

POPPER'S VIEW OF MODERN SCIENCE: IN THE FOOTSTEPS OF SCHELLING

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ABSTRACT: It has been readily observed by many Popper scholars that there was something intensely moral about his thought, which I suggest is a moral metaphysics underpinned by a naturalism, which is in keeping with a German tradition exemplified by Schelling. The notion of freedom played a huge part in this. Any scientific or political argument which seems to challenge the existence of freedom is forcefully combated, whether the discussion concerned the discipline of logic, mathematics, physics, biology or politics. For Popper, freedom was everywhere seen at the structural level of differentiated modes of organization in the universe. It was via this discernment freedom's embeddedness in the universe that his philosophy most closely resembles Schelling's naturalism. Despite the advances in scientific knowledge that Popper had access to, key themes in Schelling's thought are recurrent in Popper's later philosophy. This suggests that we can look at Popper as someone whose thought trajectory projected his life's philosophy along a similar path away from Kantianism as Schelling's. It also adds to the rehabilitation of Schelling as a philosopher of science whose thought remains relevant to the current debates.

KEYWORDS: Popper, Schelling, Kant, Process Metaphysics, *Naturphilosophie*, evolutionism, probability theory, freedom.

INTRODUCTION

It has been readily observed by many Popper scholars that there was something intensely moral about his thought, which I suggest is a moral metaphysics underpinned by naturalistic arguments, which are in keeping with a German tradition exemplified by Schelling. The notion of freedom played a huge part in this. Any scientific or political argument that seems to challenge the existence of freedom is forcefully combated, whether the discussion concerned the discipline of logic, mathematics, physics, biology or politics. For Popper, freedom was everywhere seen at the structural

level of differentiated modes of organization in the universe. It was via this discernment freedom's embeddedness in the universe that his philosophy most closely resembles Schelling's naturalism.¹ This paper does not cover the various ways in which Schelling's ideas have found counterparts in Popper's thought, rather it restricts itself to a discussion of a non-anthropocentric account of freedom being an embedded characteristic of the universe. Despite the advances in scientific knowledge that Popper had access to, key themes in Schelling's thought are recurrent in Popper's later philosophy. This suggests that we can look at Popper as someone whose thought trajectory projected his life's philosophy along a similar path away from Kantianism as Schelling's. It also adds to the rehabilitation of Schelling as a philosopher of science whose thought remains relevant to the current debates.

Popper was far from kind in his assessment of Schelling. After all, in *The Open Society* Popper stated of Fichte, Schelling and Hegel that a new kind of dogmatism became fashionable which began an "age of dishonesty".² And then "...a very fair characterization of Schelling's method, that is to say, of that audacious way of bluffing which Hegel himself copied, or rather aggravated, as soon as he realized that, if it reached its proper audience, it meant success."³ Popper, in keeping with the Viennese modernist talent for cultural scandalisation directed his attention towards the deities of the Western philosophical tradition. Although he built his reputation as the great iconoclast, he later came to write more conciliatory things about the likes of Plato, Aristotle and the German idealists. To appreciate Popper's opinion of vitalist, theological and spiritualist thinkers who he regarded as 'irrationalists' it is necessary to appreciate the specific time and place in which his thought evolved. Popper's hostility towards Schelling was part of his highly contentious and now widely rejected association of Schelling along with Hegel, Fichte and Plato in the camp of the "enemies" of a society based upon pluralism, conflictualism and openness. Popper's problematic reading of Schelling notwithstanding, this article explores how Popper's thought can be related to that of Schelling arguing that Popper's philosophy of science owes much more to the tradition of Schelling than he acknowledged. Indeed, Popper can even be seen as responding to contemporary problems in the philosophy of nature by reframing Schelling's naturalism. As a result this paper aims to inspire a way to

¹ The reference to "Schelling's naturalism" itself risks a great oversimplification of the evolving nature of Schelling's writings on nature. This study however, has focused on the Schelling of the *First Outline of a System of the Philosophy of Nature* (1799) and *Philosophical Investigations into the Nature of Human Freedom* (1809) rather than his latter writings. However, a comparison of Popper with Schelling's later writings would focus on concerns other than the theories of emergence and evolution that are the concerns of this study.

² K. Popper, *The Open Society and Its Enemies*, Vol. 2, p. 21

³ *Ibid.*, pp. 28-29.

approach both these thinkers afresh. It begins by looking at the way Popper and Schelling both developed their cosmological thought in response to subjectivist elements in Kant. It then looks at the role that a non-subjectivist or non-psychologised notion of freedom played in Popper's process thought and how this was closely allied with Schelling.

POPPER AND SCHELLING'S RESPONSES TO SUBJECTIVIST EPISTEMOLOGY

Popper's rapprochement with the legacy of *Naturphilosophie* was, I argue the result of his engagement with the contemporary theoretical and behavioral sciences of his time, and the growing body of experimental results that seemed to support insights previously articulated by his Tübingen adversaries and predecessors. Indeed, Popper's revision of Kant, in many ways mirrors the development of Schelling's own attempt to revise Kant by reconciling epistemology with ontology.⁴ Popper's mature philosophy that is examined in this paper roughly begins with his turn from epistemology to include ontological systemization exemplified by his book *Objective Knowledge: An Evolutionary Approach* (1972). Here, in his evolutionary epistemology focusing upon evolutionary and developmental theories of cognition and linguistics, we can see a metaphysical project centred upon process, emergence, activity and creativity. Popper was not keen to call his project a 'system' as such, which is in keeping with Schelling's view that it is not the objective of philosophy to form a totally coherent system.⁵ It is this mature writing, rather than his better known earlier works, that the comparison is made here to Schelling. The rationale for this is Arran Gare's argument that Schelling's

4 See: F. Beiser, 2002, p. 3. Also see: J. Wirth, "Schelling's Contemporary Resurgence: The Dawn after the Night When All Cows Were Black," *Philosophy Compass*, Vol. 6. No. 9, 2011: 591. The technical arguments of Popper's revision of Kant is not dealt with in this paper, however I have elsewhere published an extensive account. For a comprehensive account of Popper's revision of Kant see: A. Naraniecki, 2014. *Returning to Karl Popper: A Reassessment of his Politics and Philosophy*, Rodopi: Amsterdam, pp. 61-77. Also see: A. Naraniecki, 2012. 'Karl Popper, Jewish Nationalism and Cosmopolitanism', *The European Legacy: toward new paradigms*. Routledge. 17(5): 623-637. For a comparison with Popper's Kantianism with his early positivism see: A. Naraniecki, 2010. 'Neo-Positivist or Neo-Kantian? Karl Popper and the Vienna Circle', in *Philosophy*, Royal Institute of Philosophy, Cambridge University Press. 85(334): 511-530. For his early thought on logic and linguistics, particularly the one on the problem of truth see: A. Naraniecki, 2009. 'Logic and The Open Society: Revising the Place of Tarski's Semantic Theory of Truth within Popper's Political Philosophy,' in Z. Parusniková and R. S. Cohen (eds). *Rethinking Popper*. Springer Science: 257-272. Also see: A. Naraniecki, 2008. 'Karl Popper, Alfred Tarski and Problems Concerning the Correspondence Theory of Truth,' in *Anuarul Institutului de Istorie "George Bariț" din Cluj-Napoca, Series Humanistica*, Vol. VI: 193-207.

5 A. Gare, "From Kant to Schelling to Process Metaphysics: on the way to ecological civilization", *Cosmos and History: The Journal of Natural and Social Philosophy*, vol. 7, no. 2, 2011: 39. Also see: J. Wirth, "Schelling's Contemporary Resurgence: The Dawn after the Night When All Cows Were Black," *op. cit.*, pp. 588, 592.

developed the “first coherent system of process metaphysics” which I argue shares many features to Popper’s own arguments.⁶

For Gare, Schelling should be seen as the originator of the modern tradition of process philosophy, and that he “demonstrated the superiority of process metaphysics to scientific materialism”. This was a position that Popper also arrived at later in life, however, was cautious in publishing such ideas given his reluctance to promote speculative metaphysics. However, in his lectures and conversations Popper allowed greater room for this. Schelling’s cosmologically grounded understanding of freedom as an actual possibility that emerges in the universe rather than in Kant’s view of freedom arising out of reason, was similarly a point that Popper took great measures to articulate in his scientific writings. This article highlights the similar way both responded to the deficiencies of subjectivist epistemology and the role of freedom in this. Accounts of freedom as structurally embedded in the architecture of the universe was a shared feature of their solutions to the problem of Kant’s transcendental idealism and the separation of epistemology from ontology. While Kant demonstrated that the understanding determines an indeterminate “given” content, Schelling argued that this purely formal account of the synthesis leaves the substance or material of the world out and that a new ontology is needed to provide a solution to the problem of synthesis in knowledge as well as the problem of transcendental freedom. Both Popper and Schelling sought to re-ontologise cognition as an emergent feature of the universe, however with the aid of the various evolutionary theories available to them.

Kant had shown through the transcendental deduction of the “concepts of reason” that the ideas of freedom and a divine being can be regulatively employed for practical purposes, that is, to keep us from mechanism and fatalism, but can provide no constitutive knowledge.⁷ Popper’s philosophy however, seemed to show that even if we did not have the concept of freedom, we would have to invent something like it to describe the actual way the universe operates. Kant’s project also had another important feature, by keeping epistemology and ontology (form and substance) rigorously distinct critique can avoid becoming “dogmatic metaphysics”.⁸ This concern with avoiding “dogmatic” metaphysical thinking and its particular relationship to dogmatic political ideologies was a constant theme in Popper’s thought. However, by the time Popper came to work on the problems of *Erkenntnislehrer*, epistemology had undergone a thorough naturalization, and integration into the latest

6 A. Gare, “From Kant to Schelling to Process Metaphysics: on the way to ecological civilization”, op. cit., p. 28.

7 K. R. Peterson, “Translator’s Introduction”, Schelling, F.W.J. First Outline of a System of the Philosophy of Nature. State University of New York Press. 2004, p. xv.

8 K. R. Peterson, p. xv.

evolutionary thought. It was this tradition of linguistic and cognitive evolution associated with the work of Popper's supervisor Karl Bühler from the Pedagogic Institute at the University of Vienna, that would provide the basis for his later return towards bridging the gap between epistemology and ontology via an "evolutionary epistemology". This evolutionary epistemology linked subjective and objective "autonomous" knowledge together and construed both as two *aspects* of the cognitive architecture that we associate with "knowledge".⁹

I would now like to draw attention to the way key themes in Schelling's writings are reiterated, often in contemporary scientifically informed language in Popper's mature thought. Arran Gare has argued that Schelling should not be interpreted as an idealist but as a process metaphysician; who sought to overcome the oppositions between idealism and realism, spiritualism and materialism.¹⁰ Both Popper and Schelling developed philosophies that sought to overcome subjective idealism. It is also argued that as a process metaphysician, Schelling not merely defended an organic view of nature but developed a theory of emergence and a new conception of life relevant to current theoretical and philosophical biology. Central to this philosophy was Schelling's argument that "it is necessary to appreciate that we are part of nature, and that it is necessary to explain how ideation can have emerged within nature".¹¹ According to Gare "For Schelling, knowledge is not transcendental insofar as it determines nature for consciousness. Nature is transcendental as the producer of intelligence able to cognize nature. Nature must be seen as capable of organizing itself." For Gare, this amounts to a "naturalization of the transcendental" or to use Iain Hamilton Grant's term, a "hermeneutics of nature".¹² What Schelling was aiming at was a "dynamic construction of matter".¹³ Schelling, Gare argues, "was concerned not only to show the cognitive conditions for objective knowledge, but the nature of the world that enables it to be known objectively, and to produce beings which could achieve objective knowledge of it and of themselves."¹⁴ This was also a fundamental concern for Popper.

Popper's contribution in the co-authored *The Self and Its Brain: An Argument for Interactionism* (1977) with John Eccles was such an attempt to show the cognitive conditions for objective knowledge by relating his metaphysical "World 3 pluralism" to

9 For a discussion on Popper's formative epistemology see: A. Naraniecki, *Returning to Karl Popper: A reassessment of his politics and philosophy*, pp. 29-71.

10 A. Gare, "From Kant to Schelling to Process Metaphysics: on the way to ecological civilization", p. 28.

11 *Ibid.*, p. 29.

12 *Ibid.*, p. 29.

13 *Ibid.*, p. 40.

14 *Ibid.*, p. 44.

the latest developments in neurological science. Popper's World 3 thesis which seemed like a strange deviation for this scientifically minded philosopher in the Anglo analytic world, was a continuation of a very Central European *Gegenstandstheorie*. Thus, the elements which comprise the category of *Gegenstand* (*Dingen, Personen, and geistigen Inhalten*) would be separated and interned in separate 'worlds'; World 1: the physical world of material objects, World 2: the subjective world of individual people and the subjective process of thinking (*die subjektiven Denkvorgänge*), and World 3: the world of the objective content of thoughts (*Denkinhalte*). The theory of three worlds is a return to his earliest work in a way that aimed to develop it in new naturalistic directions.¹⁵

Popper's early psychology sought to integrate a Selzian active problem-solving mind with Bühler's evolutionary theory of language function. However, when Popper returned to his earlier Würzburgian influences later in life, he related it to the disciplinary needs of the field of neuroscience. This required extensional models of anatomical explanations of brain function to be integrated into his intentional (non-empirical) model of the mind. Popper supported the materialist project in physics because of the practical benefits he saw in its research but this does not mean that he was a physicalist. Physicalism for Popper was the view that the physical world (or World 1) is closed. Materialism however, needed to be a self-transcending notion in order to deal with the problem of minds and bodies and reductionist failings to explain the actual functioning of physical systems. Popper's teleological approach starts with the notion of a material universe, in which problem solving is an inherent feature of organic life. With higher organisms, problem solving is actively pursued eventually leading to the critical events that caused the emergence of the human mind. Popper expressed this view by saying: "We can only wonder that matter can thus transcend itself, by producing mind, purpose, and a world of the products of the human mind".¹⁶

Schelling and Popper both held that there was no ultimate substance in matter. Schelling argued in *First Outline of a System of the Philosophy of Nature* that "no material in Nature is simple" as "a universal compulsion towards the combination of elementary actants prevails in Nature, no actant can produce a form or shape for itself, every material has arisen by means of combination." In a note to this point Schelling argues that there "is no primal substance in Nature at all out of which everything has become... The single genuine primal substance is the individual actant. Thus, there are also no originally indecomposable factors in Nature, i.e. really *simple materials*."¹⁷

15 For Popper's early engagement with *Gegenstandstheorie* see: K. Popper, 1927, 2006. "Zur Philosophie des Heimatgedankens", in *Frühe Schriften*, Tübingen: Mohr Siebeck., pp. 18-19.

16 K. Popper and J. Eccles, 1977. *The Self and Its Brain: An Argument for Interactionism*. Berlin/Heidelberg/London/New York: Routledge, p. 11.

17 F. W. J. Schelling, *First Outline of a System of the Philosophy of Nature*, op. cit., p. 29.

Similarly, Popper in *The Self and Its Brain* came to express the view that the categories of ‘substance’ and ‘essence’ are not productive for contemporary scientific discussions, and even argued that materialism “transcends itself”, and that there was more than one sense in which such transcendence occurs. Whereas Plato’s theory, according to Popper, describes a “decent or degeneration” of concepts from the world of forms, Popper’s theory is one of “evolutionary ascent towards world 3”, and also contains theories, problems and open arguments.¹⁸ World 3 is an exosomatic product akin to a spider’s web that we have evolved, and as full consciousness requires human language and theories, the traditional inhabitants of World 3, so too is our sense of self “anchored” outside of us, in this non-physical realm and cannot exist without this. The self acts as a kind of “plastic control” between the objects of thought in World 3 and the brain and speech centres in World 1.¹⁹ Humans are no different from any other complex system, although we appear clock-like, we are indeed also cloudlike. For Popper, according to Jürgen August Alt reality is understood as being a manifold, certain modes of which cannot be grasped empirically.²⁰ Theorising about the self (*Ich-Bewusstsein*) as a condition (*Zustände*) that has emerged within the cosmic evolution requires both empirical and non-empirical concepts.

Rather than viewing an organism as a closed totality or system; a clearly defined and delineated body, Popper’s process metaphysics takes a more radical approach not keeping with traditional categories used to describe organic life. For Popper in *Objective Knowledge*, “Each organism can be regarded as a hierarchical system of *plastic controls*—as a system of clouds controlled by clouds. The controlled subsystems make trial-and-error movements which are partly suppressed and partly restrained by the controlling system”.²¹ Life is comprised of Peircean system and what Popper regards as a ‘soft’ kind of plastic control. He used the analogy of a soap bubble to provide an apt description: “The soap bubble consists of two subsystems which are both clouds and which control each other: without the air, the soap film would collapse, and we should have only a drop of soapy water. Without the soapy film, the air would be uncontrolled: it would diffuse, ceasing to exist as a system. Thus the control is mutual; it is plastic, and of a feed-back character.”²² Even apparently ‘clock-like’ systems such as a precision clock or a computer, are fundamentally clouds controlled by clouds, however, with systems built in to minimise as far as possible the cloud-like effects. For

18 K. Popper. 1994a. Knowledge and the Mind-Body Problem: In *Defence of Interaction*, op. cit., p. 49.

19 Popper, K. 1994a. Knowledge and the Mind-Body Problem: In *Defence of Interaction*, op. cit., pp. 114-116.

20 J. Alt. 2001. Karl R. Popper. Campus Verlag: Frankfurt/New York, p. 107.

21 K. Popper, *Objective Knowledge*, op. cit., p. 245.

22 *Ibid.*, p. 49.

Popper humans too, are a composition of multiple and interacting subsystems. The self, acts as a kind of soapy film softly controlling the interaction between our thoughts and actions.

The problem of essentialism has also been of concern to Popper and Schelling scholars. Popper understood there to be an evolutionary lag between the linguistic conceptual tools that we have evolved and the increasingly complex problems that we set for ourselves. Insofar as we can speak of essences in regard to Popper's philosophy it is in the Lockean sense of nominal essences. However, if we understand Popper's thought on essentialism within the German context crucial similarities between the process thought of Popper and Schelling can be discerned. Jason Wirth has recently pointed out that Schelling's use of the German *Wesen* is a great source of difficulty. *Wesen* in German philosophical writing has had strong associations with the Latin *essentia* and, as the Greek *ousia* of Aristotle's *Metaphysics* as well. Both *essentia* and *ousia* may be (and have been) translated into English as "essence," as that "what-ness" of a thing that distinguishes it as the thing it is, as that definition which gives the thing the general identity it has. Hence, *Wesen* translated as "essence" refers to an abstract universal, something that describes things in time, where they are subject to the cycle of generation and decay, but which, as a condition of its being able to do so, must be freed from that cycle. Now, Wirth has suggested that to translate Schelling's use of *Wesen* as "essence" is inevitably to distort because Schelling does not associate *Wesen* with an abstract universal; indeed, according to Wirth, *Wesen* for Schelling is fundamentally dynamic, naming "the tension between present being (existence) and the simultaneous intimation of that which is as no longer being (the past) and that which is as not yet being (the future)." Wirth's solution to this problem—one he freely admits is problematic—is to avoid use of the word "essence" to translate *Wesen* in favor of "being" with the definite or indefinite article as required. This seems similar to Popper's views on the emergent features of being (often referred to as his "modified essentialism").²³ Popper gives up substance and essence, but not necessarily being (*Wesen*). The problems of essentialism in Popper's thought have arisen as a result of a lack of familiarity with this German context.

In *Conjectures and Refutations* Popper described his notion of the essentialist doctrine as follows:

The essentialist doctrine that I am contesting is solely the doctrine that science aims at ultimate explanation; that is to say, an explanation which (essentially, or,

²³ For a discussion on modified essentialism see: Bar Am, Nimrod. *Extensionalism: The revolution in logic*. Springer, 2008. Also see: J. Agassi, 1974. "Modified Conventionalism is More Comprehensive than Modified Essentialism", in P. A. Schilpp (ed.), *The Philosophy of Karl Popper*, vol. 2, La Salle, IL: Open Court, pp. 693-697.

by its very nature) cannot be further explained, and which is in no need of any further explanation. Thus my criticism of essentialism does not aim at establishing the non-existence of essences; it merely aims at showing the obscurantist character of the role played by the idea of essences in the Galilean philosophy of science.²⁴

The problem of essentialism in Popper's thought has also caused much confusion in the Anglophone world. Popper had various criticisms of various theories covering different fields, which he associated with the doctrine of essentialism. It is difficult to arrive at a clear understanding of what Popper meant by 'essentialism' as his arguments concerning the problem of essences constantly evolved in accordance to the thought domain he was engaging with at any particular time. It was not that Popper believed in the strong thesis of the non-existence of essences, as fallibilism assures him of the possibility that he may be wrong in this regard as well. Rather, anti-essentialism was limited by Popper to an understanding of *fixed* or *unchanging* essences, as well as our ability to have *certain* knowledge of essences. Popper understood the notion of the existence of essence from an Aristotelian perspective, albeit within this fallibilist epistemology. This was despite his criticism of Aristotle in *The Open Society*. This Aristotelian essentialism has been described by Nimrod Bar-Am as the claim that "only concrete objects really exist, and yet abstract objects are out there too: in some subtle sense, they too exist. They are either general characteristics of particulars or their very essences (or both)."²⁵ Popper's opposition to essentialism is based on the understanding that we cannot know if objects have *de re* essences as contemporary physics has shown even the task of pinning down particular objects is often beyond us. Later in life, as exemplified by *A World of Propensities* (1990) Popper would increasingly talk about processes, systems and situations rather than objects revealing a concept of reality grounded in open world process based on emergent probability. For Popper, the world is one in which we can understand matter as *process*, as construing matter in terms of substances or essences is unproductive and as a result of modern physics need to be given up.²⁶

Within the materialist standpoint of modern physics Popper believed that it was not useful to talk of a self-identical entity persisting during all changes in time and that there is an essence, which is the persisting carrier or possessor of the properties or qualities of a thing. Popper saw contemporary physics as a materialist endeavour

24 K. Popper, 1989 [1963] *Conjectures and Refutations*, London: Routledge. p. 105.

25 N. Bar Am, 2008. *Extensionalism: The revolution in logic*, Springer, p. 59.

26 J. Eccles and K. Popper, *The Self and Its Brain*, op. cit., p. 7.

which had great explanatory power despite the lack of a notion of substance or essence.

FREEDOM AS A STRUCTURAL FEATURE OF THE UNIVERSE

Popper's work also reiterates Schelling's views on freedom. Against Kant's locating of freedom in the intelligible or moral world Schelling posited a freedom that was structurally embedded in the natural world.²⁷ For Schelling, "Even within the same type nature knows of a certain unmistakable freedom, which maintains a certain leeway for differentiation...so that no individuum is ever absolutely equal to another".²⁸ According to Matthews, "By positing this low-level freedom in nature as a type of chaotic force that propels the evolutionary differentiation of life, Schelling generates the conceptual resources required to integrate freedom and necessity into a unified account of nature, in which noumenal and phenomenal intertwine in an organic, and thus, chaotic, evolving cycle of self-differentiation...while limited regions of natural phenomena can be explained through mechanistic laws of nature, the entire process of our world's becoming can ultimately be understood in its systematic entirety only when we conceptualize it as a self-organizing, organic whole." This chaotic force of self-organization is what Popper was emphasizing in his argument that "all clocks are clouds".

Popper argued in *Realism and the Aim of Science* that:

If the picture of the world which modern science draws comes anywhere near to the truth—in other words, if we have anything like 'scientific knowledge'—then the conditions obtaining almost everywhere in the universe make the discovery of structural laws of the kind we are seeking—and thus the attainment of 'scientific knowledge'—almost impossible. For almost all regions of the universe are filled by chaotic radiation, and almost all the rest by matter in a likewise chaotic state. In spite of this, science has been miraculously successful in proceeding towards what I think should be regarded as its aim.²⁹

²⁷ For example, Kant in the Transcendental Doctrine of Method, in Section II of the Critique of Pure Reason described the existence of a world in which freedom is situated: "I call the world a moral world, in so far as it may be in accordance with all the ethical laws – which, by virtue of the freedom of reasonable beings, it can be, and according to the necessary laws of morality it ought to be. But this world must be conceived only as an intelligible world..." See: Kant, I. Critique of Pure Reason, §Transcendental Doctrine of Method, Ch. 2, Section II, p. 519.

²⁸ Matthews quotes from Schelling's *Sämmtliche Werke* (I/10,378) in Schelling's Organic Form of Philosophy: Life as the Schema of Freedom, op. cit., p. 7.

²⁹ K. Popper, 1983. *Realism and the Aim of Science* Volume I from the Postscript to the Logic of Scientific Discovery, Edited by W.W. Bartley III. London: Hutchinson, p. 146.

Popper also understood and accepted the analogical relationship between our theories and reality. Scientific theories are analogies, however, they are not only that. In a response to a criticism by Jacob Bronowski's, gave a concise summary of his philosophical project. Despite Popper's great support for science, there is a great modesty in what he believed the discursive rationality of science could achieve. Popper stated that he believed that such theories are our inventions, however this "Kantian idealism" was limited by the "anti-Kantian" qualification that we cannot simply impose our inventions upon the world. For Popper:

Kant thought that our mind not only produces Newtonian theory, but forces it upon experience, thereby forming Nature. I think very differently. There is a world, and we try to understand it, by talking about it, and inventing explanatory theories; but although we are often unable to think otherwise than in the terms of these theories, there is a reality on which we cannot arbitrarily impose our theories. This reality, this world, was there before man, and our attempts to impose our theories on it turn out, in the majority of cases, to be vast failures: thus Kant's idealism is wrong, and realism is right...I conjecture that such strange regularities of nature do exist. But even if they do not –even if there should be exceptions to *all* scientific laws –this does not mean that the correspondence theory of truth is inapplicable to scientific theories; it would only mean that *all* scientific theories are false. It would mean that there are no exceptionless regularities in nature.

Although I do not believe this, I admit that my belief that there exist some exceptionless intrinsic regularities of nature is a metaphysical belief. It is a metaphysical belief which is perfectly compatible with the belief that these exceptionless intrinsic regularities of nature for which we are groping in science are too deep for us, that we shall never discover them.

However, the applicability of the correspondence theory of truth, as I (following Tarski) understand it, would not be threatened – not even if all our explanatory laws are false. It only would mean that the world is much more complicated than it seems to most of us; and that our attempts to understand it are for ever illusory; that the enterprise of science (though not the world) is a dream, an illusion.³⁰

As with Schelling, a naturalism of process and emergence was crucial for Popper's overcoming subjective idealism without a 'crash' into materialism or physicalism. All knowledge or eidetic products would be treated as evolved structural features of a universe evolving ever more complex non-material entities, and the discoveries of unknown modes of immaterial substrate that describe the law-like regularities and random irregularities. Insofar as such non-physical objects contribute to changes in the

³⁰ A. Schlipp, Ed. *The Philosophy of Karl Popper*, op. cit., p. 1093.

social world or our ability to manipulate nature, they “share a measure of reality” and are, for the human animal, real. Popper and Schelling both held the Aristotelian view of the role of forms in nature. Both Popper and Schelling were Kantian in the sense of accepting Kant’s original notion of organism as one in which the organism “arises out of itself”. The formal and dispositional are not seen as separate as Popper argued in the appendix to the *Logic of Scientific Discovery* in an essay titled *Universals, Dispositions and Natural or Physical Necessity* that “all universals are dispositional”.³¹ For Schelling, a “concept lies at the base of every organization...[but]...this concept dwells in the organization itself, and can by no means be separated from it”. Life for Schelling, according to Gare, is self-organising.³² It is here that Popper is closer to Schelling than Kant who, according to Gare, denied the possibility of explaining life through evolution.³³

Parmenides was a crucial figure for both Schelling and Popper. Parmenides was, for Gare, the source of Schelling’s problematic determinism in *First Outline of a System of the Philosophy of Nature*. Parmenides was also the figure against whom Popper framed much of his thought on quantum mechanics. In 1965 Popper gave a paper titled *Beyond the Search for Invariants* in which he argued that Born’s interpretation of Boltzmann contains “one of the most important and influential Parmenidean apologies for contemporary physics: *the interpretation of probability theory as a theory of our ignorance*.”³⁴ For Popper, the subjectivist interpretation of probability was one of the most important Parmenidean apologies of our time. “It originates from Parmenides’ determinism: the determinist can hardly explain chance in any other than a subjectivist way – as an illusion due to our ignorance”.³⁵ Popper’s argument was that probability does not enter physics because of our ignorance, but because of the nature of the problem that we want to solve. The position that Popper was arguing against was one in which if only we could have perfect knowledge or certainty, we would not need probability as we could make predictions according to the determinism of the particular situation under investigation. This is where the problem-centred or evolutionary aspect of human knowledge comes to the fore. Probability theory is not a subjective idealist recreation of the world ‘out there’, of which, following Mach we can have no objective knowledge of the world in-itself as a result of our limited knowledge. Rather, the science we use and the theories we adopt, such as probability theories, are tools we

31 K. Popper, 1968 [1959]. *The Logic of Scientific Discovery*. New York: Harper and Row, Appendix *IV.

32 A. Gare, “From Kant to Schelling to Process Metaphysics: on the way to ecological civilization”, p. 52.

33 *Ibid.*, p. 54.

34 K. Popper, *The World of Parmenides*, op. cit., p. 217.

35 *Ibid.*, p. 219.

fashion to respond to the problems we set ourselves, and like tools, they tackle the external world in a very real way. “It is not the crudity of our knowledge or the roughness of our ignorance that leads to averaging and statistics, but the character of our problem. It takes a stout axe to deal with a rough block”.³⁶ The uniqueness of Popper’s thought is not the fallibilism here, rather it is the fact that we are capable of evolving such elaborate theoretical tools in the first place into which we can probe deeper and deeper into the phenomenal world.

Popper deals with subjective idealism by arguing that our theories do not have an illusionary relationship to the objects they seek to know, rather they are creative attempts of the mind to evolve ways of probing deeper into more difficult problems. As to overcoming the problem of the objectivity of the external world that our crude tools have somehow latched-onto, this would take time to further evolve into a coherent position. In this paper Popper discerned features of what he would later articulate as an objectivist theory of probability. In this 1965 lecture Popper uses the example of the subjectivist interpretation of information theory to argue that information can be interpreted objectivistically.³⁷ Popper argued that random sequencing of probabilistic measures of disorder showed that certain sequences are more disordered than others. Uncertainty is not uniform in the sense of being a blanket term used to describe those aspects of the world that we do not have sufficient knowledge to make certain predictions of. Rather we can structurally differentiate kinds of disordered or random sequences. Uncertainty has structural features that are independent of our capacity to know a situation. Recent trends in quantum mechanics are supporting this argument. For example, Roger Colbeck of the Swiss Federal Institute of Technology, “the mysterious unpredictability of quantum mechanics has nothing to do with incomplete information...the randomness is intrinsic”.³⁸

Although Popper’s ontological concerns are given full expression in *Objective Knowledge*, the basis for this ontological interest can be seen much earlier stemming from his concern with the Copenhagen interpretation of quantum mechanics.³⁹ It was the ‘subjectivism’ of the *nonlocality* described by the Copenhagen interpretation that Popper found greatly disturbing.⁴⁰ When Popper returned to these early concerns later

36 Ibid., p. 219.

37 For Popper’s example of his objective interpretation see: Popper, *The World of Parmenides*, p. 220.

38 See: Colbeck, Robert and Renato Renner, 2012. “Free randomness can be amplified”, *Nature Physics*, Vol. 8: 450-453.

39 K. Popper, [1996], 1984. *In Search of a Better World: Lectures and Essays from Thirty Years*, London and New York: Routledge, p. 11.

40 Popper’s objection to subjectivism can also linked him to the parallel goals of the German idealists. Rederick Beiser has argued that from its very inception “German idealism was a reaction against subjectivism, an attempt to prove the reality of the external world and to break out of the egocentric

in life he proposed an objectivist understanding of probability or propensities that are akin to Fregean non-physical objects. Probabilities, or what Popper referred to as “numerical propensities”, could be found objectively in the world.⁴¹ In 1955 Popper published his measure-theoretical formalism of conditional probability, which holds that “the measure-theoretical probability statements are singular probability statements...from the point of view of physics, a singular probability...can best be interpreted as a physical propensity.”⁴² Numerical propensities have an actuality and reality in the universe. However, objects such as propensities and Frege’s equator, can only be apprehended by us through thought. Frege’s ontological understanding of the objective and independent reality of numbers reappears in Popper’s objectivist solution to the problem of probability.

Key to Popper’s overcoming subjective idealism was the treating of all science as cosmology. In *A World of Propensities* (1990) Popper stated the aim of our theories and our hypotheses or what he called our “adventurous trials”:

What we aim to know, to understand, is the world, the cosmos. All science is cosmology. It is an attempt to learn more about the world. About atoms, about molecules. About living organisms and about the riddles of the origin of life on earth. About the origin of thinking, of the human mind; and about the way in which our minds work.

According to Popper, it was only due to the growth of his theorising on propensities that he came to realise its cosmological significance. By this Popper means “the fact that we live *in a world of propensities*, and that this fact makes our world both more interesting and more homely than the world as seen by earlier states of the sciences”.⁴³ Thus, in the notion of a world of propensities we can see his numerical or eidetic rendering of the possibility for change and emergence in the universe:

The tendency of statistical averages to remain stable if the conditions remain stable is one of the most remarkable characteristics of our universe. It can be explained, I hold, only by the propensity theory; by the theory that there exist weighted possibilities which *are more than mere possibilities*, but tendencies or propensities to become real: tendencies or propensities to realize themselves which are inherent in all possibilities in various degrees and which are something like forces that keep the statistics stable.⁴⁴

predicament”. See: Beiser, Frederick, *German Idealism: The Struggle Against Subjectivism 1781-1801*, Harvard University Press: Cambridge. 2002, p. 3.

41 K. Popper, 1990. *A World of Propensities*, Bristol: Thoemmes, pp. 20-21.

42 H. Keuth, 2000. *The Philosophy of Karl Popper*, Cambridge: Cambridge University Press, p. 185. Also see: K. Popper, 1968 [1959]. *The Logic of Scientific Discovery*, op. cit., Appendix *IV.

43 K. Popper, *A World of Propensities*, op. cit., pp. 7, 9, 11.

44 *Ibid.*, p. 12.

For Popper, “propensities are not mere possibilities but are physical realities”. Therefore, he called this an “objective interpretation of the theory of probability”. For Popper such propensities are not “inherent in an object” but “inherent in a situation”, of which the object is only part. Propensities are non-physical causal powers which “in physics are properties of the whole physical situation”. The “whole physical situation”, refers to the totality of events and processes. This gives rise to our apprehension of common-sense objects of the physical world. Propensities are real in the sense that they are possible as well as “actual” in that “they can act”.⁴⁵ We can know of their existence through their products; that is, the events which are the realisation of moments and situations that we experience as the physical world and with which our minds must interact.⁴⁶ Popper summarises the continual process of actualisation of “invisible” Newtonian-like “attractive forces” upon the common-sense interactive experiences with which the human mind must confront the physical world:

The future is *open: objectively open*. Only the past is fixed; it has been actualized and so it has gone. The present can be described as the continuing process of the actualization of propensities; or, more metaphorically, of the freezing or the crystallization of propensities. While the propensities actualize or *realize* themselves, they are continuing processes. When they have realized themselves, then *they are no longer real processes*. They freeze and so become past – and unreal.⁴⁷

For Popper, even before the possibilities or propensities have actualised themselves as objective situations they remain *real*. They have what Popper called a “kind of reality”. As Pythagoras understood the world of sound to be governed by exact numbers, Popper continued Pythagoras’ extrapolation of this view to include an understanding all events and situations as having objective mathematical correlates in an imagined geometric realm of inherent probabilities:

What may happen in the future – say, tomorrow at noon – is, to some extent, open. There are many possibilities trying to realize themselves, but few of them have a very high propensity, given the existing conditions. When tomorrow noon approaches, under constantly changing conditions, many of these propensities will have become zero and others very small; and some of the propensities that remain will have increased. At noon, those propensities that realize themselves will be equal to 1 in the presence of the then existing conditions. Some will have moved to 1 continuously; others will have moved to 1 in a discontinuous jump.

⁴⁵ Ibid., pp. 14, 18.

⁴⁶ Popper’s theory of propensities ought to be related to what he called “Compton’s problem” which is the problem of “how abstract entities such as rules and decisions, theories and melodies, are able to bring about changes in the physical world”. See: D. Miller, *Out of Error*, op. cit., p. 34.

⁴⁷ K. Popper, *A World of Propensities*, op. cit., p. 18.

(One can therefore still distinguish between *prima facie* causal and acausal cases.)
And although we may regard the ultimate state of the conditions at noon as the
cause of the ultimate realization of the propensities...⁴⁸

These mathematical or *numerical propensities*, as Popper called them, that correspond to the possibility of one or another situation arising in the common-sense world have “a measure of this status” that is of having reality. “A measure” qualifies them for being an ontologically “not yet fully realized reality”. The notion of “reality” in *A World of Propensities* is an extremely complex one. Not only is this notion of the real both virtual, as numerical propensities attest, and actual as the possibility becomes the moment, but the virtual is actual as it is “actively” present at every moment.⁴⁹ There are degrees and variations of the real that exists in every moment. The real for Popper can have existence or not; it can be likely to have existence in the future, or have little (if not zero) chance of coming into existence. It was through the notion of *numerical propensities* that he aimed to describe the causal interaction of dispositions in a way that explained events and processes of the physical world. It was a *determining demand* that arose out of an object’s disposition that is the result of a dispositional process that caused events to happen. These events are the actions and interactions of dispositional objects being *enticed* or *attracted* to certain outcomes, which are numerically most likely.

To summarise, probabilities are not the result of our lack of knowledge, but a structural property of the universe which governed the nature of change. It does not refer to the nature of changing objects but of changing propensities, processes and states of being. *A World of Propensities* is a highly innovative attempt at providing a technical and rigorous mathematical basis for a philosophy of process, which can be operationalized for actual scientific research. Thus, Popper’s theorising on the problem of determinism was largely conducted without a language of objects and matter; rather it was treated mathematically. Hence for Popper, the central point of his theory was that there was inherent in every possibility a tendency or propensity to realise a certain *event*, which in principle can be numerically formulated.

Popper’s rejection of essentialism supported his opposition to scientific determinism, which indirectly was an argument for freedom as being structurally discernable in the universe in a way that precedes any discussion of the possibility of human freedom, or at least cannot rule out the possibility of free decision making upon scientific grounds. Popper’s anti-determinist philosophy aimed to show various ways in which freedom was built-into the universe, and later in humans, becomes a higher emergent capacity. However, developing a moral metaphysics centering upon

48 K. Popper, *A World of Propensities*, op. cit., p. 22.

49 Ibid., p. 20.

personal responsibility for the freedom of our actions out of a cosmological argument for indeterminism at the quantum mechanical or formal mathematical realms is not a simple matter. Indeed, a discontinuous jump between propositions is needed here. It is possible that a discernment of ‘freedom’ in one mode may not be of much help in a discussion of freedom in another mode; indeed they may be conflictual.

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