

Karl Popper: From Metaphysics to Evolving Knowledge

JOHN ESCUREL FUNELAS, OP¹

THE CONCEPT OF "EVOLVING KNOWLEDGE"

This study inquires into Popper's concept of "evolving knowledge." The term 'evolving' is understood in its common meaning, i.e., denoting a gradual development or positive change. There is no explicit definition of knowledge in Popper. Initially, it may be understood as "understanding of or information about a subject that is either in a person's mind or possessed by people generally."² Popper gives it two senses:³ (a) knowledge in general; and (b) scientific knowledge in particular.⁴ Knowledge in general refers to all forms of knowledge, including animal knowledge; knowledge in particular refers to human knowledge specifically, knowledge of the natural or physical sciences. The exposi-

¹ Fr Funelas, a Doctor of Philosophy from the University of Santo Tomas, Manila, is a Professor at the said University as well as at the Philippine Dominican Center of Institutional Studies, Quezon City.

² See the *Cambridge International Dictionary of English* (Cambridge: Cambridge University Press, 1995), p. 474. In line with the present discussion, this dictionary also affirms that "bacteria play a vital part in animal evolution."

³ This may be equivalent to Aquinas' 'cognitio' and 'scientia'. Cognition refers to all knowledge, correct or not. Science refers to certain and true knowledge. Knowledge in general refers only to human knowledge, so is scientific knowledge. The latter however is a testable, criticizable knowledge. See Norman Kretzmann and Eleonore Stump, eds., *The Cambridge Companion to Aquinas* (New York: Cambridge University Press, 1993).

⁴ CR, 216. Cf. P1, 12.

tion in this second part will be on “evolutionary epistemology” or “natural selection epistemology.” Likewise, we will touch on Popper’s theories of the three worlds, verisimilitude, and the problem of language will also be discussed.

I. EVOLUTIONARY EPISTEMOLOGY

Evolutionary epistemology is only of recent origin. It is a contribution of the twentieth century, although there may have been implicit forerunners in the past.⁵ The best introduction to this field is Donald Campbell’s “Evolutionary Epistemology.”⁶ As the name suggests, this is a theory or a critique of knowledge based on Darwin’s natural selection and blind variation theory, popularly known as the ‘survival of the fittest’ theory. Campbell describes evolutionary epistemology as “an epistemology taking cognizance of and compatible with man’s status as a product of biological and social evolution.”⁷ It also argues “that evolution – even in its biological aspects – is a knowledge process, and that the natural-selection paradigm for such knowledge increments can be generalized to other epistemic activities, such as learning, thought, and science.”⁸ However, this “has been neglected in the dominant philosophical traditions. It is *primarily through the works of Karl Popper* that a natural selection epistemology is available today.”⁹

Precursors of this theory are many. Campbell mentions Alexander Bain (1855), Jevons (1874) and Souriau (1881) whose “recurrent theme is *‘le principe de l’invention est le hazard’*”¹⁰ In section 4 of said essay, “Historical Perspectives on Evolutionary Epistemology,” Campbell reveals other names associated with this theory: Capek, Mach, Poincare, Henri Bergson, William James, George Simmel, Uexkull, Charles Sand-

⁵ However, nobody provided a major theme. Herbert Spencer was the best spokesperson before Darwin. The latter gave the critical push for evolutionary epistemology to come out in the open.

⁶ In Schilpp, 413-463. Popper’s response to this is in pp.1059-1065. Cf. Radnitzky and Bartley, 47-90 and 115-120.

⁷ Campbell in *Schilpp*, 413.

⁸ *Ibid.*

⁹ *Ibid.* Italics mine.

¹⁰ *Ibid.*, 428. A rough translation of the French quotation is “The principle of invention is risk.”

ers Pierce, James Mark Baldwin, Fouille, Pillsbury, Woodworth, Rignano, Thurstone, Lowes, Tolman, Hull, Muenzinger, Miller and Dollard, Boring, Humprey, Mowrer, Sluckin, Polya and Bonsack, Kenneth J.W. Craik.¹¹ Kant's categories of perception and thought could also be taken as evolutionary products.¹²

Edward Stein has this to say regarding evolutionary epistemology: "This is an approach to the theory of knowledge that sees an important connection between the growth of knowledge and biological evolution. An evolutionary epistemologist claims that the development of human knowledge proceeds through some natural selection process, the best example of which is Darwin's theory of biological natural selection."¹³ Thus, it has two versions: the 'evolution of cognitive mechanisms program' (EEM) and the 'evolution of theories program' (EET). Campbell and Popper belong to the latter. It "sees the (partial) fit between theories and the world as explained by a mental process of trial and error known as epistemic natural selection."¹⁴

Correspondingly, two issues arise from this, namely, a) *realism* which asks the question "what sort of metaphysical commitments does an evolutionary epistemologist have to make?"; and b) *progress* whose concern is, "does knowledge develop towards a goal?"¹⁵ "With respect to realism, many evolutionary epistemologists endorse what is called hypothetical realism, a view that combines a version of epistemological *Scepticism* and tentative acceptance of metaphysical *Realism*. With respect to progress, the problem is that biological evolution is not goal-oriented,¹⁶ but the growth of human knowledge seems to be."¹⁷

As previously affirmed, Popper's metaphysical commitment is metaphysical realism. He considers the growth of knowledge as not blind but goal-oriented. Its aim is truth. His version is "perhaps best

¹¹ *Ibid.*, 430.

¹² *Ibid.*, 441.

¹³ J. Dancy and E. Sosa, eds., "Evolutionary Epistemology," *A Companion to Epistemology* (Oxford: Blackwell Publishers, 1992) p. 122. [Henceforth, Dancy and Sosa].

¹⁴ *Ibid.*, 123.

¹⁵ *Ibid.* Italics mine.

¹⁶ See Helena Cronin, "The Evolution of Evolution", *TIME* Special Issue, January 1998, p.53.

¹⁷ Dancy and Sosa, 123.

called a natural selection epistemology.”¹⁸ He did not give that name himself but prefers the description: “Towards an evolutionary theory of knowledge.”

II. TOWARDS AN EVOLUTIONARY THEORY OF KNOWLEDGE

Central to Popper’s philosophy is gnoseology or epistemology. His metaphysics, philosophy of science, social philosophy, philosophy of biology, and axiology are all based on his epistemology.¹⁹ For him, the beginning of life is the beginning of knowledge.²⁰ Knowledge is worth dying for. “Knowledge is one of the few things that are worth dying for, together with liberty, love, kindness, and helping those who are in need of help.”²¹

Popper’s theory of knowledge evolves²²; the apex of which is this ‘evolutionary theory of knowledge.’ In his lecture to the alumni of the London School of Economics (LSE), Popper withdrew the title “Evolutionary Epistemology”, considering it pretentious, and placed in its stead the title “Towards an Evolutionary Theory of Knowledge.”²³ In spite of this “humility”, he is considered as a pioneer, the “modern founder and leading advocate” of natural selection epistemology.²⁴ Other scholars who are with him in this field are Donald Campbell, Konrad Lorenz and Gunter Wachtershauser whose theory regarding the emergence of life he accepted. Specifically, it has to do with the evolution of the eye.²⁵

Besides the *Replies to my Critics* (RC), explicit discussions on evolutionary epistemology are found in his books: *Objective Knowledge; The Self and its Brain; Knowledge and the Body-Mind Problem; A World*

¹⁸ Campbell in *Schilpp*, p. 437.

¹⁹ Dancy and Sosa, 349.

²⁰ AWP, 47; 50.

²¹ *PI*, 260.

²² Bergson may have influenced Popper on this. The *Open Society* is patterned after the *Two Sources of Morality*, which discusses the open and closed morality.

²³ AWP, 29.

²⁴ Campbell in *Schilpp*, 437. See also 450-451.

²⁵ AWP, 41.

of *Propensities; In Search of a Better World*; and in his essay "Natural Selection and the Emergence of Mind", his first Darwin Lecture included in Radnitzky and Bartley's *Evolutionary Epistemology, Rationality and the Sociology of Knowledge*.²⁶ Whereas Popper's initial writings on epistemology have something to do with the philosophy of physics, his discovery of the philosophy of biology and the unity between the two disciplines led him to evolutionary epistemology. This is the reason why Bartley observed that it constitutes the unity of his thought.

Among those who greatly influence Popper with regards to this theory are Xenophanes, Parmenides, Darwin, Kant and Bergson. Although there are similarities between him and Charles Sanders Pierce, Popper accordingly worked independently of this American thinker. He explicitly acknowledged that he was "extremely interested" in Darwinism and that he accepted evolution as a 'fact'.²⁷ "As I explained in my *Intellectual Autobiography*, there is a definite connection between Darwinism... and my own theory of the evolution of knowledge through the competition and elimination of theories."²⁸ This is also the application of critical rationalism to biology, specifically to the metaphysical research program of Darwinism. Earlier, Popper called his epistemology 'common sense realism'. Later on, he accedes to Campbell's description of it as 'evolutionary epistemology', or a 'natural selection epistemology'.²⁹

If there is anything most appealing in Popper's philosophy, we could say that it is his notion of evolutionary epistemology. Anthony O'Hear commends that this is so because it avoids dogmatism in "science and human affairs."³⁰ This "setting of human knowledge in Darwinian context" is not really new in Popper's mature philosophy, because it has been latent in his early epistemology. From the very beginning, Popper has been rattling that knowledge grows by trial and error, by conjectures and refutations – "learning from our mistakes." *If there is anything truly recent or characteristic of his mature philosophy, then it is the extension of knowledge to animals and lower organisms.*

²⁶ PS, edited by David Miller, contains an essay on evolutionary epistemology delivered in 1973, pp.78-86.

²⁷ UQ, 167.

²⁸ RC, 1048.

²⁹ Campbell in *Schilpp*, 437.

³⁰ Dancy and Sosa, 350.

This is a theory "that human knowledge is a very special case of animal knowledge. My central idea in the field of animal knowledge (including human knowledge) is that it is based on inherited knowledge. It is of the character of unconscious expectations."³¹ Men and insects were born with 'instincts' or innate traditions.³² Popper contends that the beginning of knowledge is from within. Consistent with regards to critical rationalism, his is a hypothetico-deductive method.

1. The Emergence of the Cosmos, Life and Consciousness

How did the cosmos evolve? When was the moment that life first sprung forth in this world? And how about the brain, mind, consciousness, knowledge, intelligence; when, where, how was their beginning? For Popper, the evolution of the world, life and knowledge are interrelated. "Thus, the origin and the evolution of knowledge may be said to coincide with the origin and the evolution of life, and to be closely linked with the origin and evolution of our planet earth. Evolutionary theory links knowledge, and with it ourselves, with the cosmos; and so the problem of knowledge becomes a problem of cosmology."³³

Popper believes that it is absolutely impossible to know how this physical world came into being, or if it indeed really came into being.³⁴ But since he accepts the Darwinian notion of evolution, he may have also favored the Big Bang cosmogony and its various ramifications.³⁵ What is obvious is that the world is here, undeniably existing outside our mind. Popper gives the following example: if one kicks a stone, it kicks him back; that is, he can never deny the reality of the stone. From non-living matter, life evolves. "I conjecture that life, and later also the mind, have evolved or emerged in a universe that was, up to a certain time, lifeless and mindless. Life, or living matter, somehow emerged from nonliving matter; and it does not seem completely impossible that we shall one day know how this happened."³⁶

³¹ *P1*, xxv. Cf. *P3*, 86.

³² *Ibid.*, 94.

³³ *AWP*, 39.

³⁴ For the term 'emergence', see *P2*, 145 ftnt 19; *SB*, chap. P1 sec.6-9. Origin of the universe, see *P2*, 143.

³⁵ For the various variations of modern Big Bang Theory, see William Carroll.

³⁶ *NSEM*, 150.

Eventually, Popper provides an explanation by accepting the theory of the biochemist Gunter Wächtershäuser regarding the origin of the first light-sensitive organ (predecessor of human eyes), which has a bearing on the evolution of life.³⁷

"Life can only exist, and can only survive, if it is in some degree adapted to its environment. We can thus say that knowledge –primitive knowledge, of course– is as old as life. It originated with the origin of pre-cellular life, more than three thousand eight hundred million years ago. (Unicellular life came into existence not much later). This happened soon after the earth cooled down sufficiently to allow some of the water in its atmosphere to liquify. Until then, water had existed only in the form of steam or clouds, but now hot liquid water began to collect in rocky basins, big or small, forming the first rivers, lakes, and seas."³⁸

The beginning of life is simultaneous with knowledge. This is so, because once there was life, there was immediately problem-solving. As we have said previously, regarding Popper's philosophy of man, life basically consists of solving problems. This presupposes intelligence or knowledge. Organisms demise or develop, regress or progress, according to their response to problems and as they compete with others. "Thus competition can clearly be regarded as a process that favours the discovery of new ways of making a living and with them new possibilities of life, together with the discovery and the construction of new ecological niches."³⁹

Nevertheless, Popper still accepts that the origin of life is an impenetrable barrier to science; "it comes very near to what David Hume would have called, grudgingly, a miracle."⁴⁰ The emergence of "animal

³⁷ AWP, 41. He refuted the soup-theory or broth theory regarding the origin of life. "It is therefore fortunate that an alternative theory was published in 1988... It assumes only the existence of such simple inorganic micromolecules as those of water, iron, carbon dioxide and hydrosulphide... The new theory shows in detail how organic molecules (such as sugar) may evolve in time, perhaps deep down in the sea, bound to the surface of pyrite crystals, rather than in a solution. The anaerobic formation of the pyrite crystal creates the free chemical energy needed for the chemical processes –especially carbon fixation– that constitute the earliest form of pre-cellular life."

³⁸ *Ibid.*, 38-39.

³⁹ ISBW, 12.

⁴⁰ P2, 122. See also p. 148.

consciousness", feelings of joy and pain is the second miracle.⁴¹ Even up to now, the phenomenon of consciousness is still considered as "the supreme scientific mystery, one that can never be explained."⁴²

2. The Knowledge of Animals and Lower Organisms

Popper did not clearly distinguish from each other: 'brain', 'mind', 'consciousness', 'awareness', 'thought', 'intelligence', and 'knowledge'. These terms seem to be used synonymously in his writings. Within the spectrum of his evolutionary epistemology, these are attributed not only to man but also to all living organisms. One-celled organisms, plants,⁴³ insects, and animals can have knowledge.⁴⁴ Elephants, dolphins, beavers,⁴⁵ monkeys and dogs seem to exhibit intelligence.⁴⁶ From the unicellular amoeba to Einstein, the same trial and error, conjectures and refutations are observed.⁴⁷ The Popperian difference is that the amoeba may die in the process of falsifiability, while in Einstein, only his ideas are refuted. Man can change or modify his theories. But the growth of knowledge in both man and other organisms is the same. And in these species knowledge is inborn. "I think that, say, 99 per cent of the knowledge of all organisms is inborn and incorporated in our biochemical constitution."⁴⁸ "I conjecture that animals and men

⁴¹ *Ibid.* See also p. 150. "There can be little doubt that animals possess consciousness and that, at times, they can even be conscious of a problem. But the emergence of consciousness in animal kingdom is perhaps as great a mystery as is the origin of life." Likewise, *P2*, 153. "...consciousness of selfhood, is absent in animals."

⁴² Antonio Damasio, "A Clear Consciousness", *TIME* Special Issue, p.50. [Henceforth, *Damasio*].

⁴³ *AWP*, 35. Plants "have something like sensations or perceptions to which they respond, and something like sense organs. And they know, for example, how to attract bees and other insects."

⁴⁴ *Damasio*, 51. "Obviously all human beings have awareness, but I would venture to say that many animals do as well."

⁴⁵ *P2*, 27.

⁴⁶ In *SB*, Popper says that elephants have a sense of death, an attribute peculiar to man.

⁴⁷ *AWP*, 38. "But, roughly speaking, almost all forms of knowledge of an organism, from the unicellular amoeba to Albert Einstein, serve the organism to adapt itself to its actual tasks, or to tasks that may turn up in the future."

⁴⁸ *Ibid.*, 46. See also p.47.

have what can be called “inborn knowledge,” or more especially, “inborn expectations” and “inborn dispositions.”⁴⁹

This is a theory of knowledge placed “in the wide and exciting context of biological evolution.”⁵⁰ The starting point is that “animals can know something: that they can have knowledge.”⁵¹ For example, a dog knows what time his master arrives from work. He is eagerly waiting for his master’s return. This may be a “blatant anthropomorphism” but not a metaphor. This presupposes a “hypothetical theory of homology.” That is, dogs and human beings have likeness due perhaps to a common ancestor. The dog’s brain is homologous to the human brain. Organs and functions of organs, procedures, and behavior of man and animals have similarities. An example of which is the courtship behavior. This is not merely a metaphor but a serious evolutionary hypothesis. However, animals are not cognizant of their knowledge and they do not have consciousness of selfhood.⁵²

III. SCIENTIFIC KNOWLEDGE

Popper’s epistemology is centered on scientific knowledge. “Yet the study of the growth of scientific knowledge is, I believe, the most fruitful way of studying the growth of knowledge in general. For the growth of scientific knowledge may be said to be the growth of ordinary human knowledge *writ large*.”⁵³ The core problem of epistemology is the problem of the growth of knowledge which “can be studied best by studying the growth of scientific knowledge.”⁵⁴ Hence, epistemology refers to the study of scientific knowledge. “Epistemology I take to be the theory of *scientific knowledge*.”⁵⁵ This scientific knowledge is “the best and most important kind of knowledge we have”, although it is not regarded as the “only one.”⁵⁶ Evolutionary epistemology is scientific.

⁴⁹ RC, 1071. Cf. P1, 14, 59, 94-102; P3, 3.

⁵⁰ AWP, 29.

⁵¹ *Ibid.*, 30.

⁵² *Ibid.*, 31. Cf. P2, 153.

⁵³ CR, 216. Also quoted in Campbell in *Schilpp*, p. 418.

⁵⁴ LScD, 22. Also quoted in Campbell in *Schilpp*, 417.

⁵⁵ OK, 108, 142; PS, 336.

⁵⁶ ISBW, 3.

1. Problem-Shift in the Theory of Knowledge

The usual sense of knowledge is "true and certain knowledge"; "and 'to know' means, in addition, to be in possession of *sufficient reason* for holding that our knowledge is true and certain."⁵⁷ This is Hume's knowledge as "justified true belief."⁵⁸ This is also the basis of scientism (Science with capital S) which claims that its pronouncements are "gospel truth."⁵⁹ According to Popper, there is no such knowledge, because knowledge is "sheer guesswork,"⁶⁰ although controlled by criticism and experiment. The following questions are irrelevant: "How do you know?" "What is the reason, or the justification, for your assertion?" or "How can we justify our theories or beliefs?"⁶¹ Philosophy of knowledge should instead answer the following questions: "Why do you prefer this conjecture to competing conjectures?" "What is the reason for your preference?" or "How can we adjudicate or evaluate the far-reaching claims of competing theories and beliefs?" "Whether one theory is preferable to another, and if so, why." "Whether one theory has hitherto withstood criticism better than another."

And how are these questions answered? They are solved by the critical approach that leads to the closer approximation to truth. "Although critical reasons can never justify a theory, they can be used to defend (not to justify) our preference for it."⁶² All human beings hold theories taken "for granted more or less unconsciously and therefore uncritically; and these uncritically held theories often contain the strongest reason for continuing to hold those other theories consciously."⁶³ Bacon calls these "unconscious assumptions as idols and as prejudices." Socrates, Plato and Parmenides speak of "delusive opinions uncritically held by 'the mortals'"⁶⁴ Knowledge held uncritically may be called 'pre-scientific knowledge' or 'metaphysical knowledge', as has been discussed

⁵⁷ P1, 12. Cf. ISBW, 3-4.

⁵⁸ *Ibid.*, 79, fnnt 1.

⁵⁹ *Ibid.*, 13.

⁶⁰ Cf. *Ibid.*, 259. (*doxa* rather than *episteme*)

⁶¹ *Ibid.*, 19, 71.

⁶² *Ibid.*, 20.

⁶³ *Ibid.*, 14.

⁶⁴ *Ibid.*

earlier. Falsifiability, or rational criticism demarcates science from metaphysics. Thus, scientific knowledge is knowledge that can be subjected to, or a result of, critical rationalism.

2. The Searchlight Theory of Science

Popper describes science in many ways. The following may be considered to be the most important Popperian descriptions:

1. Science is "the result of human endeavour, of human dreams, hopes, passions, and most of all, as the result of the most admirable union of creative imagination and rational critical thought..."⁶⁵ It "arises from criticism *and* common sense *and* imagination."⁶⁶ It "is nothing but enlightened and responsible common sense – common sense broadened by imaginative critical thinking."⁶⁷

2. Scientific theories are genuine descriptive statements.⁶⁸

3. The scientific status of theories depends on "factors such as their simplicity, symmetry, and explanatory power, and on the way they have stood up to critical discussion and to the crucial experimental tests; and on their truth (correspondence to reality), or nearness to truth."⁶⁹

4. "Science may be described as the art of systematic over-simplification – the art of discerning what we may with advantage omit."⁷⁰

5. The task of science is satisfactory explanation. Science has no certainty.⁷¹

The lack of certainty in science is not its weakness but its strength. This makes the search for truth continuous. Thus, it is analogous to a searchlight.⁷² For instance, in the dark, no one can see unless there is light. Science provides that light so as to see and know reality.

⁶⁵ *Ibid.*, 259.

⁶⁶ *Ibid.*, 129.

⁶⁷ *Ibid.*, 260.

⁶⁸ *Ibid.*, 110.

⁶⁹ *P3*, 41; Cf. *CR*, chap.10; *OK*, chap.2.

⁷⁰ *P2*, 44.

⁷¹ *P1*, 145, 222.

⁷² *P2*, 45. Cf. *OSE2*, 260-262; *OK*, appendix 1; *CR*, 127 ff.

3. The Role of Observation in Science

Popper does not accept the method of induction; the *tabula rasa* theory which he calls the 'bucket theory of the mind.' There are already 'propensities' or 'biochemical structures' in the mind that enable it to know. The example given is Helen Keller who is able to learn despite her impaired senses. He says that "observation reports are highly selective, and this selection is influenced by preconceived ideas."⁷³ All knowledge are interpretations in the light of expectations and theories. This is similar to Plato's a priorism. The difference is that for Plato, preconceived ideas are ideals, forms that truly exist in the world of perfection, of which this physical world is only an appearance. This is also similar to Aristotle's theory of potentialities. Both philosophers agree that potencies are not nothing. However Popper considers potency as if it were already something.

With regards to learning, Popper mentions three modes: a) by trial and error/conjecture and refutation, b) by habit formation (repetition proper), c) by imitation (absorbing a tradition). Accordingly, the three can be found both in animals and in man. But only learning by trial and error is relevant to the growth of knowledge. "[I]t alone is learning in the sense of acquiring new information."⁷⁴ What then is the role of empirical observation or experience in science? It is used in *testing* theories with the aim of formulating or reaching a preferred theory.⁷⁵

4. Theories versus Concepts

In science, theories are more important than conceptual systems. Theories are not 'conceptual systems' nor conceptual frameworks'. Two theories are "logical equivalent, even though they may use two totally different 'conceptual systems (C1 and C2) or are conceived in totally

⁷³ *P1*, 59; 14, 94-95, 99-100, 102. Cf. *P3*, 3. See also *P1*, 99, 102. "No uninterpreted data.... All our knowledge is interpretation in the light of our expectations, our theories, and is therefore hypothetical in some way or other." There should be interest and stimulus to determine something as significant, as a data and not a noise. See the topic: "The Knowledge of Animals and Lower Organisms" in this study.

⁷⁴ *Ibid.*, 40; 43.

⁷⁵ *Ibid.*, 55.

different 'conceptual frameworks'."⁷⁶ For example in mathematics, $2 + 5$, $3 + 4$, $6 + 1$, $8 - 1$, are all equal to 7. A theory is the same whatever language it may be translated into. However, conceptual systems are instruments in formulating theories. They provide a language for a theory. They cannot be made precise by definition, whether formal, operations, or ostensive" because definition leads to an infinite regress. They are not pictures. Only theories are pictures. "*We understand a theory if we understand the problem which it is designed to solve, and the way in which it solves it better, or worse, than its competitors.*"⁷⁷

5. Descriptions of Scientific Knowledge

Based on Popper's descriptions of science and critical rationalism, one can already deduce what scientific knowledge is. But the following explications are given: (1) Knowledge is conjectural or hypothetical in nature. Scientific theories remain uncertain, guesswork; although under criticism they may come nearer to the truth. "All knowledge is conjectural knowledge. The different conjectures or hypotheses are our intuitive inventions (and therefore *a priori* – before experience, even though not *a priori* valid). They get weeded out through experience – through bitter experience – and so we become anxious to replace them by better conjectures: in that, and only in that, consists the contribution of experience to science."⁷⁸ (2) Scientific knowledge "begins with problems, practical as well as theoretical."⁷⁹ (3) "Thus scientific knowledge is not identical with *my* knowledge; and what is *my* knowledge ... is largely the result of my absorption of traditions, and (I do hope) of some critical thinking."⁸⁰ (4) Scientific knowledge is objective knowledge. "Knowledge consists in the search for truth – the search for objectively true, explanatory theories."⁸¹ (5) Scientific knowledge is not in a sense of "true and certain knowledge." But it is for simplicity and clarity.⁸² (6) The theory of knowledge is properly a theory of dis-

⁷⁶ P3, 42.

⁷⁷ *Ibid.*, 45. See also pp. 42-44.

⁷⁸ TWOP, 278. See also p. 116. Cf. AWP, 47; ISBW, 4, 40; P1, 13, 102, 129.

⁷⁹ ISBW, 3.

⁸⁰ P1, 93.

⁸¹ ISBW, 3-4.

⁸² *Ibid.* "It is not the search for certainty. To err is human. All human knowl-

covery.⁸³ (7) Scientific knowledge is like a net “whose mesh we try to make finer and finer,”⁸⁴ designed/invented by man to catch the reality of this world.

In his book In Search of a Better World, Popper summarizes his epistemology.

1. “There are *no ultimate sources* of knowledge.
2. The proper questions of epistemology are not actually with sources at all; rather, we ask whether an assertion is true – that is to say, whether it agrees with the facts.⁸⁵
3. *Tradition* is – apart from inborn knowledge – by far the *most important source* of our knowledge.⁸⁶
4. [...] Nevertheless, without tradition, knowledge would be impossible.
5. Knowledge cannot start from nothing – from the *tabula rasa* – nor yet from observation. *The advance of our knowledge consists in the modification and the correction of earlier knowledge.*
6. Neither observation nor reason is an authority. [...] *The most important function of observation and logical thought, but also of intellectual intuition and imagination*, is to help us in the critical examination of those bold theories which we need in order to delve into the unknown.
7. Clarity is an intellectual value in itself; exactness and precision, however, are not. *Absolute precision is unattainable*; and there is no point in trying to be more precise than our problem demands. [...] Every definition must make use of defining concepts; and so *we can never ultimately avoid working with undefined concepts*. Problems connected with the meaning or the definition of words are unimportant....

edge is fallible and therefore uncertain. It follows that we must distinguish sharply between truth and certainty. That to err is human means not only that we must constantly struggle against error, but also that, even when we have taken the greatest care, we cannot be completely certain that we have not made a mistake.”

⁸³ Cf. *UQ*, 90.

⁸⁴ *P2*, 55. See also p. 42.

⁸⁵ See *P1*, 92-93.

⁸⁶ See *Ibid.*, 92.

8. Every solution of a problem creates new unsolved problems. The harder the original problem and the bolder the attempt to solve it, the more interesting these new problems are. [...] The main source of our ignorance lies in the fact that our knowledge can only be finite, while our ignorance must necessarily be infinite.”⁸⁷

These are quoted almost *in toto* because this seems to be the simplest presentation of his scientific knowledge. What seems to be lacking is the theory that animals have knowledge too, and regarding the process of knowing, what is true to man is also true to animals and other living organisms. Men and animals employ conjectures and refutations.

6. The Growth of Scientific Knowledge

In considering the growth of scientific knowledge, the basic question should be: “how can we hope to detect error?”⁸⁸ By detecting errors, knowledge grows. Thus, the method of trial and error-elimination, conjectures and refutations is responsible for the growth of knowledge.⁸⁹ The modified schema below illustrates the growth of scientific knowledge.⁹⁰

$$\infty \dots P1 \rightarrow TT \rightarrow EE \rightarrow P2 \dots \infty$$

P1 stands for ‘problem’; TT stands for ‘tentative theory’; EE stands for ‘error-elimination’; P2 stands for ‘new problems or several problems’. The infinity signs and dots refer to the countlessness and indeterminacy of problems and solutions. There may not be only P2 but P3, P4 and so on. “Problems, after they have been solved and their solutions properly examined, tend to beget problem-children: new prob-

⁸⁷ *ISBW*, 49-50. Emphasis mine.

⁸⁸ *Ibid.*, 47. Cf. *P1*, 155, 56. This refers to “critical revision of our beliefs.” Man is not completely dependent upon his upbringing, beliefs, knowledge and expectations because he can always criticize them. See the topic: “Problem shift in the Theory of Knowledge” in this present study.

⁸⁹ *UQ*, 115. “In *Logic der Forschung* I tried to show that our knowledge grows through trial and error elimination, and that the main difference between its prescientific and its scientific growth is that on the scientific level we consciously search for our errors: the conscious adoption of the critical method becomes the main instrument for growth.”

⁹⁰ Popper’s original schema is only $P1 \otimes TT \otimes EE \rightarrow P2$.

lems, often of greater depth and ever greater fertility than the old ones. ... the best tentative theories (and all theories are tentative) are those which give rise to the deepest and most unexpected problems."⁹¹ The "swamp" is given as an illustration of the foundation of knowledge. By trial and error, knowledge is pushed deeper and deeper but it could never be determined whether it has reached rock-bottom or its ultimate base. Thus it may be illustrated thus:

$$\begin{array}{l} \infty \dots P1 \rightarrow TTs \rightarrow EE \rightarrow \\ \rightarrow P2 \rightarrow TTs \rightarrow EE \rightarrow \\ \rightarrow P3, P4, \dots \infty \end{array}$$

The diagram illustrates that problems may come from different directions, from different sources. There are different tentative theories to choose from and the solution to one problem begets more problems. A hypothesis is chosen on the basis that it is the best of the rest, *ceteres paribus*. In choosing the best hypothesis, the following requirements should be met:

1. "The new hypothesis must explain all the things that the old hypothesis successfully explained.
2. It must avoid at least some of the errors of the old hypothesis: that is, it should, where possible, withstand some of the critical tests that the old hypothesis could not withstand.
3. It should, where possible, explain things that could not be explained or predicted by the old hypothesis."⁹²

This criterion of scientific progress is also the criterion for the approximation to the truth. Evolving knowledge refers to this growth, or to the evolution of scientific knowledge. Scientific knowledge is continually growing. "This is why the evolution of physics is likely to be

⁹¹ OK, 287.

⁹² ISBW, 39. Cf. RC, 1186, fnt 73; Musgrave in *Schilpp*, 570. "According to the theory of knowledge here outlined there are in the main only two ways in which theories may be superior to other: they may explain more; and they may be better tested – that is, they may be more fully and more critically discussed, in the light of all we know, of all the objections we can think of, and especially also in the light of observational or experimental tests which were designed with the aim of criticizing the theory." (quoted in RC, 1085)

"As is well known, Popper has suggested the following standards: (a) deducibility of the *explanandum* from the *explanans*, (b) high explanatory power or empirical content or independent testability of the *explanans*, and (c) truth of the *explanans*."

an endless process of correction and better approximation.”⁹³ This may then be called “epistemological tentativism,” because it spouses the tentative nature of all theories without however denying their reality and objectivity.

7. The Psychology of Knowledge and the Logic of Knowledge

Popper distinguishes the psychology of knowledge and the logic of knowledge. The former refers to the acquisition of knowledge by empirical observation, while the latter refers to the logical relations of statements and the criticism of theories.⁹⁴ He made it clear that his concern is about the logic of knowledge. It was already indicated that the question of the sources of knowledge is irrelevant in epistemology. What is relevant is the logic of knowledge.

“Popper’s ‘logic of knowledge’ is concerned, then, with logical or objective features like truth and falsehood, deducibility, contradictoriness, deductive explanation, explanatory power or empirical content, simplicity, verisimilitude. The psychology of knowledge is concerned with psychological or subjective features which may (or may not) be *corrected* with these objective ones when some subject considers the statement in question – features like believing and doubting, inferring, feeling puzzled and being relieved of puzzlement, finding complex and difficult or finding simple.”⁹⁵

Popper’s objectivist epistemology distinguishes the “knowing subject” and his objective knowledge,⁹⁶ or the knowledge content. What is more important is not the knowing subject, but the objective knowledge, the logical relations of the content of knowledge. There will be knowledge even if there is no knower, even if it is not absolutely known.

8. Knowledge Without Authority

Knowledge is real, objective, autonomous, and man-made. It is evolving. As will be seen in the discussion on the three-world theory, knowledge is a world 3 inhabitant. The question regarding the sources

⁹³ *UQ*, 131.

⁹⁴ Musgrave in *Schilpp*, p.567.

⁹⁵ *Ibid.*, p.573.

⁹⁶ *Ibid.*, 581.

of knowledge is irrelevant because “pure, untainted and certain sources do not exist, and question of origin and of purity should not be confounded with questions of validity and of truth.”⁹⁷ In his article, “The beginnings of rationalism,” Popper says: “If you ask me, ‘How do you know?’ my reply would be, ‘I don’t; I only propose a guess. If you are interested in my problem, I shall be most happy if you criticize them.”⁹⁸ As mentioned above, knowledge is guesswork, *doxa* rather than *episteme*.

As knowledge is without foundation, it has also no authority, and ultimate validity.⁹⁹ It is possible to have knowledge without a knowing subject. It “is totally independent of anybody’s claim to know; it is also independent of anybody’s belief, or disposition to assent; or to assert, or to act. Knowledge in the objective sense is *knowledge without a knower*: it is *knowledge without a knowing subject*.”¹⁰⁰ If the issue on the sources of knowledge is irrelevant, what then is relevant in epistemology?

It “is the study of scientific problems and problem situations, of scientific conjectures (which I take as merely another word for scientific hypotheses or theories), of scientific discussions, of critical arguments, and of the *role* played by evidence in arguments; and therefore of scientific journals and books, and of experiments and their evaluation in scientific arguments; or, in brief, that the study of a *largely autonomous* world 3 of objective knowledge is of decisive importance for epistemology.”¹⁰¹

In science, nobody has, not even the experts the last say or the definite solutions to problems. “I do not know of any creative scientist who has made no mistakes; [...] So there are experts, but no authorities – a fact that has not yet established itself sufficiently.”¹⁰² That is

⁹⁷ *ISBW*, 47.

⁹⁸ *PS*, 30.

⁹⁹ Cf. *P1*, 259; *P3*, 157. One should not be impressed by the specialist – the expert; not to mistake obscurity with profundity. See also *P1*, 21-22; *P3*, 12. Popper is also against the ‘end of the road’ (endgültig) theory and that knowledge is complete (*vollständig*).

¹⁰⁰ *PS*, 60. Cf. *ISBW*, 51.

¹⁰¹ *Ibid.*, 63. Emphasis mine.

¹⁰² *AWP*, 34.

why science strives only for objective truth that is beyond human authority and beyond scientific fashions. "For I hold that science *ought* to strive for objective truth, for truth that depends only on the facts; on truth that is above human authority and above arbitration, and certainly above scientific fashions."¹⁰³

9. The Myth of Knowledge as Justified True Beliefs

Popper attacks the idea that knowledge needs justification or that it is justification itself. It has no ultimate explanation.¹⁰⁴ Scientific knowledge could never be justified even by millions of empirical observations or verifications. The statement "All swans are white" could never be justified by verifiability, because it is impossible to observe all swans in the world and from time immemorial till the present. Knowledge then is not justified true beliefs but that which has been falsified, which has undergone the 'mettle of tests' by observation. Scientific knowledge is what is rationally criticizable.

The difference between beliefs and written language is that the latter could be criticized. Beliefs that are expressed in language could be criticized, and hence, could either be metaphysical or partly scientific knowledge.

IV. THE THEORY OF THREE WORLDS

Popper's three-world theory is a product of his "metaphysical shift" while writing the *Open Society*. He says: "it was only approximately in 1960 that I devoted a paper to the subject."¹⁰⁵ Describing this conjecture, he says: "The conjecture I am here proposing has this very special advantage over all others I know: it seems to me the only one which gives a real and biologically significant function to the mind, consciousness, the experience of strenuous thought, and to the self."¹⁰⁶ This theory is consistent with his concept of truth which he adapted from Tarski [correspondence theory] and with his critical trial and error-elimination method.

¹⁰³ *Ibid.*

¹⁰⁴ P2, 135; Cf. P2, 161; P1, 28, 57.

¹⁰⁵ RC, 1050.

¹⁰⁶ *Ibid.*, 1052.

What is this theory all about? Simply speaking, Popper believes that there is reality outside the mind, that the world is real and objective, and that there are three worlds.¹⁰⁷ World 1 is the physical world; world 2 is mental consciousness or psychological awareness; and world 3 is the products of the human mind including problems. These three worlds interact with each other.

1. Description of the Three Worlds

a) *World One*

World One is "...the world of physical objects or of physical states"¹⁰⁸ – the material sensible world. This includes everything that is empirically observed. Examples are human bodies, books, pens, chalk, buildings, etc. This world is *temporally prior* than the other two worlds.

World One is "the physical world, which we divide into animate and inanimate bodies, and which also contains in particular states and events such as stresses, movements, forces and fields of force."¹⁰⁹ However it is not known how this physical world came into being *if it really* came into being. "Should the big bang theory be true, then the first thing to come into existence was probably light."¹¹⁰

b) *World Two*

World Two is "...the world of states of consciousness, or of mental states, or perhaps of behavioural dispositions to act."¹¹¹ World 2 is the "world of our experiences, especially the experiences of human beings... the world of all conscious experiences, and we may suppose, also of unconscious experiences."¹¹² This is "presumably an *evaluating and discerning consciousness*, a problem-solving consciousness, right from

¹⁰⁷ See *P2*, 114 ff; *OK*, chaps. 3 & 4; *SB*, chap.2.

¹⁰⁸ *OK*, 106. Cf. *P2*, 119. "acoustical language noises"

¹⁰⁹ *ISBW*, 8. Cf. *P2*, 114. World of physics: rocks, trees, physical fields of forces, chemistry and biology.

¹¹⁰ *Ibid.*, 19.

¹¹¹ *OK*, 106. Cf. *P2*, 114. (fear, hope, dispositions to act, all kinds of subjective experiences including subconscious and unconscious experiences)

¹¹² *ISBW*, 7, 8.

the start.”¹¹³ Thinking, intuition, imagination, perception, even emotion, and all other psychological acts belong here. The scholastics’ three acts of the intellect [simple apprehension, judgment, reasoning] and freewill are categorized here. Even dreams are included. Acts involving the brain or the mind are world 2 inhabitants. This is said to have evolved together with world 3. Referring to his co-author of *The Self and its Brain*, Popper says: “Eccles and I see the fully developed human world 2 – the world of thought, reflection, self-consciousness, and of the tribulations involved in solving the most difficult problems – as having evolved with the specifically human world 3.”¹¹⁴ Popper’s hypothesis is “that the original task of consciousness was to anticipate success and failure in problem-solving and to signal to the organism in the form of pleasure and pain whether it was on the right or wrong path to the solution of the problem.”¹¹⁵

c) World Three

Popper likewise believes in “the reality of a world of man-made theories, problems, and mistakes” which he calls world 3.¹¹⁶ “What I called “the third world” and now prefer to call, upon Eccles’s suggestion “world 3” is, essentially, the world of the products of the human mind; but I include in it, and I hold it necessary so to include, the unintended interrelationships and interactions between these products. World 3 is to a remarkable extent autonomous.”¹¹⁷

This is “...the world of *objective contents of thought*, especially of scientific and poetic thoughts and of works of art”¹¹⁸; “the world of the objective products of the human mind, that is, the world springing from the human part of World 2. World 3, the world of the products of the human mind, contains such things as books, symphonies, works of sculpture, shoes, aeroplanes, computers¹¹⁹; and also quite simple physical

¹¹³ *Ibid.*, 17.

¹¹⁴ *RC*, 1053.

¹¹⁵ *ISBW*, 17.

¹¹⁶ *Ibid.*, 1053. Cf. *P2*, 114 [Works of art, ethical values, social institutions (societies), libraries, books, scientific problems and theories]; *P2*, 154 [Story-telling, mythmaking, theories, theoretical problems, detecting mistakes, arguments].

¹¹⁷ *RC*, 1050. See also *OK* 106; Corvi, 89.

¹¹⁸ *OK*, 106.

¹¹⁹ *P2*, 126.

objects, which quite obviously also belong to world 1, such as saucepans and truncheons.”¹²⁰ As objective products of the human mind, world 3 contains material and immaterial inhabitants. “I assume that there exists immaterial inhabitants of World Three, which are real and every important; for example, problems.”¹²¹

Scientific knowledge is in world 3. “While knowledge in the sense of ‘I know’ belongs to what I call the ‘second world’, the world of *subjects*, scientific knowledge belongs to the third world, to the world of objective theories, objective problems, and objective arguments.”¹²² The linguistically formulated human knowledge is the most characteristic of world 3.¹²³

The human world 3 is different from the animal world 3, although it could be said that the latter is a precedence of the former. “When I compare, in places, the human world 3 to animal products –to bee’s honey or spiders’ webs– then I do it not in an attempt to identify the human world 3 with an animal world 3, but in order to show that even the greatest novelties and emergent steps in evolution have analogues in some of the preceding steps.”¹²⁴ World 3 is likewise autonomous.

“World 3 comprises amongst other quite disparate things (such as social institutions) especially the sciences and the arts, and it has its own non-arbitrary domain of autonomy. My favourite example –much laboured in this volume– is that though we have invented (along with the invention of a highly developed language) the sequence of natural numbers, we did not invent the sequences of odd or even or prime or perfect numbers, which existed, even if for long unnoticed, as soon as the natural numbers did: prime numbers were actually there, to be *discovered rather than invented*. Although in its origin and growth world 3 is a product of the human mind, it is one of my theses that the human mind in its turn is also largely a product of world 3. [...] Thus world 3, as I see it, is in flux, partly in response to the changes it has itself

¹²⁰ *ISBW*, 402.

¹²¹ *Ibid.*, 9.

¹²² *OK*, 108.

¹²³ *P2*, 114-116. World 3 begins only with the evolution of human language. It is a class of things, a universe of discourse. It is neither a theory nor an assertion nor an argument. See *p2*, 130. By world 3, man has transcended himself and nature.

¹²⁴ *RC*, 1190, fnt 112.

provoked in world 2; changes induced, that is to say, by feedback from the autonomous problems of world 3.”¹²⁵

World Three is constantly changing. “I have argued that world 3 is a changing world –a product of the human mind– and that the discoveries of open problems and their proposed solutions by way of new theories are among its most characteristic events.”¹²⁶ World Three is a “mitigated version of Platonism.” The difference is that World 3 has “many false ideas as true ones.” More so, it is man made, and there is a “two-way, not just one-way interaction between minds and ideas.”¹²⁷

2. The Interaction of the Three Worlds

The three worlds evolved in different times. “The order of worlds 1, 2 and 3 (as indicated by these numbers) corresponds to their age. According to the current state of our conjectural knowledge, the inanimate part of world 1 is by far the oldest; then comes the animate part of world 1, and at the same time or somewhat later comes world 2, the world of experiences; and then with the advent of mankind comes world 3, the world of mental products; that is, the world that anthropologists call ‘culture’.”¹²⁸ They interact with one another. Each is “open” and is “affected” by the two others. “If we call the physical world “world 1”; the world of mental experiences “world 2” and the world of problems, arguments, reasons (and also of works of art and many other things) “world 3,” then my thesis can be formulated: world 3 can act (at any rate via world 2) upon world 1; therefore, world 1 is not causally closed.”¹²⁹ They influence each other. “One of my central theses is that reasons (or the validity of reasons), arguments, and even problems, can influence human behaviour and therefore the physical world (world 1). For example, a scientific argument between builders of bridges can lead to a change in the plan for the construction of a bridge, and therefore influence the part of the physical world represented by the completed bridge.”¹³⁰

¹²⁵ *Ibid.*, 1177.

¹²⁶ *Ibid.*, 1077.

¹²⁷ Watkins in *Schilpp*, pp.399-400.

¹²⁸ *ISBW*, 9.

¹²⁹ *RC*, 1073.

¹³⁰ *Ibid.* See also 1060.

For Popper, reality consists of these three worlds. Their interaction is the shaping of reality.

"It is the interaction between world 1, world 2, and world 3 that may be regarded as the *shaping of reality*; the interaction that consists of multiple feedback mechanisms. We –the human mind, our dreams, our objectives– are the creator of the work, of the product, and at the same time we are shaped by our work. This is in fact the creative element in mankind: that we, in the act of creating, at the same time transform ourselves through our work. The shaping of reality is therefore our doing; a process that cannot be understood without trying to understand all three of its aspects, these three worlds; and without seeking to understand the way in which the three worlds interact with each another."¹³¹

In his essay "Epistemology without a knowing subject," Popper mentions the similarity of his views with the Platonic world and with Hegel's objective spirit. This is also affirmed by Watkins.¹³² "It has more in common still with Bolzano's theory of a universe of propositions in themselves and of truths in themselves, though it differs from Bolzano's also. My third world resembles most closely the universe of Frege's objective contents of thought."¹³³ What differentiates Popper's world three is that it is man-made, autonomous, changing, evolving; it is objective and real but allows error or false ideas. Realism and objectivism is presupposed in world 3. "All we need to assume, in world 3, is realism. In world 2 we are compelled to act and thus as a rule believe in more than can be justified, but we still choose the best of the competing hypotheses: this is a consequence of realism."¹³⁴

We present below an illustration of the three-world interaction. This is a modified form of Rudolp Krejci's model (from tabular to circular form), which was accordingly approved by Popper.¹³⁵ The broken circles illustrates the openness and interaction between these three worlds better than the closed circles:

¹³¹ *ISBW*, 26.

¹³² See Watkins in *Schilpp*, 339-340. Also in p.408, fnt 15.

¹³³ *OK*, 106.

¹³⁴ *Ibid.*, 93, fnt 53.

¹³⁵ R. Krejci, "Panetics: Popper's Integrated Universes of Discourse," <http://www.panetics.org/popper.html>, 1/26/98.

WORLD 1	WORLD 3
PHYSICAL OBJECTIVES AND STATES	KNOWLEDGE IN OBJECTIVE SENSE
1. INORGANIC	Cultural heritage cod. on material substrates
Matter and energy of cosmos	philosophical
2. BIOLOGY	theological
Structure and actions of all living beings	scientific
Human beings	historical
3. ARTIFACTS	literary
Material substrates	artistic
Of human creativity	technological
Of tools	Theoretical systems
Of machines	scientific problems
Of books	critical arguments
Of works of art	
Of music	
WORLD 2	
STATES OF CONSCIOUSNESS	
Subjective knowledge	
Experience of	
Perceptions	
Thinking	
Emotions	
Dispositional intentions	
Memories	
Dreams	
Creative imagination	

3. Subjective-Objective Interaction

Given this paradigm, objectivity is attributed to world 3 while subjectivity is to world 2. Objective knowledge then is the knowledge of world 3 objects, existing independently of human consciousness. This could be compared to Kant's "things-in-themselves." Unlike Kant, Popper conjectures that man has the power to know them, although he has no guarantee as to the absolute certainty of his knowledge. The best he could do is to approximate, to come nearer to the truth, as we will see later on.

Subjective knowledge is knowledge of the individual human thinker. This may vary from person to person, or there may be great commonality among them. Since there is no guarantee of final truth, then each one should formulate his theories as clear as possible so that it could be subjected to critical tests. Theories (whatever their origin) which survive these tests and which are inter-subjectively accepted by the scientific community are regarded as the best theories and the near-

est approximation to truth. But it should be emphasized that subjective knowledge is very important because it influences objective knowledge. There is a symbiotic relation between the two.¹³⁶

V. THE PROBLEM OF LANGUAGE

The evolution of the human brain or mind is mysterious. Popper theorizes that it must have developed with human language. "The greatest emergent step that life and consciousness have taken up to now is, I suspect, the invention of *human* language. This no doubt led to the creation of mankind."¹³⁷ "Human language is our invention."¹³⁸ It is the method of critical rationalism or trial and error-elimination that triggered the invention of language. Eccles confirms that the Sumerians were the first inventors of written language. "This non-violent use of the method of rational criticism is made possible through biological development; through our invention of language and the subsequent creation of world 3."¹³⁹ The beginning of language is the beginning of man and of human knowledge. Man is a prisoner of his language, and he frees himself also by his critical efforts.¹⁴⁰ Of which does language consist? "Language consists, we may say, of dispositions anchored in nervous structures and therefore in something material; of elements of memory, engrams, expectations, learnt and discovered behaviour; and of books."¹⁴¹ As an invention, language belongs to the reality of world 3.

Popper's intense interest in language is not so much because of "words and their meanings" but because it is that which makes human beings human. "I have often described human language as a social institution – the most important and universal of all human institutions."¹⁴² Language makes man a critical animal. "Thus it is only

¹³⁶ *OK*, 142. See *P1*, 95-96. Objective knowledge cannot grow without subjective knowledge; objective knowledge in turn helps to form one's subjective convictions.

¹³⁷ *ISBW*, 20. Cf. *P2*, 118. "Human language and human thought evolve together, in mutual interaction."

¹³⁸ *Ibid.*, 25.

¹³⁹ *Ibid.*, 29.

¹⁴⁰ *P1*, 16.

¹⁴¹ *ISBW*, 22.

¹⁴² *RC*, 1166.

through language that conscious criticism becomes possible. This, I conjecture, is *the main reason* for the importance of language; and I conjecture that it is human language which is responsible for the peculiarities of man (including even his achievements in the nonlinguistic arts such as music).¹⁴³ Man's linguistic capacity is innate, an innate disposition. It is already in his biochemical genetic makeup. "The learning by the human child of an articulate, descriptive, and argumentative language is, I conjecture, based upon innate dispositions; it has a genetic basis. The genetic basis comprises dispositions to state, to describe, to agree or disagree with a description; to argue, to be critical of a statement; and countless more."¹⁴⁴

Language is also very important, not only because it makes critical attitude possible but it also gives birth to the idea of truth.

"Both of these values, the critical approach and objective truth, enter our world only with the human language, the first and most important product of the human mind. Language makes it possible to consider our theories critically: to look at them as if they were external objects, as if they belonged to the world outside of ourselves which we share with others. Theories become objects of criticism, like the beaver dam. And we can try to repair them in the light of that most important value: corresponded to the facts – *truth*."¹⁴⁵

Thus, Popper in effect affirms that science is based on language.¹⁴⁶

1. Four Functions of Language

According to Popper, language has four functions. The first two are self-expression and signaling (symbolism, rituals) which man shares with the animals. The third function is descriptive. "Descriptive statements or representative function (statements which describe an objective state of affairs which may be true or false. This is the unprecedented feature within human language."¹⁴⁷ The fourth is argumentative. "Argumentative function. The ability of *checking* our own theo-

¹⁴³ *UQ*, 140. Emphasis mine.

¹⁴⁴ *RC*, 1071-1072.

¹⁴⁵ *AWP*, 51.

¹⁴⁶ *RC*, 1123.

¹⁴⁷ *ISBW*, 21. See also *CR*, 120-135; *SB*, 57-60; *UQ*, 72-78; *OK*, chaps. 2,3,4,6.

ries for their objective truth by means of critical arguments.”¹⁴⁸ The first three functions of language have been explicited by Karl Buhler (1934), while the fourth is Popper’s own contribution.¹⁴⁹

The invention of the descriptive and argumentative functions leads to the invention of criticism. “It is the invention of a *conscious choice*, a *conscious selection* of theories in place of their *natural* selection. [...] The conscious and critical pursuit of errors is the beginning of human knowledge.... There is no knowledge without rational criticism, criticism in the service of the search for truth.”¹⁵⁰ The rationality of man is determined by the argumentative function of language. “I think that human rationality and the argumentative or critical use of human language have evolved together, and are, in fact, hardly distinguishable.”¹⁵¹

“Language, the formulation of problems, the emergence of new problem situations, competing theories, mutual criticism by way of argument: all these are indispensable means to scientific growth. The most important function or dimensions of human language are the descriptive and the argumentative functions (which animal languages do not possess). The growth of these functions is, of course, of our making, though they are unintended consequences of our actions. It is only within a language thus enriched that critical argument and knowledge in the objective sense become possible.”¹⁵²

In his essay “Evolutionary epistemology,” Popper says:

“It is one of the novelties of human language that it encourages story telling, and thus *creative imagination*. *Scientific discovery* is akin to explanatory story telling, to myth making and to poetic imagination. The growth of imagination enhances of course the need for some control, such as, in science, interpersonal criticism – the friendly-hostile co-operation of scientists which is partly based on competition and partly on the common aim to get nearer to the truth.”¹⁵³

¹⁴⁸ *Ibid.*

¹⁴⁹ P2, 82. “true or false descriptions; valid or invalid arguments”

¹⁵⁰ *ISBW*, 21.

¹⁵¹ *RC*, 1192, ftnt 155.

¹⁵² *PS*, 73.

¹⁵³ *Ibid.*, 83. Emphasis mine.

The four are the main functions of language. However, there may be further functions, such as “prescriptive or advisory or exhortative function”¹⁵⁴ and “giving orders or making requests or promises.”¹⁵⁵

2. Object Language and Metalanguage

Popper distinguishes object language from metalanguage. We use object language in describing physical things. These things can be observed, tested by experience. For example when I say “chalk” to refer to something cylindrical with color white, and used as an instrument in writing, then I can really observe, hold, throw or use it. Object language refers to the factual experiential thing.

Metalanguage, on the other hand, is the language used to describe language itself. It is factual and experiential in a sense that it could be read and criticized. But it does not refer to a physical object. Translations are metalanguage. Translations are interpretations; metalanguage is interpretative too.

“In order to be able to speak about statements, it must use names of statements, or descriptions of statements, and perhaps words such as “statement”; that is, the theory must be in a metalanguage, a language in which one can speak about language. And in order to be able to speak about facts and purported facts, it must use names of facts, or descriptions of facts, and perhaps words like “fact.” Once we have a metalanguage, a language like this in which we can speak about statements *and* facts, it becomes easy to make assertions about the correspondence between a statement and a fact”.¹⁵⁶

In everyday experience and in science we use both object language and metalanguage. Both could have the four functions of language. But both are peculiar only to human language.

3. Clarity and Precision of Language

Popper gives utmost importance to the clarity and simplicity of language. The responsibility of the scientists and philosophers is to be

¹⁵⁴ P2, 83.

¹⁵⁵ *Ibid.*, 154.

¹⁵⁶ UQ, 142. See also OK, 314.

clear and simple in their statements. He is against 'big words'.

"Every intellectual has a very special responsibility. He has the privilege and the opportunity of studying. In return, he owes it to his fellow men (or 'to society') to represent the results of his study as simply, clearly and modestly as he can. The worst thing that intellectual can do – the cardinal sin – is to try to set themselves up as great prophets vis-à-vis their fellow men and to impress them with puzzling philosophies. Anyone who cannot speak simply and clearly should say nothing and continue to work until he can do so."¹⁵⁷

In fact, his critique against the Frankfurt School represented by Adorno and Habermas is that they use ambiguous language, or 'big words'.¹⁵⁸ The same observation he has with regards to Gadamer.¹⁵⁹ This seems to be a hasty generalization. Popper did not actually explicitate on this. But his criticism is understandable because Popper considers German language as promoting 'obscuratism' (Adorno, Gadamer and Habermas wrote in German), and their linguistic expressions seem to carry multifarious meanings.

Absolute precision is impossible to attain. "The precision of a language depends, rather, just upon the fact that it takes care not to burden its terms with the task of being precise."¹⁶⁰ Precision in language becomes burdensome if it tries to define as definite as possible the meaning of words. Contrary to the Scholastic method of precisely defining terms to eliminate confusions, this instead adds to more confusion, and to the formulation of 'esoteric jargons'.

"In general I try to live up to the rule (not a dogma) that we should avoid fine terminological distinctions, and that we should not stick even to a definite terminology. It is the context, and the problem under discussion, which should elucidate, in each case, what is at stake. I believe that this rule is important: we should not, like Aristotelian essentialists, worry too much about the meanings of words; and we should recoil from the danger of introducing another esoteric jargon. There is also my old thesis

¹⁵⁷ *ISBW*, 83. See *P3*, 157. "clear thinking, simplicity and intellectual responsibility."

¹⁵⁸ See *MF*, 78-81.

¹⁵⁹ See *ISBW*, 82-95.

¹⁶⁰ *PS*, 98. See also *P1*, 263, 271, 277. (attribute of exactness is not absolute)

that precision – itself only a means to an end – cannot be achieved by introducing a precise terminology, and that trying to do so leads to pseudo precision and to scholasticism.”¹⁶¹

Precision in language, hence definitions, is only a means and not an end. It could never then be absolute. Statements and theories should be expressed as clear as possible, although absolute precision is impossible. Referring to the critique of Lakatos, Popper counters: “...he unconsciously saddles me with the obligation of using terms always in the same sense, and with the intention of being “precise”.”¹⁶² Asking whether Popper has also been always precise, then it could be said that he is not. This may be a weakness of our philosopher, but he is just consistent in the claim that if knowledge is to grow, then it has to have something not yet precise.

4. Nominalist vs. Essentialist Definition

Popper quotes F.P. Ramsey in his essay “Two kinds of definitions.” “The chief danger of our philosophy, apart from laziness and woolliness, is *scholasticism*, ...which is treating what is vague as if it were precise...”¹⁶³ He attacks the essentialist definition of Plato, Aristotle, and the scholastics:

“in science there is no ‘*knowledge*’, in the sense in which Plato and Aristotle understood the word, in the sense which implies finality; in science, we never have sufficient reason for the belief that we have attained the truth. What we usually call ‘scientific knowledge’ is, as a rule, not knowledge in this sense, but rather information regarding the various competing hypotheses and the way in which they have stood up to various tests; it is, using the language of Plato and Aristotle, information concerning the latest, and the best tested, scientific ‘*opinion*’.”¹⁶⁴

Definitions are therefore not essentialist, but rather nominalist in nature. “The scientific use of definitions, characterized by the approach ‘from the right to the left’, may be called its *nominalist* interpretation, as opposed to its Aristotelian or *essentialist* interpretation.

¹⁶¹ RC, 1186, fnnt 70a.

¹⁶² *Ibid.*

¹⁶³ PS, 87.

¹⁶⁴ *Ibid.*, 91.

In modern science, only nominalist definitions occur, that is to say, shorthand symbols or labels are introduced to cut a long story short.”¹⁶⁵ In view of critical rationalism, the useful definition is the eliminating definition.¹⁶⁶

VI. THE THEORY OF VERISIMILITUDE

Literally, verisimilitude means ‘truthlikeness’, similar to the truth, or like the truth. It is not the truth in itself, neither is it false. It is an approximation to truth. Popper’s theory of verisimilitude states that truth is the aim of science,¹⁶⁷ that there is objective truth and that it can be attained, but never can one be absolutely certain that he has already attained it. Thus, science is a continual, ‘unended’ search for truth.¹⁶⁸ He compares this situation to a “blind man who searches in a dark room for a black hat which is –perhaps– not there.”¹⁶⁹ The trials are “forays into the unknown.”¹⁷⁰

The best-tested theories are at best the closest approximation to truth.¹⁷¹ For example, the Copernican model as revised by Newton is nearer to the truth than Ptolemy’s.¹⁷² Truth is a regulative idea.¹⁷³ What differentiates evolutionary epistemology from Darwin’s natural

¹⁶⁵ *Ibid.*, 92.

¹⁶⁶ *P1*, 261, 265, 275; *LScD*, note 2 to sec. 19; *The Open Society and its Enemies*, vol. 1 (1945) [Hereforth *OSE1*], sec.ii of chap.2; *PH*, sec.10; *UQ*, sec.7.

¹⁶⁷ *ISBW*, 4, 38, 39.

¹⁶⁸ *CR*, 153. Popper adopts this from Xenophanes’ poem. “But as for certain truth, no man has known it ... And even if by chance he were to utter The final truth, he would himself not know it: For all is but a woven web of guesses.”

¹⁶⁹ *RC*, 1061.

¹⁷⁰ *Ibid.*

¹⁷¹ *UQ*, 150 “...the idea of a better and better approximation to truth, or of increasing truthlikeness or verisimilitude. According to this view, the search for better approximations to truth is what the scientist aims at; the aim of science is to know more and more. This involves the growth of the content of our theories, the growth of our knowledge of the world.”

¹⁷² *P1*, 61.

¹⁷³ *RC*, 1157. “But the idea of objective or absolute truth is also a man-made idea; and fallibility means that though truth is our supreme standard, we often fall short of it. Truth is therefore a regulative idea: we try to live up to our standards, even though we have no criterion by which we could decide whether we have reached them.”

selection is that the growth of scientific knowledge is not blind. It is regulated and aims at truth. Science aims at an explanation of the truth of this world. Critical rationalism is for truth. "1. There is no criterion for truth; even when we have reached the truth, we can never be certain of it. 2. There is a rational criterion for progress in the search for truth, and hence a criterion for scientific progress."¹⁷⁴ This criterion is rational criticism. One criticizes a theory to detect error and to get closer to truth.

Popper distinguishes between the degree of verisimilitude and the degree of corroboration. The degree of corroboration is the "degree of the rationality of our belief that a certain theory has achieved (a certain degree of) truthlikeness."¹⁷⁵ The degree of verisimilitude is the degree of truthlikeness of a theory. "Though we may reasonably believe that the Copernican model as revised by Newton is nearer to the truth than Ptolemy's, there is no means of saying *how* near it is: even if we could *define* a metric for verisimilitude..."¹⁷⁶ The two are interrelated. If the degree of corroboration of one theory is greater than the other theory, there is "reason to believe that the first is a better approximation to truth than the second."¹⁷⁷ "The fact that we do not and cannot know that a theory is true is not in itself a reason why it should not be true. It may be a reason for suspending belief, but it certainly is not a reason for disbelief, for believing that they theory is false."¹⁷⁸

1. Theories of Truth

Popper proposes three main theories of truth. The oldest of these three is the correspondence theory, "the theory that truth is correspondence with the facts, or to put it more precisely, that a statement is true if (and only if) it corresponds to the facts, or if it adequately describes the facts."¹⁷⁹ Second, is the coherence theory: "a statement is

¹⁷⁴ *ISBW*, 38-39.

¹⁷⁵ *P1*, 58. See also 64, 65.. It is an "evaluation of the past performance of the theory." Life expectancy of a theory does not depend on the degree of corroboration, because there is no conclusive proof from the past survival to future survival.

¹⁷⁶ *Ibid.*, 61.

¹⁷⁷ *Ibid.*, 58.

¹⁷⁸ *Ibid.*, 79.

¹⁷⁹ *OK*, 308. See also *P1*, 274-275 (Tarski's definition of truth); *CR*, chap.10; *OK*, chaps 2 & 9; *OSE2*, chap.11; *ÜQ*, 31.

regarded as true if (and only if) it coheres with the rest of our knowledge."¹⁸⁰ And the third is the pragmatic theory, which looks at truth simply as "pragmatic utility or pragmatic usefulness."¹⁸¹ "The theory of pragmatic utility is especially concerned with the problem of theories in the natural sciences such as physics. It says that we should accept a physical theory as true if it turns out in tests, and other applications, to be pragmatically useful, or successful."¹⁸² The coherence theory has two versions. The first version says that "truth is coherence with our beliefs, or more precisely, a given statement is true if it coheres with the rest of our beliefs."¹⁸³ The second version says that "a certain given statement, of which we do not know whether it is true or not, is to be accepted as true if (and only if) it coheres with the statements we have preciously accepted. This version has the effect of making our knowledge utterly conservative: 'entrenched' knowledge can hardly be overthrown."¹⁸⁴

Among the three theories, Popper chooses the correspondence theory as the best theory. "It is, I believe, this idea of *truth as correspondence with the facts* which makes rational criticism possible. Together with the fact that our curiosity, our passion to explain by means of unified theories, is universal and unlimited, our aim of getting nearer to the truth explains the integrative growth of the tree of knowledge."¹⁸⁵ He adds that the correspondence theory accepts the importance of the two other theories, although by themselves, they are not enough. "Thus the correspondence theory does not deny the importance of the coherence and pragmatist theories, though it does imply that they are not good enough."¹⁸⁶ This correspondence theory is taken from Aristotle, Kant and Tarski.¹⁸⁷ Kant defines truth as the "correspondence of knowl-

¹⁸⁰ *Ibid.*

¹⁸¹ *Ibid.*

¹⁸² *Ibid.*, 309.

¹⁸³ *Ibid.*

¹⁸⁴ *Ibid.*

¹⁸⁵ *Ibid.*, 263-264.

¹⁸⁶ *Ibid.*, 312.

¹⁸⁷ *UQ*, 98. "When in 1935 Tarski explained to me (in the Volksgarten in Vienna) the idea of his definition of the concept of truth, I realized how important it was, and that he had finally rehabilitated the much maligned correspondence theory of truth which, I suggest, is and always has been the commonsense idea of truth."

edge with its objects’.”¹⁸⁸ With this theory, Popper refutes “the now so fashionable view that human knowledge can only be understood as an instrument.”

Theories have a function towards in view of the truth. “[I]t is the function of every theory to divide all statements pertaining to the subject matter in question into three distinct classes – those which the theory asserts to be true, those which it asserts to be false, and those about which it does not make any assertion. [...] An inconsistent theory is useless because it asserts too much.”¹⁸⁹

2. Truth and Certainty

For Popper, a “*theory or a statement is true, if what it says corresponds to reality.*”¹⁹⁰ He presents this summation:

1. “Every unambiguously formulated statement is either true or false; and if it is false, then its negation is true.
2. There are therefore just as many true statements as there are false one.
3. Every such unambiguous statement (even if we do not know for certain if it is true) either is true or has a true negation. It also follows from this that it is wrong to equate the truth with definite or certain truth. Truth and certainty must be sharply distinguished.”¹⁹¹

Certainty and truth are not the same. Objective truth is attainable but absolute certainty is not. “There are uncertain truths—even true statements that we take to be false— but there are no uncertain certainties. Since we can never know anything for sure, it is simply not worth searching for certainty; but it is well worth searching for truth; and we do this chiefly by searching for mistakes, so that we can correct them.”¹⁹² He continues to say that since scientific knowledge is hypothetical, its method, the critical method is in the service not of

¹⁸⁸ Immanuel Kant, *Critique of Pure Reason*, 2nd ed., p. 82.

¹⁸⁹ P2, 108.

¹⁹⁰ ISBW, 5.

¹⁹¹ *Ibid.*

¹⁹² *Ibid.*, 4.

absolute certainty but of objective truth.¹⁹³

3. Objective Truth

Although one could not be certain of the attainment of final truth, yet truth is objective.¹⁹⁴ "Objectivity is not the result of disinterested and unprejudiced observation."¹⁹⁵ It is the result of criticism.

"The status of truth in the objective sense, as correspondence to the facts, and its role as a regulative principle, may be compared to that of a mountain peak which is permanently, almost permanently, wrapped in clouds. The climber may not merely have difficulties in getting there – he may not know when he gets there, because he may be unable to distinguish, in the clouds, between the main summit and some subsidiary peak. Yet this does not affect the objective existence of the summit, and if the climber tells us 'I have some doubts whether I reached the actual summit,' then he does, by implication, recognize the objective existence of the summit. The very idea of error, or of doubt (in its normal straightforward sense) implies the idea of an objective truth which we may fail to reach."¹⁹⁶

This analogy of Popper seems plausible. Once when this researcher climbed Mt. Apo in Mindanao, there was a stage wherein the climber could not see anything because of the fog. The summit was then invisible. However, once it became clear, the summit was very visible to this researcher. In human understanding however, Popper presupposes that there is no clear day in the process of knowing.

Truth is not certain. Knowledge is opinion disciplined by rational criticism. As truth is objective, it is beyond authority. "In the sciences there is at least one sovereign regulative idea which determines

¹⁹³ Ibid. See also *LScD*, 314. "In so far as the statements of geometry speak about reality, they are not certain, and in so far as they are certain, they do not speak about reality." (Einstein quoted).

¹⁹⁴ *UQ*, 143. "The correspondence theory of truth which Tarski rescued is a theory which regards truth as objective: as a property of theories, rather than as an experience or belief or something subjective like that. It is also absolute, rather than relative to some set of assumptions (or beliefs); for we may ask of any set of assumptions whether these assumptions are true."

¹⁹⁵ *P1*, 48. See also *P3*, 42.

¹⁹⁶ *CR*, 226.

the rationality of its critical discussions; I mean the idea of objective truth.”¹⁹⁷

4. Conventional Truth

Truth is conventional but it is not arbitrary. Popper compares it to a jury.

“When the jurors reach an agreement – a ‘convention’ – this is called the ‘verdict’. The verdict is far from arbitrary. It is the duty of every juror to try to discover the objective truth to the best of his knowledge, and according to his conscience. But at the same time, he should be aware of his fallibility, of his uncertainty. And where there is reasonable doubt as to the truth, he should find in favour of the accused.

The task is arduous and responsible; and it demonstrates clearly that the transition from the search for truth to the linguistically formulated verdict is a matter of a *decision*, of a *judgment*. This is also the case in science.”¹⁹⁸

Convention does not imply arbitrariness.¹⁹⁹ The word “*vere dictum*” or “verdict” means spoken truly. It is not arbitrary because truth is a verdict of a scientific community which maintains a “friendly-hostile cooperation.” Once a verdict is given it is based on evidences. It has been rigorously tested. The best-tested theory is a conventional truth, or the best approximation to the truth. This does not mean, however, that it is the final, absolute truth.

5. Skepticism:

Is Popper a skeptic? At length our author explains that he is not a skeptic in the contemporary sense.

“It is indeed correct to describe me as a sceptic (in the classical sense) in so far as I deny the possibility of a general criterion of (non-tautological) truth. But this holds of every rational thinker, say, Kant or Wittgenstein or Tarski. And, like them, I accept classical logic (which I interpret as the organon of criticism; that

¹⁹⁷ RC, 1179.

¹⁹⁸ ISBW, 5.

¹⁹⁹ RC, 1110. Cf. OSE1, 64.

is, not as the organon of proof, but as the organon of refutation, of *elenchos*). But my position differs fundamentally from what is usually termed sceptical these days. As a philosopher I am not interested in doubt and uncertainty, because these are subjective states and because long ago I gave up as superfluous the search for subjective certainty. The problem that interests me is that of *the objectively critical rational grounds* for preferring one theory to another, *in the search for truth*. I am fairly sure that no modern sceptic has said anything like this before me.”²⁰⁰

Popper instead claims to be an “anti-inductivist; anti-sensationalist; a champion of the primacy of the theoretical and the hypothetical a *realist*,”²⁰¹ and an optimist.²⁰² He is against scientism “scientism – that is, of having a dogmatic belief in the authority of the method of the natural sciences and in its results...”²⁰³ He is more of a philosophical realist. “All men are philosophers, because in one way or another we take up an attitude towards life and death...”²⁰⁴ He may also be considered a pragmatist. “Genuine philosophical problems are always rooted in urgent problems outside philosophy, and they die if these roots decay. This is so because philosophy helps in our search for a better world and in realizing the better world itself.”²⁰⁵ In this sense we may consider Popper a ‘tentativist’.

CONCLUSION

In Part One of this study, we saw Karl Popper finding metaphysics as interesting, important and meaningful. Even religious metaphysics could be empirically meaningful, and therefore understandable. This has been his position since he publicly started philosophizing. However, he manifested his explicit metaphysical orientation, only at the latter part of his career. At first he was only concerned with gnoseology and the method of science. Thus, it can be said that there is a “metaphysical turn” in his career.

²⁰⁰ *ISBW*, 7.

²⁰¹ *Ibid.*

²⁰² *Ibid.*, 223.

²⁰³ *Ibid.*, 41.

²⁰⁴ *Ibid.*, 186. Man is ideological and philosophical.

²⁰⁵ *Ibid.*

Popper considers himself a metaphysician. For him, "metaphysics" simply means that which cannot be empirically tested or not falsifiable. This includes pre-scientific, pseudo-scientific and non-scientific statements. Myths, dreams, superstitious beliefs, ideologies, religious and moral convictions based on tradition also fall under the metaphysical category. Contrary to Aquinas, Popper's metaphysics is based on epistemology.

Falsifiability is the criterion of demarcation between science and metaphysics. It is to be understood only in its logical technical sense. When Popper speaks of the observable test, he applies falsification to said test. "Degree of corroboration" refers to the grading of hypotheses or to the grade of withstanding empirical tests; and to the preference of one theory over another.

This 'logical technical sense' points to rational criticism. Rational criticism has a wider application than falsifiability. It could be the method not only of physical sciences but of all sciences, thereby making it a unifying method. Thus, all men should adopt this method in order to grow in knowledge and to transcend themselves. It is the method of trial and error, conjectures and refutations. It is not a sharp criterion of demarcation between science and metaphysics; but it has definiteness as a criterion between criticizable and non-criticizable knowledge.

Metaphysics could be rationally criticized. The fact that it is falsifiable does not mean that a theory cannot be criticized. Criticism is done by the use of logical analysis, by comparing metaphysical theories to determine which of them is nearer to science and to truth. Criticizable metaphysical ideas are called 'metaphysical research programs'. Kuhn's 'paradigm' belongs to this category. Foremost of these programs is atomism. The choice of the better or best metaphysical research program is also through critical rationalism. Simplicity, coherence, unifying power, intuitive appeal and fruitfulness of theories are the main considerations. Metaphysical research programs are important to science, because they give problems, inspirations and even hope. They could be the basis of science. They may eventually become scientific knowledge.

In Part Two of this study, we consider Popper as the modern father of evolutionary epistemology. His commitment to this epistemology presupposes his metaphysical realism and knowledge's aim and regulation by truth. Peculiar to this epistemology is the acceptance

that all living organisms have knowledge. In all organisms, knowledge is inborn, in their bio-chemical compositions. All have expectations. And the growth of knowledge is the same to all –by trial and error, conjectures and refutations, in short, through critical rationalism. What is peculiar in man is that his theories die instead of himself. Only he has self-awareness.

Science is regarded to be genuine descriptive statements; a union of creative imagination and critical thinking whose task is satisfactory explanation. It is *doxa*, or sheer guesswork. Scientific knowledge is conjectural and hypothetical by nature, which under criticism may come nearer to truth. It is a combination of criticism, imagination, and common sense. Tradition and inborn expectations are the most important sources of knowledge. However question of the sources of knowledge are not of value. What is important is the question on the growth of scientific knowledge. The real question is: Why is one theory preferred over another?

To better understand evolutionary epistemology, then Popper's theory of the three worlds, the problem of language, and the theory of verisimilitude should be taken into consideration. The theory of three worlds simply says that reality is composed of the three worlds: world 1, the physical world; world 2, the world of consciousness; and world 3, the world of the products of the human mind, especially problems. These worlds interact with each other, which also accounts for the shaping of reality. World 3 is real, objective, man-made, autonomous and changing. Man creates this world, and in creating it, he is also transformed by it. Man is capable of knowing the truth of this world but he could never be absolutely certain whether he already attained it. Thus, if there is objective truth, then objective knowledge is possible.

World 1 is prior in time while worlds 2 and 3 may have evolved simultaneously. It is not known how the physical world evolved but what is conjectured is that life and consciousness emerged from the material physical world. Once there is life, there is immediately problem-solving. It is inborn in the genetic structure of the organisms. Life forms evolve by adapting to their environment through the trial and error-elimination method. All organisms, including man, "from the amoeba to Einstein," share in this built-in structure of anticipation and critical trial and error-elimination. What differentiates man is that in solving problems by conjectures and refutations, only his ideas and theories are the ones eliminated. His scientific knowledge grows

by this critical attitude in its search for truth. Man evolves from animals because of language, particularly the descriptive and argumentative functions of language. Animals only have expressive and communicative language. Language goes hand in hand with knowledge. That is why the human mind, which is responsible for scientific knowledge, is linguistic. Eccles concurs with the information that it was the Sumerians who invented the written language. With written language the history of observation and of man has radically changed. Theories and ideas could now be easily criticized and the growth of scientific knowledge has an unparalleled leap. Scientific knowledge is that which could be falsified, tested by observation, which could be criticized. Because of the importance of language, it should then be formulated as clear and precise as possible, although absolute precision is impossible. That is the utmost responsibility of scientists and philosophers.

Like organisms, scientific knowledge grows by conjectures and refutations or by the trial and error-elimination method. It is illustrated by the schema: $\infty \dots P1 \rightarrow TT \rightarrow EE \rightarrow P2 \dots \infty$, where P1 is the problem; TT is tentative theory; EE is the process of error-elimination; and P2 is the new problem or several other problems. The dots and infinity signs refer to the indeterminacy and endlessness of problems and solutions. Every solution to a problem breeds other problems. It may be called epistemic *tentativism*. For Popper, man is in fact understood as a being forever faced by problems, practical and theoretical, with no guarantee as to the certainty of the solutions to these problems. The theory that survives the most rigorous tests is therefore the fittest, or the best. It has more explanatory power, more content, better tested and the least *ad hoc*. But unlike organisms, the growth of scientific knowledge is not blind. It aims towards better explanations, towards truth.

Truth then is the regulative principle of science. It is real and objective. Whether one knows it or not, it is there, waiting to be discovered. It could be known but one could never be absolutely certain that he has known it. The best that could be done is an approximation to truth. This is the theory of verisimilitude, or truthlikeness. The best-tested theory is the best approximation. It is conventional, but not arbitrary, because it is arrived at by the inter-subjective agreement of the intellectual community who has a "friendly hostile" relation with each other. It is a critical judgment based on evidences and facts. Truth dwells in world 3. It is perpetually elusive. Man's intellectual and epistemological journey should then be an endless search for truth, an

“unended quest”, “in search of a better world.” We can say that, in this sense, Popper’s evolutionary epistemology is reminiscent of Homer’s “the journey is the thing.”

Popper’s metaphysics is presupposed in his evolving knowledge. While at the same time, his concept of evolving knowledge is a meta-physical research program.²⁰⁶ □

²⁰⁶ I am very thankful to Dr. Macario Ofilada for editing this work.