cost: it is therefore easy to convey the message that any metaphor has an opportunity cost and that, when choosing to express one's ideas through a given metaphor, one automatically gives up other options, a choice that will surely influence the reader or public. This should not be taken to mean that whenever an author uses terms such as "levers" or "forces", he should automatically be understood to consider the economy as a machine: such a stance would be too categorical and systematic. However, as Boers points out (2000), it is when the author has a choice between different metaphors that his choice may be interesting to analyse.

Among the several functions of metaphors listed by Henderson (1994: 343), one is that it can be used as a basis for argument, and this is where critical reading will matter; students must therefore realize that metaphor can be a bearer of ideology:

Metaphor can be viewed as a useful teaching device; as a central organising principle of all language; as a way of viewing and constructing new problems; as a fundamental basis for argument and storytelling.

Conclusion

This chapter has provided an opportunity to analyse a number of functions performed by metaphor: The heuristic function that helps thinkers to discover new horizons, the pedagogical function that helps share one's discovery and explain theory to the uninitiated. Metaphor has also been shown to be a springboard for the teacher of ESP who discovers economics as a non-specialist: starting from surface metaphors, he/she can gradually carry on his/her own investigations and find out how surface metaphors are related to deeper layers of fundamental, theory-constitutive metaphors. In the process, other functions of metaphors are fore-grounded: metaphor favours or signals paradigm shifts in sciences, it forces questioning (Resche 2007) and can be seen as a rebel at times; it also acts as an interface (Resche 2006) between different fields of science. The influence of physics, mechanics, biology, neuroscience, has been established, but the influence of economics on other sciences would also be worth considering.

From a more general point of view, it would be enriching to observe the cross-fertilization of different fields of knowledge in order to determine whether the same metaphorical veins run through different scientific domains at the same periods of time under the influence of scientific progress or/and Man's social preoccupations at a given time. If so, it should be possible to learn from shifts in metaphorical paradigms by just observing metaphors along the diachronic axis. How influential a science has been over time could also be determined by assessing how much other sciences have borrowed from it to develop their own theories. Adopting a history-of-economic-thought perspective would certainly be of interest for historians and sociologists, as well as for linguists and terminologists. For these reasons, and considering that metaphor can be a motor as well as a barometer of change, I would suggest

setting up an observatory of metaphors²³, modelled after the system used by terminologists to monitor the new terms that are coined as a reflection of new concepts or objects. As Borges (1985: 224) suggested, “it may be that universal history is the history of a handful of metaphors”.

To paint as objective a picture of metaphor as possible, I would like to remind the reader of its two major drawbacks: while paving the way for investigation in one direction, metaphor unavoidably blocks other paths, which can be detrimental to the direction of future research for some time in a specific field; it can also be a means to influence opinions and surreptitiously convey an ideological message. In all cases, whether its effects are positive or negative, metaphor does make a difference. Robert Frost’s last three lines of *The road not taken* can surely express this idea more poetically and forcefully:

*Two roads diverged in a wood, and I –
I took the one less travelled by,
And that has made all the difference.*

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²³ There already exists a Metaphor observatory based on the media (<http://www.metaphorobservatory.com/>). However, tracking metaphors characteristic of specialized fields of knowledge might help us to detect new trends in academic disciplines, reflecting turning points in research perspectives, the emergence of a new worldview and a potential paradigm shift in the Kuhnian sense.

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