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# The pretense of Mathematizing human action: A brief critic towards the neoclassical microeconomic theory

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*The spread of mathematized economic theory was helped even by its esoteric character.*

Debreu, 1991

**Abstract:** This article tries to understand how the Economic Science started a research program identified as the Neoclassical program, founded under the pretense of introducing mathematics as the solely language admitted for elaborating economic theory. This project produced another pretense, that was the endeavour of enclosing human action into different schemas that were compatible with the mathematical instrumental used by the program. We identify two critical moments of the Neoclassical program reshaped the way we understand human action: the pleasure-seeker behavior moment, introduced by William Jevons with the assistance of Jeremy Bentham and the second, called the utility-function era, the one that accompany us until today. Finally, we present some reflections about how a new outlook, based in Aristotelic insights could be very helpful in understanding and studying better human action.

**Keywords:** Economics, philosophy, rational choice theory, neoaristotelism, mathematics

**Resumen:** Este artículo trata de comprender cómo la Ciencia Económica puso en marcha un programa de investigación identificado como el programa neoclásico, fundado bajo la pretensión de introducir las matemáticas como el único lenguaje admitido para elaborar la teoría económica. Este proyecto produjo otra pretensión, que fue el empeño de encerrar la acción humana en diferentes esquemas que fueran compatibles con el instrumental matemático utilizado por el programa. Identificamos dos momentos críticos del programa neoclásico que reconfiguraron la forma de entender la acción humana: el momento del comportamiento de búsqueda de placer, introducido por William Jevons con la ayuda de Jeremy Bentham y el segundo, llamado la era de la función de utilidad, el que nos acompaña hasta hoy. Finalmente presentamos algunas reflexiones sobre cómo una nueva perspectiva, basada en las ideas aristotélicas, podría ser muy útil para entender y estudiar mejor la acción humana.

**Palabras clave:** Economía, filosofía, teoría de la elección racional, neoaristotelismo, matemáticas

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## Introduction

In this essay, we centered our attention in how the theorizing work made by neoclassical economics tried a reductionist endeavour that provoked the mathematization of human action. In a concise manner, we unfold the two principal theoretical perspectives that neoclassicals developed in their efforts of mathematize action. First with William Stanley Jevons, and his pleasure-seeker behavior, feelings are a measurable physical existence, and the agent is reduced until it becomes a mass-point entity. Economic actions are simple part of a binomial action-reaction dynamic, where the agent attracts everything containing positive utility. In the second act, we introduce how nowadays mainstream economics understand human action, releasing another reductionist program where the agent is conceived in means for the efficiency and the effectivity of the research program simple as a preference-satisfaction-seeker who is denied of any symptom of irrationality — every scenario of a possible decision must be settled in advance, and is preconceived with perfect clarity in their minds, there is no place for commitment or a lifelike hesitation where final verdict relies on a simple mental throw of dices, casting overboard all the consistent properties of a well-behaved set of preferences. Finally, we propose an endeavor for a more holistic account of human action, considering some aristotelic notions. Depicting action as the result of a deliberation process that entails considering the partially uncontrolled biological (properly of man and of the randomness of nature) and psychological circumstances, then, the capacity of man to reflect upon his past and embodying the reality of how we learn from others in an undeniable social world, presents action and choice as a spontaneous and haphazard moment where nothing is totally guaranteed.

## Act one: Pleasure-seeker behavior

Let me start with a surname: Jevons. The reflections of William Stanley Jevons, founding father of the marginalist revolution, were the ignition for a new way of understanding and elaboration of economic theory, using a novel mathematical-based approach. Possibly, *The Theory of Political Economy,* written by the very same Jevons in 1830, it's the overture of a new way of economic thinking: there it is plainly posited that human action, specifically human feeling of pleasure and pain, is measurable, quantified, and possible to be incorporated into a mathematical framework[2]. There he asserts that human feeling

[2] The second chapter of *The Theory of Political Economy.* is subtitled as: *Pleasure and Pain as Quantities.* Even though in the first footnote of this chapter, Jevons acknowledges that he, so far as he knew, just only one earlier author treated pleasure and pain as quantities, and this was Francis Hutcheson. Jevons, W. 1880. p. 28

could be determined by the measure of two out of seven proper Benthamite aspects of their own nature[3], intensity, and duration (Jevons, W. 1880. p. 29). These two attributes will be used as anthropological tenets of the economic man to enable, later, the appearance of what is called "Utility". The reasons of this British knight of the social sciences for straining in these undertakings are that the maximization of pleasure is the ultimate object of economics, and along with pain both constitute the unique set of feelings that should be heeded when we deal with economic problems ( Jevons, W. 1880. p. 26).

> "PLEASURE and pain are undoubtedly the ultimate objects of the Calculus of Economics. To satisfy our wants to the utmost with the least effort-to procure the greatest amount of what is desirable at the expense of the least that is undesirable-in other words, to maximize pleasure, is the problem of Economics" (Jevons, W. 1880. p. 37).

Therefore, intensity and duration of feeling are each of them realities capable of being comprised and translated into the numeric realm. However, there is more here, feeling treated as we do now, is reduced to their essential physical form. These two magnitudes, respectively treated as variables, will knit a typical relation very similar to those we found in physics. Jevons arrives to the conclusion that either intensity or duration shall be treated has continuous variables (Cf. Jevons, W. 1880. p. 28). In that sense, it proffer us through an example of how feeling is calculated and obtained: if we assume that intensity 'ever continued fixed, the whole quantity would be found by multiplying the number of units of intensity into the numbers of units of duration' (Jevons, William. 1880. p. 30). And *voilà,* here we have human feeling reduced to the result of a mathematical operation between two physical magnitudes. This theoretic calculation of feeling – because Jevons never carried it out experimentally – is a clear example of how human action could be reduced and circumscribed into a mathematic environment. In one word: mathematized. Seems strange that with the tons and tons of manuscripts*,* *tractatus* and pages attempting to identify the quiddity of both terms, pleasure and pain, now we have the two reduced into a simple numeric value. Nevertheless, Philip Mirowski, with his magnificent *oeuvre*, offers us – from this gloomy and dismal place called heterodoxy – an answer that until today, no 'true' economist presented in an honest and with no qualms in vernacular way: that neoclassical economics built the foundations of his mathematical machinery in Newtonian Mechanics terms, and his reductionist mathematical endeavor was supported by an authoritatively claiming that the nature

[3] Bentham aspects of feeling reckon seven: intensity, duration, certainty or uncertainty, propinquity or remoteness, fecundity, purity, and extent. (Bentham, J. 1781. p. 26).

of economics science was, inherently, quantitative[4]. A proof of the latter, even not in mathematical style, the very Jevons advocates with is prominent prestige the normative journey that the economic science must undertake:

> It is clear that economics, if it is to be a science at all, must be a mathematical science... simply because it deals in quantities… The symbols in mathematical books are not different in nature from language… They do not constitute the mode of reasoning they embody; they merely facilitate its exhibition and comprehension (Jevons, W. 1880. p. 3-4).

Finally: utility, a sort of being-of-reason -if we categorized it in scholastic terms-, it is without single doubt, one of the major conceptual pillars of economic thought. In other words, the one that gives clear aims to every model, and at the same time is the neutralizer for every claim of introducing a normative outlook into theory, operating as a 'positive monster' that safeguards economics of being attacked by suspicious ethical endeavors with metaphysics-ladens. Bentham's utilitarianism is the bedrock for the theory elaborated by Jevons, where he explicitly and without qualms asserts that the definition offered by his brother in arms 'perfectly expresses the meaning of the word in Economics' (Jevons, W. 1880. p. 39). For Bentham, and thus, for Jevons, utility is straightforwardly identified with pleasure. Jevons clearly states that 'whatever can produce pleasure or prevent pain may possess utility' (Cf. Jevons, W. 1880. p. 38). The pleasure that ordinary things produce over man – considered along with pain – belongs to the low rank realm of feelings, the unique ones to be regarded by the economic discipline as the effective ones for a correct approach of it (Jevons, W. 1880. p. 26). Here is precisely the way Bentham addressed it:

> By utility it is meant that property in any object, whereby it tends to produce benefit, advantage, pleasure, good, or happiness (all this, in the present case, comes to the same thing), or (what comes again to the same thing) to prevent the happening of mischief, pain, evil, or unhappiness to the party whose interest is considered. (Bentham, J. 1780. ii. p. 2.)

This equation between utility and pleasure conveys a new definition of human action, specifically for the motives of it, that extracts from it every type of ethical deliberation, transforming action in a sort of attracting-repelling mass behavior, where man is represented as a mere point-mass that deploys attraction towards things with positive utility for him and repels things sensed or felt as despicable. Here we are attesting how the concept of utility produces a reductionist endeavor on the way that action is perceived, and Jevons is the first one to restate it: 'utility is an attraction between a wanting being and what is wanted' (Jevons, W. 1981. p. 80). Without any regards towards the ethical dimension

[4] See Mirowski, P. 1988. *Against Mechanism: Protecting Economics from Science*. Maryland: Rowman & Littlefield.

of life, human action is not assessed under the light of how it should be, but by the light of how it is unfolded instinctively. This British knight subtlty seems to lean on over the shoulders of the modern project, saying plainly that in the science of Economics 'we treat men not as they ought to be but as they are' (Jevons, W. 1880. p. 38). Here there is no room for a quest towards deliberated decision, where we leave space for the possibility of displacement of our own interests, for the sake of others and the fulfillment of moral considerations, something that is a daily dilemma, even in decisions that involve the administration of scarce resources. Amartya Sen, in *On Ethics and Economics* (1987) recovers, I shall say instead, unearth, the Socratic question: how should one live? Trying to arise a conscious call for a more ethical endeavor in economics. If we narrow the motivations of our actions in the way posited by Jevons, there is any space for this question, indeed, if it is simply taken as this, there is more space for a mere animal action account than what we can expect of a realistic approach of human action, an account that contemplates not only pleasure and pain but purposeful actions and commitment, aspects that are doubtless found in an Aristotelian outlook. Alasdair MacIntyre in *Dependent Rational Animals: Why Human Beings Need the Virtues* (2001), suggests that dolphins are not mere impulsive or instinctive creatures merely driven by their appetites: dolphin's actions can be recognized as purposeful directed towards an end, thus leaving space for a kind of lower rationality. Added to this fact, and supporting partially the assertion made by MacIntyre, economists themselves had proved that animals respond correctly to their rational choice model. They showed how simply pigeons and rats responds to certain experimental shocks that are equivalent to price and wealth shocks. This is very ironic coming from the very economists, because one of the criticisms that are directed towards neoclassicism is that all the calculations needed for accomplish one choice under the mathematical framework of their model is far beyond the possibilities of any ordinary human being. Declaring that your model is the most elaborated effort of explaining explicitly human choice but at the same time works fine under animals utters a bit of suspicious[5]. Let's continue with the next part, where we analyze the adequacy of the utility functions in their pursuit of representing a clear artifact of human decision.

**Act Two: Utility Functions: properly for humans, for animals or for cyborgs?**

In this second part, we will take barely a few lines to describe the key elements needed to understand how the utility functions are defined, and how the self-pleasure-seeker behavior dogma was

[5] For more about animals responding to rational choice model see: (Kagel, J. H. et al. 1975)

superseded by a going after satisfaction of preferences and maximization of utility, all beneath the craft of the advent of the rational choice model.

Utility functions are the consequence of establishing a 'well behaved' system of preferences. Economists, consider that our rationality is sustained by a logical structure that is mathematically defined and declare upon it the way humans decide among things, maintaining above all, a non-contradictory character. Let's make this further plain: for establishing their theory, economists work in the abstract domain, where they consider a set of all possible goods that humans could produce. The next step is to drop a supposed rational agent into this mysterious abstract world where all these goods are available and command him to start making choices, trying to order them from the more preferred to the least, following these specific rules that were given to him. Then, what does these rules consist of? There are merely two rules that this agent must bear in mind: completeness and transitivity. The first signifies that this agent must set in a clear way what he prefers in every pair of goods, if he prefers one over another or he is indifferent between them. Here there is no place for hesitation. Then transitivity states that he must be consistent in his choices, and in every three goods comparison, he must always establish a unique way of ordering them that shall be logical, in the sense that if we prefer A in lieu of B and B in lieu of C, without thinking it twice, almost automatically, we declare A in lieu of C[6]. Here we have the rules that permit create ranks of what is more preferred for every rational agent. Goods could be anything that is possible to achieve or to produce, like apples, jeans, or a certain outcome relative to a specific course of action. We can think of anything that we can achieve as humans in a social environment, like health, pleasure, prestige, leisure time, so forth. Here Gary Becker explains it more carefully:

> 'The preferences that are assumed to be stable do not refer to market goods and services, like oranges, automobiles, or medical care, but to underlying objects of choice that are produced by each household using market goods and services, their own time, and other inputs. These underlying preferences are defined over fundamental aspects of life, such as health, prestige, sensual pleasure, benevolence, or envy, that do not always bear a stable relation to market goods and services (see chapter 7 below).' (Becker, G. 1976. p. 5).

The next step consists in telling this agent that he is constrained with the amount of money that he can use for getting hold of all these goods, hence their mission is to choose the perfect combination

[6] Lastly, independence, is the third but not always required condition express that in every moment of choice between two goods, this decision is isolated from any other alternative available. The formalization of all this and more, is clearly exposed in: (Mas-Colell, A., Whinston, D. M., & Green, J. R. 1995). In *1- Preference and Choice.* pp. 3-15.

of goods that should satisfy his preferences and be sure of making some use of all his money. Here, money could be replaced by a manifold of alternatives such us time, bananas, or any other entity with trait of being sensible of convey pleasure or pain, in 'utilitarian': negative or positive utility, and the same time possible of being bartered. In that way, the agent will – without any psychological explanation of how choice making is deployed– instantly arrive to the conclusion that multiple combinations of the available goods or possibilities of action bestow him the same level of satisfaction, but only one, reaches the situation where he is squeezing all his money. At this point the economist is ready to translate all this situation into a mathematical framework[7] and express the idea that everyone is a rational agent, with his preferences always ranked, with an instantaneous capacity, similar as a CPU[8], of refreshing this list whenever new opportunities or incentives come across [9]; also, that it is always urged to achieve the best bundle of goods or possible courses of action that our constrained resources – say money, time, or oranges – permits. Entrusting all this formal apparatus, it is possible to define a utility function that will map, in a cartesian way[10] , how these preferences are revealed, identifying different combinations of goods bundles, with different levels of utility[11]. Therefore, achieving the maximum level of utility, by this automatic selection of goods regarding the restrains, is the final objective of every agent. Gerard Debreu one of the most prominent mathematical economists equals human action to a simple Euclidean vector:

> 'Having chosen a unit of measurement for each one of them (the commodities), and a sign convention to distinguish inputs from outputs, one can describe the action of an economic agent by a vector in the commodity space $R^n$' (Debreu, G. 1984. p. 267-268)

This, finally, could be a simple sketch of the *homo economicus*. Here again, we perceive another palpable attempt to mathematize human action, particularly in a mechanic process that is fundamentally

[7] *Microeconomic Theory* written by Andreu Mas-Colell, Michael D. Whinston and Jerry R. Green is the by far, the most used book for advanced doctoral courses on microeconomic theory under the Neoclassical research program.

[8] Mirowski in *Machine Dreams: Economics becomes Cyborg Science* affirms that after the second world war, economics started to absorb a huge quantity of the knowledge that the RAND with the hegemonic influence of John Von Neumann, produced. This fact led towards a new definition about the rational agent, a definition that contained the notion of *cyborg* describing the economic agent simply as 'a processor of information', capable of not only of maximizing utility with constrains, but also determining Nash equilibria, resolving principal agent dilemmas and moral hazard or asymmetric information problems. (Mirowski, P. 2002. p. 7).

[9] Incentives are one of the most elemental parts assumed in the rational choice model. The assumption goes like this: Everyone is susceptible to incentives. Hence a good incentive would change the current decision of the agent by selecting a new bundle of goods where this latter is somehow incorporated. Economists are described as most experts when it comes to talk about incentives.

[10] In *Against Mechanism: Protecting Economics from Science*, Philip Mirowski in just a few pages presents a clear parallelism between the 'cartesian tradition' and Neoclassical Economic Theory. See (Mirowski, P. 1988. pp. 145-147).

[11] See it in more detail at: (Mas-Colell, A., Whinston, D. M., & Green, J. R. 1995). In *1- Preference and Choice.* p.51.

constructed under assumptions, that with no doubt remits towards real aspects of human action. Such preferences and bounded circumstances, however, are instrumentally defined attaining first, to their mathematical fitness, to the possibilities of being introduced into the majestic realm of real analysis and lastly, almost with distaste, uttering and portraying some real human action traits -*quasi* animal, in my point of view- over these esoteric symbols. Of what is this formalist endeavor made of? and, what is left to add in this *homo economicus* account of human action? This twofold questioning will be our last effort before we are done with this essay. Let's begin with the first one: again, Philip Mirowski can help us by shedding light into this obscure subject matter again. He introduces two main defenses that this crusade of formalism regarded as mystics signs that might had compelled them to initiate his venture. In this opportunity we will refer to the first one[12]. Defense$_1$, if we follow Mirowski notation, is the idea already mentioned by Jevons, that the nature of economics is inherently presented in a quantitative form. Samuelson in his Nobel prize lecture recalled his 'old teacher' Joseph Schumpeter once said that 'the very subject matter presents itself in quantitative form: take away the numerical magnitude of price or barter exchange-ratio and you have nothing left' (Samuelson, P. 1970. p. 1). Debreu anew, takes a real further step in this consideration, insisting over the real quiddity of the 'commodity space': 'The *fact* that the commodity space has the structure of a real vector space is a basic reason for the success of the mathematization of economic theory' (Debreu, G. 1984. p. 268). Apart from the *fact* word, this is clearly an observation that qualifies without hesitation as a simple *a priori* judgement. I shall say it is a metaphysical proposition, that is needless of empirical verification, a dangerous and harmful value assertion as some knights of this crusade affirmed. Pareto 'furiously' talking about the real approach of the social science says:

> 'Such research envisage things exclusively, and can therefore derive no advantage from words. They can, however, incur great harm, whether because of the sentiments that words arouse, or because the existence of a word may lead one astray as to the reality of the thing that it is supposed to represent, and so introduce into the experimental field imaginary entities such as the fictions of metaphysics or theology; or, finally, because reasonings based on words are as a rule woefully lacking in exactness'. (Pareto, V. 1935. p 267).

I would be pleased if one of this positivistic cavalry come and proved me, empirically, *factually*, how is the commodity space perceived sensibly, as a real Euclidean vector. Let's trace where this comes from.

[12] Defense$_2$ consists in defend the way mathematics proffer a more formal environment far away from the vague and sentimental use of words at the time of producing science: 'In this view, mathematical formalism is merely the imposition of logical rigor upon the loose and imprecise common discussion of economic phenomena'. (Mirowski, Philip. 1986. p. 182)

The renowned Vilfredo Pareto condemns with energy those economists that are mudded in their thoughts wasting all his days in 'dilly-dallying with speculations such us ´What is Value? What is Capital?' and do not understand that 'things are everything and words nothing, and that they, may apply the terms "value" and "capital" to any blessed things they please, so only they be kind enough – they never are – to tell one precisely what those things are'. But what is this *thing* of Pareto*,* this *fact* of Debreu that is supposedly recognizable as clear-water about the quantifiable character of economics, again, is just an interpretation; an aprioristic insight about the reality that is subsequentially represented in a mathematical expression. Nevertheless, in Debreu – despite the *fact* episode – as in Pareto we see a clear influence of the positivism movement, that tries to eliminate all types of value judgements from a truthful science research program, only considering judgments sensible of being verifiable as the unique form of meaningful statement, thus constituting the only source of knowledge[13]. Mathematizing human action is the best thing that a positivist could undertake, because under these symbols there it seems no place for opinion or different believes or intentions, all spiritual phenomena impossible of the least sensible observation. There is no room for moral considerations of good and bad, there is only a neutral seek of well-being through maximization of utility. Also, here is either no room for personal commitment that could in some cases -and not very rarely- in less than a second pulverize a whole rank of 'well behaved' preferences.

These last lines concede us with a straightforward passage towards the second question that deliver us to the end of this essay: What is missed in this account of human action that neoclassical economics purposed? What we stand for here is a more realistic account of what is being human, that could be achieved throughout a holistic perspective; one that is capable of introducing biological and psychological insights as the bedrocks of their account and at the same time has neither qualm of listening the sage voice of philosophy. Indeed, this would entail the withdrawal of most of the mathematical apparatus created by neoclassicals, but at the same time would introduce essential concepts such as commitment, belief and faith, notions that certainly – if we were in possession of the motivation history of any layman's actions – does multiple checkmates a day to this kind of instinctively preference-seeker behavior. But what we truly expect for this new account by far, being the key features, are the concepts of purposeful actions and practical reasoning, two dimensions of prudence, the Aristotelian virtue. In his recent book *Aquinas and the Market: Toward a Humane Economy*,

[13] Here A. J. Ayer, give us clearly the idea behind Pareto's and Debreu's position: 'Metaphysical utterances were condemned not for being emotive, which could hardly be considered as objectionable in itself, but for pretending to be cognitive, for masquerading as something that they were not'. (Ayer, A. J. 1959. p. 54). Cited in (Caldwell, B. 1994 p. 14).

Mary Hirschfeld, criticizes the rational choice model and introduces through the Thomistic tradition, plainly influenced by Aristotle, the idea that our actions are always steered towards an end: our personal depiction of what is good life. Every *momentum* previous of action considered in their singular uniqueness, is the site of what we call practical reasoning, the ability that 'allows us to discern order in a world of myriad particulars, so that we can order our acts toward our end (which is also God's end) wisely' (Hirschfeld, M. 2018. p. 113).

It is proper of prudence – the headquarters of practical reason – the indetermination of method of choice: there is no manifest mental process possible of being perceivable during our decisions about whether we decide over different ends, even over simple commodities. Sometimes our hesitation is so that our final verdict relies on a simple mental throw of dices, casting overboard all the consistent properties of a well-behaved set of preferences. Secondly, the haphazard trait of life plus the continuous acceleration[14] of how choice scenarios are presented nowadays, contributes with our a priori impossibility of real mental control, making the alleged risk calculator behavior under uncertainty capable of modeling probability distributions about any event, simply hilarious scientific fables proper of a cyborg science, the ones that Mirowski (2002) in his book depicts. Finally, prudence and with it, the spontaneous exercise of practical reason under a world filled with the lawless impetus of how dilemmas of choice are presented plus the intrinsic social status that compels man to integrated it every time he acts, creates potential situations where we can learn how to act and choose by inviting our past and the others: reflecting about how we acted and how the others have tried the same is considering our life as a progressive trial and error where men continuously are learning about their and other's previous actions trying to reach little by little more perfectible situations or status.

**Final Act: Conclusion**

In this occasion we conveyed some reflections about the mathematization in economics, particularly what means and implies to mathematize human action; an attempt clearly made by neoclassical economics. In that sense, two historical accounts of human action will be briefly presented here. In first place, we present one of the premiere Neoclassical economists, William Stanley Jevons, and his pleasure-seeker behavior model. Secondly, we offer an explanation on how the utility functions are defined and how the self-pleasure-seeker behavior dogma was superseded by a going after satisfaction of preferences and maximization of utility, all beneath the craft of the advent of rational choice model.

[14] For the concept of acceleration of life see: (Rosa, H. 2013).

By the end we address some initial reflections about what would be due consider if we start to think in a more comprehensive approach to human action, taking a glimpse to an aristotelic outlook.

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