



**TRABAJO FIN DE GRADO
GRADO EN ECONOMÍA (INGLÉS)
CURSO ACADÉMICO 4º
CONVOCATORIA TERCERA**

**AN INQUIRY INTO THE FOUNDATIONS AND LIMITS OF ECONOMIC
SCIENCE**

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En Madrid, a 17 de junio de 2024

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INTRODUCTION

La razón humana es grande cuando reconoce que tiene un límite

Padre Pablo Domínguez

Within the intricate tapestry of human knowledge, the area of economic science stands as a formidable, yet profoundly misunderstood field. All throughout its history, attacks have been mercilessly leveled against its theorems and, most troublingly, its very validity as a field of study. This, however, was always to be expected. The search for and recognition of immutable laws that govern human action and the behavior of human society flies directly in the face of that innate desire of man to shape the world around him according to his will. The logos that believed itself unlimited found in the social realm, like it did in the domain of the natural sciences before it, bounds which it could not surpass. It found limits that circumscribe the endeavors of acting man. Economics, by acknowledging these limits, always stood as an affront to those autocrats and democratic majorities drunk with power.

Unfortunately, many economists have fallen prey to these erroneous critiques. They have incorporated them in their methodology and rebuilt the edifice of our science upon the false assumptions of these charges. Thus, they have unwittingly exposed economics to even more attacks, many of which, now, due to their misguided efforts to acquiesce, are entirely legitimate. The role of this essay is not to propose a new paradigm under which to study economic phenomena, but to rightly characterize the method which economists have used since the advent of our science more than three centuries ago.

The first of the upcoming chapters will serve as the philosophical foundation for the rest of the essay. It begins with a consideration about the nature of human knowledge itself and our man's quest for certainty and truth. Then, we will turn to the questions of science: what separates science from non-science, what are its essential features, what are the branches of science and what is the role of complexity in scientific explanations. This first part establishes, among other things, the correct place of economics within realm of science.

Next, the second chapter details the nature of the phenomena with which economic science deals. It is important that this exposition of nature precedes that of method, because, contrary to the dogmas of scientism and positivism, it is the nature of the phenomena which details the method available for their study. Economic phenomena, as essentially subjective and mental, cannot possibly be studied by pure observation. The third chapter will then, in accordance with the exposition of the previous chapter, detail the method of economic science. It will be shown how limited we really are in the explanation of these phenomena and, even more so, in their prediction and testing.

After having thoroughly described both the nature of our problem and the procedure of economics, the fourth chapter will tackle some of the most significant errors that are firmly held as dogmas today. Among these, positivism and scientism are the biggest threats to genuine intellectual inquiry and have had the most pervasive effects on much of academia and the general population. A critique will also be provided of some less significant views or positions, like the attempt at precise predictions through statistical methods in macroeconomics, the

standard perspective on the nature of equilibrium analysis, and the use of game theory to analyze social cooperation in the market.

Finally, one last chapter will provide a few additional philosophical considerations which will serve as a fitting conclusion. These will cover some topics of political philosophy and policymaking, metaphysics and scientific ethics.

ON KNOWLEDGE AND SCIENCE

I. Skepticism and Common Sense

The most fundamental question of any epistemological inquiry, the one that precedes any other, is whether we can attain any knowledge in the first place. If the answer turns out negative, that will be the end of our investigation. Radical skepticism, the theory that men cannot reach any knowledge, if true, undercuts the entire field of epistemology. It is most appropriate, therefore, that we start here.

Whether we can truly know anything at all is not, as it may appear at first, a trivial question. Although it seems immediately obvious that we can indeed know or are justified in believing certain things, upon some reflection, doubts about this perception can be raised. We are often mistaken in our beliefs: we commit logical errors, we sometimes misremember past experiences, and we often perceive things that aren't so. Doubt thus begins to set in about our current beliefs and perceptions. Can I really trust my senses if I know they have led me astray in the past? When I dream, I'm rarely aware that I am indeed dreaming, everything seems real. Can I be sure that I am not dreaming right now? Is it possible that all my experiences are illusions, and I am actually a simple brain in a vat? This is the standpoint of skepticism. We cannot truly know or justify our beliefs. I cannot know whether I am a brain in a vat or not and, therefore, I cannot know that what I experience is real either. Man can never hope to attain knowledge.

Skepticism, and particularly global skepticism, is rarely ever taken seriously by philosophers, and rightly so. But the arguments against it usually fall flat due to the skeptic's incessant doubts. Take, for example, René Descartes, whose philosophy most famously begins with such universal doubt. In his *Meditations* (2008, pp. 13-17), Descartes starts by pointing out that his senses have deceived him in the past and he therefore cannot trust them. He looks for an infallible belief, a necessary truth which he believes can only be afforded by the *cogito ergo sum* (I think, therefore I am). In this way he achieves a foundational, absolutely certain belief upon which to rebuild the entire world of human thought. However, this bedrock belief is illusory, for if Descartes had been consistent in his application of doubt, he should have questioned whether it was in fact "him" who was thinking, which already presupposes his own identity and existence (Russell, 1945, p. 567). But, more than that, a consistent skeptic would not and should not stop his doubts at the external world and his senses, he should carry forward his doubts to his rational capacities and his memories.¹ Descartes never doubts his reason. He never puts it on trial, even if it has, like his senses, deceived him in the past.

If he had been as skeptical with his reason, he would never have reached any foundational belief. No belief could ever pass such a test, for he would be trying to prove the reliability of reason through reason itself, which obviously commits the fallacy of begging the question. Proving the reliability of an instrument, therefore, must necessarily be done through

¹ In Descartes, M. Moriarty (Trans.), *Meditations on First Philosophy With Selections from the Objections and Replies* (Oxford: Oxford University Press, 2008) p. 17, Descartes does imply to doubt his memory, but he is not consistent in this particular doubt either. He claims that he "believe[s] that none of those things represented by [his] deceitful memory has ever existed", but if that were so, he would have no reason to doubt anything at all. He only began to doubt his senses because he *remembers* a time when they weren't infallible. If he rejected all memories, he would have no basis for doubt.

something else which is prior or higher than the instrument itself. But this principle also applies to the skeptic. Proving the unreliability of reason through reason is clearly contradictory. I cannot know that I know nothing, and, of course, the skeptic recognizes that. He does not claim to know that we cannot know, but merely points to the possibility. But he does so with arguments, which, like all arguments, attempt to reach or justify a conclusion from certain premises. So, if the arguments are valid and convincing they would serve to contradict the skeptical position, but, on the other hand, if they are bad or invalid, that's all they are, bad arguments. The skeptical position is, therefore, a performative contradiction. The way in which the skeptic defends his position implies self-refutation. Universal doubt, thus, undermines the very reason for itself.

There is another sense in which one can understand skepticism, however. Rather than a philosophical position, it may be a method of arriving at knowledge. One begins doubting everything until he finds out what cannot be doubted and, from there, attempts to build up again the edifice of his knowledge from absolutely certain foundations. It should be readily recognized at this point that all the previous critiques also apply to this view. Beginning with doubt, one cannot establish any foundation unless he is inconsistent with his method. One must trust, at the very least, the laws of logic. But, furthermore, doubt is not a good procedure to attain true knowledge. No one has ever truly began to know anything through skepticism. As the Greeks pointed out, it is wonder that impels man to seek knowledge.² But instead of wonder, the skeptic replaces it with doubt or, rather, distrust, which inevitably impedes the attainment of knowledge. In order to investigate a topic, one must first be able to formulate a question to guide his investigation, which, in turn, can only be done successfully with some knowledge of the subject matter. If the skeptic truly rejected all previous knowledge, he could never, from that point, move forward in his quest for truth.³

There exists no formal proof that our senses, our reason, or our memories are reliable. It is not logically inconsistent to believe that one is a brain in a vat whose experiences are mere illusions caused by some scientist in the actual reality. But we can know that they are indeed reliable. We know it in the same way that we know that other people exist or that when I feel pain in my hand I am actually in pain. It is simply common sense. Although the remote possibility may exist that everything one has ever experienced and thought is indeed a lie, there is no good reason or evidence to believe it. Absolute, unequivocal certitude is not needed to know, otherwise we would never know anything. The term "knowledge", as it is commonly used, has nothing to do with absolute certainty. I can know, for example, that my mother loves me even if I cannot prove it beyond *any* doubt.

That we cannot ever hope to achieve such a level of epistemic certainty does not imply that we must therefore reject everything we ever held to be true. Instead, we should hold the rational presumption that things are as they appear to be, unless we have specific grounds for doubting those appearances. For instance, if some appearances contradict others, there are clear

² See, for example, Aristotle, *The Metaphysics*, translated by Hugh Tredennick (London: Heinemann Ltd, 1933), Book 1, part 2, 982b: "It is through wonder that men now begin and originally began to philosophize; wondering in the first place at obvious perplexities, and then by gradual progression raising questions about the greater matters too".

³ Following Aristotle, *op. cit.*, Book 3, part 1, 995a: "those who start an inquiry without first considering the difficulties are like people who do not know where they are going; besides, one does not even know whether the thing required has been found or not. To such a man the *end* is not clear; but it is clear to one who has already faced the difficulties."

grounds to doubt the less justified appearances. Appearances can serve as sources of epistemic justification because they are not beliefs (they are mental states in which something seems to be so), and so they couldn't be justified. Some types of appearances may be sensory experiences, memory experiences, introspective appearances and intuitions, thus covering the usual sources of knowledge, namely sense perception, memories, discursive reasoning and the testimony of others (that is, we trust in the appearances of others unless we have grounds for doubting either their appearances or their testimony's veracity). This view, which has been termed phenomenal conservatism, is the position held by several contemporary philosophers and it appears, at least to the present writer, to describe in a generally correct manner the way in which men actually form beliefs and consider their beliefs justified.⁴

II. On Certainty and Truth

As limited, finite beings, men can never hope to achieve ultimate epistemic certainty. Their rational capacities can doubt themselves for they realize that there exists something outside of their control. Only the omniscient, supreme being may have such absolute certainty, since the existence of everything else depends upon him. But it is of no use to dismay over this fact. That is simply the human condition, how we live and how we have always lived. Man's search for knowledge and certitude is, however, unlimited; and the recognition of our own ignorance with regards to the ultimate structure of the universe and the last things produces in man a feeling of anguish. Over the ages, metaphysical and theological speculation have served to remove this anxiety. They appeal to something other than man, something which transcends the human condition, therefore recognizing our own inadequacy in dealing with these issues.

We can never hope to achieve such absolute certitude with regards to the entirety of the structure of our knowledge, but we can have certainty within particular frameworks. In his quest for knowledge, man creates distinct systems to explain certain parts of reality, which he calls sciences⁵. These systems all stand upon presuppositions about human knowledge and the structure of the world, among them those that have been explained in the previous section. It is given these presuppositions, which no one would ordinarily doubt, that we can claim to be certain of a scientific fact. For instance, within economics, we can have total certainty of the truth of the law of diminishing marginal utility, given that the fundamental laws of logic really do describe reality.

Certainty thus reflects the scope of our inquiries. The more fundamental our questions are, the less certain we can be about our answers, for first principles provide justification for themselves. To doubt and justify them on further principles would make them no longer first principles. Therefore, ultimate epistemic certainty is not possible because we don't have access to the ultimate structure of reality; but assuming, as we have, that things are as they appear to

⁴ For the first formulation and defense of this view, see Huemer, *Skepticism and the Veil of Perception*, (Lanham: Rowman & Littlefield Publishers, 2001), for a more general introduction to phenomenal conservatism and the discussion between skepticism and foundationalism, see Huemer, *Knowledge, Reality and Value*, (Boulder: Independently Published, 2021), pp. 80-113. Something like phenomenal conservatism seems to be implied by Popper in *Conjectures and Refutations: The Growth of Scientific Knowledge*, (Abingdon: Routledge, 2002), p. 36: "There are no ultimate sources of knowledge. Every source, every suggestion, is welcome; and every source, every suggestion, is open to critical examination. [...] The proper epistemological question is not one about sources; rather, we ask whether the assertion made is true--that is to say, whether it agrees with the facts."

⁵ See below, pp. 12-13

be, we have a foundation to which we may trace back all our knowledge and from which certainty can sprout.

Absolute certainty is not a prerequisite of knowledge, but truth is, and one need not be certain to hold a true belief. Truth is the reflection of reality on one's beliefs, it is the *adaequatio rei et intellectus*. To say that something is true is to say that it is real, that it exists. It is the property of being in accord with reality. Therefore, truth corresponds with being.⁶

This is the correspondence theory of truth, the one which has prevailed ever since Plato's attacks on the relativism of the sophists. Whatever some philosophers may say, this view is patently correct. It spells out what the meaning of "truth" actually is in ordinary language. Any other theory simply misses the mark and ignores how the term is used.⁷

Now, if truth depends on reality, something must be either true or false. It cannot be that something is both true and false at the same time, or neither. But there are gradations in truth. The more accurate or informative a statement is, the truer it is. Take, for instance the following statements:

A. Socrates is not a dog.

B. Socrates is a man.

C. Socrates was a Greek philosopher of the fifth century BC.

All of these statements are true, but statement B clearly reflects more of reality than statement A, in so far as statement B is positive, while statement A, being negative, only excludes the possibility of Socrates being a dog. Thus, we can say that statement B is truer than statement A. Similarly, statement C is truer than A or B, since it is more informative, it describes more of reality.

However, a significant criticism can be made here. It might be argued that this idea of degrees of truth violates the law of the excluded middle, namely that a proposition may be either true or false, there is no third alternative. But this criticism misunderstands the nature of both the gradation of truth and the law of the excluded middle. The law applies to individual statements, while the degrees of truth are compared between different propositions. Take statement B: Socrates is either a man or he is not, there is no other option. But statement C, being different, expresses more of reality than B and so is truer. In their search for truth, men seek to replace less true or informative beliefs by truer or more informative ones.

Finally, that truth depends upon reality does not mean that there are no subjective truths. It is fairly obvious that there are. Within economics especially, we are confronted with many notions which depend upon the individual agent, among them: value, utility, means, ends, scarcity, time, profit and cost. This, however, does not mean that we cannot say something objectively true about these concepts. For example, the statement "value is subjective" is, itself,

⁶ "To say of what is that it is not, or of what is not that it is, is false, while to say of what is that it is, and of what is not that it is not, is true" says Aristotle, *op. cit.*, Book 4, part 7, 1011b25.

⁷ In modern times, new theories have sprung up, the most important of which are pragmatism, which identifies that which is true with something that is practical or good to believe, and the coherence theory, which views that which is true as something that can form part of a coherent set of beliefs. From these views, it follows that something is true for me if it is good for me to believe it or if it coheres with the rest of my beliefs. Truth is no longer absolute, it is relative, for they make the truth of a statement depend on something which, unlike reality, is not absolute and may depend on the subject. Consequently, these theories inevitably lead to some form of relativism, an obviously self-contradictory position: is the truth of relativism relative?

not subjective but objective. In economics, therefore, we deal with objectively true facts even if they are the result of subjectively held beliefs.

III. The Analysis of Knowledge

Probably the most important debate between epistemologists today concerns the definition of knowledge. Since epistemology is the theory of knowledge, we might want to know what knowledge is before we move on to other questions.

According to the usual historical account, the traditional view on this matter was that knowledge meant “justified true belief” (JTB in short).⁸ This means that, with regards to P, to know that P (1) a person must believe that P, (2) P must be true, and (3) the person’s belief in P must be justified. If a person doesn’t believe that, for example, the Earth is round, it is obvious that he does not know it. Similarly, if a person believes that the Earth is flat, since it is not, he does not know that it is flat. Belief and truth are therefore necessary conditions of knowledge, but they are not sufficient, justification is also required. To illustrate why that is, let us use a practical example:

Imagine two people, Robert and James, who both believe that it will rain tomorrow. Robert believes it will rain because he saw it on the weather forecasts, and he knows that the forecasts tend to be generally reliable. He also knows that it’s been getting colder for the past couple of days and that the clouds are turning darker, which usually indicates it might rain. On the other hand, James is quite credulous. He believes it will rain because he took a coin and thought to himself: “If it lands on tails, it’ll rain tomorrow”. Then, he flipped the coin, and it landed on tails. This is his sole reason for believing that it will rain. If it does in fact rain tomorrow, did both men know it would rain? Robert definitely did since his belief was justified, but James did not. His belief was formed through an unreliable process. He took a stab in the dark and just happened to be correct. James simply had a lucky guess.

Knowledge was therefore taken to mean justified true belief. But in 1963, Edmund Gettier published a short paper providing two counterexamples which revolutionized the entire field of epistemology. These examples showed cases in which a person had a JTB, but we would not ordinarily claim they had knowledge.⁹ Instead of presenting these examples here, it will suffice to use a simpler one due to Bertrand Russell (2009, p. 113):¹⁰

⁸ It is not clear whether this view was actually the predominant one. There were some specific philosophers who did advance such a definition, but it seems that the acceptance of it in the past has been widely overstated. Edmund Gettier, the man responsible for the view’s refutation, claimed in his original paper that it could be found in Plato’s *Theaetetus* 201d and *Meno* 97a-98b, but Plato’s statements are not quite clear on the matter. Even if they were, however, it would be quite a stretch to claim there was an actual tradition supporting this definition. As shown below, in fact, this should not be surprising, for the emphasis on the analysis of concepts (defining words) was a recent development in the history of philosophy. On the rejection of the historical account, see Plantinga, *Warrant: The Current Debate*, (Oxford: Oxford University Press, 1993), pp. 6-7: “Of course, there is an interesting historical irony here: it isn’t easy to find many really explicit statements of a JTB analysis of knowledge prior to Gettier. It is almost as if a distinguished critic created a tradition in the very act of destroying it.” Plantinga then proceeds to name C. I. Lewis and A. J. Ayer as two examples of philosophers who did explicitly state the JTB view, hardly a tradition.

⁹ Gettier, “Is Justified True Belief Knowledge?”, *Analysis*, vol. 23, issue 6, June 1963, pp. 121-123.

¹⁰ Russell provided the example of the stopped clock long before Gettier published his paper. But he did so to show that justification is needed to have knowledge. He failed to realize that it disproved the JTB formulation.

Mike has an analog clock in his office, which he always checks to know the time. One day, he enters his office and looks at the clock. It reads 9 am, the usual time he enters his office, so he believes that it is in fact 9 am. The belief seems justified: the clock always indicates the correct time. However, unbeknownst to him, the clock had stopped the night before at 9 pm, but coincidentally it is actually 9 am, so his belief is correct. Thus, Mike has a justified true belief about it being 9 am, but it does not seem like he *knew* it was 9 am.

Following the publication of Gettier's paper, there have been countless attempts to provide a new definition of knowledge which correctly categorized the now-called "Gettier problems" as not knowledge. All of them without exception have been followed by counterexamples showing their inadequacy.¹¹ It is not our task here to delve into any of them, but it will be important for our following discussion to highlight one point. Zagzebski (1994) has argued that the two conditions of JTB – that is, justification and truth – being independent made Gettier problems inescapable. If justification does not guarantee truth, there could always be Gettier cases. Take, once again, the stopped clock example. Mike looks at the clock and forms a justified belief. At any other time, his belief would be false, but, by pure chance, it just so happens to be correct. Since justification does not imply truth, we can form justified false beliefs which, by pure chance, can be made correct. This applies not only to the justification condition, but also to any other condition which may be added to "true belief" which does not guarantee the truth of the belief.

Being this the issue at the root of Gettier problems, it is clear that a solution must connect the truth of the belief with its justification. A recent proposal by Thomas Bogardus and Will Perrin (2022) attempts to do this. Their view, explanationism, defines knowledge as the belief in something "because it is true". A belief is knowledge if and only if an "appeal to the truth of the belief enters prominently into the best explanation for its being held". In this manner, the truth of the belief and the additional condition are inseparable. If something is believed because it is true, then it necessarily is true. Going back to our example, Mike had a JTB about it being 9 am, but it didn't count as knowledge. Explanationism accounts for this in the following way: Mike believed it was 9 am because the clock read 9:00, but the clock didn't read 9:00 because it was in fact 9 am, but rather because it had stopped at 9 pm the previous evening. The truth of the belief did not figure crucially into the explanation of why Mike held the belief, so it cannot count as knowledge. It appears that this analysis of the concept of knowledge brings us much closer to a correct definition, but there is an important reason why the very attempt at analysis may ultimately be misguided.

The emphasis on analysis among contemporary philosophers is due to the proliferation of analytic philosophy, which gained prominence around the turn of the 20th century. Inspired by Hume, the logical positivists considered that knowledge could only be of two kinds: a posteriori (empirical) and synthetic, and a priori (non-empirical) and analytic. Analytic propositions are tautological, their predicate is contained in their subject. The truth of analytic statements depends exclusively on the meaning and definitions of the words. For example: "all bachelors are unmarried". In their view, since synthetic knowledge was necessarily empirical and philosophy was clearly not, philosophy had to study analytic propositions. The main task of the philosopher was, therefore, to analyze concepts, that is, to reduce complex concepts into

¹¹ For a survey on the various attempts and counterexamples, see Shope, *The Analysis of Knowing: A Decade of Research*, (Princeton: Princeton University Press, 1983). The book appeared around two decades after the publication of Gettier's paper and already contained several tens of definitions and 98 cases.

their simpler parts from which to form a definition through formal logic and mathematics.¹² For example, knowledge according to the JTB view would be expressed in this way:

S knows that P if and only if:

- i. S believes that P,
- ii. P is true, and
- iii. S is justified in believing that P.

Therefore, the concept KNOWLEDGE is built up from the simpler concepts BELIEF, TRUTH, and JUSTIFICATION. These other concepts would then have to be analyzed and broken down into their simpler components until we reach the few simple concepts which do not depend on any other.

It is expected, or assumed, that anyone who understands a concept will be able to, through introspection, define it successfully. But philosophers have consistently failed to do so for over a century. The analysis of knowledge is not alone in this regard, as Huemer (2015) has pointed out, “no generally accepted analysis of any philosophically interesting term has yet been devised”. And it is for good reason. This theory of concepts, which Huemer has identified with the Lockean or Humean view, is simply wrong. With very few exceptions, we do not begin to understand the meaning of words by knowing their definitions, but rather through use and imitation. We understand the meaning of a word by having the appropriate *disposition* to use it, that is, by “being disposed to apply the word to the things that it applies to, and not apply it to the things it doesn’t apply to” (Huemer, 2021, p. 129). It has been amply corroborated that children learn language through observation and imitation. We observe others using certain terms and understand their meaning through their context and continuous use. Afterwards, we attempt to form definitions of the concepts we use by *recognizing* how they are already being used. But these definitions cannot be perfect one-to-one representations of the meaning of concepts, for concepts are dispositional mental states, and so cannot be completely introspectively observable.

Language is a social institution. Our knowledge of it is mostly tacit, it is a knowledge of *how* to use certain words and not of *what* they exactly mean.¹³ We learn concepts through habit and practice, so they cannot be formalized in the scientific and logical manner that the analytic philosophers would like to. A very similar thing, as will be shown later, happens with the knowledge relevant to the economic and market processes.¹⁴

Finally, let us state that the very manner in which analytic philosophers have proceeded in their attempt at analysis demonstrates the tacit nature of concepts. The philosopher provides a definition to classify a belief as either knowledge or not knowledge, then another philosopher

¹² This movement towards analyticity and the relation between language, speakers and the world has been termed “the linguistic turn”. On it, see Glock, H.-J., & Kalhat, J., “Linguistic Turn”, *Routledge Encyclopedia of Philosophy*, 2018, doi:10.4324/0123456789-DD3600-1. The paper states that the linguistic turn originated with Wittgenstein, but it has been traced by to Frege and Bergmann by other philosophers.

¹³ On the distinction between know-how and know-that, which will be helpful for the understanding of economic phenomena, see Ryle, “Knowing How and Knowing That: The Presidential Address”, *Proceedings of the Aristotelian Society*, vol. 46, 1945, pp. 1-16. The main theorist of tacit knowledge was Michale Polanyi, whose main work on the subject is *Personal Knowledge: Towards a Post-Critical Philosophy*, (New York City: Harper & Row, 1962). For a smaller work introducing his views on the subject, see Polanyi, *The Tacit Dimension*, (Chicago: The University of Chicago Press, 2009).

¹⁴ See below, pp. 19-21.

gives a counterexample in which the definition classifies something which is not knowledge as knowledge. This procedure could not work if we didn't already know what knowledge was. It is because we already know, because we have the right dispositions to use the term, that we understand that a particular counterexample shows that a definition is incorrect. If we didn't previously tacitly understand that Mike did not know it was 9:00, we could not disprove the JTB definition.

Through introspection we may get closer to the analysis of concepts like knowledge, justice or freedom, but most concepts could never be fully analyzed. Their boundaries are blurry. Most human knowledge is tacit. Most of the knowledge that guides our actions, the knowledge of norms, techniques, concepts, traditions and values cannot be articulated. It cannot therefore be scientifically formalized.

IV. Science and the Search for an Ultimate Foundation

The problem of the demarcation of science has been at the forefront of epistemology since the early decades of the 20th century. The logical positivists, in their crusade against non-empirical knowledge, held to the belief that a theory could only be considered scientific if and only if it could be verified through observation. Karl Popper later rightly showed, following Hume, that it is impossible to empirically verify a theory due to the problem of induction, but he simply replaced the criterion of verifiability by that of falsifiability.¹⁵

For Popper, what separates scientific from non-scientific (or pseudo-scientific) statements is the fact that the former could come into conflict with observable events. A scientific theory must be able to predict a future event in such a way that there may be conceivable observations which could not possibly occur were the theory correct, which would

¹⁵ In essence, the problem of induction could be summed up in the following way: there is no reason to assume that the conclusions we draw from our limited past experience will apply to the potentially infinite instances of which we have had no experience. There is no logical justification for the expectation that, given the frequent conjunction of two or more objects in our observations, these objects will continue to appear always in conjunction. For instance, if, in our entire lives, we had only seen black cats, we would not be justified in expecting that all cats were black. Of course, this example may appear rather obvious, as we know that there are non-black cats. But it applies just as well to the expectation "cats can't speak English". Now, of course, this belief is much more justified. We have formed anatomical and psychological theories about the requirements for speech, which have not yet been falsified, which explain why cats can't speak English. But these theories remain conjectures – tentative statements – because we can't guarantee with complete certainty that a future observation (e.g. a cat that speaks English) may falsify them. See Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge*, (Abingdon: Routledge, 2002), p. 55.

However, it is my belief that Popper goes too far in making his case. He denies the a priori validity of the expectation of finding regularities in nature, i.e., the expectation that there are constant relations in the succession of events. In denying this, Popper must claim that, given two states of the world which are completely identical at time t₀, the two states may not remain identical at t₁. Now, if they are not equal at t₁, it must be because some factor caused the difference to appear, and this factor had to be present at t₀, which would mean the two states were not actually identical. Denying the a priori validity of causation is therefore contradictory. It leads to the belief in uncaused and undetermined events. If there is no regularity at all, man could not expect anything, and all knowledge would necessarily be a recollection of past events which could not possibly be interpreted in light of any theory. Instead, I hold to the belief that if A was followed by B under certain conditions, given the same conditions B will always succeed A. Consequently, the problem of induction is not caused by a lack of regularity, but rather by our incapacity to fully determine and control all the conditions that enter into the determination of B after A. See Popper's statements on the matter in Popper, op. cit., p. 63: "the expectation of finding regularities is not only psychologically a priori, but also logically a priori [...] But in spite of being logically a priori in this sense the expectation is not valid a priori".

therefore falsify the theory (Popper, 2002, p. 51). Scientific theories are conjectures or hypotheses of real, observable events. The scientist aims at a true explanation of reality, not simply at a useful theory. But, due to the impossibility of genuine induction, the theories remain tentative, that is, they cannot be verified and must remain as informative conjectures. The scientist can never be certain of the truth of his theories, only of the falsity or incompleteness of those theories which have been falsified by observations (Popper, 2002, p. 154).

Either the verificationist or the falsificationist views seem to have been accepted by a wide variety of scientists and laymen. But, on the contrary, the philosophy of science has moved past them. Kuhn created the first doubts in the minds of philosophers. Then Feyerabend mounted a frontal critique of scientism and Lakatos attempted to reconcile Kuhn with Popper. But it was Laudan, in his now famous paper, who finally put to rest the empiricist doctrines of demarcation.¹⁶ There are two main critiques we can make of empiricist solutions to the demarcation problem: (1) it does not actually reflect what science is, and (2) it is a trivial issue.

In a manner reminiscent of our critique of the analysis of knowledge, Laudan highlights that “any proposed dividing line between science and non-science would have to be (at least in part) explicative and thus sensitive to existing patterns of usage” (1983, p. 117). For a definition of science to be correct, it must classify as science what is considered to be science and as non-science what is not. Typically, we speak of three branches of science: the empirical natural sciences, the social sciences and the formal sciences. The historical sciences might be added to this list, but it is commonly accepted that they are of a different epistemic status. The formal sciences – among them mathematics and logic – are evidently non-falsifiable. The same applies to the theories of a significant part of the social sciences, as will be shown later. Therefore, the falsification criterion leaves out of the scientific broad swaths of knowledge which ordinarily is considered such.

Additionally, the falsification criterion makes scientific a huge number of theories which are not simply unscientific, but also outright false. As long as someone is ready to make a prediction which could be empirically falsified, this prediction would be scientific, no matter how asinine and absurd it is. Thus, as Laudan (1983, p. 121) so brilliantly put it, even the flat Earthers, Bermuda Triangulators, Lysenkoists, Big Foot searchers, faith healers, the-world-is-about-to-enders, and astrologers “turn out to be scientific on Popper's criterion - just so long as they are prepared to indicate some observation, however improbable, which (if it came to pass) would cause them to change their minds.” Even astrologers, the most paradigmatic case of pseudo-science, would be scientific as long as they make testable predictions, which they do make.

The falsification criterion also makes the demarcation problem trivial, for it no longer depends on the truth, justification or meaning of the knowledge we have. Popper himself recognizes as much: “the problem which I tried to solve by proposing the criterion of falsifiability was neither a problem of meaningfulness or significance, nor a problem of truth or acceptability. It was the problem of drawing a line (as well as this can be done) between the statements, or systems of statements, of the empirical sciences, and all other statements” (2002, p. 51). If the problem is simply about “drawing a line”, then science becomes synonymous with

¹⁶ Laudan, “The Demise of the Demarcation Problem”, in R. S. Cohen, & L. Laudan, *Physics, Philosophy, and Psychoanalysis: Essays in Honor of Adolf Grinbaum* (Dordrecht: D. Reidel, 1983), pp. 111-127.

falsifiability and falsifiability with science. Anything testable is science, anything which isn't testable is not. It is a merely linguistic question and, therefore, trivial.

In the face of such fantastic failure of modern attempts at demarcation or, rather, as it ought be called, analysis of the concept of science, we must not dismay and reject science altogether, but instead reject the empiricist attempts at demarcation and embrace the traditional views on science. Because the issue of what science is, is in fact important. When something is said to be scientific, it elucidates in the mind of the listener some idea of an authoritative source, or of a more warranted belief; while when something is said to be pseudo-scientific or unscientific it is almost taken to be false or unjustified. It is clear from this simple introspection that there must be something to science that is more warranted or certain than other types of knowledge. This is a distinguishing feature of science, and not the method or source of the knowledge, which has been the criterion of the new solutions to the demarcation issue. Having seen, therefore, that there exists something which separates science from non-science, we may proceed with a new yet ancient proposal of demarcation.

Aristotle began his *Metaphysics* with a supremely important phrase: “All men by nature desire to know”. Men desire to know the truth, to understand the reality around them. In this quest, they are confronted by the wide variety of different types of phenomena which form the world. Adapting to this situation, men create systems to study these different types of phenomena. A system is a coherent and ordered set of different theories which are so intricately connected in such a way that they explain a particular realm of the world. These systems are the various branches of science. The boundaries between each science are sometimes blurry, since the world is not divided in clearly identifiable and distinct dimensions. But there is a clear dividing line between two realms: (1) the realm of the physical, of nature and causality, and (2) the realm of ideas, of man and of purpose. Economics, our field of study, belongs to the latter camp. It is because there are different types of phenomena, that there are different branches of science and, therefore, different methods of study. We must never commit the error of believing that the method comes first, that it is the method which determines what phenomena can be studied. It is phenomena that determines what method must be used. And it is for this reason that the next chapter will explain the nature of economic science and only afterwards will a method be proposed. The issue with the recent proposals of demarcation lay in the fact that they did not recognize the epistemic heterogeneity of the sciences and, instead, used a method as the criterion of demarcation.

A science is therefore a systematic arrangement of explanations, theories and statements that intend to reflect a particular reality of the world. The only way for man to explain and understand the world is through the study of *regularities*. Without such categories as cause and effect, all human knowledge would be restricted to a chronologically ordered recollection of past events, from which no understanding of possible future events could be extracted. It is because we can find regularities in the form of laws of nature that history is not a mere recollection of data, but a systematic arrangement and interpretation of concrete events in light of the theories of the sciences. Explication is invariably connected to prediction, although not necessarily to the capacity of testing these predictions.

Nature may not abhor a vacuum, but human knowledge surely does. When there appears within a system of thought a gap in explanation, we can sense that something is wrong with our theories. It is for this reason that the sciences attempt to be coherent wholes. But they cannot ever be so. A particular science can never explain within itself its own foundations. The

scientist must go outside of this system to justify these foundations, which are to be found in epistemology and, ultimately, in metaphysics.¹⁷ It is here where we find the limits of the scientific. The attempt at ultimate explanation belongs to the realm of metaphysics and theology. The scientist must assume certain metaphysical truths, like the existence of the external world or the capacity of our cognitive faculties to discover truth, to carry on his studies. At any time, scientific research comes upon something which it cannot trace back to previous or simpler phenomena, to first principles. This is the ultimate given of a scientific system. Some ultimate givens may be pushed further back with time, like the move from subatomic particles to quarks as the elementary particles of physics. Others may remain forever, like the real existence of these elementary particles which we theorize about.¹⁸

Meanwhile, there is not a clear distinction of pseudo-science from science, and, in fact, the very attempt at separating them may be unwarranted. Pseudoscience claims to be science, it claims to explain certain phenomena through specific theories. Rather than attempting to discard their status of “scientific”, we would be much better off refuting their errors and revealing their fallacies.

V. Complexity and Degrees of Explanation

The development of science over the past century has revealed an increasing complexity in our research systems. Classical physics studied simple phenomena which required the consideration of the interactions of only a small number of variables. Modern science, however, has to deal with the problems of complexity, that is, of systems made up of a large number of highly interconnected phenomena. Statistical techniques are very effective at simplifying the objects of study of some sciences within which the relations between the variables are random. In these sciences, like thermodynamics, we deal with disorganized complexity. But the bigger issue lies in those systems which present organized complexity, that is, where the variables are interconnected in a non-random manner, where they form highly abstract patterns. Statistics cannot reduce the complexity present in these fields without forgoing the explanation of the patterns. Economics, like much of biology and the other sciences of society, belong to this camp. For this reason, the problems of complexity to which the further discussion refers are those of organized complexity.¹⁹

The problem of complexity reveals itself most critically with regards to explanation and prediction of phenomena. In simple systems, a prediction may be “if A and B, then C”. In these predictions, a relatively small number of variables must be taken into account and a full explanation of the phenomena may be reached, which afterwards could be tested with ease. However, in complex systems, where the number of significantly interdependent variables is large and, for practical reasons or otherwise, some of the values of these variables cannot be

¹⁷ It may be interesting to note that this analysis, Gödel’s incompleteness theorems, Hayek’s hypothesis of the impossibility of the mind giving a full account of its own workings, and what was discussed in the first section of this chapter regarding the justification of reason through reason, are all individual instances of the same principle, namely, that *the foundations upon which an order is built do not belong to this order*.

¹⁸ There is good reason to believe that the separation made above between the fields of the natural and social sciences is such an ultimate given, i.e., that it constitutes a gap in our knowledge which will never be covered, which makes impossible any complete unification of scientific knowledge in terms of the physical sciences. See below, p. 19-20.

¹⁹ On the problems of complexity, see Weaver, “Science and Complexity” *American Scientist*, vol. 36, issue 4, 1945, pp. 536-544.

ascertained, the situation is different. It is not possible to attain the numerical values of each variable and calculate an estimate result for a detailed prediction. In Popperian terminology, the predictions of complex sciences have less empirical content than theories of simple phenomena and, therefore, have less explanatory power and are less falsifiable by observations. It is both hard, if even possible, to assign values to our predictions and to quantify the results of a test that might falsify our theories.

A significant number of these complex sciences are applied sciences, like oceanography or meteorology. The main task of the scientist in these fields is that of the theorist. He takes the well-established hypotheses (laws) of pure physics and derives from them explanatory statements of the complex phenomena they deal with, given the relevant assumptions. It is because of these assumptions that the process of deduction is guided by observation. The theorist takes the hypotheses of pure physics he considers to be relevant according to his understanding of the nature of the complex phenomena in question and derives general statements about the patterns of the phenomena. The theorist, in a certain sense, creates a model of the phenomena. And it is this model all that the scientist may be able to obtain within complex sciences. The model is an explanation in general terms of the formation and patterns of the complex system in question. It does not, by itself, contain any concrete values. And because the concrete values may not be able to be ascertained, no direct test of the model will be possible. These models, these explanations of the principle, are all that can be obtained in the study of complex systems.²⁰

Now, let us illustrate this by a simple example provided in Hayek (2018b, §8.66). In oceanography, an important problem is that of the formation of waves. An explanation of the principle of wave formation is an explanation of “the mechanism by which waves are formed and propagated on the surface of water”. We may, for example, point to the effect of the force of the wind blowing over the water on the frequency and amplitude of the waves. These sorts of explanations (or theories) offer an account of the principle common to a large number of particular phenomena, which in many other respects would be widely different. On the other hand, a full or detailed explanation would be able to “predict the shape and movements of the wave that will form on the ocean at a particular place and moment of time”. An explanation of the principle is necessarily abstract and general, while a detailed explanation deals with concrete events. Another example of an explanation of the principle Hayek likes to cite is that of the theory of evolution (2014a, pp. 266-269). Regarding economics, every single theory is (and must remain) an explanation of the principle, or an untestable simplified explanation in terms of the *ceteris paribus* condition.

On a last note, that only a model or explanation of the principle can be provided of these complex systems does not necessarily imply that no test whatsoever could be done. The model, in proposing a principle or pattern that is common to all the phenomena of the system, implies that there exists a range of observable phenomena which would not occur were the explanation correct. These negative predictions (also called “pattern predictions”) are of the character “A, B and C could not occur together”. For example: “without private ownership over the means of production, prices will not reflect consumer demand”. Having said this, however, although

²⁰ On the problem of complex phenomena and degrees of explanation, see Hayek, “Degrees of Explanation”, *The British Journal for the Philosophy of Science*, vol. 6, issue 23, November 1955, pp. 209-225; and Hayek, “The Theory of Complex Phenomena” in F. A. Hayek, & B. Caldwell (Ed.), *The Market and Other Orders* (Abingdon: Routledge, 2014), pp. 257-277.

theoretically possible, some of these tests may be impossible to carry out for practical reasons, and, whenever they can be performed, a result contrary to the prediction would much more likely imply that the pattern does not apply to the tested situation than that the theory is incorrect. Economics, as a science of the social realm, rests upon a different epistemic foundation than biology or oceanography. As such, in the following discussion, there will be a few remarks specifying the particularities of the complexity of economic phenomena and economic prediction. For instance, there is good reason to believe that all economic theories must be explanations of the principle and that no empirical tests of economic predictions could falsify an economic theory.

ON THE NATURE OF ECONOMICS

I. The Economic Point of View

It is quite intuitive that an investigation of the subject matter of economics should begin with an examination of the views economists have held about the object of study of their field. In this regard, a definition usually serves to provide a rough scope of the science, and the most widely accepted definition of our science is the one put forward close to a century ago by Lionel Robbins. Economics, Professor Robbins says, is “the science which studies human behavior as a relationship between ends and scarce means which have alternative uses” (Robbins, 1945, p. 16). The main virtue of this definition is its recognition of general human behavior as the subject matter of the field. A great many economists in the past were led into grave error by overlooking the fundamental role human action plays in the phenomena of their studies. Instead, they considered the defining characteristic of economics to be the study of material wealth or social welfare, or only one particular type of selfish behavior subject to profit-maximization.²¹

The history of economic thought reveals a shift of conceptions of the science from more material and objective to more personal and subjective. Like most fields which deal with human relations, economic themes were first investigated as auxiliary considerations of normative questions in moral and political philosophy and theology. It was not until the 18th century that this connection was severed and the first treatises on economics as a standalone positive science began to appear. These treatments presented economics as primarily concerned with material wealth.²² This approach completely abstracted human behavior from economic considerations, so much so that the classical economists held to an objective theory of value, thus rejecting the subjectivist outlook which had characterized scholastic economic inquiries and was already clearly stated in 1554 by Diego de Covarrubias y Leyva (Huerta de Soto, 2009). Naturally, therefore, many of the discussions surrounding the subject dealt with the nature and composition of wealth itself, which eventually broadened the scope of economics as a science, not of material wealth, but of social or psychical welfare. This constituted a shift towards a more subjective approach. However, both conceptions still neglected the role of action in dealing with external objects. These objects, whether material or psychical, are only accounted for within economics when they are infused with meaning through human conduct, i.e., in their quality as ends or means of action.

A second definition that was developed throughout the 19th century considered the defining criterion of economic phenomena to be self-interested motivation.²³ Thus, the focal point of the economic shifted away from an outside good to a kind of action. However, the

²¹ For an extensive survey of the definition of economics, see Kirzner, P. J. Boettke, & F. Sautet, (Eds.), *The Economic Point of View* (Indianapolis: Liberty Fund Inc, 2009).

²² See, e.g., Adam Smith, R. H. Campbell, A. S. Skinner, & W. B. Todd (Eds.), *An Inquiry into the Nature and Causes of the Wealth of Nations*, (Indianapolis: Liberty Fund Inc, 1981), p. 372: “the great object of the political [economy] of every country, is to [increase] the riches and power of that country”.

²³ See, e.g., J. S. Mill, “On the Definition of Political Economy and the Method of Investigation Proper to It” in *Essays on Some Unsettled Questions of Political Economy* (London, United Kingdom: Longmans, Green & Co, 3rd ed, 1877), pp. 120-164: “What is now commonly understood by the term ‘Political Economy’ is not the science of speculative politics, but a branch of that science. It does not treat of the whole of man’s nature as modified by the social state, nor of the whole conduct of man in society. It is concerned with him solely as a being who desires to possess wealth, and who is capable of judging of the comparative efficacy of means for obtaining that end.”

concern of economics was not the entirety of man's nature. It abstracted from the considerations of acting man all motivation that was not wealth-oriented, thus building up the infamous homo oeconomicus. Both this conception of economic man and the later developed maximization principle – that man seeks to get the most for the least²⁴ – became the basic assumptions from which a whole system of simultaneous equations was built up. The hedonistic profit-maximizer, who later also became perfectly rational, can only behave in a certain mechanistic way. He is an automaton. By assuming a particular type of conduct, then, economists created a system in which the economic agent, no longer purposefully acting, was relegated to the background.

There have been plenty of other minor definitions, and there exist subtle differences within the major approaches we have outlined so far, but their consideration would be out of the scope of this essay. However, by now it should be clear not just how great of a leap forward Robbins' view was, but also where its faults lay. The second part of the definition, which attempts to define what conduct is, merely serves to limit the realm of economics. The Robbinsian paradigm is not about action, but about choice. The decisions made by the economic agent are purely allocative. He does not have the task of identifying ends or means; they are assumed to be given to him (Kirzner, 1973, pp. 32-37). In reality, one's goals are not always clear, let alone the best means to achieve them. Through a process of trial and error, the agent learns and discovers them. But this discovery procedure is assumed away in a pure theory of choice (Hayek, 1937, p. 45). The significance of this distinction between action and choice can be readily observed at the market level. According to Kirzner (1979, p. 28), because, unlike action, choice doesn't happen within time, under the Robbinsian paradigm, "the market process must indeed seem a discrete sequence of separate states, linked, at best, by the extra-economic facts of the learning process." The economist qua economist can only observe separate, unconnected frames of a movie, so to speak. There are only states of equilibrium or disequilibrium, instead of a dynamic process leading toward some unreachable and ever-changing state.

Implicit in the previous discussion is a lesson which will now be made explicit. Carrying the subjectivist trend to its logical conclusion, we must recognize the foundational importance of action for economic phenomena. Economics thus becomes, under this framework, subsumed under a more general science of human action: praxeology.²⁵ Praxeology is the formal study of human action. It does not concern itself with any of the particularities of concrete actions, but with their universal form. For the theorist, "action is purposeful behavior" (Mises, 1998, p. 11). It is the deliberate attempt to replace an expected future state of affairs which is perceived to be unsatisfactory by a more satisfactory one. Cognition of this fact is as self-evident as the principle of identity or the principle of non-contradiction in logic. It is implied in all our

²⁴ See Senior, *An Outline of the Science of Political Economy*, (London: George Allen & Unwin, 1836), p. 26: "We have already stated that the general facts on which the Science of Political Economy rests, are [...] that every man desires to obtain additional Wealth with as little sacrifice as possible", or Jevons, *The Theory of Political Economy*, 5th ed. (New York City: Sentry Press, 1957), p. 23: "The theory which follows is entirely based on a calculus of pleasure and pain; and the object of Economics is to maximise happiness by purchasing pleasure, as it were, at the lowest cost of pain".

²⁵ The main proponent of this field was the Austrian economist Ludwig von Mises, although a similar yet slightly different view was developed separately by the reist philosopher Kotarbiński. See, e.g., Kotarbiński, *Praxiology: An Introduction to the Sciences of Efficient Action* (Oxford: Pergamon Press, 1965). Before him, the French philosopher Alfred Espinas employed the term in his *Les Origines de la Technologie*, F. Alcan ed. (Paris: Ancienne Librairie Germer-Baillière et Cie, 1897).

reasoning. Its negation must of necessity appear unthinkable and self-defeating, for its very denial is itself an action. Therefore, cognition of action and all the theorems that can be deduced from it alone are a priori and empirically unfalsifiable. This, in Lakatosian terminology, is the theoretical hard core of the research program of praxeology, which, like all sciences, is grounded in some metaphysics. If our cognitive faculties are not capable of forming true beliefs, for instance, there is no point in any rational discussion. Traditionally, the praxeological view has been grounded on either Kantianism or Aristotelian realism but it could, in principle, be substantiated in most philosophies, since it claims for itself a space in human thought as elementary as logic or mathematics.

I do not mean to suggest that there opens here and now a completely new field of human thought, for much has been said about it, at least implicitly, since the time of the Greeks. The categories of profit and loss can already be found in Plato's *Hipparchus* (1997). Similarly, St. Thomas Aquinas' conception of the will (ST, Prima Pars, q. 82) is one of the faculties that enable man to act. That man desires or wills some thing which he regards as good, and the expectation that through action this good can be achieved, are the prerequisites of action. But the lack of any systematic treatment of action as a corollary of thought must be regarded as one of the great failings of philosophy.

II. Action as an Ultimate Given and the Limits of the Human Mind

In his quest for knowledge, man seeks to trace back all phenomena to its causes. But eventually, he is confronted by some phenomena which he cannot, at least for the time being, trace back to any other. In the physical realm we theorize about the elementary particles, those which make up the entirety of the material universe. Already in Democritus we find the first speculations about the ἄτομος (atom). In recent centuries, modern physicists were not only able to prove the existence of such particles, but also to divide them into their subatomic constituents, namely the neutron, the electron, and the proton. And in recent decades even more elementary particles have been theorized and discovered in the form of fermions and bosons.

There is no demonstrable ultimate phenomena to which every other can be traced in the physical sciences. Since an infinite regress is impossible, we know there must exist such an elementary particle, but we can never be certain that we have reached it nor do we know of its nature. However, in the social sciences, we know of such an ultimate given. Action is the basic ontological form of the social universe. No action can ever truly be traced back to its causes. We know, for instance, that a man who buys bread one morning does so because he valued more the loaf of bread than the monetary units he spent, but we do not know why that was the case. When asked about the exchange, the man could hardly give any answer other than "because I wanted it for lunch" or "because I like it". The values, the views and expectations of men cannot be objectively determined by an external observer, nor by the same acting men, for most of them are tacitly held.²⁶

It is at this point that the mind-body problem becomes apparent. It is true that there exist a relation between the mind and the brain, that is, between mental and the physiological processes, but there is no possible way to ascertain the external stimuli that, acting through the

²⁶ Cf. Mises, *Human Action: A Treatise on Economics*, Scholar's ed. (Auburn: Ludwig von Mises Institute, 1998), pp. 17-18, Mises, *The Ultimate Foundation of Economic Science: An Essay on Method* (Indianapolis: Liberty Fund Inc, 2006) pp. 53-55.

person's neurological connections, caused a particular action. It is not even clear whether all mental processes are ultimately a product of the physical; it could be that a non-physical mind substance exists, as many philosophers have argued. But, even if that is not the case, even if the mind is entirely a product of neural connections and external stimuli acting upon them, there is a demonstrable limit to the explanations we can ever hope to achieve of these connections.

In his little-known work on theoretical psychology, Hayek (2018b) takes on the task of inquiring into the nature of the human mind and its relation to the neural system. From a fully naturalistic approach, which attributes all mental events to physical processes, he draws the conclusion that it is impossible for an explaining agent to ever fully explain or give account of objects of an equal or higher complexity than its own (2018b, §8.69). The capacity of explanation of any phenomena is given by the nature of the instrument used for explanation. In our case, the instrument used is the human mind, the same as the object of investigation. The conclusion is obvious: even if all mental processes were the result of physical phenomena, it is impossible for us to trace them back to those physical phenomena.²⁷ All we can hope to achieve is an explanation of the principle by which the mind works. And market processes being of an even higher degree of complexity, the same applies to the study of economic phenomena. Here lies the reason for the previous references to economic theorems necessarily remaining explanations of the principle.

Now, it might be argued that a machine or artificial intelligence of a higher degree of complexity than the human mind could, in theory, achieve such an explanation. Simulations could be made from which, eventually, some detailed explanations of the connection between physical and mental processes could be obtained. In fact, taking the previous example of the explanation of wave formation, facilities have been created which can generate a simulation of all kinds of waves that could be found in the oceans. The US Navy has its own test facility (MASK) which has been invaluablely useful to test the resistance of ships under a simulation of the real-world conditions they will find at sea. Nevertheless, this cannot be done for the actions of human beings. Never mind the questionable ethics behind it, no artificial intelligence machine could be built of a higher degree of complexity than the human mind, for it is precisely a human mind which would create it. If we cannot fully account for the processes of our own minds, we cannot create one of an equal or higher degree of complexity either.

For these reasons, there exists an unbridgeable chasm between the physical world and the world of human action. The hope for a unified science is simply a mirage. In the study of action, our starting point must always be a direct knowledge of the different kinds of praxeological categories without recourse to any physical phenomena. The means and ends, the words and sentences, they must all remain irreducible entities, i.e., ultimately given.²⁸

²⁷ On the impossibility of reducing mental processes to physical phenomena, see also Nagel, "What Is It Like to Be a Bat?", *The Philosophical Review*, vol. 83, issue 4, 1974, pp. 435-450. <https://doi.org/10.2307/2183914>.

²⁸ The same reason that creates an inescapable dualism in science, that is, the impossibility of reducing mental processes to physical phenomena makes free will free. According to Hayek, V. J. Vanberg (Ed.), *The Sensory Order and Other Writings on the Foundations of Theoretical Psychology* (Abingdon: Routledge, 2018), §8.88: "Even though we may know the general principle by which all human action is causally determined by physical processes, this would not mean that to us a particular human action can ever be recognizable as the necessary result of a particular set of physical circumstances. To us human decisions must always appear as the result of the whole of a human personality—that means the whole of a person's mind—which, as we have seen, we cannot

III. The Character of Economic Phenomena

Before moving forward in the examination of the nature of the phenomena of economics, there is an important terminological point which must be made. It is unfortunate that the term “social sciences” is so widely used today, as it lumps together a wide amalgam of different fields which do not present the same problems. The term “praxeological sciences”, deriving its name from “praxis”, appears to be the most accurate name for the disciplines which concern us. But both these sciences and the fields of social statistics and other disciplines which study instincts and processes within the human body, study aspects of human or social relations and thus belong to the “social sciences”. A more accurate term for these other fields, among which we can find parts of ethology, anthropology and virology, would be “natural sciences of man”.

The problems which concern us are the problems of economics. They are those of the praxeological sciences, those whose ultimate foundation is purposeful human behavior. The praxeological sciences stand in a position unique among all sciences, for their data, those categories which they make reference to, are entirely subjective in nature. The ends sought by action, the means utilized, the value attributed to both, the scarcity perceived of the means and even the time itself within which the action will take place is subjective. The meaning of each category is given by the individual actor in accord with his own thoughts and beliefs. Take, for example, the case of money. Money is the commonly accepted medium of exchange. This definition makes no reference whatever to physical or material conditions. Whatever physical object it applies to depends entirely on the subjective valuations of the actors. The actor, through his thinking and acting, infuses meaning, as it were, into the physical object.

All definitions of the phenomena with which economics deals must point to the opinions of people. They must run in terms of what the objects are used for, that is, in teleological terms. And it does not matter whether the opinions of men regarding these external objects are correct or not. For the economist, “the things are what the acting people think they are” (Hayek, 2018a, p.89). Tribal magic is just as much of a means to heal for the tribesman as modern medicine is for the Westerner. What makes any individual physical object part of the same class of social phenomena as any other physical object is not any of their physical qualities, but the mental attitudes of men towards them. Of course, recognizing external reality there will be some characteristics of particular physical objects that make them more prone to be used for a particular purpose, but, ultimately, it is only the opinion of men that matters.

It is for good reason, in fact, that all definitions of these “teleological concepts” make no reference to physical qualities, for if they did, they would no longer apply to all instances of such concepts. Because the concepts of wealth, factor of production or good depend solely on the individuals’ beliefs for their connection with material reality, any reference to a physical attribute will necessarily exclude some objects of the same class. Take, once again, the example of money. A piece of colored paper or cotton belongs to the class of money. A small disc-like metal object does as well. Historically, cattle and seashells were also used as money. Anything, theoretically, could be money so long as people believe and act as if it is. We could identify some physical attributes that would make a particular object a better money – like divisibility

reduce to something else”. The development of this view would exceed the limits of this text, but this position (like that of Mises) coincides with the compatibilist view and Aquinas’ presentation of the *liberum arbitrium*, viz. that our thoughts and actions being ultimately determined is compatible with free will.

or durability – but to include these attributes, or any for that matter, in the definition of money would exclude some objects and, most importantly, make us err in the deductions of our theorems. The history of any good shows that it can and has been used for many different purposes which belong to different classes of economic phenomena. When a frying pan is used to cook, it belongs to a different class than when it is bought in a store. And even within the act of exchange at that store, the pan serves a different purpose for the seller than for the buyer.

Unlike the phenomena of the physical sciences, the essence of the objects of study of the praxeological sciences can indeed be known. Ultimate explanation of the essence of a plant or a cat belongs to metaphysics, but the ultimate explanation of economic phenomena can be explained within our science, for it is the meaning or purpose which the actor gives them. Making no recourse to physical facts implies that the class of economic phenomena are immaterial, they are ideas. It is the action of men which creates and gives meaning to the phenomena. Their essence is the purpose they attribute to them. The essence of a means, for example, is that of serving to the attainment of an end.²⁹

In recognizing the essentially subjective quality of economic phenomena, we are confronted with the problem of how to identify objective and scientific knowledge about economics. If the meaning of the different classes of phenomena is given or attributed to objects solely by the acting individual, how then can the social scientist ever achieve any objective knowledge about these classes? Here the unique epistemic position of the sciences of action makes itself felt most strongly. It is only in this realm of thought that the structure of the object of study is similar to that of the scientist himself. The object of study, man, has a mind whose structure is essentially the same as that of the investigator. It is by this relation, by this knowledge of like by like, that the social scientist knows of the different classes of phenomena. That this is the case is an empirical fact proven by all interpersonal acts. The existence of this very essay, which is written in a language which by its very nature is public and understandable by different individual men (Wittgenstein, 1967, §243-271), proves this similarity and the capacity for interpersonal understanding of mental qualities.

The knowledge of the universal concepts and categories is the cognition of theory. This is a knowledge of abstract ideas, of the form of action and of the classes of social phenomena. But there exists also a knowledge of the application of these classes to real-world, concrete physical objects. The cognition of the categories of means and ends, of capital and factors of production, is completely formal and is given by the common logical structure of the human mind. Because action is a product of reason, our rational faculties can make clear the essential features of action. However, the application of these features to the real world of action, the historical understanding of their applicability, is what depends entirely on the beliefs of men. If the information contained in every single mind were the same, if every person held the same beliefs and had the same preferences about the external world and the relations of man to man, there would be no reason for the facts of the social sciences to be called “subjective”. But

²⁹ In Popper, *op. cit.*, pp. 139-144, Popper lays out what I understand to be a generally correct criticism of the essentialist view of science, although it is my opinion that essences, even of material objects, do exist. However, as often is the case, he ignores the specific problems of the sciences of human action. Now, it is true that in a footnote of p. 142, he claims that “certain things of our own making—such as clocks—may well be said to have ‘essences’, viz. their ‘purposes’”. I take that this statement is referring exclusively to physical human creations or inventions and not the categories of economics. But, given the principle implied that those things “made” by us have an essence (their purpose), it can be claimed that, in certain sense, the phenomena of the praxeological sciences are indeed “made” by us, for they depend on human action.

because this is not the case, because the concrete knowledge which guides the action of any group of people exists only in a “dispersed, incomplete and inconsistent form” (Hayek, 2018a, p. 93), this knowledge can never be said to be objective. And, consequently, the relations between the external objects of action can never be said to be constant. All that remains constant, and therefore all that can be studied as a regularity, is the relation between the abstract categories of pure theory, between the idea of money and capital, and not between dollars and housing prices. These explanations of economic phenomena are, once again, explanations of the principles which govern the relations of all economic phenomena.

ON THE METHOD OF ECONOMICS

I. The A Priori and Deduction

All facts are theory laden. Observations are never free of interpretation in light of a previous theory. As Popper explained, the suggestion of a pure observation is simply absurd, for observation is necessarily selective. One must first know what to observe (Popper, 2002, p. 61). Theory must therefore always be prior to experience, but observational experience can serve to falsify or, rather, modify our previous theories. The theories, our beliefs, provide us with expectations of future events. If these events do not correlate with what was expected, the expectations will change. We have therefore a chain of expectation-observation-reframing of expectations which may apparently extend ad infinitum into the past. But this is not so, we are born with certain a priori expectations, which Popper calls the psychological or genetic a priori. For example, a new-born baby has the inborn expectation of being cared for by his parents. Subsequent experience may prove him wrong in this “belief” if his mother died in childbirth and she was single parent. These a priori expectations are therefore not a priori valid. They are simply instinctive feelings or reactions which experience may falsify.

But, contra Popper (2002, pp. 62-64), there exist a priori valid propositions. These make up the logical structure of the human mind. They must be a priori valid for they cannot be falsified by any experience. All human experiences are understood through them. These a priori valid propositions are the basic principles of logic: the law of non-contradiction, the law of identity, the law excluded middle... But action, purposeful behavior, as a corollary of human thought, is also one of these basic a priori valid propositions. The starting point of the sciences of action, like that of logic, is a self-evident proposition: humans act purposefully. No amount of experience could ever show that this is not the case for, as just explained, experience presupposes some knowledge. All experience concerning human action presupposes some understanding, even if not explicit, of the form of action (Mises, 1998, pp. 38-41). The simple observation of any action, without making recourse to the praxeological categories, must necessarily run in terms of physical phenomena. Even the most simple actions, those which only involve one individual, would be accounted for in an essentially different manner than how we do so in reality. “A hungry man eats lunch” would have to be described as “the stomach of a male homo sapiens emptied and released the hormone ghrelin, as a result of which the brain directed the motor system of the organism to ingest biological matter from which his digestive system may extract nutrients”. The description of an action which involves more than one person, like any exchange, would have to run in similar terms. Money would have to be described as a rectangular paper fabric, for instance. But the act of exchange itself would lack any meaning at all. It couldn’t even be described as giving something to someone else and receiving something else in return, for that would already presuppose the concept of property or ownership of material things, which, again, isn’t material. The gap that separates the physical sciences from the sciences of thought and action makes all our actions meaningful and, at the same time, undescrivable in physical terms, for meaning itself is not physical.

Proceeding in the way of what we have termed “sciences of organized complexity”, the theorems of economics are logical deductions from premises. But here lies the difference between the praxeological sciences and the other complex sciences of the physical realm: the premises from which these deductions proceed are not simply well-established hypotheses

about the nature of social phenomena, they are the a priori valid categories of action. The a priori of action is the foundation of all formal knowledge of the social realm.³⁰ It is unfalsifiable by empirical tests and, consequently, all theorems which are correctly derived from it are also unfalsifiable.

Praxeology is the formal study of action. From the proposition that “humans act purposefully” alone at least 24 theorems have been derived (Zanotti, 2004).³¹ This is the task of the praxeologist, he must examine and deduce all the theorems that are implied in the category of human action and expound all their implications. These theorems apply universally, that is, under any conditions. They define the universal condition of acting. Among them, we can find such basic propositions as “the means used for the achievement of ends are by definition scarce”, “every action implies the act of valuation, that is, of a choice between A or B” or “value is subjective”. But implied in the category of action, there are also other theorems which appear less basic, like the law of marginal diminishing utility, the law of returns, or the law of time preference. An enumeration of these theorems far exceeds the scope of this essay, but it must be clearly understood that these theorems can be directly derived from the basic ontological reality of the social realm, that is, of the ultimate given of action, which every individual person has direct cognition of.

Economics is not, however, identical with praxeology. Praxeology is the hard core of economics, it is what has historically been referred to as “Crusoe economics”, or the theory of isolated individual action. Economics springs from praxeology and uses the same methods, but it is not the same. Economics is merely one discipline of the sciences of action, albeit the most developed one. The theorems which can be directly derived from the category of action alone belong to praxeology. They are applicable to and presupposed by every action under any conditions, but the theorems of economics, taking these into account, are different. After having detailed the universal theorems of praxeology, the role of the theorist is to define in a formal and categorical manner the less general conditions of acting (Mises, 1998, pp. 64-65). These auxiliary assumptions are premises which cannot be derived from the category of action, but which we know from experience that take place in the real world. Herein lies the role of history and observation in the development of theory: because the purpose of science is the attainment of true knowledge, the auxiliary assumptions used in the deduction of economic theories should reflect the conditions of the real world. Once again, a full exposition of all these premises, if

³⁰ See above pp. 18-19.

³¹ I feel compelled to note that, other than these theorems, implicit in the reality of action is a metaphysical argument for the existence of the external world, per Mises, B. Bien Greaves (Ed.), *The Ultimate Foundation of Economic Science: An Essay on Method* (LF ed.), (Indianapolis: Liberty Fund, Inc, 2006), p. 5. Action is purposeful behavior directed toward the removal of some unsatisfactory state. If a person is in a state of total satisfaction, he will not act. So, because man acts, he knows that there is something beyond his control which is offering resistance to the attainment of his total satisfaction. Man cannot attain satisfaction through sheer tyranny of will because he is not omnipotent, and, therefore, the reality of action presupposes the limited nature of man and the reality of the external world. Put in syllogistic form, the argument would run as follows:

P1. Action implies the existence of an unsatisfactory state which cannot be removed immediately.

P2. The existence of an unsatisfactory state which cannot be removed immediately implies the existence of something beyond the actor's control.

P3. Man acts.

Therefore,

C. There is something beyond man's control which we call the external world.

even possible, would far exceed the scope of this essay, so only a few of the most used ones will suffice.³²

The theorist begins his deductions making use of the most basic auxiliary assumptions and, after having carefully deduced all the possible theorems, moves towards other assumptions of increasing precision. Zanotti (2022, pp. 95-107) has divided the auxiliary assumptions according to their precision or universality between: (1) anthropological assumptions, (2) sociological assumptions, and (3) assumptions about the institutional and policy framework of the country, which Machlup calls “assumed conditions” (Machlup, 1955). The anthropological assumptions are the most universal ones. Among them, the first and most basic one is the assumption of the existence of more than one acting agent, which separates praxeology or Crusoe economics from economics proper or catallactics. Along with it, there is also the assumption of entrepreneurial alertness or capacity to learn of profit opportunities,³³ and the assumption of monetary maximization in a broad sense, i.e., that a man, given the option, would rather, *ceteris paribus*, get more for a commodity he wants to sell and spend less to buy a commodity. Within the second set of assumptions, we find social cooperation, the division of labor and the existence of a medium of exchange. Finally, within the third set of assumptions, there are all kinds of premises defining, in terms of ideal types, the types of markets, the economic policies and the institutional framework of the country.

Before moving on to the next section, a particularity of the procedure of the economist must be noted. The deductions of the theorems of the praxeological sciences are not carried out like those of the formal sciences. The deductions of economics cannot be meaningfully stated in the language and symbols of mathematical logic, for the meaning of the verbal words is crucial in their understanding. One of the preeminent logical positivists highlights precisely this point in an article (Carnap, 1952). He makes a distinction between two types of implications: formal and material. Formal implications do not depend upon the meaning of the words of the postulate, but material implications do. To show that the statements of economics belong to the second kind of implications, consider the following example:

i. “If at a certain time I prefer coffee to tea, it is not the case that I prefer coffee to tea”

I. $P \Rightarrow \sim P$

ii. “If at a certain time I prefer coffee to tea, it is not the case that I prefer tea to coffee”

II. $P \Rightarrow \sim Q$

The statements i. and ii. have been formalized into the the statements I. and II. respectively. As is obvious, the first pair of statements are contradictions. But they are not contradictions due to meaning of the terms, but due to the form of the statement. It is a formal contradiction that “if P, then not P”. On the other hand, the other two statements are perfectly valid. But the formal statement does not show why “not Q” follows from “P”, it simply states it and, since it is not a contradiction, it is valid. In nonformal terms, that is, in statement ii. we

³² For a list of many of these auxiliary assumptions followed by the deduction of 87 theorems ranging all subjects of economics in the manner described in this essay, see Zanotti, *La Economía de la Acción Humana: Un Ordenamiento Epistemológico de los Teoremas de la Acción Humana según Mises* (Madrid: Unión Editorial, S.A., 2009).

³³ Note that “profit” should not be understood as monetary profit. That would presuppose already the existence of a division of labor and monetary exchange. Profit here should be understood as some form of subjective benefit from action.

are able to see why the second part of the statement follows from the first. It follows due to the meaning of the word “prefer”. This is a material implication, which, if formalized would no longer be explained.

II. A Taxonomy of the Praxeological Sciences

The increasing precision of the auxiliary assumptions also brings about the differentiation of the praxeological sciences. Among these, economics has been the most thoroughly developed field. Below, a taxonomy of the praxeological science, inspired by Rothbard (1951) will be provided:

The Praxeological Sciences:

A. Praxeology: The Theory of the Isolated Individual (Crusoe Economics).

B. Economics: The Theory of Interpersonal Exchange (Catallactics).

1. Barter Economy.
2. With a Medium of Exchange.
 - a. The Unhampered Market Economy.
 - b. The Economy of a Socialist Society.
 - c. The Theory of Interventionism.

C. The Theory of Intraorganizational Action.

1. The Theory of the Firm.
2. Public Choice Theory.
3. The Theory of Religious Structures.

D. The Theory of War: Hostile Action.

E. The Action of the Scientific Researcher.

F. Unknown.

Historically, A has been considered part of economics, but if our previous considerations are correct, it would be more accurate to separate it, for its theorems are applicable to all areas of the rest of the praxeological sciences. Economics itself, as the theory of interpersonal exchange can develop, through the careful application of auxiliary assumptions, all the theorems regarding both a barter economy and all kinds of monetary economies. Moving forward, in C, under the name of “intraorganizational action” I have classified those fields which have had the most development in recent decades. These concern the action of individuals as members of an organization, which could be a company (theory of the firm), a political party or state bureaucracy (public choice theory and parts of political science), and a religious institution.³⁴ D, as the theory of war, would cover issues pertaining to

³⁴ Action within a company has been largely studied by economists as the “theory of the firm”, albeit under a more objectivist paradigm. For a study of business organisation from a praxeological standpoint, see Lewin, *Capital in Disequilibrium: The Role of Capital in a Changing World*, (Abingdon: Routledge, 1999), pp. 147-213. Action within parties and states has been thoroughly examined in the field of political science. Within economics, the public choice school has given the most thought to these issues, but, as its name suggest, it has focused

the causes of violent conflict and forms of imperialism and colonialism.³⁵ Finally, a new field which has become apparent to me that could be investigated is the theory of the action of the scientist qua scientist.³⁶ Regardless of all these distinctions, however, all areas of the praxeological sciences can trace back the origin of their phenomena to a common cause, viz. action. It follows, therefore, that the theorist of each disciple ought not to remain isolated from developments in other fields, which could help explain certain aspects of his own. Similarly, he should always remain conversant with other sciences of man and of nature, not only to fully understand the distinction between them, but also because the study of action is only one facet, albeit probably the most important, in the development of a real science of civilization. It's hardly ever the case that a single problem within the social sciences can be answered satisfactorily on the basis of a single discipline.

Other specific areas may be explored further in the future, but the focus is likely to remain on these particular ones in the coming years. Particularly, in economics, there is a need for the study of the effects of economic conditions on the moral values and character of the individuals.

III. The Use of Imaginary Constructions and the Ceteris Paribus Condition

In addition to the auxiliary assumptions used in the deductions of theorems, the theorist is aided by the use of imaginary constructions. These are, as Mises (1998, p. 237) puts it, “conceptual image[s] of a sequence of events logically evolved from the elements of action employed in its formation”. Unlike the assumptions, however, these are not supposed to represent anything that actually happens in the real world. They are not used to derive any theorems. Instead, they are simple mental images used to aid the theorist in his comprehension of particular aspects of reality.

Imaginary constructions are thought experiments of the form “if $\sim X$, then Y”, that is, they are formulated by abstracting from one or various conditions present in reality and then, through deduction, obtaining some conclusion. This conclusion will not reflect reality, since at least one of the premises is incorrect (the abstraction), but it allows us to understand better the role of the condition from which we have abstracted. This procedure is regularly used by the layman. “If I hadn't done X, then...” is probably one of the most common thoughts when one is reflecting on any past experience. Similarly, all counterfactual or alternative history is based upon the same procedure. The historian abstracts from the existence of particular historical event and conjectures on what might have happened to understand better the consequences of the historical event he abstracted from. Whenever it is claimed, for example, that the rise of the NSDAP was due to the perceived unfairness of the impositions upon Germany of the Treaty of

primarily on choice instead of action. For an action-based view of the bureaucratic process, see Mises, *Bureaucracy*, (New Haven: Yale University Press, 1944). Finally, the present writer does not know of any theoretical study of religious institutions, but that is likely to be due to a lack of awareness on his part.

³⁵ The most systematic treatment of this issue appears to be Clausewitz, M. Howard, & P. Paret (Eds.), *On War* (Princeton: Princeton University Press, 1984).

³⁶ Unfortunately, philosophers of science have generally taken a historicist approach to their subject. Thus, it appears there has been little work in the development of a theory of action in this front. The most interesting work done to this end appears to be Polanyi, *The Tacit Dimension*, (Chicago: The University of Chicago Press, 2009), pp. 70-74. In these pages, Polanyi defines a process by which the opinion of every particular scientist within the limited sphere of their expertise exercises a form of control on every other through “chains of overlapping neighborhoods”, which sounds very familiar to the theory of prices as signals.

Versailles, the reasoning behind this statement is precisely an imaginary construction which abstracts from at least some of those impositions.

Imaginary constructions could be viewed as mental models. They are models of particular situations which can be manipulated through a mental simulation. In reality, these models, at least for the most part, are entirely unrealizable, but they are still incredibly useful for the careful theorist. In economics we make constant use of imaginary constructions. The equilibrium model, or evenly rotating economy, is an imaginary construction which eliminates all change in the market data, that is, all changes in the preferences and beliefs of the individual market participants. If there is no change in the data, there is a perfect coordination of all material factors of production, there are no excess inventories, all prices are final prices, there is no uncertainty, and the entire system is in a perpetual flux. Since there is no uncertainty, there is also no profit and loss. And since all actions result in a change in the data, there is also no action for every individual is perfectly content.³⁷ Clearly, this model or imaginary construction is of no use at all in describing reality, but it is one of the most basic means through which to study the effects of any change in the market data. In addition to the equilibrium model, the other most commonly used imaginary constructions are those of a pure market economy and of a pure socialist economy, and, especially, the *ceteris paribus* condition.

“*Ceteris paribus*” is Latin for “other things equal”. It is an imaginary construction which takes the world as it is at a certain moment in time and allows no changes to happen except one, i.e., it is a counterfactual.³⁸ It is most useful to understand the full effect of a particular policy measure or change in the data, but it isn’t empirically testable. The counterfactual creates, as it were, a duplicate of our world at time t_0 (before the change), only allows the change in question to take place and then examines the effects of that change in this duplicate world. This conception grants the theorist the capacity to examine in detail all the possible effects – within the limits of what can be ascertained by economic theory – of any particular change in the data. But it cannot make any prediction as to the state of the real world at t_1 , for it never is the case that only one change takes place at any moment. “As soon as we let time to elapse, we must permit knowledge to change” (Lachmann, 1976). And because knowledge is the data of economics, because it is what ultimately determines the actions of men, every change in knowledge means a change in the market conditions. The *ceteris paribus* condition, rightly understood as a counterfactual, applied to the market is similar to the comparison of two runners which are perfect clones of each except for the fact that one has a reduced lung capacity. If we set them out in a race in which they had to run until they eventually got tired and could not run any longer, we know that, given the fact that in every other respect they are completely equal, the runner with the reduced lung capacity will be able to run less. Similarly in economics, given a particular state of the market, if we only allowed for the demand of commodity R to rise, we know that the price of R will increase.³⁹ This is the meaning of the *ceteris paribus* condition.

³⁷ One of the best descriptions of general equilibrium can be found in Mises, *Human Action: A Treatise on Economics*, Scholar's ed. (Auburn: Ludwig von Mises Institute, 1998), pp. 245-251.

³⁸ Cf. Hülsmann, “Facts and Counterfactuals in Economic Law”, *Journal of Libertarian Studies*, vol. 17, issue 1, 2003, pp. 57-102, which argues that a significant proportion of economic laws consist of counterfactual statements.

³⁹ Note that there is an epistemic difference between these two examples. We know the effects of a reduced lung capacity as a hypothesis of the natural sciences. Even if it is very well-established, it remains a conjecture or hypothesis per the hypothetico-deductive method developed by Popper. But the effects of an increased demand

IV. The Character of Economic Predictions

Explanation and prediction are two sides of the same coin, they are corollaries of each other. Particularly in complex sciences, the explanations of complex phenomena always refer to phenomena of a certain class and not to a unique phenomenon. Some of the particular qualities or accidents of the phenomena explained are abstracted from the explanation in order for it to be applicable to the entirety of the class of phenomena in question. Explanation establishes the regularities which exist between the phenomena of a certain class or between classes of phenomena, which then can be used to derive from known facts a prediction about a future event.

Nevertheless, explanation does not necessarily imply the capacity to test its associated prediction. For example, an explanation in terms of a counterfactual, like “if the demand for commodity X increases, its price will be higher than it otherwise would have been”, because we cannot compare a world in which no increase of demand had happened with one in which the only relevant change was an increase in the demand of X. This form of explanation, which abstracts from particular facts of the real world is highly informative for the economist. It is, as was explained, an imaginary construction which allows him to mentally construct a simulation of the world in which he can “play around” with the data to fully comprehend the effects of particular facts and changes. But these are not explanations of the principle, they are simple explanations of complex phenomena which, as Hayek (2014a, p. 263) puts it, are “probably merely of necessity false—at least without a specified *ceteris paribus* assumption, after the full statement of which the theory would no longer be simple”. The *ceteris paribus* condition makes the explanation unrealistic, although still theoretically useful.

The explanations of the principle of economics are explanations of a discernable pattern in the categories of action. They are the theorems of economics. They do not employ the *ceteris paribus* condition, for they make reference to the entire order or class of phenomena. But, due to the essentially subjective and non-physical nature of economic phenomena, the character of economic predictions and tests are unique among other complex sciences. This character is best shown by an example. Take the well-established theory that: “Given various factors of production are used together in the production of one commodity in variable proportions, and of which one is more specific than others (meaning that it is used for comparatively fewer ends), changes in the value of the commodity produced will induced larger changes in the value of the more specific factor than in the rest”. This is a statement of pure economic theory. It cannot possibly be empirically tested since it makes no reference to physical phenomena, only to the mental phenomena of economics – commodity, value and factors of production. But the same theorem, in its original formulation by Ricardo as the “law of rent” (Hayek, 2018a, pp. 95-96), is indeed stated in physical terms: “changes in the value of commodities in the production of which *land* was used, would cause much greater changes in the value of *land* than in the value of the other complementary factors of production”. The theorem is no longer a theorem of pure theory, for it refers to a physical factor: land. What we have done in moving from the first statement to the second is to move from the realm of pure theory to the realm of empirical reality. We have given the statement a physical content.⁴⁰ The first statement is a

on the price of a commodity is not a hypothesis but an apodictically certain theory (apodictic certainty being total certainty given the axioms and premises of the framework, not the ultimate epistemic certainty which was shown to be unattainable in the first chapter of this essay).

⁴⁰ Hayek calls these statements, or rather, the predictions that can be derived from them “pattern predictions”.

universally valid statement about the relations of economic (mental) phenomena irrespective of time and place. The second statement is no longer necessarily universally valid, it alludes to a concrete reality of the conditions that prevail at a specific time and place. The identification of “land” with the more specific factor of production is done by the economist through his knowledge of the real world. This is a historical knowledge, a knowledge of experience and historical understanding.⁴¹

The only possible tests of economic theorems are therefore indirect. They can never test the theorem of pure science, but its application to the real world at a particular moment in time, at a particular place and under a particular state of subjective and dispersed knowledge among the different individuals which make up the market process. Pure theory, if correctly derived from the theorems of action and the auxiliary assumptions, is necessarily true for all those cases in which the assumptions reflect the real world conditions. Although given the assumed conditions the theorems pertaining to a system of monetary exchange with central banking are valid, it cannot be expected that they could be applied, and therefore tested, in a barter economy. In other words, the epistemological and ontological contingency of the hypotheses does not refer to their essence, but rather to their existence (Zanotti, 2022, pp. 105). An empirical test cannot falsify either the praxeological hard core or the derivation of the theorems from this core and the empirical hypotheses. It can only indicate that the derivation may be incorrect and should be reviewed, or the inadequacy of the assumed conditions for the case studied. But if experience reveals the assumed conditions correspond with reality, all the correctly derived theorems necessarily describe this reality. What is tested is not the theory itself, but the economist’s application of it to a concrete reality, a procedure which depends solely in his understanding of the subjectively held beliefs and preferences of the individuals involved in the tested situation.

⁴¹ An exposition of the methods of history would far exceed the scope of this essay, but they can be found in Mises, B. Bien Greaves (Ed.), *Theory and History: An Interpretation of Social and Economic Evolution* (Indianapolis: Liberty Fund, Inc., 2005), pp. 183-320 and Weber, E. A. Shils, & H. A. Finch (Trans.), *Max Weber on the Methodology of the Social Sciences* (Glencoe: The Free Press, 1949).

CONTRA ERRORES MODERNORUM

I. Scientism

Over the past century, a certain dogmatic attitude towards the nature, scope and methods of science has taken hold of the minds of men. This attitude, scientism, is so widespread that it almost defies a unique explanation. Different definitions of it have been stated by various authors, and among its supporters, different beliefs can characterize it. But there is a common feature to all scientific positions: the belief that science, through the so-called “scientific method”, can today or will be able in the future to explain the entirety of reality, that science is the only way towards attaining truth, and that, consequently, those beliefs which cannot be supported by the scientific method are false and the phenomena they claim to explain either do not exist or can be explained in physical terms. And, of course, “science” is identified with empirical methods and mathematical formalization.⁴²

This baseless prejudice is built atop a philosophical house of cards. Since it denies the utility and sometimes even the truth of philosophical discussion, it is entirely unsurprising that the slightest rational examination can reveal that it is self-contradictory. Its basic assumptions – those mentioned above – are evidently non-scientific propositions. They have not been arrived at through empirical methods and yet they are held up as the highest form of dogma. As shown throughout the first chapter of this essay, science cannot account for much of what we consider to be true and descriptive of all our past experiences. Science must rely for its justification in non-scientific, i.e., metaphysical and epistemological beliefs. The existence of the external world cannot be proved through the scientific method. In fact, if science is defined solely by the use of an empirical method, it cannot strictly prove anything, it can only propose tentative hypotheses due to the problem of induction. Logic, mathematics and the sciences of man would cease to be sciences. The dogmas of scientism are supported only by the epistemic prejudices of its proponents.

Fortunately, many scholars of great stature have rejected scientism. Hayek (2018a, p. 80) characterized it as a “slavish imitation of the method and language of Science”, Grothendieck (1971) called it a “new religion”, and Popper (1979, p. 185) defined it as “the aping of what is widely mistaken for the method of science”. However, much to the dismay of Popper, it is my contention that the scientific prejudice originated and spread due to his and the logical positivists’ attempts at demarcation of science according to a method. The old view of science was correct in putting on a higher pedestal scientific knowledge, for it was scientific because it was more warranted, because it was more justified. This position towards scientific knowledge was held for several millenia, so it should not be surprising that science still incites in the minds of men the aspect of a more rigorous knowledge. But due to the attempts at methodological demarcation, science can no longer be identified with those beliefs, but the positive prejudice towards it still remains. In this manner, the empirical methods have come to be deified and all other beliefs have been discredited and rejected.

⁴² The origin of scientism is usually traced back to the logical positivists, but it has affected broad swaths of the general population and of academic research since the beginning of the 20th century. In the past couple of decades, the scientific attitude has characterized the entire movement of the “New Atheists”. See, e.g., Rosenberg, *The Atheist's Guide to Reality* (New York City: W. W. Norton & Company, 2011), p. 6: “[T]he methods of science are the only reliable ways to secure knowledge of anything”.

Lastly, it must also be noted that the claim that it was science that caused the enormous development and progress of human society since the Industrial Revolution relies also upon a false understanding of economics. Scientific progress, it is argued, created the technological innovations which allowed us to rise above the level of the animals. This account of economic history does away with the entirety of the actions of individual men which make up the market process. No technological innovation however revolutionary can cause, by itself, economic growth. It has to be recognized by acting men to be useful in the achievement of their ends, these men have to accumulate capital through savings to acquire the innovation, and it has to be put to use in an environment of division of labor (Mises, 2006, pp. 114-116). Technological innovation can lead to economic growth, but only thanks to the correct allocative and productive judgements of acting men.

II. Logical Positivism

The central premise of logical positivism is the negation of the possibility of a priori valid statements that aren't simple tautologies, that is, of the synthetic a priori.⁴³ All throughout the past two centuries, positivist perspectives of the social sciences, starting with Comte and continuing through the Vienna Circle, the Chicago School, and Friedman, have garnered substantial support. Their views have won out. A significant portion of the economists of today believe that their role as academics is to empirically test theories through econometric methods, or, much worse, to build theories directly from empirical data. A quick look through the main academic journals will reveal countless examples of such articles. This may not necessarily be a problem. If empirical-based economists focused on illustrating properly derived theories and ascertaining rather than trying to create theories without universal validity or reasoning, the abundance of such works would not be a concern. It may, in fact, be natural for that to be the case. Not all economists are able to dedicate the necessary time and effort to constantly revise theories in search of fallacious reasoning. However, the reality is different. Many affirm the possibility of deriving empirical laws from historical data.

Before moving to the criticism of positivism and empiricism in the particular case of economics, a rather obvious observation must be stated: the maxim of logical positivism, viz. that there is no synthetic a priori statements, is itself a synthetic a priori statement (Mises, 2006, p. 4). It cannot be analytic, for inexistence is not contained within the meaning of "synthetic a priori". The other possibility is that it is a synthetic a posteriori statement, but how could the inexistence of such knowledge be tested empirically? It's simply not possible. We are left with only the possibility that premise is indeed a synthetic a priori proposition, which would make it self-contradictory and therefore false. Therefore, a proof by contradiction can support the existence of synthetic a priori statements, which were already proven in the previous chapter.

Regardless of the discussion above, more can be said against the positivistic outlook of economic science. The phenomena of economics are complex and subjective. A scientific law

⁴³ The analytic-synthetic distinction was first introduced by Kant, but he did support the idea of synthetic a priori statements. An analytic proposition is one whose predicate concept is contained in its subject concept, i.e., a definition. A synthetic proposition is one whose predicate concept is not contained in its subject concept. The distinction will be made clearer with an example. "All bachelors are unmarried" is an analytic proposition because "bachelor" implies "unmarried". On the other hand, "All bachelors are sad" is a synthetic proposition, since "sad" is not implied by the meaning of "bachelor". Meanwhile, an a priori proposition is one which is not justified by or grounded in experience, while an a posteriori proposition is.

must give account of some regularity, of some constant relation between two phenomena. But the only regularities found in the realm of man are the purely formal categories of the aprioristic theory of action. If there are any other regularities, they would have to deal with concrete actions and their material causes. For there to exist empirical laws in the realm of man, the nature of economic phenomena would have to be physical, for it is impossible to empirically test the thoughts and preferences of men, most of which are not even consciously held. Therefore, the doctrine of positivism, which has so much maligned the field metaphysics, relies itself on a metaphysical foundation, viz. a regularity in the effects of physical processes on the mental processes of man, and the possibility, at least at a future time, of determining the physical causes of every thought, action and preference held by every man (Mises, 2006, pp. 104-106). This, as demonstrated in the second chapter of this essay, is an impermissible belief. Even if there existed such regularities, it would be impossible for man to determine them.

III. Statistics and Macroeconomics

The theorems of economic science must remain explanations of the principle. They are necessarily abstract and universal, for the patterns they explain appear in subjective phenomena which refer not to objective characteristics of persons and things, but to mental qualities attributed to them by the acting agents. Meaning, which classifies in the minds of men external objects in the different subjective categories, depends on the knowledge of each individual, a knowledge of concrete and unique events of an essentially subjective, practical and tacit character. This is the knowledge that guides men in their every action. It is their beliefs, preferences and opinions, but also many sub-conscious processes or super-conscious rules, both of which guide the actions of every man without him being aware of them. Ultimately, this knowledge is all that makes up what we call mind. As such, this kind of knowledge can never be objectifiable, clearly articulated and formalized in a scientific manner.⁴⁴

The economist's role is, therefore, to draw scientific, i.e., objective and articulate knowledge about things which depend for their existence on the subjective and practical knowledge that is dispersed among the minds of men (Huerta de Soto, 2020, pp. 52-54). Such scientific knowledge must run in purely formal and universal terms, without referring to any particular external events, but to the regularities between the universal categories of thought and action. This means that the economist's goal must be to formulate explanations of the principle, of the patterns which are present between all economic phenomena, but which materialize in the physical world through the action of men, based upon their own private knowledge of the concrete reality around them.

In an attempt to surpass the limits of our knowledge, macroeconomic theory replaced the information about the concrete facts of time and place with statistical magnitudes and averages. In so doing, it lost the capacity to explain the arrangement of the relations between

⁴⁴ For lack of a better word, the term “knowledge” is used here to describe these things, since it is the term used in the economic tradition. The term “knowledge” does not have the same meaning here than in philosophy (in the first chapter). It is the “data” of the social sciences, that is, what we take for granted, the ultimate given, what cannot be explained nor studied. In the cases where this knowledge is conscious, it can be contrary to physical reality and does not need to be justified. It is, in the words of Plato, *doxa*, mere opinion. But these opinions rely upon a whole superstructure of unconscious rules which govern our every action. On this, see Hayek, “Rules, Perception and Intelligibility”, *Proceedings of the British Academy*, vol. 48, 1962, pp. 321-344; as well as Hayek, “The Primacy of the Abstract” in F. A. Hayek, & B. Caldwell (Ed.), *The Market and Other Orders* (Abingdon: Routledge, 2014) pp. 314-337.

agents and economic phenomena. This development may very well have been worthwhile if concrete prediction was achieved, but this endeavor was doomed from the start. Statistics, by definition, must abstract from the minor differences between the particular circumstances of the objects they aggregate, the knowledge of which is precisely what is necessary to make precise predictions (Hayek, 1945, p. 524). To predict particular events, one needs information of particulars, not of statistical magnitudes. Additionally, as the objects they aggregate are physical, the statistician must assume some form of constancy in the relations between them in order to make, from his statistical knowledge of the past, concrete predictions of the future. But the knowledge necessary to make such an assumption is precisely that private, subjective knowledge of every individual about the things which surround him. Macroeconomics lost its micro-foundations in a bid to increase its explanatory power, but, without recourse to individual action, it deprived its theories of any.

IV. Equilibrium Analysis

The state of equilibrium is probably one of the most used concepts or models in modern economic theory. Here it has been characterized as an imaginary construction, a mental model which abstracts from crucial elements of reality and is, therefore, entirely unrealistic. It is useful in so far as it shows us the importance of change. If changes in the data of the market were, from this moment on, to cease forever, an equilibrium state would eventually emerge. In such a state, there would no longer be any uncertainty and, therefore, no profits or losses. The future would be perfectly known by every market participant and, since no change would occur which would cause individuals to change their behavior, all transactions would be repeated again and again. The system would be in a perpetual flux. But, of course, this state is completely alien to our world. Man's limited knowledge and irremediable uncertainty towards the future are essential features of human existence and, as such, should be considered foundational facts of any science of man. A dynamic world, a world of change, is a world of disequilibrium.

Hardly ever does one come by an economist who seriously views the state of equilibrium as a genuine description of the real world. But unfortunately, it is not so uncommon to find one who, although acknowledging the absurdity of its premises and explanations, defends it for its supposed "predictive power". No less a figure than Milton Friedman in one of the most influential books on economic method of the past century claimed that: "The ultimate goal of a positive science is the development of a 'theory' or, 'hypothesis' that yields valid and meaningful (i.e., not truistic) predictions about phenomena not yet observed. [...] Truly important and significant hypotheses will be found to have 'assumptions' that are wildly inaccurate descriptive representations of reality, and, in general, the more significant the theory, the more unrealistic the assumptions" (Friedman, 1966, p. 14). This principle, viz. that the ultimate goal of science is to develop theories that make "valid" predictions, if consistently applied, would undo all the progress human thought has made since the dawn of humanity. It would demolish the whole edifice of human knowledge and lead to the acceptance of all kinds of absurd and contradictory views as "scientific".

Take the following theory: "Thirst is caused by a fire starting in your stomach, so when you drink water it puts it out, causing you to no longer be thirsty". From this theory we can derive a very simple prediction: "Whenever I drink water, I will quench my thirst". Generally, this prediction is correct, but should we accept the theory? Before we knew about human

anatomy, taking Friedman's position would've led us to accept this theory without even batting an eye. Nowadays it could be argued that we know the fire is not there, but, similarly, we know people are not omniscient and yet the equilibrium state is defended as a good predictor of reality. We can also have other theories that lead us to the same conclusions. Maybe the fire wasn't physical fire and so couldn't be seen or felt. Or what if our theory was that Hephaestus himself, the God of fire, caused in every man every so often a thirst which only the drinking of water (understood to be some form of sacramental ritual for Poseidon) could stop? The prediction remains equally valid and, therefore, the theory is just as scientific as the theory that dehydration causes thirst. Consequently, this position on the nature of science not only leads to the acceptance of nonsensical views, but also to relativism. Various contradictory theories can produce the same predictions, so they should be accepted as equally valid.

Friedman's position, instrumentalism,⁴⁵ profoundly misrepresents the nature of knowledge and science. The purpose of scientific inquiry is to know and understand the world. Simple "predictive power", which may change at any time due to a lack of constant relations between economic phenomena, is not knowledge at all. It can be neither true, nor justified in any manner. But, even if the conclusion happens to be true, a belief in it cannot be knowledge since the premises and reasons for the belief are false.⁴⁶ There is no use in believing in something that is known to be false simply because it makes – for now – accurate predictions. The correct predictions made from false beliefs are lucky guesses and coincidences, they owe no part of their accuracy to the false beliefs, so the conclusion that the data appear in a way "as if the model is true" (Friedman, 1966, p. 21) is useless. People get thirsty *as if* they were dehydrated, *as if* they had a fire in their stomachs, and *as if* Hephaestus made them thirsty.

Lastly, it must be noted that the state of equilibrium does not make accurate predictions, at least not about the things that most matter. It follows from its premises that everyone would be perfectly content, that there'd be no innovation, that all price fluctuation would stop, and even that money would cease to be a medium of exchange (Mises, 1998, pp. 249-250). The conclusions that can be drawn from the assumptions of the state of equilibrium, those from which real testable predictions can be made, unlike the precise statistical predictions of particular events which Friedman supposes, are not accurate at all. The equilibrium model is an unrealistic construction of the mind, which ought never to be used to describe reality.

V. Game Theory

Game theory is superior to the standard approach to equilibrium analysis on one account: it does not intend to be descriptive, but prescriptive (Hülsmann, 2000, p. 31). It does not claim that the equilibria of the various games are the results achieved in reality, but that they could be reached given the right strategies. However, the use of game-theoretic methods in economic theory is just as misleading.

⁴⁵ Friedman's position may be, arguably, even more incoherent than the instrumentalist view. He does not deny the existence of truth or our capacity to attain true knowledge, for he explicitly accepts that the assumptions can (and should) be unrealistic, i.e. contrary to reality and therefore false. For an explanation of instrumentalism and a critique of it, see Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge*, (Abingdon: Routledge, 2002), p. 144-153.

⁴⁶ See above, p. 9.

First of all, playing games is a kind of action, but so is drinking a beer. Not all actions are games and therefore can't be understood as such. In the majority of games, if not in all, there is a clear objective: to defeat the opponent. But the majority of actions do not involve or have as an end anyone else's defeat. In fact, at least within a market economy under the division of labor, the ends sought by men are usually achieved by providing others with what they deem important. Social cooperation is the norm (Mises, 1998, p. 116-117). It is an error to assume the means to achieve an end, for the theory to be comprehensive of all phenomena must run in purely formal terms.

Regardless of the last point, which is rather minor, the more significant critique is due to the assumptions of every game. The game theorist, in formulating the games, draws up the strategies that players may follow, which, therefore, are assumed to be given by the players. The players' actions are no longer free, the courses of action they will take are already pre-designed and the only choice they have is to choose to follow one between them. The reality is much different. The actor does not choose one path among many from which he knows the results, but necessarily forges his own path in an environment of uncertainty. His every action depends on all the subjective and tacit knowledge which makes up his mind. His actions are essentially creative. The game-theorist has also pre-selected the rewards for each path, which are assumed to be equally valuable for both players. In this way, he has solved much of the problem which poses the nature of economic phenomena: the rewards are known, the valuations of the players are equal and therefore also known and the different strategies are known as well.⁴⁷ The only uncertain factor left is that of the behavior of the other players, which is indeed of great importance but is hardly the only factor that limits our knowledge in the real world. For this reason, game theory is more descriptive not of the market process, but of situations where these things, especially the different strategies, are almost completely known by the players. For instance, in the realm of politics and geopolitical conflict, where not only are the courses of action more or less established, but there is a real opposition of interests between the different parties.

⁴⁷ Paraphrasing Solow's critique of endogenous growth theorists, we could say that "The idea of [game theory] so captures the imagination that [game] theorists often just insert favorable assumptions in an unearned way; and then when they put in their thumb and pull out the very plum they have inserted, there is a tendency to think that something has been proved". See Solow, "Perspectives on Growth Theory", *Journal of Economic Perspectives*, vol. 8, issue 1, 1994, 45-54.

ADDITIONAL PHILOSOPHICAL CONSIDERATIONS

I. The Nature of Economic Phenomena and the Limits of Intervention

The nature of economic phenomena has significant implications for the capacity that States have for intervening. Being dependent for their existence on subjective and ever-changing knowledge, economic phenomena cannot be ascertained and accumulated in all their complexity. The information or knowledge relevant for the coordination of society is an information about particular, unique facts of time and place. The totality of these facts are not known by any individual actor, but are dispersed among the minds of men and constantly being created or discovered and, subsequently, acted upon. So, it is only natural that the question arises as to how individual men with partial knowledge could coordinate society.⁴⁸

Social coordination can happen due to the existence of market prices. Market prices are not the final prices of the state of equilibrium, they are historical prices which have been paid for a determined amount of a good, at a definite time and in a definite place. As such, they are not established by any higher authority than the owner of the goods in question guided by his understanding of consumer demand. Market prices communicate information to market participants, but this information will affect each agent in a different way. An increase in the price of commodity X in country A may be viewed by an actor as bad, as something which will increase his costs and, therefore, it will induce him to buy relatively less of X. The same event may be viewed by a different actor as a profit opportunity. It could cause him to go to country B, where the price of X is now relatively lower, buy some supply of the commodity and sell it in country A. He could only do that if he knew about the relevant facts to carry out such an action. But the actions of both men, in reacting to the fluctuation of the price of commodity X, have contributed to the coordination of society. The first agent caused the demand of X to decrease a bit, and the latter one brought in more supply of X. Both actions, *ceteris paribus*, contribute to bringing the price X back down. The information the actors need to bring about coordination, therefore, is only about the relative importance for the rest of society of their different possible courses of action. They need not know why the price of X changed. They only need to interpret this change in light of their own partial knowledge under the conditions of a monetary economy and the division of labor.

A particular agent at a particular time and place discovers some (subjective) profit opportunity which he can take advantage of and decides to do so. It is this action that allows for social cooperation. However, State intervention invariably distorts the market prices which would've prevailed were the intervention not have occurred. In order for the State, as a centralized decision maker, to act in a coordinated manner, it must be able to collect and aggregate all the dispersed subjective knowledge of every individual market agent. This he cannot do. The State is thus in the same position as the macroeconomist who attempts to reach a precise prediction of particular events. Neither can obtain the necessary knowledge and must resort to statistics, which do not actually reflect the knowledge necessary for the coordination of society. Additionally, unlike the statistician, the State, in its action, does affect the real

⁴⁸ Of course, by “coordination” we do not mean “equilibrium”, but the ability to modify and adapt one’s behavior and expectations to the behavior and expectations of other men. On the issue of coordination, see Hayek, “Economics and Knowledge”, *Economica*, vol. 4, issue 13, 1937, pp. 33-54; Hayek, “The Use of Knowledge in Society”, *The American Economic Review*, vol. 35, issue 4, 1945, pp. 519-530; and Huerta de Soto, *Socialismo, Cálculo Económico y Función Empresarial* (6th ed.) (Madrid: Unión Editorial, 2020), pp. 41-86.

operation of market processes in altering price signals. Therefore, by its own action, the State prevents the creation of the very information it needs to coordinate society, since it distorts market prices and, with them, the perceived profit opportunities of market agents.

Of course, whatever policies are followed must depend on the goals sought, which depend on non-economic questions about ethics and political philosophy. However, the knowledge that centralized decisions cannot be coordinative is supremely important for policymaking. The goal of a particular policy may be non-economic, but the results of its execution depend on its effects on society. For any policy to succeed, it must take into account the laws of economics and the nature of social phenomena.

II. A Hypothesis about the Origin and Reliability of our Cognitive Faculties

Having reached this point in our discussion of the nature and methods of economics and of science more broadly, we will indulge in a bit of metaphysical speculation. At the beginning of this essay, it has been demonstrated that, even if we have no reason to doubt our cognitive capacities, we cannot prove their reliability for the discovery of truth through them. We must simply hold that because it appears that we can know truth, that the external world exists and that $2+2$ is 4, these beliefs are correct. But even if we cannot prove it, nothing prevents us from speculating and formulating hypotheses about the reason for the reliability of our cognitive faculties.

A naturalistic account of the development of these faculties through evolution is usually the position taken by most scientists. In fact, the two economists who have been cited the most throughout this essay, Hayek and Mises, hold this view. Mises (2006, p. 14), for example, has claimed that “[t]he concepts of natural selection and evolution make it possible to develop a hypothesis about the emergence of the logical structure of the human mind and the a priori”, while Hayek in his work on theoretical psychology (2018b) explains the emergence of mind and the phenomenal world as entirely a result of experience and evolution. However, it has been argued that such a combination of a naturalistic worldview with the historical fact of evolution presents a challenge rather than a solution to the question of the reliability of our cognitive faculties. Plantinga (1993, pp. 216-237) has demonstrated that under a naturalistic framework, viz. one in which all that exists is the material world and everything can ultimately be reduced to the interactions of physical forces, an evolutionary explanation of the origin of the human mind gives us a reason to doubt all our beliefs. Instead of presenting the entire argument in purely formal and probabilistic terms, the following will be a simple exposition of why the conclusion is reached.

The criterion of evolutionary success is not truth, but survival. Those species who are best adapted to the world survive, and those who are not, perish. Truth can indeed be helpful for survival, but it is not necessary. Truth is a quality applicable to beliefs, but survival is a result of behavior. One could behave in a way conducive to his survival, in theory, without being correct about any of the reasons that cause him to behave in such a manner. Plantinga (1993, p. 225-226) proposes the following example: suppose a prehistoric man encounters a tiger. All beliefs that cause him to run away will contribute to his survival. He may, for example, “[like] the idea of being eaten, but whenever he sees a tiger, always runs off looking for a better prospect, because he thinks it unlikely that the tiger he sees will eat him”. He may also think that tigers are cuddly animals and wants to pet him, “he also believes that the best

way to pet it is to run away from it”. Or he may confuse “running toward it with running away from it”. All of these beliefs would result in the survival of the prehistoric man, even if they are all wrong. There exist an indefinite number of beliefs that could result in survival-oriented behavior, but only one that is true, whose reasons reflect reality. Therefore, if naturalism were the case, an explanation of our cognitive faculties through evolution provides, instead of support, a defeater (a reason to doubt) for the naturalistic worldview. For, if our cognitive faculties are not truth-oriented but survival-oriented, can we truly be sure that the naturalistic position is correct, or, much worse, that any of our beliefs are true?

This argument shows, at least, the unlikelihood of a naturalistic reality, not of evolution. Again, maybe naturalism is indeed correct and maybe all that we hold to be true is false, we cannot prove it either way. But everything in our experience points to the truth-oriented nature of our cognitive faculties and, thus, against naturalism. So, we are faced now with the choice between many different non-naturalistic positions: from Platonic idealism to Aristotelian or Thomistic realism, to any other form of non-naturalistic explanation. The explanation that appears most plausible and simplest, or at least most reflective of the nature of our cognitive faculties *and* their limits, is the one presented in this paper, that is, realism.

Reason alone cannot prove its own reliability. It must appeal to a higher and previous order of things. It can appeal to evolution, but not to a purely naturalistic evolution. It must appeal to something which can indeed explain its reliability. Historically, the most influential thinkers have indeed appealed to such a higher order, to God and, particularly, to the Christian God. In the biblical narrative, men are created in the image and likeness of God (RSVCE, Genesis 1:26-27), but they are not gods. The *imago Dei*, the image of God implanted in man is what makes him, through his reason, “capable of understanding the order of things established by the Creator” (CCC, §1704). Man’s reason is not creative, it does not create reality like God’s logos; it is a reason that acknowledges its place as a creature but that is able to recognize the reality of the created things. The book of Genesis has always been regarded to be highly symbolic, so an explanation of the reliability of our cognitive capacities through some form of theistic evolution would not be contradictory. But it could also be the case that we have immortal and uncreated souls which reach into the Platonic world of ideas and forms and thus can perceive truth.

Ultimately, we can never truly know or be certain about such speculations. Everything that we experience and think happens through our own cognitive faculties, so there is no escape to this problem. But such is the human condition, the condition of a limited being. It seems as if things are as they appear to us, so let us assume that they are so and conjecture about the reasons for our own intellectual satisfaction.

III. The Guiding Virtues of Scientific Inquiry

Prudence is the queen of the moral virtues; it is the moral virtue which most perfects our actions in ensuring that reason conforms them to reality (ST, Secunda Secundæ Partis, q. 47). The prudent man adjusts his behavior in conformity to the truth and, thus, is regularly able to achieve his goals. With regards to the scientist, this implies that he ought to go about his research in conformity to the reality of the phenomena he studies, taking important notice of the usefulness of the tools and methods he uses. If the phenomena in question consist of mental qualities, the scientist cannot pretend to use the methods of the physical sciences to study them.

All his efforts in that regard would be in vain. Whatever truth he may attain will not be about the mental qualities, but about statistical data of the physical objects which the same scientist has assumed to correspond with them at a definite moment in the past. Similarly, if the objects of study of the researcher are physical objects which do not depend on man for their existence, he would be better off employing empirical tests and the hypothetico-deductive method.

But the scientific researcher must also be aware of his own limits. He is not omniscient. There are serious demonstrable limitations to human knowledge. Humility, the opposite of pride, is therefore another key virtue for the scientist. Humility, from the Latin *humus* (earth), is not self-deprecation or shame, but rather the quality of being close to “the earth”, of being grounded in reality. The social scientist, being of the same nature as his object of study, is implicitly aware of all the mental qualities that guide the actions of men, just like he is aware – safe for cases of impairment – of the qualities of color, of pitch and of taste. These qualities are elucidated in man by physical facts directly through his sensory organs, but the qualities of action depend on the entirety of the thoughts and preferences of the individual actor. The social scientist cannot, therefore, know through empirical tests the external objects to which these qualities refer in the mind of each man, but he is able to know of the relations between the mental qualities and their implications. We must defend the use of reason and the a priori, but only for the purposes which conform to reality, that is, only for the formal study of human thought and action, not of atoms, fluids and the movement of the celestial bodies, of which we have no innate a priori valid knowledge.

There exist, both in the physical realm and in the world of action, laws which circumscribe what we may do. These laws are true, they are real. They stand as a testament to our own limits. Rebelling against nature will inevitably prove to be futile. All we can hope for is to conform our actions to this external reality. For us, this entails the recognition of human action as the foundational phenomenon of economic science and the acceptance of harsh constraints on our knowledge of the social order. Blindness to these facts could only lead us astray.

CONCLUDING REMARKS

A world in which the phenomena of economics have an objective, physical reality is a world of great simplicity. It is a world in which any reference to the action of men would be superfluous. But it would be a world essentially different from our own. The phenomena of economics are essentially subjective in nature. But the scientific knowledge of the theorems of economics is objective. It is real, and it describes and delimits all of our actions.

In the previous analysis we have attempted to lay the epistemological foundations for a realist approach to economic science. In doing so, we have contended with and given solutions to the major problems of the theory of knowledge and the theory of science. Science cannot know all that exists, for it is a human institution. It is the systematic arrangement of human knowledge, which, as such, must necessarily be limited. It has to rely on ultimate givens, and it cannot ever achieve a full unity of its branches.

Arising from the unbridgeable gap between the mental and the physical, the theory of action, praxeology, defines and studies the universal laws that are contained in the regularities of the forms and categories of action. Physical objects form part of the sciences of man only in so far as their imbued with the meaning of some category through the action of individual men. This brings forth the essentially subjective element of the phenomena of the social sciences. These phenomena are complex, they depend entirely on the thoughts of each man. The same physical object at the same time and in the same place can form part of different classes for different men. For the same man, it could move from one class to another in the blink of an eye. There is no possible way for the economist, as a man, to safely know to which class a particular external object belongs, except by the use of his historical understanding. But the theory must run entirely in terms of the universal patterns between the mental phenomena. We can neither explain nor predict any particular events, nor should we attempt to. The aprioristic-deductive method, starting from the category of action and slowly introducing into our deductive chains empirical assumptions about the conditions within which action takes place, grants us all the knowledge we can hope to achieve about pure theory. Whatever tests may be carried out, they would no longer refer to pure theory, but to the applied theory to the particular concrete reality the economist predicted. Falsification can only imply that the economist had guessed wrong in the application of the correct theorems.

There is plenty of room for development within the sciences of action. Particularly within economics, until recently most studies neglected the influence of economic and policy conditions on the values of individuals and families. The easiest connection of the two realms can be found in the category of time preference. Additionally, there is a need to substantiate from correct foundations many of the theories that have been developed over the past century without recourse to action. Many of the conclusions could be correct, and often are, but we must clearly show why that is the case. Outside of economics proper, theorems could be formulated about the actions of the scientific researcher and of the actors within organizations.

Economic science for the past few decades seems to have been immersed in grave confusion. Before the turn of the 21st century, much of the field seemed to have agreed upon the same incorrect methods. Now, heterodoxies of every kind are sprouting up everywhere. I kindly welcome this change. To tear down a rotten building is the first step in reconstruction. It is a great moment to question our assumptions and to rebuild from among the ashes the edifice of our science.

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