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Metaphors in Economics: Conceptual Mapping Possibilities in the Lectures of Economics

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Abstract

Contemporary theory of metaphor stresses its cognitive nature, as opposed to traditional view of metaphor as rather a linguistic ornament. Its importance in the field of science education has been already recognized, yet the application to the area of economic education is still missing. Besides the discussion of literality and figurativeness in economic terminology, this article gives the account of the way the conceptual theory of metaphor can be applied to teaching basic concepts of economics and suggests research options in the area of empirical pedagogical research. Special focus is given to the example of “demand for money” concept and difficulties with understanding students might face due to its ambiguous conceptual mappings. View of the metaphor taken is the interactive one.

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1. Introduction

It seems to be a common sense saying that a scientific language should be free of ambiguity, figurativeness and as much precise and literal as possible, preferably mathematical to this end. Metaphor, traditionally viewed as a master rhetoric device, a trope, seems to be an essence of figurative language. In other words, just the opposite of what a scientific language is supposed to be - at least as far as the metaphor is viewed as a pure frill of language, an avoidable figure of speech.

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Yet, in the past 35 years, an enormous progress has been made and applications of the new view of metaphor, being a *cognitive device* rather than linguistic ornament, have emerged. There is no unified theory of metaphor at the moment, nevertheless, various facets of the role of metaphor in human language, cognition and learning have been thoroughly studied.

Contemporary approach to the conceptual metaphor stems from the book *Metaphors We Live By* (Lakoff, Johnson, 1980), which, using very accessible language, laid foundations of subsequent research. Recent developments in the conceptual metaphor theory (CMT) are reviewed by Gibbs (2011).

Basic observations, which the CMT is based upon, are as follows:

- Metaphor allows for *comprehending* one domain in terms of the other domain. The former one is known as the target domain (tenor, principal subject), the latter as the source domain (vehicle, subsidiary subject, analog).
- Metaphor is not a matter of expressing ourselves with “mere words”, but a matter of projecting *internal structure* of source domain onto the target domain.
- Metaphor *conceptualizes* the target domain, giving us a simplification that enables us to organize the domain in our minds.
- Metaphor highlights certain attributes of the target domain, but hides the others. Hence works as a *filter for viewing* the target domain.
- Metaphor *constitutes* a target domain whenever used in dealing with abstractions. It *creates* new views of the domain.
- Metaphors are rooted in our *bodily experience* with physical world, which forms the foundations of our conceptual system.

The list above indicates, that learning and teaching can indeed benefit from using metaphors. Intriguing question is whether metaphor is important not only for teaching and learning of economics, but for economics itself. Latest comprehensive work on the topic *Applications of Cognitive Linguistics [ACL] : Metaphor and Mills : Figurative Language in Business and Economics* (Herrera-Soler, White, Kristiansen (eds.), 2012) clearly suggests so, having its predecessors in now classical works of *Rhetoric of Economics* (McCloskey, 1998), *Natural Images in Economic Thought: Markets Read in Tooth and Claw* (Mirowski (ed.), 1994) and *More Heat Than Light: Economics as Social Physics, Physics as Nature's Economics* (Mirowski, 1989). Although this discussion goes beyond the scope of this article, we'll touch it in regard to obvious metaphoricality of much of elementary economic terminology.

2. Literal and figurative language in the terminology of economics

Use of figurative language in economic discourse can be researched within the corpus-based analysis of media content (e.g. newspaper articles). Boers and Demecheleer (1997) reported results of analysis in three languages - English, French and Dutch - when searching for expressions based on conventional metaphorical source domains of *path* (as in “*moves* towards privatisation”), *warfare* (as in “*retaliation* against country's exports”) and *health care* (as in “*chronic deficit*”).

Second approach, taken in this article, focuses on the metaphorical foundations of terminology of economics. Despite the requirement for literality of scientific language and an implicit ban of figurativeness in the discourse, even the shortest glance at the terminology used in economics may seem to suggest otherwise. Deidre McCloskey, a respected economist, gives a clear account of this in her book *The Rhetoric of Economics*:

“*The more obvious metaphors in economics are those used to convey novel thoughts, one sort of novelty being to compare economic with noneconomic matters. "Elasticity" was once a mind-stretching fancy; "depression" was depressing, "equilibrium" compared an economy to an apple in a bowl, a settling idea; "competition" once induced thoughts of horseraces; money's "velocity," thoughts of swirling bits of paper. Much of the vocabulary of economics consists of dead metaphors taken from noneconomic spheres.*” (McCloskey, 1998, p. 41)

What a dead metaphor is will be covered later, nevertheless it is worth noting, that it is the original *literal* meaning in the examples above that has been *overridden* by the terminological coining. The first reaction to such claim would be that it doesn't matter what the words used to be used for, now the meaning comes from the well-established terminology.

However, the figurative meaning of the terms makes the basis for *understanding* these concepts in the realms of economics. It may be daring, yet obvious, to suggest, that students, at the first touch, grasp the meaning of “price elasticity of demand” not from the formula displayed but from knowing what “elastic” means. Such understanding then *creates the frame* which allows them to *interpret* the formula of division of percentage changes in quantity and price. They know *what* is actually *measured* by such division.

Any advocate of CMT would applaud, as this is an typical example of projection of embodied experience with physical world we all face: a force being applied (price change) against a material (demand) is either deforming it - then we say the material was “elastic”, knowing that it will recover its original shape once the push stops, or not at all - then we say the material was “inelastic”. Anticipating the argumentation presented below, it is necessary to point out, that the metaphor *allows* for discussion of *temporal* and *permanent* deformations, which is rarely subject of economic interpretation in the textbooks of economics. Is there anything in the economic life that would map to “permanent deformation” possibility? That’s a potential way how to make students think, use newly acquired concept and explore its application limits.

Being able to do mappings on the domain level is potentially a necessary prerequisite of *application* in the actual real-world situation. In other words, stepping from *understanding level (II.)* of revised Bloom’s taxonomy of educational objectives (Krathwohl, 2002, p. 215) to *application level (III.)*.

As metaphor takes into account some features of the domain and suppresses the other ones, one has to make sure which ones are the former and which ones are the latter. It’s the very same requirement as the one attached to building of economic models: making clear what the assumptions are. Such an obvious correspondence between models and metaphors, enforced by the simple fact that models by definition treat reality *as if* it was limited to modelled elements, make some authors flatly claim that models are simply metaphors in nature (McCloskey, 1998, p. 40).

Giving a clear overview of aspects in which the metaphor *is like* studied phenomena and in which it is *not like* studied phenomena means to elaborate metaphor into an analogy. “*Whereas a metaphor merely suggests that the principal and subsidiary subjects have attributes in common, an analogy draws explicit parallels between them.*” (Klamer, Leonard, 1994, p. 34)

Aubusson, Harrison and Ritchie (2006, p. 3) add: “*It seems that the term metaphor can be applied to all comparisons that feature the identification of some similarity between two things. While not always the case, there appears to be a tendency to use the term analogy when the comparison is extended highlighting a range of similarities and differences between two things. Thus, all analogies are metaphors but not all metaphors are extended into analogies.*”

Being precise, meaning well-defined, is in no odds with being figurative in nature. The whole trick is in finding a precise way of using figurative language. *Visualizations of conceptual mappings* may fit such requirement. Moreover, they will emphasize the fact, that terminology is a matter of agreement on language used, rather than description of the world as-is. In turn, such requirement equals to the need for finding the way of explicating projective nature of many economic terms. Conclusion can be the following: it is *not* the act of establishing terminology what makes meanings literal. Precise yes, literal not.

3. Concept Lexicalization

Metaphors can apparently become dead metaphors, a state for which a term *lexicalized* has been coined. It means they have become a word which is no longer understood in its figurative meaning, rather it is being treated (and mentally processed) as a literal expression. Merriam Webster Dictionary (2015) delivers the definition saying, that lexicalization is “the realization of a meaning in a single word or morpheme rather than in a grammatical construction”. Who would wonder today that the word “expression” might have had something to do with “press out” coming from the Latin word (*ex*)*primere* (myEtymology, 2008)?

The same process applies to concepts. They get lexicalized as a learning outcome; at least at the lowest levels of Bloom’s taxonomy, given the fact that they are delivered to students as a *terminology* with precise meaning.

However, such circumstance doesn’t stop students’ minds from trying to grasp the basics via metaphorical projection of focused attributes of words (terms) they already know, but not necessarily in the presented context.

Demand for money is such an example. Despite the fact it has a clear definition as *one* term, you try to understand it rather by reading it as three words that should build up new meaning from the meaning they have on their own.

Which attributes of the concept of *demand* get projected onto the concept of *money* in an attempt to understand it without further elaboration from the teacher? Will the elaboration fit into the picture built up in students' minds? Or will the failure to produce such picture hamper the explanation from the teacher altogether?

Beauty of analysing the language lies in ability to show examples of the point made on the analysis itself. To give the logic of projection its due, it is worth noting, that it has been used in two cases described above: *concept lexicalization* and *concept of money*. For the former one the new meaning arises from projection of attributes of "lexicalization" onto the "concept" (focusing on the fact that grammatical construction of the term can fade in favour of established meaning), the latter one treats "money" as a "concept" rather than valued "things" (focusing on the role money plays in institutionalized interactions of trading humans). Such meaning mash-ups are apparently normal ways of progressing on the intellectual paths. In the context of this article we would say that natural metaphoricity of human thought is naturally to be seen in academic thinking as well.

4. Conceptualizing Demand for Money

Different ways the actual metaphoric thought can be viewed is discussed by Lakoff and Johnson (2003), where the account of three main *metaphors of metaphor* is given: mathematical mapping, projection and neural theory of language.

Since the aim of using a metaphor in this text is primarily pedagogical, the view taken hereafter is the *projection approach*, meaning that metaphor is seen as mapping various aspects of one domain onto the other, with the ability to actually *create* new views of the target domain. The problem of *domain override*, meaning that only such attributes are projected, which do not cause the interference with the internal structure of the target domain, is then analysed not as a problem of the view of the metaphor, but as a *pedagogical* problem.

First step in the metaphoric approach is to view "demand" and "money" as *cognitive domains* rather than labels with definitions attached. No one would argue that students *have* many preconceptions about the economy and economic terms from their lives (some of them already cultivated by previous education) to date they enter the first lecture of economics.

Saying "demand for money" is terminology. However, saying "holding a stock of money *is like* demanding them" is going behind the scene. It is an attempt to *explain* what demand for money actually means, using the metaphorical projection as a base. It is extremely important to note that the projection can go both ways, which is called an interaction view of metaphor (Black 1966, p. 38; 1980, p. 27). We learn something about money, but we learn something about demand as well.

Figure 1 displays two cognitive domains and main conceptual attributes attached in them. Such definition of domains' content is just exemplary, but captures typical situation within the course of economics, where the account of demand and supply has been already covered and macroeconomic discussion of money is yet to be taught.

Demand (Domain)	Money (Domain)
<ul style="list-style-type: none"> • reflects our preferences <ul style="list-style-type: none"> ◦ substitution between two products • restricted by budget and prices • manifested as <ul style="list-style-type: none"> ◦ buying <ul style="list-style-type: none"> ▪ things and services • clashes with supply <ul style="list-style-type: none"> ◦ establishing price • quantity demanded changes are inverse to price changes • repeated over time as needs arise • ... 	<ul style="list-style-type: none"> • received for the work we do • spent by buying goods and services • held in stock to make transactions <ul style="list-style-type: none"> ◦ being our budget • used to quote prices • can be borrowed <ul style="list-style-type: none"> ◦ at an interest ◦ has to be repaid back • saved at interest <ul style="list-style-type: none"> ◦ in the bank ◦ by buying bonds • received by selling things/assets • ...

Source: author

Fig. 1: Cognitive domains – Demand and Money

Visualization of cognitive domains is on the popular side well known as *mind mapping* (Buzan, Buzan, 1994), a technique that is already well established in the field of education and business. On the far more formalised end we can find *conceptual graphs*, a notation that can be processed by computers and forms a basis for knowledge representation in artificial intelligence (Way, 1994, p. 107). Another notation called *embodied construction grammar*, suggested by Lakoff (2008, p. 37), is specifically created for writing down metaphorical mappings and it respects findings within neural theory of language.

Approach taken below draws on the visualizations presented by Klamer and Leonard (1994, p. 29), yet enhances them with a few more features. Notational rules for reading the figures below are as follows:

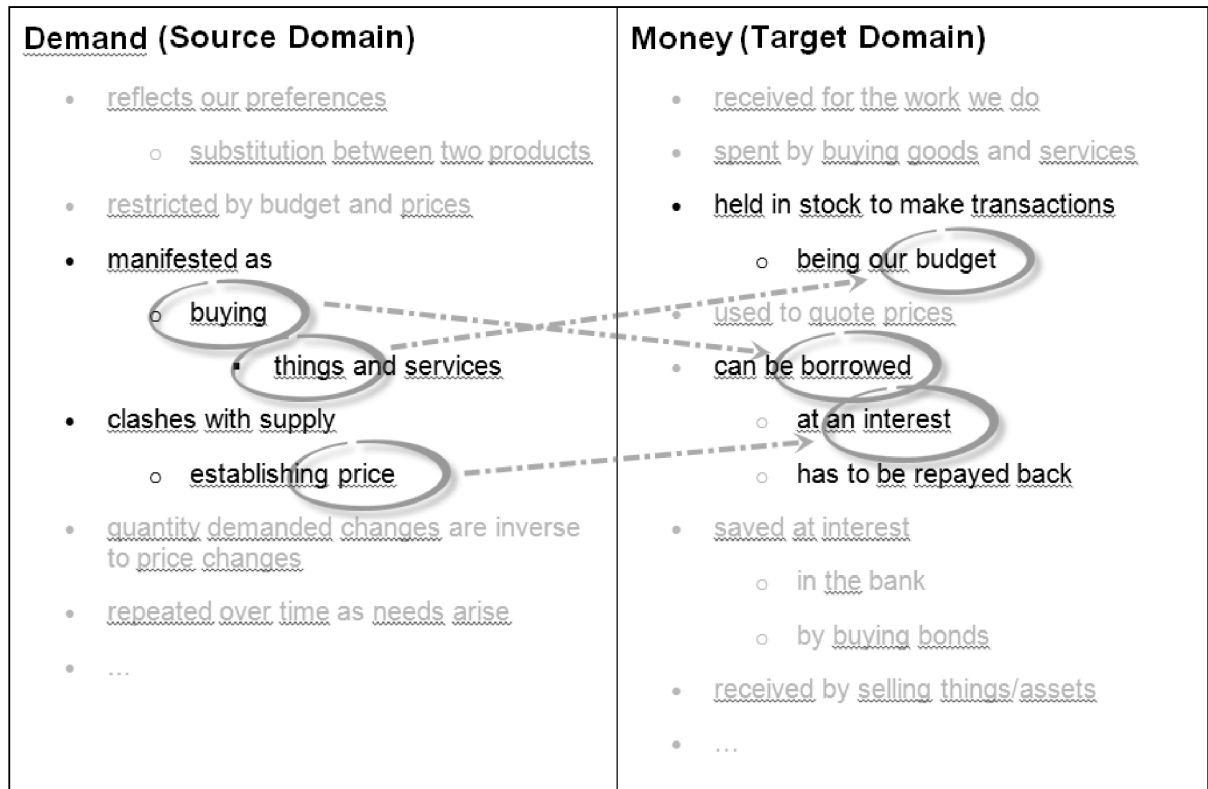
- *Metaphor highlights certain aspects and hides others.* This feature is visualized through graying the hidden ones on the target domain side.
- *Metaphor maps only such attributes, that won't create a conflict in the internal structure of target domain (domain override problem).* This feature is symmetrically visualized using graying on the source domain side. Some of the aspects (nodes) would be “blackened” when further elaboration in commentary finds a mapping for them.
- *Metaphor projects source domain to the target one.* This feature is visualized using the arrows.
- *Metaphor creates aspects in the target domain.* This feature is not visualized and is described in commentary below the figure.

Mapping from the terminological use is just one possible “solution” (*as in* solving an equation which gives a general structure of possibilities) of the potential mappings available in the presented framework. Before we

visualize the mappings of “demand for money” as per terminology, let’s analyze another typical case of “money as loanable funds”.

5. Mapping Demand to Money I.: Loanable funds

Demand plays the role of demand for credit, meaning investment in case of business loans. Money is viewed as a good that is being traded. Just the simple case of balance of investment and savings is taken into account.



Source: author

Fig. 2: Conceptual Mapping – Loanable funds

Mapping displayed reads as follows: we borrow the principal, at an interest, which is the price of money borrowed; taking the loan increases the budget we have.

However, there are more ways the domain table in Figure 2 can be thought of:

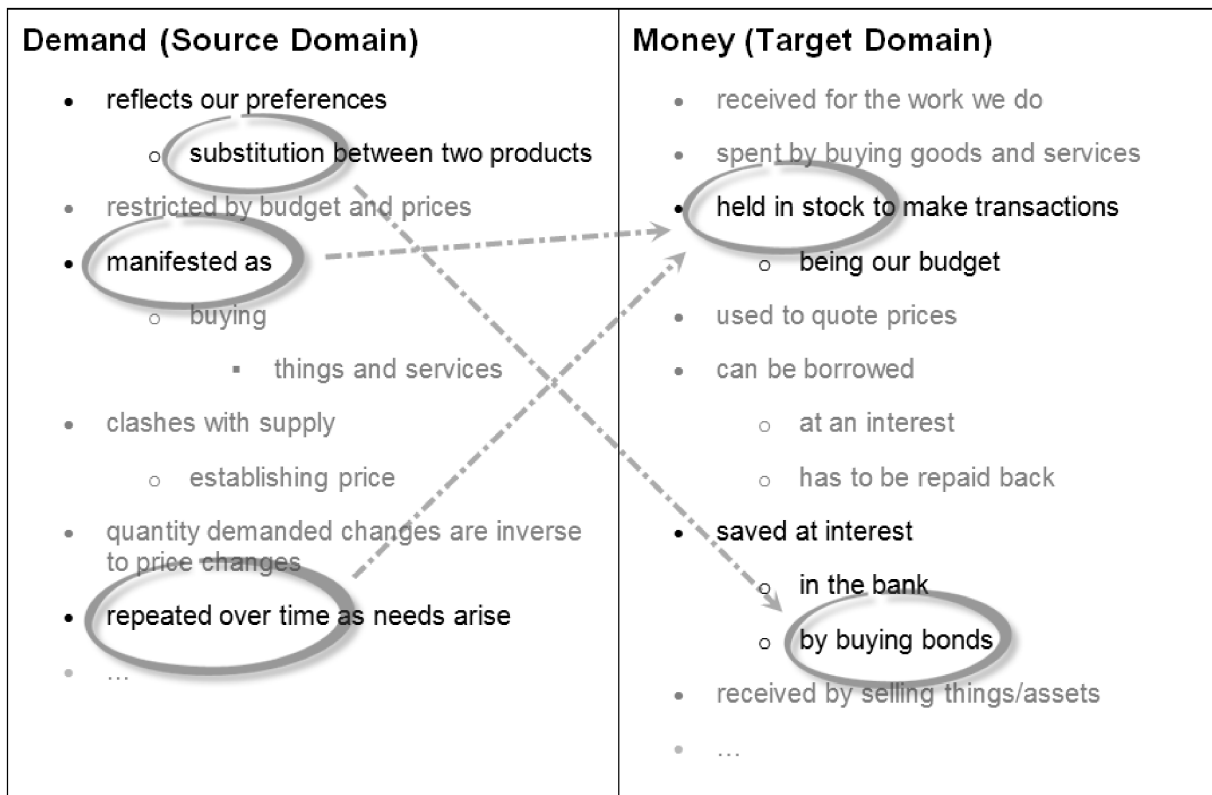
- “Where can be the supply (to clash with) mapped to? It’s the savings in the bank.” (Additional conceptual mapping can be produced on the picture).
- “What we are actually buying? The principal has to be repaid! We actually pay to have the principal at our disposal for a period of time. So it is rather like *renting* a car than *buying* a car.” (The interaction in the metaphor has just created a new node in the demand domain as demand is manifested not only by buying things but by renting things as well.)
- “Is there actually any budget that restricts the demand for taking a loan?” (In other words, is there any appropriate mapping for the node “restricted by budget and prices” within the metaphor?) “For a business loan, the limit for taking a loan is the anticipated return the investment will make.” (Budget is suddenly viewed as a percentage rather than an amount of money, which is a creation produced by the projection). “Private loan has

the very budget of the family to squeeze interest payment into.” (So the budget is the budget we already know, the node stays its usual self).

- “Is there any interpretation of changes in demand and changes in prices? Sure, when the interest rates are low, it might be suitable to take a mortgage.” (The cognitive domain of money has just been broadened by another connotation.)

6. Mapping Demand to Money II.: Demand for Money (terminology)

Demand for money is “[...] *the stock of assets held as cash, checking accounts, and closely related assets, specifically not generic wealth or income*” (Dornbush, Fisher, Startz, 2008). For the sake of simplicity, the discussion of real and nominal balances is abstracted from.



Source: author

Fig. 3: Conceptual Mapping – Demand for Money

Mapping displayed reads as follows: demanding money is holding them in stock for transactions we want to make and replenish this stock repetitively; we decide upon holding cash or interest bearing bonds, depending on our preference.

However, there are more ways the domain table in Figure 3 can be thought of:

- “Is there any price, at which the stock held (quantity demanded) changes inversely to?” (In other words, where to map the “quantity demanded changes” node?) “It is the *interest rate on savings/bonds*. If it goes up, it pays off holding less money in cash.”
- (Making an interaction between domains we can create a new view of demand domain and ask): “Is *holding* a stock of (e.g. durable) goods realisation of demand? Under which conditions can we consider demand to be

repetitive replenishment of stock sought to be held? And how to show that in the PxQ chart with the indifference curves?”

- “Is demanding more money, to hold bigger stock, the same as asking my boss for a pay rise?” (Mapping “manifestation of demand” to “received for the work we do” node) “It is not, unless you plan to spend more as well. Higher pay needn’t be spent and then you would save it by buying bonds, for example, leaving your demand for money the same.” (It is a “mapping trap”, figuratively speaking. Something that may come easily on mind, yet is a misunderstanding of the concept.)

7. Teaching with Metaphors and Analogies

Two different sets of mapping on identically described cognitive domains convincingly show that there is much space to interpret something wrong, in an unwanted manner. Exercise shown above can be concluded with a quote: “*Hence careful analysis of analogy is essential to tease out relevant, irrelevant and misleading features in order to promote understanding where misunderstanding threatens.*” (Aubusson, Harrison, Ritchie, 2006, p. 4)

Using visualization of domains as a board and playing around with conceptual mappings can be a quite entertaining exercise, which has a potential to produce rich and interlinked picture of the concept in students’ minds. Mapping of concepts’ attributes seems to be a general framework for delivering the explanations that actively work with students’ preconceptions and make them think, rather than absorb terminology presented to them. Active exploration of mappings is by definition a thought provoking exercise.

Ways and effectivity of teaching with metaphors and analogies has been subject to educational research in the past decades. A unique collection of papers *Metaphor and Analogy in Science Education* (Aubusson, Harrison, Ritchie, 2006) covers the state of the art research into the topic. There are a few basic learnings presented in the papers.

Harrison and Treagust (2006) warn that analogies are two edged swords and students should not be left to interpret them on their own. However, when used deliberately, with clear distinction of aspects that are the similarities and the ones that are the dissimilarities, the research shows that they enhance students’ learning and links building between past familiar knowledge and new contexts. Such position is explored in this paper in regard to economic education.

Wilbers and Duit (2006) suggest teachers to bear in mind, that their conception of metaphor or analogy employed in the class is different from the one of their students’. Teacher knows both sides of the projection (the analog as a source, and scientific phenomena as the target). Such “post festum” analogy produces different psychological effect than the “heuristic analogy” of students that face only the source side, unacquainted yet with the phenomena studied. Heuristic analogy is rather a way of formulating hypotheses about the target then answering them. There might be a difference in physical science teaching (which is discussed in the paper) and economics, where social phenomena are more or less available to anyone and learning constitutes mainly of learning ways of how to look at them.

Reflecting upon the main educational paradigms, it is clear that in the very core of the idea of metaphorical acquisition of knowledge there is a strong *constructivist position* about the nature of learning. As examples of demand for money have indeed suggested, the understanding of the (economic) concepts is constructed mapping by mapping along the projective path of explanation. Interesting question is, which of the aspects of “construction” are taken *here* into account.

8. Research prospects

Having the stage set, it seems obvious, that much of the claims made above are to be put to an empirical testing. Research questions that will lead such enquiry are to be as follows:

- What kinds of default mappings between selected domains and in what frequency are actually the case in the room full of students? In other words, what the actual preconceptions are?
- Is the default mapping of terminology being learned important for the way students understand the rest of explanation from the teacher? How will students interpret the connection of words “demand for money” before they learn its standard meaning?

- What kind of visual notation will be pedagogically effective for *demonstrating* conceptual mappings to students?
- Is working explicitly with cognitive domains *enhancing* students' understanding of the topic and ability to apply concept to a real-world situation?

Of course, we don't have to stick to "demand for money" example only. As Klamer and Leonard (1994, p. 23) put it: "*Our most "rigorous" scientific expressions are unabashedly metaphorical. When speaking of <price mechanism>, <transmission mechanism>, <inflation>, <human capital>, <policy instruments> <multiplier>, and <accelerator>, we do not intend a literal identification with a machine.*" Apparently there is much more economic terminology left, which can be analysed from the viewpoint of metaphorical mapping, if only for pedagogical purposes.

9. Conclusion

Economic terminology is in many cases based on words that have been taken on board for their metaphorical meaning. Given the *emphasize-and-hide* nature of metaphor, it is advisable to make sure that implicit metaphor in the terminology is not actually diverting us from understanding the economy. McCloskey (1998, p. 46) adds: "*Unexamined metaphor is a substitute for thinking - which is a recommendation to examine metaphors, not to attempt the impossible by banishing them.*"

Explicating the conceptual mappings of metaphors is a prospective way of approaching students with not-so-obvious concepts of economics. *Projecting* one cognitive domain on the other may elucidate the explanations provided by teacher and allows for further exploration by students. That brings about highly appreciated higher cognitive level of thinking and extends students' ability to apply concepts to real-world situations.

Such pedagogical approach has to be thoroughly examined by research, basics of which have been outlined. Studies of teaching of other sciences suggest that it may prove fruitful.

Projection is *of course* a metaphor of thinking, hence learning. Nevertheless, even *teachers* need to grasp somehow what they are actually doing, when teaching using metaphors. In such respect, the projection metaphor of metaphor is sufficiently practical to give them a clue and structure the domain of *teaching concepts* (in economics), which enables them to do their trade in a new way (or at least understand it in a new way). Let such observation be again another example of cognitive nature and importance of metaphors.

Pedagogical assumption of the considerations above is that understanding of rather complex concepts of economics is simply *not solely* students' business. Teachers should aim at delivering *ease of understanding*, not confusing a thought provoking explanation with intellectual challenge imposed by the puzzlement after "the content" has been delivered to their students.

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