On the Derivation of an Applied Metaphysic

I. On the Role of Applied Metaphysics

Every natural science, without exception, bases itself on some applied metaphysic. Today's sciences generally do so unwittingly, by which I mean they take their metaphysical foundations largely from some unscientific and quite personal pseudo-metaphysic the individual practicing scientist has developed in his own mind during the course of his lifetime with an addendum of some fractional metaphysic or pseudo-metaphysic that his scientific community has sanctioned as a paradigm for that field. Considering that this is the general situation, it is, strictly speaking, not correct to say any of the modern sciences are based on a *scientific* metaphysic. They are, rather, based on some disorganized and quixotic set of different ones that tend to work against the unified advancement of science in general and create antagonisms in interdisciplinary research.

This state of affairs is, *perhaps*, less important in the simpler natural sciences such as physics and some branches of engineering. In others, such as biology, psychology, economics, or political science[1], it is a serious issue tending to proliferate disjointed mini-theories that at the least put up roadblocks to progress and in the most serious cases lead to the disintegration of the science. Such a situation, for example, is taking place in psychology today. It is an issue keenly felt in the effects that the absence of social-natural sciences have. Their chosen topics of study, while far more difficult than the topic of physics, are the very topics of far greater practical impact to humanity in general. Yet even physics, the natural science enjoying the most advanced state of development because it is the simplest of the natural sciences, is not immune from suffering adverse effects of pseudo-metaphysical prejudices. This is yearly being made more evident by a growing tide of Platonism that has been infecting it since at least the decade of the 1970s. The end of positivism in the 20th century seems also to have been the beginning of the end of *discipline* in the practice of physics. Discipline in science was the one and only benefit the long dark age of positivism delivered. Now positivism is dead, has been replaced by nothing, and its one benefit is consequently undergoing erosion. It is not unjust to say we who are alive today are the witnesses to the beginning of another dark age. The words of Boethius are no less relevant for us today than they were in the days after the fall of the Western Roman Empire:

> This man used once to wander free under open skies
> The paths of the heavens; used to gaze
> On rosy sunlight, and on the constellations
> Of the cold new moon,
> And on each star that on its wandering ways
> Turns through its changing circles – all such things
> He mastered and bound by number and law.
>
> Causes, moreover, he sought and knew;
> Why the winds howl and stir up the waves of the sea,
> What breath turns the fixed stars' sphere,
> Why the sun rises in the red east
> And sinks beneath the Western waves,
> What warms the spring's calm hours
> So that the earth is lovely with flowers of roses,
> And who makes fruitful autumn heavy, as the year fills,
> With the full grapes. He sought and told
> All Nature's secret causes.

[1] Also strictly speaking, the latter three are no longer social-*natural* sciences, although the last two were in their beginnings. They have become, through the influence of positivism and misguided efforts to copy the methods of physics, mere "social sciences" and even have detractors who deny they are sciences at all.

> But now he lies,
> His mind's light languishing,
> Bowed with these heavy chains about his neck,
> His eyes cast down beneath the weight of care,
> Seeing nothing
> But the dull, solid earth. [Boethius (*c*. 520 AD), I.iia]

Details of the origins of science are hidden in the fog of prehistory. However, it appears to be nearly certain that every science developed along with civilization itself and did so as a mix of practical technical arts (invention and engineering), superstition (magic and, later, organized religion), and early commerce long before its practices were codified and unified by any theory. Experience and the application of experience is the genesis of every science. Historian Will Durant wrote,

> Natural man formulates no physics, but merely practices it; he cannot plot the path of a projectile, but he can aim an arrow well; he has no chemical symbols, but he knows at a glance which plants are poison and which are food, and uses subtle herbs to heal the ills of the flesh. Perhaps we should employ another gender here, for probably the first doctors were women; not only because they were the natural nurses of the men, nor merely because they made midwifery, rather than venality, the oldest profession, but because their closer connection with the soil gave them a superior knowledge of plants, and enabled them to develop the art of medicine as distinct from the magic-mongering of the priests. From the earliest days to a time yet within our memory, it was the woman who healed. Only when the woman failed did the primitive sick resort to the medicine man and the shaman. [Durant (1935), pg. 80]

Whether we speak of ancient Sumeria, Egypt, India or China, the scraps of evidence history does possess all seem to whisper the same story of the probable genesis of science. It begins with natural observations, the invention of tools, and the slow development of technical arts to better produce those tools or better organize their applications to practical ends. The Sumerians had a highly developed system of irrigation in 4000 B.C. and by 2400 B.C. medicine was flourishing and they had extensive commercial trade with Egypt and India. The oldest known wheeled vehicles were Sumerian, and the Sumerians possessed a calendar of uncertain age and origin. In other respects Sumeria remained a primitive culture.

Egypt enters the historical record already in possession of a developed mathematics, the art of surveying, and architectural and building capabilities that still inspire awe to the present day. The priest-scholars of ancient Egypt ascribed the invention of science to the god Thoth[2] in 18,000 B.C., although there is also reason to think arithmetic and at least some of the other technical arts came to Egypt from Ur or other western centers in Sumeria. Astronomy, advances in geometry, and computation seem to have been the special province of the Babylonians. Durant wrote,

> Being merchants, the Babylonians were more likely to achieve successes in science than in art. Commerce created mathematics, and united with religion to beget astronomy. In their varied functions as judges, administrators, agricultural and industrial magnates, and soothsayers skilled in examining entrails and stars, the priests of Mesopotamia unconsciously laid the foundations of those sciences [*ibid*., pg. 256].

Superstition in partnership with technical arts seems to be a foundational theme in the invention of science emerging from pre- and early history. Durant remarked,

> Magic begins in superstition and ends in science. . . Frazier has shown . . . that the glories of science have their roots in the absurdities of magic. For since magic often failed, it

[2] To the ancient Greeks, Thoth was known by the name Hermes (and was named Mercury by the Romans).

> became of advantage to the magician to discover natural operations by which he might help supernatural forces to produce the desired event. Slowly the natural means came to predominate, even though the magician, to preserve his standing with the people, concealed these natural means as well as he could, and gave the credit to supernatural magic . . . In this way magic gave birth to the physician, the chemist, the metallurgist, and the astronomer.
>
> More immediately, however, magic made the priest. Gradually, as religious rites became more numerous and complex, they outgrew the knowledge and competence of the ordinary man and generated a special class that gave most of its time to the functions and ceremonies of religion. The priest as magician had access . . . to the will of the spirits or the gods, and could change that will for human purposes. Since such knowledge and skill seemed to primitive men the most valuable of all . . . the power of the clergy became as great as that of the state . . . Let Egypt, Judea and medieval Europe suffice as instances.
>
> The priest did not create religion, he merely used it, as a statesman uses the impulses and customs of mankind . . . If he had not existed the people would have invented him. [*ibid.*, pp. 67-68]

When we look for the place in history where the evolution from *ad hoc* technical craft to natural science first began, there is very little room to doubt that this place lies somewhere between Thales of Miletus (*c*. 585 B.C.) and Aristotle (384-322 B.C.) and almost as little doubt that that place lies far closer to Aristotle than to Thales. Thales was the first of the famous Seven Sages of the ancient world, and he is recognized as the first of the Greek philosophers as well as the first natural philosopher. Diogenes Laertius tells us,

> He had no instructor, except that he went to Egypt and spent some time with the priests there. Hieronymus informs us that he measured the height of the pyramids by the shadow they cast, taking the observation at the hour when our shadow is of the same length as ourselves. [Diogenes Laertius, I. 27]

Thales is credited with achievements in geometry, in calendar-making, in weather forecasting, and in politics. However, he can take no credit for any attempt to de-deify science. Diogenes tells us quite plainly that Thales ascribed to animism as well as to the efficacious interventions of the gods in human affairs. He is not credited with the invention of metaphysics; that credit is given to Parmenides (*c*. 500 B.C.). Yet it is not until Aristotle that we see metaphysics take shape as a science and as "first science." Of all the Greek philosophers, Aristotle's work contains the least degree of deism, although this is not altogether missing and so the element of shamanism is not completely expunged from Aristotle's science.

This, however, is *foundationally* due to the fact that Aristotle's metaphysics is ontology-centered, like all known systems of metaphysics prior to Kant with the probable but debatable exception of Protagoras (481-411 B.C.). It has been the unbroken record of twenty-five centuries of philosophy that *every* ontology-centered system of metaphysics is ultimately forced to call upon the agency of a deity to rescue its foundations[3]. It is a different case, though, when a system of metaphysics is *epistemology-centered* instead. Diogenes tells us,

> Protagoras was the first to maintain that there are two sides to every question, opposed to each other, and he even argued in this fashion, being the first to do so. Furthermore he

[3] Isaac Newton wrote, "All these things being considered, it seems probable to me that God in the beginning formed matter in solid, massy, hard, impenetrable, moveable particles, of such sizes and figures, and with such other properties, and in such proportion to space, as most conduced to the end for which He formed them [Newton, *Optics*, Bk. III, pt. I]. To Newton God was not problematic, a point he could not have made more clear than he did in the General Scholium at the end of *Mathematical Principles of Natural Philosophy*. Modern physics replaces Newton's God with an Aristotle-like god of probability.

> began a work thus: "Man is the measure of all things, of things that are that they are, and of things that are not that they are not." He used to say that soul was nothing apart from the senses, as we learn from Plato in the *Theaetetus*, and that everything is true. In another work he began thus: "As to the gods, I have no means of knowing either that they exist or that they do not exist. For many are the obstacles that impede knowledge, both the obscurity of the question and the shortness of human life." For this introduction to his book the Athenians expelled him; and they burnt his works in the marketplace, after sending around a herald to collect them from all who had copies in their possession. [Diogenes Laertius, IX. 50-52][4]

Ontology-centered metaphysics is so called because, figuratively speaking, it places a theory of ontology at the center of metaphysics and makes epistemology "orbit" around it. Kant's radical reformation of metaphysics reversed this, and is for that reason called "Kant's Copernican revolution" in metaphysics. With this change it became possible, for the first time, to provide objective validity and real meaning to the so-called "primitive" terms of every science (including mathematics), and to provide for the sciences solid grounding for their theories. Unfortunately, Kant's immediate successors in history, most notably Fichte and Hegel, rejected the Copernican revolution and continued the tradition of the failure of ontology-centered metaphysics to ground the empirical sciences. Positivism was little more than the expression of the frustration of scientists at this ignominious record of non-achievement. This frustration was already evident in Kant's day, expressed by those who were known as "the indifferentists," and who were the immediate forerunners of the positivists. Although a vast movement like positivism can hardly be credited to only a few select individuals, there is little reason to dispute that the two most important figures in the genesis of positivism were Hegel and Comte. Benjamin E. Smith wrote,

> The claim of Hegelianism to be the completion of philosophy has not been historically justified. On the contrary, the rejection of Hegel's theories by the scientific world has been complete and striking. Even before his death the opposing tendencies of the age, which the sudden and brilliant success of his doctrines had rather hidden from sight than overcome, aided by numerous defections within the ranks of his own school, had materially weakened his influence; and the reaction thus begun rapidly advanced until, within less than thirty years, his authority was almost wholly destroyed. . .
>
> The grounds of this reaction are to be found, partly in the opposition of Hegelianism to the growing social, political, and religious radicalism of the present age; but more fundamentally, in certain special internal weaknesses of that system itself. The two most important of these are, in brief, the following two: (1) Hegel's philosophy was based upon a one-sided interpretation of Kant. In [Hegel's] *Logik* and *Naturphilosophie*, the idealistic element of Kant's system, the apriority and spontaneity of pure thought, was made superior to the corresponding real element, and posited as the ground from which this latter is to be logically deduced. But in this the peculiar standpoint of Kant was altogether abandoned. . . (2) The central doctrine of Hegelianism, viz., that *knowledge* is possible through pure thought alone (which was the immediate result of this subordination of Kant's realism to his idealism), involved consequences which it is impossible for modern thought to admit. . . It is, in fact, in this bold contradiction of the firmly established realism of modern thought, and especially of inductive science, that the chief cause of the reaction against Hegel is to be found. For the physical sciences the test of truth is conformity to the actual as determined by observation and experiment; and it was the impossibility of making Hegel's physical theories conform to this test that most clearly betrayed the inadequacy of his position. [Smith (1886), pp. 423-425]

[4] In *Critique of Pure Reason*, Kant proved that the question of the existence or non-existence of God is *formally undecidable* by science [Kant (1787), B620-670]. Science can neither say, "God exists," nor "God does not exist" with any objective validity whatsoever. Nothing at all, therefore, in Critical metaphysics depends in any way whatsoever on any deity.

Hegel's incredibly arrogant claims to have completed and perfected metaphysics provided the source of the outrage that caught fire in the first half of the 19th century. In the first ranks of the outraged we find Auguste Comte, the founder of sociology and one of the leaders of the positivism movement. Of him, Smith tells us,

> That reduction of all science to natural science, and of all scientific methods to the objective methods of physics, which has been noted as the characteristic of the second movement to be considered [positivism], was first clearly set forth in the "Positive Philosophy" of *Auguste Comte*. Considered in itself, as a system of special doctrines, Comte's philosophy has little significance; that in it which is of value is borrowed from preceding thinkers, and that which is original in it is, for the most part, whether viewed from the standpoint of empirical science or of philosophy, both inaccurate and unimportant. In the general standpoint, however, it is now recognized as the first exponent of an important, wide-spread, and aggressive movement of speculative thought [*ibid.*, pg 447].

It was Comte who successfully championed the mistaken turn taken by the social sciences to use only the methods of dead-matter science that had proven efficacious for physics. This was a great error because the social-natural sciences (having as their fundamental Object the human being) are different *in kind* from the dead-matter sciences of physics, chemistry, and biology. These sciences require a different type of approach because their objectively valid fundamental principles are utterly alien to, and nowhere to be found within, the first principles and ontology of empirical physics[5]. Positivism turned political science and economics away from their promising grounding in social-natural science and steered them into the sterile and unproductive route they have taken ever since. As for sociology and psychology, these were born into positivism and, for that reason, have never had a chance to become fecund and successful doctrines of social-natural science. Positivism was akin to the doctrine of "learned ignorance" of Nicolas of Cusa (1401-1464 A.D.) but without any shred of Cusa's humility.

Cut adrift from sound and robust first principles, an empirical science can succeed for a time in dealing with its early and more superficial technical inquiries. In the long run, though, it is a house built on vaporous foundations and its ultimate breakdown is assured. When the record of a science is more studded with failures than with tangible practical successes, its practitioners find themselves lacking the nourishment their activities need and draw from the patronage of broader society, in which those practitioners are always embedded. We see this erosion taking place in the United States today (and not for the first time in U.S. history). Positivism and reliance upon subjective and accidental pseudo-metaphysics are like doses of arsenic to the body of science. The alternative is epistemology-centered foundation in Critical metaphysics. It is with the nature of this and the challenges it presents that the rest of this essay is concerned.

II. Kant's System of Metaphysics

In Kant's day the words "scientist" and "philosopher" did not yet denote distinct intellectual activities. A physical scientist was a "natural philosopher" (a philosopher of nature). The modern distinction between scientist and philosopher is owed more to Kant than to any other individual. As Durant has remarked, we today would have called Kant a scientist rather than a philosopher prior to his 57th birthday. He was, for example, the first to propose the nebular hypothesis of the formation of the solar system and he lectured extensively on anthropology, physics, and other like subjects. With only a slight bit of license, we might also call him a system theorist. Kant wrote,

> Every doctrine when it is a system – that is, a whole of knowledge ordered according to principles – is called a science. [Kant (1786), 4: 467]

[5] I discuss this point in detail in Wells (2011).

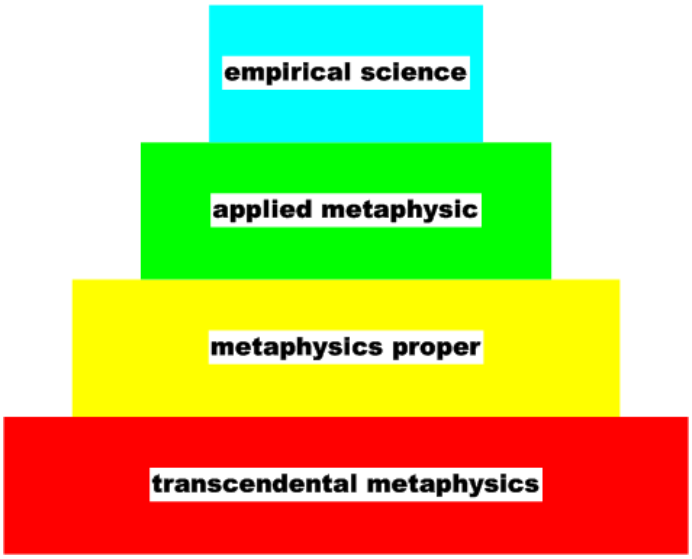

Figure 1: Kant's pyramid organization of science

Although his terminology evolved over the years, Kant's view of the organization of scientific knowledge logically divides into four pieces. These, although distinguishable, are seamlessly joined to make up one whole. Figure 1 illustrates this as a pyramid. Transcendental metaphysics and metaphysics proper jointly make up Critical epistemology. Kant explained these terms in the following words:

> Metaphysics, or the system of pure cognitions of reason, divides into two main objectives:
>
> I. Transcendental metaphysics, or that part of metaphysics which presents elementary notions in order to recognize Objects *a priori* which can be given: this system of metaphysical knowledge is called *ontology* and rests on dissection of reason according to all the elementary notions contained in it[6], e.g., magnitude, Quality, substance, cause, effect, etc.
>
> II. Metaphysics proper, as metaphysics is called when it is applied to Objects themselves: these objects are
>
> a. either *sensuous* and then
>
> 1. the system concerns either Objects of inner sense or soul[7], therefore doctrine of soul, rational psychology;
>
> 2. or Objects of outer sense, therefore doctrine of body, rational physics;
>
> b. or Objects of mere reason, i.e., Ideas or ideas of mere reason = cognitions whose Objects cannot be given by the Objects. These are the objects of supersensible cognition, and such contribute

[6] This is "ontology" after the Copernican revolution is applied to its definition. That is to say, it is the system of elementary noetic *rules* for the representation of cognitions by which we come to know sensuous appearances *as* objects. The most famous of these elementary notions are Kant's categories of understanding. All such transcendental rules answer to the unbending requirement that they are necessary for the possibility of experience as human beings come to know experience. They are epistemology-centered, not thing-centered as the fundamental notions of classical ontology are.

[7] *Seele*. Kant uses the word "soul" to refer to the subjective inner aspects of mind. The word is almost a synonym for "mind" and carries no religious or ontological connotation whatsoever.

1. rational cosmology, or cosmology of pure reason, and

2. rational, or rather natural, theology, theology of pure reason[8]. [Kant (1794-5), 29: 956]

One must take great care to note that Kant's terminology here differs radically from how we customarily think about the terms soul, cosmology, and theology (see footnotes). The Ideas of metaphysics proper are *regulative principles of pure Reason* that *direct and orient* the human processes of judgment, imagination, and apprehension. Metaphysics proper pertains to thinking and reasoning as processes. *Speculative* ontology, the usual connotation of the word "ontology" as Leibniz defined it in the 17th century, is a mere by-product of these processes.

Rational Physics is the metaphysic proper that pertains to how we come to understand objective perceptions as Objects of outer sense. Its principles do not deal with objects-as-things but, rather, what properties must be presented in a perception in order to *think* what is represented in perception is an object. Rational Psychology is the metaphysic proper that pertains to what is subjective in a human being's mental processes – what Kant sometimes called the thinking Nature of being a human being. This is what is meant by the phrase "Object of inner sense." Rational Physics and Rational Psychology constitute, respectively, the Quantity and Quality headings of metaphysics proper. They provide, respectively, the logical and the transcendental ***reflective perspectives***[9] of human understanding.

Rational Cosmology is the metaphysic proper of Nature. In Critical epistemology, Nature is the *world model* each of us constructs individually for himself. Nature is the general context of how one comes to view and understand the world (or, if you prefer, the universe). Rational Cosmology provides one's *hypothetical* perspective in human understanding. It constitutes Relation in metaphysics proper.

Rational Theology is the metaphysic proper of fundamental principles of pure Reason, by which each of us *define* what it means to understand something to be real. It is an *empirical* perspective by which *how* we think an object we come-to-know-as-real belongs to or is "placed in" a universal mental substratum of all-that-is-real. This general substratum is called Reality. Rational Theology is the metaphysic of Reality and constitutes Modality in metaphysics proper. In Critical ontology, *every* object-in-Nature *is real in some contexts*, *unreal in other contexts*, and *non-real* in relationship to concepts with which it has no context. For example, the ghost of Marley is real as a character in Dickens' *A Christmas Carol*, unreal in the context of being the shade of any actually-once-living-but-now-dead English businessman, and non-real in the contexts of Sun Tzu's *The Art of War* and the final exam scores of my students. It cannot be over-emphasized that Kant's Rational Theology has *nothing whatsoever* to do with God or religion.

A Kantian Idea (in German, *Idee*) is a pure concept made up entirely of notions, the Object of which is beyond the possibility of actual experience. "The universe" is such an Object; no one ever encounters "the-whole-universe-itself." All experiences are with "objects *in* the universe" and this is not the same thing as experiencing *the* universe. An Idea has no other objective validity than *practical* objective validity as a *regulative principle of activity*. When one's mental

[8] Kant uses the word "theology" in an Aristotelian rather than a religious connotation (after, of course, applying his Copernican turn to Aristotle's idea). Rational Theology has nothing to do with religion. It is, rather, the Critical metaphysic for *coherence* in how human beings understand Reality in general.

[9] The theory of reflective perspectives was introduced by Palmquist. A reflective perspective is, he wrote, "a way of thinking about or considering something; or a set of assumptions from which an *object* can be viewed. Knowing which perspective is assumed is important because the same question can have different answers if different perspectives are assumed. . . The main *Critical* perspectives are the *transcendental*, *empirical*, *logical* and *hypothetical*." [Palmquist (1993), pg. 458]

activity cognizes the existence of a cat, one "places" the cat "in the universe" as "a part of it." The Kantian theory of Ideas results from applying Kant's Copernican turn to Plato's theory of *εἶδος* (Platonic ideas).

The empirical sciences are the special doctrines of knowledge pertaining to specific objects in Nature. Each one is delineated by the topics of its legitimate and proper application; its doctrine melds empirical experiences of phenomena with rational ideas of *noumena* that serve to unify scientific experience. That such a doctrine is restricted to a specific topic is why these are called the *special* sciences. *All* true special sciences are *natural* sciences because they all deal with objects in Nature. For the physical sciences – e.g., physics, chemistry and biology – the topical objects are called *dead matter* because the phenomena with which they deal are non-living objects[10] (e.g., atoms, molecules, cells, etc.).

The social sciences – were they in fact rather than merely in intent social-*natural* sciences – are special doctrines of the phenomenon of being a human being. For that reason, their Object is called *living matter* because the Critical real-explanation of "life" is grounded in the phenomenon of being a human being[11]. Today's social sciences have tried to adopt the methods and paradigms of dead-matter physics and, as a consequence, have lost their proper grounding in the phenomenon of being a human being. For this reason, they are not being practiced and studied as natural sciences at all – and this is the principal reason political science, economics, sociology, history, etc. have achieved very few actual successes of large-scale benefit to humankind and is the reason a great many people regard them as not really being sciences at all. The Object of every social-natural science is the individual human being, and this makes a social-natural science *different in kind* from the dead-matter physical sciences[12]. Unfortunately, with the exception of political science, economics and history, the social sciences were begun under the nineteenth century sway of positivism and adopted dead-matter paradigms in their very beginnings. Political science and economics came to do the same, and at that point ceased to be social-natural sciences. History is still groping for a way to become a social-natural science. This has been and is to the great disbenefit of humankind because the questions with which social-natural science must deal are questions of far greater importance to everyone than are the questions dealt with in the physical sciences. Furthermore, there are other extremely important arts – such as education – that can be made into social-natural sciences, and doing so would greatly benefit humankind.

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[10] Biology is called "life science" but this is not proper terminology. The appellation is a hangover from the vitalism that dominated biological science (science of organic matter) prior to the mid-19th century. Before the revolution in biology brought about by the work of Claude Bernard, biologists and physicians habitually "explained" everything they could not actually explain about organic phenomena by saying "this is life," and they held that "living matter" differed in kind from inorganic matter *because* it possessed this mysterious thing-called-life. Among other things, the doctrine of vitalism meant that nothing of use to medical practices could be learned by studying dissected parts because after dissection "life" was no longer present in the now-dead organic matter. Bernard wrote, "When an obscure or inexplicable phenomenon presents itself, instead of saying 'I do not know,' as every scientific man should do, physicians are in the habit of saying, 'This is life'; apparently without the least idea that they are explaining darkness by still greater darkness. We must therefore . . . always seek to exclude life entirely from our explanations of physiological phenomena as a whole. Life is nothing but a word that means ignorance" – Bernard (1865).

[11] Wells (2006) chapter 12; Wells (2009), chapter 10.

[12] The most fundamental difference is due to the fact that human beings establish personal purposes, set personal goals, and take actions with the aim of realizing these goals. This means nothing less than that a true social-natural science must treat teleological (final) causes seriously, whereas in the physical sciences the employment of teleological causes is utterly without any objective validity whatsoever. This is why political science, economics, psychology, etc. are different in kind. They cannot follow the investigative paradigms of physics, chemistry or biology and expect to actually accomplish anything scientifically fundamental or practically efficacious on a large scale. Social-natural sciences are teleological sciences.

There is, however, no special science without its practitioner, the scientist. For any special science to come to objectively valid understandings of its basic principles, that science must be raised up upon objectively valid metaphysical grounds or else it will incur fundamental paradoxes and antinomies that arise from being raised upon personal and subjective grounding in pseudo-metaphysical prejudices. This, in fact, was the fundamental error of positivism and is still the fundamental error of so-called scientific materialism. Upon this point, Kant and Aristotle stand in agreement – disagreeing only on the issue of epistemology-centered vs. ontology-centered metaphysics. Aristotle tells us,

> Every art and every investigation, and likewise every practical pursuit or undertaking, seems to aim at some good . . . It is true that a certain variety is to be observed among the ends at which the arts and sciences aim . . . But as there are numerous pursuits and arts and sciences, it follows that their ends are correspondingly numerous [Aristotle, *Nicomachean Ethics*, I. i].

> Scientific Knowledge is a mode of conception dealing with universals and things that are of necessity; and demonstrated truths and all scientific knowledge (since this involves reasoning) are derived from first principles. Consequently the first principles from which scientific truths are derived cannot themselves be reached by [their] Science; nor yet are they apprehended by Art, nor by Prudence. To be matter of Scientific Knowledge a truth must be demonstrated by deduction from other truths [*ibid*., VI. vi].

Aristotle sought these "other truths" immediately in his ontology-centered doctrine of metaphysics. By doing so he did achieve some successes within the limitations imposed by the degree of objectivity his metaphysics provided[13] and the limitations imposed by his lack of scientific instruments that extend the horizon of possible experience. Kant agreed with every word quoted above and, likewise, attempted to go directly from Critical epistemology to the special sciences. However, in his final years he also came to recognize that this method was flawed and that it was necessary to develop a level of metaphysics standing between metaphysics proper and any special empirical science. Such a metaphysic is called an *applied* metaphysic, and it constitutes a bridge or transition from the acroamatic principles of Critical epistemology to the application of these acroams to the special Objects of the science in question. Figure 2 provides a schematic illustration of this idea. Kant wrote,

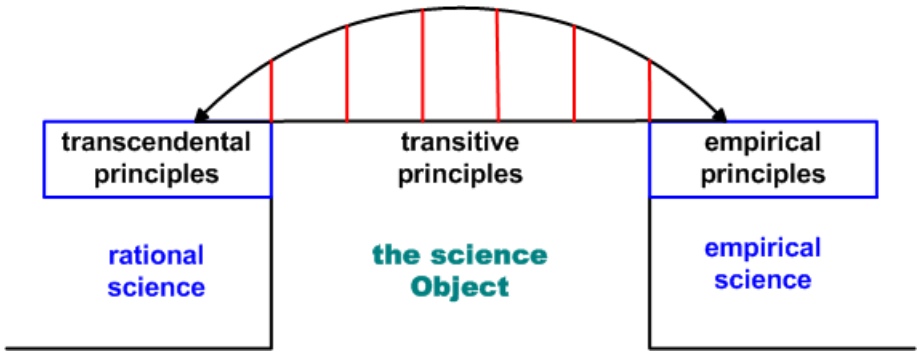

Figure 2: Conceptual model of the proper linkage between an empirical special science and metaphysics proper. The applied metaphysic is pictured here as a bridge spanning the gap between rational science and empirical experience. Principles make up the bridgeheads at each end and the span between them.

[13] While today's sciences err in adopting a one-sided prejudice in favor of physical causality & dependency, Aristotle committed the equally untenable error of adopting a one-sided prejudice in favor of teleological causality & dependency. This produces the peculiar form of vitalism characteristic of Aristotle's physics.

> *Physica generalis* thus at the same time contains the necessity of the transition from the metaphysical rudiments of natural science to physics, in virtue of the affinity which is to be found between *a priori* rules and the knowledge of their application to empirically given Objects, which restricts itself from continuing upon the ground onto which it has passed (which would yield a special physics) but only determines and sets its eye upon the rudiments for progress in this science.
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> My *Metaphysical Rudiments etc*.[14] already undertook several steps in this field, but simply as examples of their possible application to cases from experience, in order to make comprehensible by examples what had been stated abstractly. [Kant (1796-7), 21: 407-408]

The "*a priori* rules" to which Kant here refers are the acroams of metaphysics proper. The task of an applied metaphysic is to bring these to bear on the Object of the empirical science. It is in this task of bringing them to bear where transcendental metaphysics enters into the picture. Kant tells us,

> But the schema for completeness of a metaphysical system, whether it be of nature in general, or of corporeal nature in particular, is the table of categories. For there are no more notions of understanding which can be concerned with the nature of things. All determinations of the general concept of a matter in general must be able to be brought under their four classes, those of magnitude, of Quality, of Relation, and finally of Modality, and so too must all that may be thought *a priori* in this concept, or presented in mathematical construction, or given as a determinate object of experience. There is no more to be done, or to be discovered, or to be added here, except, if need be, to improve it where it may lack clarity or thoroughness. [Kant (1786), 4: 473-476]

We may and must regard this remark in *Metaphysical Rudiments etc.* as a prescriptive necessary maxim rather than as an explicit rule of producing an applied metaphysic. It points to one quite explicit property one must find in an applied metaphysic, but by itself it does not present us with an explicit doctrine of method for *producing* this metaphysic in the first place. Furthermore, if we take Kant to be saying that simply applying the categories of understanding is sufficient for the task of developing a metaphysical system, we will find ourselves misled. The categories are not auto-directing notions. Their employment in the process of determining judgment is *regulated* by the acroams of pure Reason, and their *Realdefinition* is completed only when they are examined in all four of the reflective perspectives governed by these acroams from the theoretical Standpoint of Critical epistemology [Wells (2009), chapter 5]. It is important to note that Kant only said the *table* of categories provides a *schema for completeness*. This is not at all the same thing as saying an applied metaphysic can be deduced from the categories alone.

III. The Development of an Applied Metaphysic

In a sense that is romantic and Platonic rather than practical, one might suppose a *proper* natural science would ideally develop from a logical sequence that goes

transcendental metaphysics → metaphysics proper → applied metaphysic → empirical science.

In fact, no science has ever been developed by following this recipe. Whether or not it is possible to develop a science according to this recipe is a question that cannot be answered before having a doctrine for developing an applied metaphysic in hand. The absence of such a doctrine is a hole in Kant's system that remained unfilled at the time of his death, and which this paper seeks to

[14] Kant (1786). Although the title of this work is traditionally translated into English as *Metaphysical Foundations of Natural Science*, and is just as widely regarded as Kant's applied metaphysic of physical science, Kant's own words in *Opus Postumum* show us that "foundations" is too strong a word to use (the correct translation is "rudiments") and that this work is a prolegomenon to the real applied metaphysic.

begin filling in. Even if this hole in the theory did not exist, the doctrine of mental physics indicates that following the progression above is not generally practical. Human beings learn new general concepts by abstracting from previous less general ones. We *first* learn from the particular and concrete to the general and abstract. Only *after* this does it become possible to descend from the general (by episyllogism) to understand new particulars. In the case of a science doctrine, this cannot be done before enough concrete concepts of experience are in hand from the practice of what Kant non-pejoratively termed "natural science improperly so-called."

The terms "proper" and "improper" natural science require explanation. Kant made a four-fold logical division of scientific doctrines that he explained in the following way:

> If the word nature is taken simply in its *formal* meaning, where it means the first inner principle of all that belongs to the *Dasein* of a thing, then there can be given as many different natural sciences as there are specifically different things, each of which must contain its own peculiar inner principle of the determinations belonging to its *Dasein*. But nature is also taken in its *material* meaning, not as a constitution but as the sum of all things insofar as they can be *objects of our senses*, and thus also of experience, under which is therefore understood the whole of all appearances – that is, the sensible world with exclusion of all non-sensuous Objects. Nature taken in this meaning of the word has two principal parts, in accordance with the division of our senses, where one contains the objects of the *outer* senses, the other the object of *inner* sense; hence is possible a twofold doctrine of nature, the *doctrine of body* and the *doctrine of soul*, where the first takes into consideration *extended* nature, the second *thinking* nature[15].
>
> Every doctrine when it is a system – that is, a whole of knowledge ordered according to principles – is called a science, and since such principles may be either fundamental principles of *empirical* or of *rational* connection of knowledge into a whole, then natural science, whether it be doctrine of body or doctrine of soul, would have to be divided into *historical* or *rational* natural science, were it not that the word *nature* (because this signifies a derivation of the manifold appertaining to the *Dasein* of things from their inner *principle*) makes necessary a knowledge through reason of the context of natural things, insofar as this is to deserve the name of a science. Therefore, the doctrine of nature would be better divided into *historical doctrine of nature*, which contains nothing but systematically ordered facts about natural things (and would in turn consist of *natural description*, as a classification system for them according to their similarities, and *natural history*, as a systematic presentation of them at various times and places), and natural science. Natural science would now be either *properly* or *improperly* so-called natural science, where the first treats its object wholly according to *a priori* principles, the second according to laws of experience. [Kant (1786), 4: 467-468]

It seems rather obvious that one cannot present so much as an idea of either an historical doctrine of nature or a natural science without already having had some natural experiences. Nor, because of the formal meaning of the word nature, can one begin to assemble a context for *a priori* principles (general laws) of a natural science *proper* prior to having assembled some set of provisional phenomenal "laws" (regularities) of experience into a natural science *improper*. A science doesn't simply appear out of nowhere. It must be built up. The doctrine of an applied metaphysic provides a *tool* for its pre-construction activities – erecting, in a manner of speaking, a scaffolding for us to use in the construction of the natural science proper. A doctrine for *developing* an applied metaphysic is a doctrine of pre-construction another step farther removed from this, i.e., it is a plan for how to build the *scaffold*.

Even though it is impractical to follow the idealistic recipe above, and even if the development

[15] In more modern terminology, a general science of dead-matter objects and a science of general psychology. But in addition, we must also include their synthesis as in, e.g., *Critical* medical science.

of a science seems inherently to exhibit a sort of two-steps-forward-one-step-back process (owing to the contingency of natural phenomena), being in possession of a doctrine of construction methodology has practical benefits that are more or less clear and obvious. This idea is neither new nor especially surprising. Francis Bacon enounced it rather forcefully early in the seventeenth century at the dawn of what later came to be known as the Age of Reason:

> When we have thus properly and regularly placed before the eyes a collection of particulars, we must not immediately proceed to the investigation and discovery of new particulars or effects, or, at least, if we do so, must not rest satisfied therewith. For, though we do not deny that by transferring the experiments from one art to another (when all the experiments of each have been collected and arranged, and have been acquired by the knowledge, and subjected to the judgment of a single individual), many new experiments may be discovered tending to benefit society and mankind, by what we term literate experience; yet comparatively insignificant results are to be expected thence, whilst the more important are to be derived from the new light of axioms, deduced by certain method and rule from the above particulars, and pointing out and defining new particulars in their turn. Our road is not a long plain, but rises and falls, ascending to axioms, and descending to effects.
>
> Nor can we suffer the understanding to jump and fly from particulars to remote and most general axioms (such as are termed the principles of arts and things), and thus prove and make out their intermediate axioms according to the supposed unshaken truth of the former. . . [We] can then only augur well for the sciences when the ascent shall proceed by a true scale and successive steps, without interruption or breach, from particulars to the lesser axioms, thence to the intermediate (rising one above the other), and lastly to the most general. For the lowest axioms differ but little from bare experiments; the highest and most general (as they are esteemed at present), are notional, abstract, and of no real weight. The intermediate are true, solid, full of life, and upon them depend the business and fortune of mankind; beyond these are the really general, but not abstract, axioms, which are truly limited by the intermediate. [Bacon (1620), Book I, §103-104]

Kant left us a number of clues and maxims for the development of an applied metaphysic. This was the main topic in his *Prolegomena* [Kant (1783)], although that work was also seasoned and peppered with a number of tangential side issues that tended to defocus his writing from the principal point:

> If one wishes to present knowledge as a *science*, then one must first be able to determine precisely the discriminatives it has in common with no other [knowledge], and which is therefore its *distinguishing feature*; otherwise the boundaries of all the sciences run together, and none of them can be dealt with thoroughly according to its own nature.
>
> Whether this distinguishing feature consists in a difference of the *Object* or the *source of knowledge*, or even the *type of knowledge*, or several if not all of these things together, the Idea of the possible science and its territory rests first of all upon it.
>
> First, concerning the *sources* of metaphysical knowledge, it already lies in the idea of metaphysics that they cannot be empirical. The principles of such (which include not only its fundamental propositions, but also its fundamental concepts) must therefore never be grounded in experience; for it shall be not physical but metaphysical knowledge, i.e., lying beyond experience[16]. Therefore it will be based upon neither outer experience, which constitutes the source of physics proper, nor inner, which provides the foundation of empirical psychology. It is therefore knowledge *a priori*, or from pure understanding and pure reason. [Kant (1783), 4: 265-266]

[16] Not, however, in the transcendent illusions of ontology-centered prejudice. Kant means metaphysical knowledge is knowledge tried and tested by the Critical standard that it be knowledge *necessary for the possibility of experience* (as human beings come to know experience).

> The inference of this section is therefore: that metaphysics properly has to do with synthetic propositions *a priori*, and these alone constitute its aim, for which it indeed requires many analyses of its concepts . . ., in which analysis, though, the procedure is no different from that in any other type of knowledge when one seeks simply to make its concepts clear through analysis. But the *generation* of knowledge *a priori* in accordance with both intuition and concepts, ultimately of synthetic propositions *a priori* as well, and, specifically in philosophical knowledge, forms the essential content of the metaphysic. [*ibid*., 4: 274]

It is a lasting monument to the opacity of Kant's writing style that generations of scholars have thought Kant's *Prolegomena* was a kind of *Readers' Digest* abridgment of *Critique of Pure Reason*, but this is not so. Kant was trying to present the considerations that must go into the development of a new applied metaphysic for any special science. That objective is set into the full title of that work: *Prolegomena to any Future Metaphysic that can Emerge as a Science*.

The title also warns us that in 1783 Kant had no such applied metaphysic yet for any of the special sciences. Such a metaphysic lay *in the future*. Unfortunately, to the end of his career and life, Kant never succeeded in bringing forth such a completed applied metaphysic. His one work that directly bore the title of a metaphysic, *Die Metaphysik der Sitten* (*The Metaphysic of Morals*), is seen to be incomplete because, although it did present metaphysical ideas in the four-fold form of a 2LAR, it did not carry the development through to the twelve defining *momenta* a *complete* metaphysic requires (that is, it did not complete "the schema of the table of categories"). It is a work further hampered by the fact that it involves the one major blunder Kant made in his moral theory, namely his equation of the categorical imperative of pure Reason with the so-called "moral law" Kant thought every human being is born possessing. The result of this backslide into ontology-centered prejudice is that Kant's moral theory produces theoretical consequences that modern neuroscience and neuropsychology have directly refuted[17].

Some of Kant's other works, e.g., *Metaphysische Anfangsgründe der Naturwissenschaft* and *Die Religion innerhalb der Grenzen der bloßen Vernunft*, present us with examples of essays in this craft before it is full grown, but do not conform to the schema Kant laid down for what one must find in an applied metaphysic. There could hardly be a more clear indication that the methodology for developing applied metaphysics remained a task for philosophers to undertake in the service of empirical science. With his *Prolegomena*, Kant was calling for helpers.

As part of my development of mental physics (the application of Critical epistemology to the phenomenon of being a human being), it was necessary for an applied metaphysic of the logical division of *psyche* in the Organized Being model to be constructed. This was accomplished, but the process by which I developed it cannot be said to have followed a well-prescribed algorithm. It was a heuristic undertaking, not too dissimilar to what we find in *Metaphysische Anfangsgründe der Naturwissenschaft* (which did serve me as an example), and its treatment in Wells (2006) and Wells (2009) cannot at all be said to lay out a clear doctrine of methodology for other developers to follow. This paper aims to address that shortcoming.

While neither Kant's works nor my own to date have finished filling the methodological hole in Kant's Critical system, these essays in the craft do collectively present at least the key lessons-

[17] The showcase example of this is that Kant's theory predicts sociopaths should not exist. It holds that every person "has a conscience" and experiences at the least some cognitive dissonance as a result of committing an "immoral act." Today we know, as Kant could not in his day, that this is simply untrue, and that serial killers who display utterly no neurological evidence of remorse, empathy or conscience do in fact inhabit the world. His theory likewise predicts that antisocial personality disorders should not be possible – another prediction modern psychology directly refutes. The correct Critical theory of the categorical imperative, in which these pathologies find a natural place, is presented in Wells (2006) and Wells (2009).

learned that should prove fecund for making a new science; let us call it ***applied metaphysic engineering***. It is the task of this paper to set out what these lessons are.

IV. Palmquist's Schema for Derivation of an Applied Metaphysic

We can never know for certain what Kant's working thoughts were as he developed his architectonic system of metaphysics. These thoughts would be the "workman's scaffold" of his philosophical theorizing, and Kant did not explicitly share these thoughts with his readers or with his students during the course of his lectures. The metaphysical system erected, Kant removed the scaffolding when he wrote up his published works. He left tantalizing scattered clues behind in various places in the Kantian *corpus*, but no explicit instructions another crew of workmen could follow. Thus, we are left with the body of his work itself and sundry and often obscure clues to his thought process. It is even possible Kant himself might not have been fully cognizant of all the details in his maxims of thinking insofar as his development of theory is concerned. After all, does a master carpenter think about the details of hammering a nail or does he just hammer it? Mental physics, supported by findings from empirical psychology [Piaget (1976)], teaches us that all meanings are at root practical, and that the development of practical rules of Reason precedes objective cognizance of these maxims. This is no way contradicts Kant's frequent remark that he had a "plan" for his system that he was following. Kant's terminology is evidence enough to state with a large degree of confidence that he was often a teleological thinker – by which I mean he kept his attention focused on the end results he was seeking to attain. This is as much as to say he was a practical man. A person can be clearly aware of what he is trying to do without necessarily being clearly aware of the steps or methods by which he pursues that end.

This puts the modern Kant scholar in a situation and role not unlike that of an archeologist who must examine what a vanished people have left behind for him to find and study. From that examination and study, he tries to deduce what the vanished culture was like. In the case of an "archeologist of Kantian philosophy," this endeavor is called "Kant interpretation."

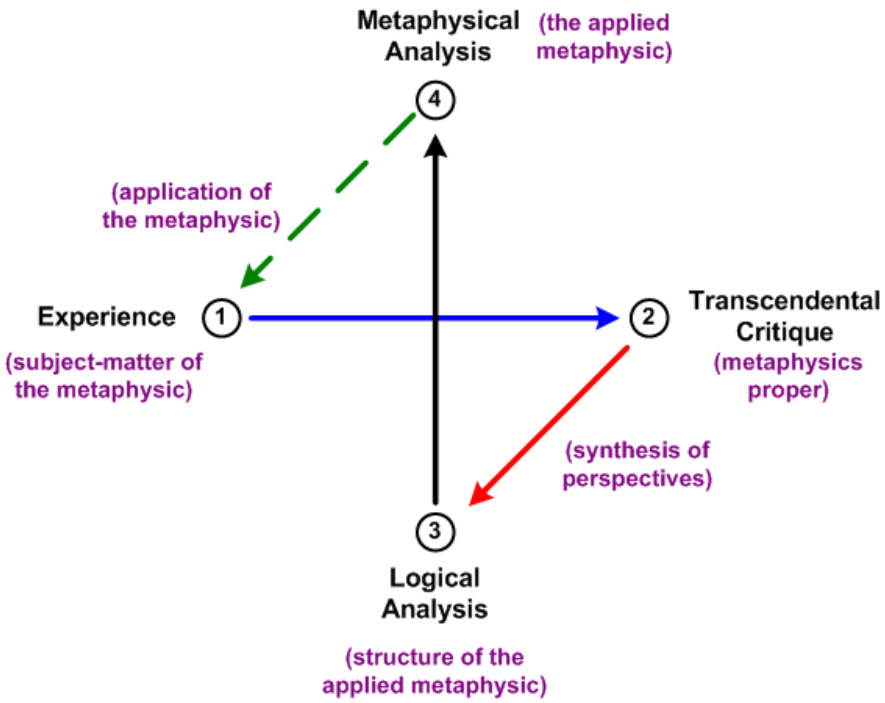

Figure 3: Palmquist's schema for Kant's development of metaphysics [adapted from Palmquist (1993)].

Stephen R. Palmquist is a gifted archeologist of Kant's work. While it is true that my Kant interpretations differ from Stephen's on some particular points, I fully agree that Palmquist's interpretation of Kant's work as a *system of perspectives* [Palmquist (1993)] is *the* correct and proper *overall* interpretation, and it is quite correct to say that the theory of mental physics was guided, often inspired, and even made possible by Palmquist's interpretations. One of these interpretations, illustrated by figure 3, is of the keenest pertinence to our topic at hand. Figure 3 depicts nothing less than a procedural schema that appears to describe the process Kant followed in developing his metaphysics. Palmquist calls this schema a *twelve-fold compound relation* or **12CR model** [Palmquist (1993), pp. 87-103]. He writes,

> If my placement of [*Metaphysische Anfangsgründe der Naturwissenschaft*] and [*Grundlegung zur Metaphysik der Sitten* (Kant 1785)] is correct, then as far as the theoretical and practical standpoints are concerned, Kant has consistently followed an architectonic plan by writing one book from each of three Perspectives to develop the implications of each standpoint. From the above discussion we can see that the relationship between each set of three books, when considered together with the experiential subject matter which first defines each standpoint, forms a [P-2LAR[18]], as depicted in Figure [3[19]]. Proceeding analytically from the Empirical perspective . . . we find that the first task in the elaboration of these two systems is to adopt the Transcendental Perspective in order to criticize reason's interpretation of the field of human experience under consideration. Next, the results of this Critique are expressed in simpler form, by using the Logical Perspective's analytic method. This can then serve as the foundation for constructing the full-fledged metaphysics proper to the standpoint in question . . . Such explicitly metaphysical works serve to complete the circuit of philosophical explanation by shedding new light, from the Metaphysical Perspective, directly upon the *details* which arise out of experience. [Palmquist (1993), pp. 95-96]

Palmquist used the 12CR schema to bring into the light a much clearer exposition of the overall *systematic architectonic unity* of Kant's Critical system of metaphysics. He tells us,

> In spite of the widespread recognition of the importance of the transcendental perspective as the touchstone of Kant's Critical philosophy, the full significance of the 'perspectival' approach (which it entails) is rarely appreciated. To counteract this neglect, I will argue that the general transcendental assumption which guides the Critical method implies most fundamentally a thoroughgoing 'perspectival revolution' in philosophy . . . For the Transcendental Perspective in general includes within it several levels of subordinate perspectives, which are equally important in guiding the development of the various systems and subsystems which compose Kant's System. Thus, what I shall call the '*principle* of perspective' (i.e., the universal rule that the truth is always relative to some perspective) can be seen functioning throughout the System: transcendental philosophy begins by giving the knowing subject the determining power formerly given to the object on general matters, such as questions regarding the nature and form of knowledge; so any *change* in the conditions adopted by the subject as the System develops will have a profound effect on the way the subject characterizes the object. Kant's primary interest, of course, lies in discovering the general forms which the subject *necessarily* adopts in interpreting experience, and which therefore *cannot* simply be changed at will. But in the course of describing the nature and operation of these synthetic a priori forms of

[18] Palmquist introduced a construct he called a second-level analytic *relation*. This construct was the original inspiration for the later development of the second-level analytic *representation* construct used in mental physics. As I called the latter a 2LAR, here I re-term Palmquist's construct by the name *Palmquist-2LAR* or P-2LAR.

[19] Figure 3 in this paper is a modified version of the figure actually cited [Palmquist (1993), pg. 96, Figure III.8]. The adaptation presented in this paper was made to comply with the somewhat different terminology of mental physics and to put the figure squarely into the context of developing an *applied* metaphysic.

> experience, he does find it necessary at times to alter his conception of how the subject and object are related. Each change of this sort can be regarded as a change of perspective. [*ibid*., pg 28]

During the development of mental physics it was necessary to produce an applied metaphysic for the logical division of *psyche* in the Organized Being model [Wells (2006), chap. 6]. This was a difficult undertaking carried out heuristically beginning with partial clues to the logical nature of *psyche* gleaned from Kant's work on pragmatic anthropology [Kant (1798)]. The placement of Kant's *Anthropology etc*., like that of his *Religion etc*. [Kant (1793)], within the Kantian system is unclear. This is a point where the interpretations of Palmquist and Wells differ. Palmquist proposes that *Religion etc*. occupies position 3 in figure 3. Wells does not disagree with this in regard to Kant's unfinished effort to produce what he called "the highest standpoint of transcendental philosophy in the system of Ideas: *God*, the *World*, and *Man* in the world restricting himself through Laws of Duty" [Kant (*c*. 1801), 21: 59]. He disagrees, however, with a proposition that *Opus Postumum* could be a single metaphysic (or, more correctly, attempted metaphysic) because if it's ultimate goal was one unified system of the four aforementioned Ideas, then each of these four (God, the world, man, and duty) must first have its own particular metaphysic delimiting the Idea[20]; only afterwards would any attempt to synthesize them into a *single* system be possible.

There should be little doubt that throughout his long life Kant was concerned with the problem of being able to reconcile religion and theology with mankind's place and perhaps even purpose in the world. We have from Kant's own pen:

> Moral theology has as its Object God as the highest self-sufficient good, as author of the world, which is thereby the highest created good.
>
> The principle of moral theology is: that the (positive) Idea of freedom as the ground of all morality is derived from the Idea of the highest good, which is constituted only by the system of all ends, in which we think ourselves to be member and from the viewpoint of which we should take action, because it is to be possible through us and our freedom. [Kant (*c*. 1783-9), 18: 464]

From this and numerous other remarks found throughout the Kantian *corpus*, Wells concludes that bringing forth a system of moral theology was a lifelong ambition of Kant's, and that if the objective of the 1st fascicle of *Opus Postumum* had been achieved, that would have been its achievement. Wells therefore agrees with Palmquist when the latter writes,

> If Kant is neither straightforward positivist nor a traditional rationalist, the question yet remains how he intends his philosophy to relate to theology. . . [If] the meaning of 'theology' is widened to include any serious, scholarly study of God, religion, and related subjects, his philosophy can be seen in many respects to be 'theocentric' in orientation. 'Theocentric' here does not mean Kant requires human *knowledge* of God to serve as the basis of or center for all other types of knowledge. On the contrary, it means the problems surrounding our understanding of the nature and reality of God serve as the central driving force of his philosophy. [Palmquist (2000), pp. 7-8]

It follows from this, Wells concludes, that Kant's *Religion, etc*. would properly occupy position 3 in a figure 3 version of a Kantian system of *moral theology*.

But moral theology is not properly metaphysics, except in the rather loose and non-technical connotation of metaphysics as "the way one looks at the world." A *true* metaphysic must always be a *science of Nature*. No theology can ever stand as a science because theology, as described

[20] Or, if the Idea has multiple logical divisions, a particular metaphysic for each logical division.

above by Kant, must first presuppose some sort of *super*natural Object for its inquiry.

When the topic of inquiry is man – which is to say *homo Sapiens* in his conjoined aspects as *homo phaenomenon* and *homo noumenon* – a different sort of analysis is called for in position 3 of figure 3, and this Wells thinks is in part and to a provisional degree provided by Kant's *Anthropology, etc*. [Kant (1798)]. Thus, the genesis of the applied metaphysic of *psyche* (called ***the sensorimotor idea***) began with Critical anthropology. This development, as is more or less apparent from its documentation in Wells (2006) and its summary in Wells (2009), actually was carried out as a groping and heuristic art, in which I tried a number of ideas before finally coming up with the end result. This is not unusual – it is, indeed, even commonplace – at the beginning of a new topic of scientific inquiry. In and of itself, the *documented* development of the applied metaphysic of the sensorimotor idea does not deserve to be called profound. However, what is very enlightening, and perhaps even deserving of being called profound, is the outcome of a *post*-analysis of how the final development took place. This post-analysis, documented here, brings into the light the fact that the eventual *successful* synthesis of the sensorimotor idea *did in fact conform to Palmquist's 12CR schema illustrated above*.

In particular, the synthesis was comprised of three full circuits through the Palmquist 12CR. This was because to obtain a complete synthesis – one that, as Kant put it, followed the schema of the table of categories – it was necessary to bring out the three functional ideas of synthesis under the headings of a 2LAR of the sensorimotor idea. Figure 4 illustrates this 2LAR structure. The three sub-ideas of functional synthesis are called, respectively, the transcendental sensorimotor idea (TSI), the empirical sensorimotor idea (ESI), and the data of the senses (DOS). One complete circuit through Palmquist's 12CR was used for each of these.

It is unnecessary to go into the details of the three functional sub-ideas under each heading in this 2LAR for the purposes of this paper (which is devoted to the topic of doctrine of *method* rather than doctrine of elements). Those details are already provided in Wells (2006) and Wells (2009). The proper concern of this paper is to describe and explain the method by which they were deduced. Wells claims that the sensorimotor idea is the first example of a *complete* 2LAR of an applied metaphysic to appear within Critical metaphysics. If one at least accepts this claim as a working premise, it follows that an examination of the method presents a first exposition of the topic-at-hand.

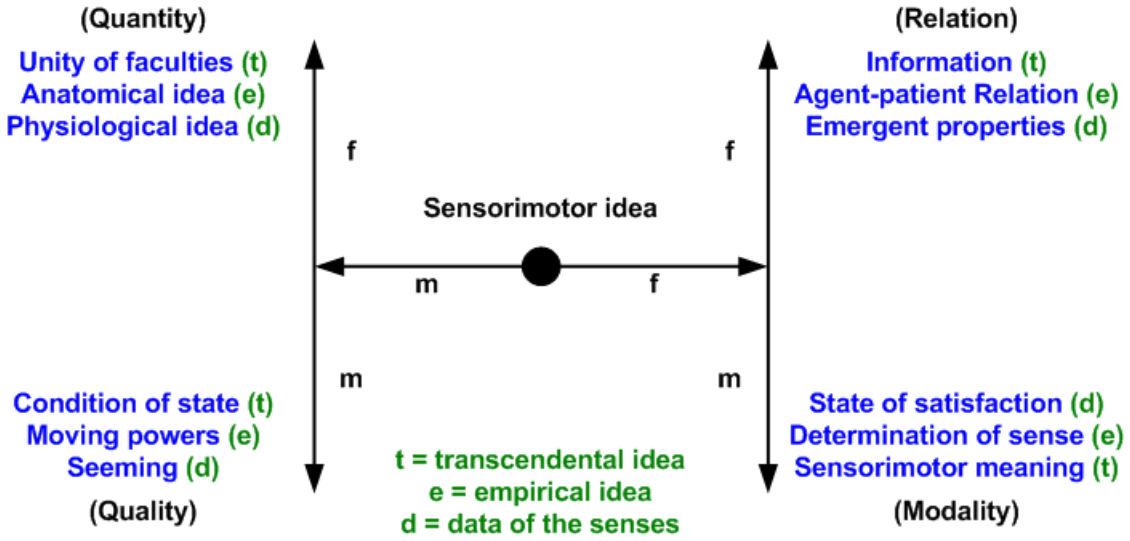

Figure 4: 2LAR structure of the sensorimotor idea (the applied metaphysic of *psyche*).

V. Methodology Underlying the Sensorimotor Idea

The starting point in experience ① for development of the sensorimotor idea was obvious from and dictated by the purpose to be served by the applied metaphysic. This was to establish the foundations for the theory of *psyche* in the Organized Being model. It was, in this context, to be an applied metaphysic for what can be called a *psyche*-somatic anthropology of *h. Sapiens*. The *purpose* of the logical division of *psyche* is to enforce thorough-going mind-body *reciprocity* in all appearances of organized being. The metaphysical issues subsumed under this purpose are those that pertain to the construct of *psyche* insofar as this construct is *necessary for the possibility of experience as human beings come to know experience*. This is nothing else than Kant's grounding principle of Critical epistemology [Kant (1787), B3-5].

That set the objective for the work and so the next step in the synthesis is to understand and properly place the ***context*** of the metaphysic being sought *in relationship to* the foundational acroams of Critical epistemology. This, of course, is the Transcendental Critique ② in Palmquist's 12CR schema. Here there are two requirements. The first, both logically and practically, is to establish which of the four titles of metaphysics proper is the ***general regulating reflective perspective*** for the synthesis. This is the "master perspective" of the synthesis to follow because it is the perspective for keeping the process of synthesis focused on the general *Object of purpose* for the applied metaphysic. For the sensorimotor idea it is immediately obvious that this general regulating perspective can be none other than the transcendental Idea of Rational Psychology, the Critical acroam of which is *the Idea of the complete subject*[21].

Having made this first determination, the required next step is to comprehend what is required of the 2LAR structure of the metaphysic in order to meet Kant's stated characterization that the metaphysic be a "schema for completeness of a metaphysical system," i.e. that it conforms "to the schema of the table of categories." This must not, however, be taken too literally. The categories of understanding are pure *a priori* functional ***notions*** whose *Realdefinition* tells us that we are to regard them as no more than *rules* for the reproduction of intuitions in the free play of understanding and imagination in *nous*. The categories are *primitives* of transcendental meta-physics, and as such these bare notions are so remote from complex ideas of *noumena* and complex concepts of phenomena that they are like molecules of water in an ocean (this particular ocean being known in mental physics as the manifold of concepts in determining judgment). A formal evaluation of the theoretical correctness of an applied metaphysic can demand that the twelve functional *momenta* (in a 2LAR structure) be traceable all the way back to the categories, but this is something very different from saying that these ideas must be deduced *from* the categories. To *conform* with their schema is not the same thing as *being* that schema.

Nor does it appear to be practical that one *could* carry out the synthesis process by beginning with the categories themselves, owing to the very primitiveness of their real character. Rather, one must begin with the *transcendental topic* of the synthesis from the theoretical Standpoint. This is provided by the twelve *general ideas of representation* of a thing (figure 5)[22]. While the relationship between these ideas and their corresponding categories must be kept in mind during the synthesis, it is the 2LAR of representation-of-a-thing that provides *contextual* guidance for the theorist, not the categories immediately in and of themselves.

Now we come to an important simplification in the problem of analyzing the required structure. It is the defined task of an applied metaphysic to be a bridge between the principles of Critical epistemology, on the one hand, and empirical experience, on the other. This means that the three sub-ideas under each head are bound to the three construct tasks illustrated in figure 2.

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[21] By "subject" is meant: *h. Sapiens* ***as*** an Organized Being.
[22] refer to Wells (2006), chapter 3, for the detailed explanation of this 2LAR.

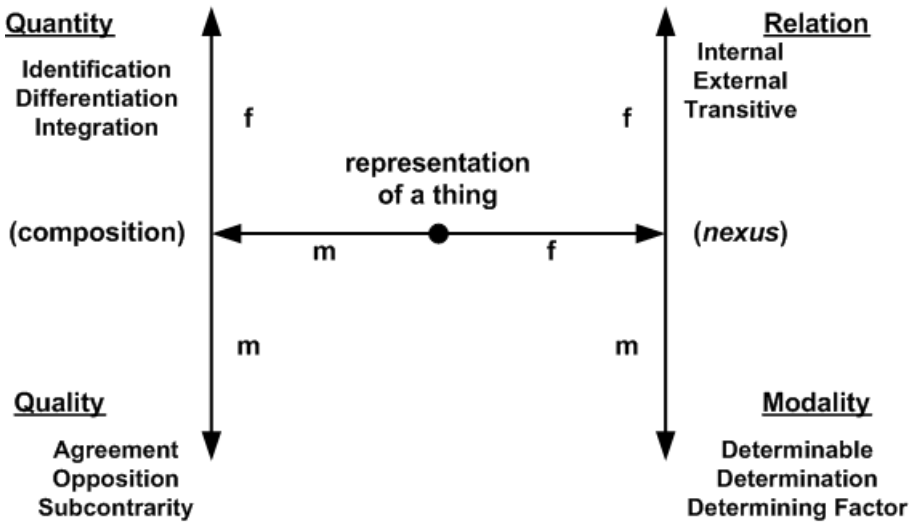

Figure 5: 2LAR of the general ideas of representation in transcendental topic in the theoretical Standpoint.

From this, it follows that *under each heading* in figure 5, one of the general ideas will specialize to the task of forming the bridgehead on the side of rational science, one will specialize to the task of forming the bridgehead on the side of empirical science, and to the third is then left the task of forming the span of the bridge between them. One is, consequently, faced with a three-step process of synthesis, and this is why *three* passes through Palmquist's 12CR come about in the deduction of an applied metaphysic. For the sensorimotor idea, its three sub-ideas align with our "bridge" metaphor as: (1) the transcendental sensorimotor idea on the side of rational science; (2) the empirical sensorimotor idea on the side of empirical science; and, (3) the data of the senses as the span between these bridgeheads.

Therefore, to complete the Transcendental Critique of step ②, one must identify the correct ***special perspective of metaphysics proper*** for each sub-idea. This second reflective perspective is *subsumed under* the general regulating perspective (Rational Psychology for the sensorimotor idea). It is in making these determinations especially that the general ideas in figure 5 are most useful and fecund. On the side of rational science, the topic of a special science has one general Object which, in terms of logical functions, must be metaphysically regarded as singular, affirmative, categorical, and apodictic. Corresponding to this alignment will be the categories of unity, reality, substance & accident, and necessity & contingency. In the 2LAR of the general ideas of representation, the transcendental idea therefore comes under the ideas of identification, agreement, information, and the determining factor.

On the side of empirical science, experience is presented in manifold appearances, is *not* given in terms of things-regarded-as-they-are-in-themselves (*Ding an selbst sich*), the objects of experience are always cognized in context with other objects, and are held-to-be determinations of actual objects. In terms of logical schemata of determining judgments, these characteristics of the empirically givable fall under the *momenta* of the particular, the negative (because appearance is not a thing-in-itself), the hypothetical, and the assertoric. These are the logical forms for the construction of concepts corresponding, as schemes, to the categories of plurality, negation, causality & dependency, and actuality & non-being. The topical general ideas consequently are the general ideas of differentiation, opposition, external Relation, and the determination.

This leaves only the third set of ideas, and here it is very useful to bear in mind that in Kant's three-fold structure of synthetic notions the third notion can always be regarded as the synthesis of the other two. The spanning element of the metaphysical "bridgework" therefore is at once

subsumed under the general ideas of integration, subcontrarity, transitive Relation, and the determinable. The corresponding logical functions are universal, infinite, disjunctive, and problematic, for which the corresponding categories are totality, limitation, community, and possibility & impossibility.

These alignments provide a formal structure and a transcendental orientation for the functional ideas of the desired applied metaphysic. What remains is place them in their appropriate reflective perspectives in metaphysics proper. Here is where the regulating Idea comes into action because its regulation and orientation directs one to ask the proper transcendental questions to be answered by the minor reflective perspective. The development of an applied metaphysic will specialize at this point because this is where its ideas are specifically targeted at the Object of the science in question.

The case of the transcendental sensorimotor idea (TSI) pertains to the rational placement of the special Object of the science within the overall context of Reality in general. At the same time, this placement is regulated by the fact that the object in question (*psyche*) is regarded as an Object of inner sense (Rational Psychology). Its rational *placement* is therefore that of an Object of reason made in order to understand how the Object of the science is to *cohere* with other objects in Reality. This falls under the transcendental Idea of Kant's Rational Theology, the general acroam of which is *absolute unity of the condition of all objects of thinking in general*. Rational Theology is the metaphysic proper of the coherence in Reality of all objects in Nature.

The empirical sensorimotor idea (ESI) pertains to the placement of appearances of the Object of the special science in relationship to concepts of natural objects *as phenomenal objects*. Every such object is understood as an object of outer sense (because the object *qua* object is thought in terms of its *thing-like* characteristics). But this perspective of the Object is the reflective perspective of Rational Physics, the general acroam of which is *unity in the synthesis of appearances*.

The data of the senses (DOS) is the idea bridging the gap between rational understanding of the metaphysical foundations of the science and empirical knowledge unearthed by the practice of the science. A *complete* empirical explanation of phenomena must conduct empirically gained knowledge in an unbroken chain all the way back to its primitives. But such a chain can never be completed in *phenomenal* experience, and so *practical completion* of the chain is not found in the observations of empirical happenings but, rather, in the thinking Nature of the scientist himself. For this reason, the master regulation of the applied metaphysic remains with the transcendental Idea of Rational Psychology. Completion of the chain, on the other hand, falls under the regulative principle of Rational Cosmology, the Idea of which is: *absolute completion in the series of conditions*.

If we make the symbol $\subset$ read "subsumed under" and the symbol $\Rightarrow$ read "provides the regulating principles for," then the three-fold synthesis of Transcendental Critique in deducing the sensorimotor idea is mathematically denoted by

$$\text{Rational Theology} \subset \text{Rational Psychology} \Rightarrow \text{the TSI};$$
$$\text{Rational Physics} \subset \text{Rational Psychology} \Rightarrow \text{the ESI};$$
$$\text{Rational Cosmology} \subset \text{Rational Psychology} \Rightarrow \text{the DOS}.$$

One then has all four reflective perspectives properly arranged and can then proceed through a synthesis of these perspectives to the logical analysis ③ of the full 2LAR structure of the applied metaphysic.

It is this synthesis of perspectives and the logical analysis that is presented in Wells (2006), and on which most of the text is expended. It is at this point, step ③ in Palmquist's 12CR, where

the general ideas of representation (figure 5), the logical functions and the categories of understanding come into full play in the analysis and synthesis. Now, all three of these, taken in their general and abstract forms, are protean in the sense that they apply to *all* topics of possible discourse. To make them specific to the matter-at-hand, as must be done to produce an *applied* metaphysic, additional ***specifying concepts*** must be joined to them *to form the context* of the specific deductions[23]. The general ideas of representation, the logical functions and the categories function in the role of what system theorist William K. Linvill once called ***portable concepts***. He said,

> Having described the problems of the modelmaking area in a general way, we now see what sort of capability they imply as necessary for a system engineer. At the outset it is clear that he needs to have a broad background in mathematics and physics. This need is dictated by the wide range of technical problems he will face. Narrow scientific training will almost certainly be inadequate except possibly for the components specialist. All I have said above has been said earlier, more forcefully, and more completely by others. Engineers need broad scientific backgrounds.
>
> Another more important aspect of system engineering has so far received too little attention it seems to me. It is the design aspect. *Engineering design and invention depends much more on concept than quantity*. What the system engineer needs for design is a set of *portable engineering concepts*. Really significant concepts can be shorn of their special restrictions and should be presented in as clear and uncluttered fashion as possible. *Portable concepts* are necessary because of the wide technical range of system problems. At the detailed and sophisticated level no two problems are sufficiently alike so that the same specific methods of solution apply. The system engineer brings his system problem into focus by applying concepts to it. After such focusing, the finer resolution of the problem may require detailed analysis but the rarer and more valuable element required for design is the portable concept. [Linvill (1962)]

What was (and is) true for the system engineer is equally true for the metaphysic engineer. One who develops an applied metaphysic for a special science is none other than a metaphysic engineer. While Linvill emphasized the need for portable concepts (because such were no part of any technical education in 1962), it nonetheless cannot be forgotten that specifying concepts must always be joined to them in every *specific* application.

This is what is presented, albeit imperfectly, in Wells (2006). Looking back at that work in retrospect, I cannot help but conclude that the presentation might have been made much more clear if I had better appreciated and understood the principle of Palmquist's 12CR at that time. The important point to bring out in this paper is that *the specifying concepts can come from nowhere else than from empirical scientific experiences*. It is, after all, the solid grounding of the science practice in which subsists the entire purpose of the applied metaphysic. It is equally clear that in order to have any specifying empirical concepts to call upon, there must be some amount of practicing experience in hand prior to the genesis of an applied metaphysic. This is why it was earlier said in this paper that following such a neat and tidy progression as the idealistic recipe is not practical.

Kant seems to have run up against this issue himself both in the case of his *Metaphysische Anfangsgründe der Naturwissenschaft* and in the case of *Die Metaphysik der Sitten*. Perhaps this is why he seems to have evidenced some reluctance to call either work a metaphysic and took pains to point out that both were of the nature of "rudiments" (*Anfangsgründe*) rather than a full-fledged *Metaphysik* in either case. He went so far as to put this into the title of the first work. In the latter work he wrote,

[23] No thing is *real* if it has no context given to its concept.

> The critique of practical reason was to be followed by a system, the metaphysic of **morals**, which decomposes into metaphysical rudiments of the *doctrine of right* and metaphysical rudiments of the *doctrine of virtue* (as the counterpart already published of the metaphysical rudiments of *natural science*), which the here-following introduction of the form of the system both presents and in part makes concrete.
>
> For the doctrine of right, the first part of the doctrine of morals, there is demanded a system coming forth from reason which could be called the *metaphysic of right*. But since the idea of right is a pure concept that still frameworks practice (application to cases being met with in experience), a *metaphysical system* of the same would also have to handle, in its divisions, the empirical manifold of such cases in order to makes its arrangement complete (which is an indispensable demand for the establishment of a system of reason), yet completeness of the division of the empirical is impossible, and if this is attempted (at least to come close to it), such concepts cannot be brought as integrating parts in the system but can only be used as examples in remarks [Kant (1797), 6: 205].

It seems clear that Kant had not found a way at that time to deal with this issue, and this would seem to be sufficient to explain why neither of these metaphysical works actually attained to the status of an applied metaphysic but, instead, were limited to rudiments. It is a credit to Kant's creativity, from a particular point of view, that he was able to accomplish as much as he did with these two works. It is not impossible that his intuitive-subjective grasp of Critical epistemology enabled him to skip carrying out Palmquist's step ③ explicitly and, instead, to race through it in his own mind to arrive at his rudiments. On my own much more modest scale, I felt this sort of urge during the deduction of the sensorimotor idea, and some of this did make its way into the presentation in Wells (2006). It is a temptation and a trap Bacon warned us of long ago:

> The idols of the market are the most troublesome of all, those namely which have entwined themselves round the understanding from the associations of words and names. For men imagine that their reason governs words, whilst, in fact, words react upon the understanding; and this has rendered philosophy and the sciences sophistical and inactive. Words are generally formed in the popular sense, and define things by those broad lines which are most obvious to the vulgar mind; but when a more acute understanding, or more diligent observation is anxious to vary those lines, and to adapt them more accurately to nature, words oppose it. [Bacon (1620), Book I, §59]

But if, as Bacon said, the ambiguity of words as symbols of meanings lies at the root of many puzzles, problems, and errors in science and philosophy, then clearer and more distinct words, again as symbols, is the remedy. This is, of course, the role that *mathematics* plays in science and in metaphysics. Mathematical expressions, *such as figure 5*, convey greater precision, delimiting concepts in relationship to their contexts. *Mathematics is a language for saying things precisely and with sufficient clarity that consequences can be deduced from statements*. It is no more and no less than this. Trace the etymology of the word "mathematics" back towards its root and you will come to *mathēma*, "what is learned." Any form of expression that wards off error and leads to learning is *mathēma*, which is as much as to say that form of expression *is* a mathematic[24].

The role of the specifying (empirical) concepts becomes clearer in the deduction of the

[24] The demonstrated appalling ignorance of mathematics displayed by U.S. college students is nothing more and nothing less than the poison fruit of a 50-year folly in mathematics education under the idolatrous sway of a bankrupt pseudo-philosophy. In the 1960s this institutionalized ignorance was introduced under the name "the new math." It is nothing else than the horse chestnut of Hilbert's failed pseudo-philosophy of so-called "metamathematics" as this developed in the 1920s and was resurrected by the Bourbaki movement of the 1950s. American students today think that nothing is mathematics unless it is in algebraic form; they think mathematical expressions such as figure 5 are somehow "not really math" and using them is somehow wrong or incorrect. To these students, mathematics is nothing but a scribble of Mayan hieroglyphics.

sensorimotor idea. They did not end up as *part of* the metaphysic but, instead, *provided contexts* that guided the *Realerklärung* (real explanation) of the twelve sub-ideas within the metaphysic. A better-developed organum of mathematical expression can be expected, once we have it in hand, to make these ideas and their inherent consequences more distinct, more easily applicable to the study of Nature, and to advance the state of the art in metaphysic engineering.

In deducing the sensorimotor idea, the central specifying concept is the idea of thoroughgoing *nous-soma* reciprocity. This idea is the root concept of the logical definition of *psyche*, i.e., it is the *definitional* idea of the logical division of *psyche* in the Organized Being model and the *reason* for introducing *psyche* into the model in the first place. We can note that this specifying concept is a teleological idea. This is to say: the specifying concept is a concept of the purpose of an Object (*psyche*) expressing the logical function *to be accomplished* by that Object. At root, all *real* meanings are *practical*, i.e. stand in relationship to *actions* in phenomenal experience. Mental physics, the science of the phenomenon of mind, is a doctrine of fundamental human Nature. Although it is premature to raise the following hypothesis to the status of a theorem, because the sensorimotor idea is merely the first example of a completed applied metaphysic (step ④ in the 12CR diagram), it may be that the central specifying concept of an applied metaphysic in every *social-natural* science will be a teleological idea. This is because every social-natural science has the human being as its fundamental Object and is a science either of the thinking Nature of a human being (psychology, ethics) or of interactions among human beings (political science, economics, sociology, cultural anthropology, leadership), or of both of these together (education, biography, history, linguistics). Human beings are goal-setting beings who establish for themselves particular purposes and aims, and who act to realize these aims. Therefore psychological causality (which is a *teleological* causality) is the prominent peculiar feature that distinguishes a social-natural science from a physical-natural science (physics, chemistry, biology, engineering). For this very reason, an objectively valid social-natural science *cannot adopt the paradigms and methods of a physical-natural science* because final causes utterly lack objective validity in a physical-natural science and, instead, they must obey a principle of *efficient* causes in their metaphysical bases. *Every social-natural science is a teleological science*, and so it seems likely that for the applied metaphysic of such a science the central specifying concept will be one stating an end result to be *realized* (made actual).

The next step taken in Wells (2006) was the deduction of the what was to be represented in the idea of the transition between the rational and empirical sides of a science of *psyche* as a Critical doctrine of psychophysical[25] organized being. The history of rationalism and the history of empiricism each clearly demonstrate that rational science by itself and empiricism by itself are insufficient to produce perfectible doctrines of knowledge. They are, in other words, particular instances of knowledge but are inadequate for generalized knowledge. It therefore fell to the transition idea (the DOS) to stand as an idea universal in Quantity, and this pointed straightaway to the idea of integration in figure 5 as the idea of Quantity for the DOS. Next, a special science is by definition a restricted doctrine of Nature and never a "science of everything real." The transitional idea (that is, the DOS) must therefore be an idea rooted in the category of limitation in Critical ontology, and this pointed straightaway to the idea of subcontrarity in figure 5 as the idea of Quality for the DOS. Thirdly, the very definition of the transitional idea as a bridge tells us that the idea of Relation in figure 5 for the DOS is the idea of transitive Relation. Finally, all special sciences are doctrines for coming to an understanding of contingent natural experiences.

[25] One can classify sciences such as neuroscience, medicine and military science as *psychophysical* sciences because they are doctrines for the complete nature of being a human being insofar as the human being is regarded in both the *homo noumenal* and *homo phaenomenal* aspects of being human. Psycho-physical sciences stand as the third general class of science-in-general and can be regarded as the synthesis of physical-natural science and social-natural science. Mental physics is a psychophysical science.

The Modality of its bridging idea, therefore, pertains to the determinable matter, which is to say it is pertinent to the problematic *materia ex qua* out of which understanding of experience is synthesized by scientific doctrine. Thus the idea of Modality for the DOS is the determinable and we have for the *idea structure* of the DOS

DOS = {integration, subcontrarity, transitive Relation, the determinable}.

It is also possible to see at this point that the ***orienting acroams*** of DOS are those of Rational Cosmology. All sensuous appearances (phenomena of *soma*) are unremittingly bound to Relations of physical causality & dependency and, because these appearances, and experience in general, are always contingent, it is impossible to complete the chain of cause-to-effect relationships on the empirical side of *psyche*. This completion, which the transcendental Idea of Rational Cosmology requires, can only be achieved in the *homo noumenal* aspect of being a human being – which belongs to the rational and mathematical bridgehead of the applied metaphysic of *psyche*. The transitional idea (DOS) therefore is an idea *serving the requirement for absolute completion in the series of conditions* and thus falls under the orientation of Rational Cosmology. Hence, Rational Cosmology $\subset$ Rational Psychology $\Rightarrow$ the DOS.

The second specifying concept for the sensorimotor idea was a concept of its *empirical context*. The reason for and need of a specifying concept of context is probably fairly obvious: no thing is real if it is devoid of context and *psyche*, as a coordinating *noumenon* at the horizon of possible experience, has practical objective validity only through empirical phenomena over which its Object must stand as a condition for the empirically actual. Most of the discussion in the first four sections of chapter 6 in Wells (2006) were devoted to carefully examining what the true empirical context of *psyche* was. This led to incorporation of the idea of sense *per se* as part of this context and to Rational Physics as the orienting reflective perspective for the empirical sensorimotor idea. Thus, Rational Physics $\subset$ Rational Psychology $\Rightarrow$ the ESI. However, Wells (2006) did not then immediately proceed to deducing the general ideas for the structure of the ESI but, instead, proceeded to examination of the transcendental sensorimotor idea.

It might seem that the conclusion Rational Theology $\subset$ Rational Psychology $\Rightarrow$ the TSI would have followed at once by simple process of elimination, and this idea did occur to me at this point in the deduction. However, a lifetime of experience in the practice of science and engineering had previously taught me to be skeptical of relying upon process of elimination. For that reason I engaged in an exercise in retrospective (the ④-① transition in figure 3) in re-examining the roles of the four reflective perspectives before eventually determining that the third specifying concept needed for the sensorimotor idea was a concept of *the necessary conditions for appearances of the empirically real Self*. Necessity is a Modal notion that obviously stands at the rational science bridgehead of the metaphysic. The concept of the empirically real Self pointed directly at Rational Theology as the orienting reflective perspective for the transcendental sensorimotor idea because Rational Theology is the metaphysic proper for reflection upon *coherence* of contexts. These acroams provided the principles that led to the idea structure of the TSI as

TSI = {identification, agreement, inner Relation, determining factor}

and likewise brought into focus the pertinent logical functions (the singular, etc.) and categories of understanding (unity, reality, substance & accident, necessity & contingency) for the logical and ontological essences of the TSI.

From here, completing the idea structure of the ESI was a lengthy but more or less straight-forward exercise in the synthesis of perspectives. The idea structure

ESI = {differentiation, opposition, external Relation, the determination}

was consistent with the retrospective and so the general structure of figure 4 was established. Eight of the twelve *momenta* in figure 4 had been determined and only the specific *momenta* of the DOS remained to be done. For this, a simple synthesis of ideas, TSI + ESI → DOS, was carried out. The justification for the validity of this process was merely the master regulation of Rational Psychology since the factor of a *master* regulation in the compound relation (12CR) explanation of the sensorimotor idea *requires* that the third set of *momenta* be givable through synthesis from the other two. Otherwise, one does not have a structural manifold of ideas in a 2LAR but, rather, a heap of *ad hoc* guesses. Three passes through the 12CR process had been completed, the 2LAR of figure 4 was in hand and the task was completed.

VI. Concluding Remarks

So far as I know at the time of this writing, the applied metaphysic of the sensorimotor idea is the first example of an applied metaphysic developed to the point of a full 2LAR structure. It is obvious that the scope of this metaphysic is very highly focused; it pertains to the *Realerklärung* of *psyche* in the Organized Being model and nothing more. Perhaps future experiences will come to demonstrate that such narrowness is displayed in all or almost all fecund systems of applied metaphysic. If so, this would probably not be pleasing to Plato but one can imagine Aristotle might approve. The fecundity of the doctrine of method proposed in this paper has yet to be put to the test on a wider scale of application, and this should be done so as to ensure that there is not hiding within the doctrine the fatal limitations eventually exposed in Hegel's "triangle" method. But the answer to this question of concern can only come from the experience of practicing the method and, no doubt, improving upon it through the development of an organum of Critical applied mathematics suited to fit it.

That it is possible to accomplish a great deal without first obtaining a completed applied metaphysic is demonstrated by the example of Kant, who was able to come up rudimentary principles (*Metaphysische Anfangsgründe der Naturwissenschaft* and *Die Metaphysik der Sitten*) without one. But Kant's example likewise demonstrates that serious gaps and shortcomings remain even if one is in possession of such rudiments. The practical benefit of an applied metaphysic comes from filling in these gaps, reducing and finally eliminating shortcomings, and providing continuity without leaps between the rational and the empirical sides of a special science. Kant wrote,

> *Progress* in knowledge as science in general captures that [advance][26] from discovery of its elements of knowledge, and after that how the manner of orderly arrangement must be (systematic), so as to connect these such that the division of this business into a doctrine of elements and a doctrine of method constitutes the supreme division; the former presents the concepts, the latter their structure, in order to make a whole of science.
>
> The passage (transition) from one form of knowledge to another must be a step (*passus*) only, not a leap (*saltus*); that is, the doctrine of method requires one to pass from the metaphysical rudiments of natural science to physics – from concepts of nature givable *a priori* to empirical ones which yield empirical knowledge [Kant (1796-7), 21: 386-387].

This paper has traced the major factors in developing an applied metaphysic, to wit:

- use of the acroams, ideas and notions of Critical epistemology as **portable concepts** and as **orienting acroams**;
- the need for and use of practical **specifying concepts** by which the metaphysic is structured;

[26] *progreßus*, from Latin *progressus*, an advance towards a more perfect or finished state. Kant means "how it is that advances in science are made to happen," i.e., "how progress is captured" by the scientist.

- the representation of all four Critical reflective perspectives in the synthesis of the metaphysic (under Rational Physics, Psychology, Cosmology, and Theology);
- identification of *one* **master perspective** for the synthesis, with the other three serving as **orienting perspectives**;
- the **2LAR** as the basic mathematico-structural form of the metaphysic; and
- the procedure of progressing through **the 12CR process** of analysis and synthesis.

An applied metaphysic cannot guarantee to eliminate all errors (for example, an error in the deduction of the applied metaphysic itself will produce errors in the special science). But having one will reduce the frequency of occurrence of errors. One need only look at the history of psychology to see the importance of this. Furthermore, the recent history (the past 30 years) of biological neuroscience, which has undergone major changes in its models relative to the first 80 years of the 20th century, illustrates that even a physical-natural science can benefit from a Critical applied metaphysic. Perhaps the most important service an applied metaphysic can provide is the elimination of unsound and subjective pseudo-metaphysical prejudices in science. We must replace failed positivism and *ad hoc* materialism with *systems* of Critical applied metaphysic. If we would do so in a sound and efficient way, we must also produce a new kind of scientist, the metaphysic engineer, whose role in science is the counterpart to that of the system engineer in engineering. In doing so, we would, at the same time, produce a better and higher level of ***system science*** capable of bringing the present social sciences into full bloom as social-natural sciences.

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