Book Review

DIMENSIONS OF APEIRON[1]
Steven M. Rosen
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Reviewed by Dave Stein

This is the book that seemingly "validates" indeterminacy, be it associated with the quantum mechanics wave function or with human consciousness! From ancient Greece's concept of nature in the wild (apeiron) to the chaotic vacuum of modern physics, ***Dimensions of Apeiron*** masterfully traces the evolution of the age-old quest to dominate nature and the reflection of this quest in Western philosophical thought. This journey takes the reader through physics, psychology, philosophy, creation myths, art, media, language, consciousness, and Western religions, culminating in a brief discussion on the seeming inability to solve major problems of humanity.

A major point throughout the book is that chaos, disorder, and unbridled nature are pervasive. In addition, the book makes a cogent case for an underlying reality beyond continuity, linearity, and rationality. In author Steven M. Rosen's own words,

> *"...from the outset Western culture has been spurred by the drive toward differentiated being or individuality, toward individuation. Achieving this end essentially has meant containing what at first appeared uncontainable: the boundless apeiron. The proposition I submit is that apeiron, after being held at bay for over two thousand years, has now returned with a vengeance.... What I intend to demonstrate...is that the upsurgence of apeiron – far from indelibly spelling the demise of human individuality, actually offers us the opportunity to bring it to fruition."*

Rosen begins with a discussion of the drive toward individuation and the role of this drive as a basis for classical [Western] philosophy and the science to which it gave birth. It is to this end, he notes, that "the prime directive of the classical enterprise is to wrest order from the chaos of nature." Furthermore, humanity can exert influence over nature by detaching itself from the world, itself stabilized, and stabilizing its position in relation to the world. The operative framework here is that space mediates between the object (observed) and the subject (observer) and is the medium through which one makes an observation. For its part, the subject is a thinking thing without extension in space, without boundaries or parts, indivisible – and hence beyond reductionism. As Rosen later notes, our earliest sense of ourselves as individuals is linked to our experience with space. In contrast, the object is characterized by bounded extension. Thus, observer – medium (space) – observed. Interestingly, this reductionist delineation has striking parallels with Vedic thought (observer – process of observing – observed), although this parallel is not discussed in *Dimensions of Apeiron*.

Indeed, notes Rosen, it was Plato who characterized space as the receptacle that contains the changing forms without itself changing. In the Platonic transformation of the soul, apeiron

itself was now to be contained. However, this was not entirely the case, as the container was subject to the disruptive forces of chaos, or in other words, leaks. It is in the context of the quest to subjugate this chaos – the goddess Apeiron (a.k.a. Mother Nature) – and the concurrent drive for individuation, that Rosen traces the evolution of Western religion and philosophy.

For example, in pre-classical Greece, the individual was two steps removed from full autonomy – he or she was ruled by the gods, who in turn were ruled by fate – the goddess Apeiron. In classical Greece, the mythic experience was sublimated with the growth of critical thinking and the philosopher class, and the influence of the old gods gave way to an enhanced sense of personal identity. With the advent of monotheism that later culminated in the highly individuated God of Judeo-Christianity, the diffuse powers of the gods became concentrated in the power of a singular being that could contain the tempestuous goddess Apeiron (the Greek word for that which is limitless, boundless, indeterminate; the principle of disorder or disharmony) and bring order to all of creation. Notes Rosen, the Hebraic YHVH creates the chaotic Apeiron at the outset and then subdues her. Thus, there was now a personal covenant with God, and one could gain control over one's life and bring order to it by following God's commandments. Christianity took this one step further with human and divine becoming one, since one could align with God by surrendering to Jesus Christ.

But still, as Rosen states, there continued a great divide between the Creator and the created, including mortals, and the Judeo-Christian concepts of individuality would reign supreme until the 1500's – approximately 2000 years after the Greeks transformed the old mythic sense of identity.

It was during the Renaissance that the subject was characterized as transcending space, being separate from God and the material world, and having dominion over nature. Notes Rosen, the Renaissance subject "I" is a point of view or perspective (that he later correlates with mathematics, physics, and art), whereas Renaissance space was characterized as extensive and well-ordered, no longer requiring the divine act of subduing apeiron. Objects in Renaissance space were constrained by the laws of space (motion), whereas the Renaissance subject was not to be known; rather, it was to do the knowing. The object (that which is experienced), the subject (or transcendent perspective from which the experience is had), and space (the medium through which the experience occurs) were regarded as separate. In other words, object-in-space-before-subject. But, asks Rosen, was apeiron entirely eliminated in this Renaissance experience? No.

It is here that Rosen launches into an extensive discussion of spacetime, relativity, and quantum mechanics, even drawing insights from string theory. In Cartesian space, he asserts, one's perspective can be transformed into another by a continuous displacement in Cartesian space, as one can shift the origin by moving one's eyes – so perspectives are equivalent. Rosen goes on to say that the representation of space is a correlate of one's ability to locate oneself as the point of reference in space.
However, the subject has a totally objective viewpoint, since he or she can transcend all perspectives and view reality from a "universal frame of reference." So what is this universal frame of reference? Observes Rosen, even in Galilean relativity, it is impossible to determine one's state of motion in an absolute sense, and so a given coordinate system (inertial system)

cannot be this frame. Instead, it is the laws of classical mechanics that are invariant. With the subject also invariant, the only term in the object-in-space-before-subject framework that is susceptible to change is the object, or so it was believed.

But even here, continues Rosen, apeiron is still at play, since its banishment requires total and absolute agreement between theoretical and empirical reality and yet nobody has ever found an ideal discrepancy-free coordinate system. Thus, the total equivalence of perspectives and Galilean transformations is still open to question. Of course, one might raise the issue of measurement precision, but the quest for ever-increasing exactitude culminated in the overturning of the most fundamental expectations of physics as it delved into the very fast and very small, notes Rosen – as well as the very massive and the very distant.

The upset started with the Michelson-Morley experiment in 1887. At that time, electromagnetic waves were regarded as an object in space requiring a medium through which to propagate – and this medium, the hypothesized luminiferous (light bearing) ether (the subtle, elusive framework within which the motions of coarser substances including light could be measured) was postulated to be at rest, the absolute inertial system. In Galilean relativity, the appearance of an object will change if one changes perspective on the object, a point echoed by Sigmund Freud (object constancy depends on subject constancy) as Rosen notes. However, as this is not what was observed in the Michelson-Morley experiment, the classical instinctive notion of object-in-space-before-subject was called into question – a point that Rosen illustrates brilliantly with the hypothetical example of a computer screen that maintains its full square appearance whether viewed at an angle or head-on. More profoundly, if the subject-object separation with respect to light does not exist, then space (as commonly understood) does not exist, since existence of space presupposes separation.

Einstein's response, asserts Rosen, was to attempt to maintain the classical object-in-space-before-subject. Einstein's letting space and time themselves change replaced the notion of a universal clock with a new invariance, a more abstract four-dimensional spacetime, with the here-now point of the light cone replacing the old Cartesian origin. Continues Rosen, Einstein foreclosed the interpretation of the Michelson-Morley experiment that the constancy of the speed of light was indicative of a blending of the subject and object. In the Einsteinian framework, subjectivity itself is the object, and "objects" are observational events in four-dimensional spacetime. There exists the object (objectified relativistic event), the spacetime continuum that contains the event, and the detached subject who analyzes the event from afar.

When the Michelson-Morley experiment failed to confirm the existence of the luminiferous ether continuum, Einstein plugged the gap by postulating a four-dimensional spacetime continuum. In this way, he accommodated apeiron but in a way that it loses its force – by accepting the dynamic ambiguity of nature at one level but denying it on a more fundamental level. Furthermore, general relativity re-introduced the discontinuity, since spacetime curvature can be sufficiently extreme to create a singularity (black hole) in the continuum. So once again, analytic continuity fails.

Rosen then turns his attention to Max Planck, whose investigations of blackbody radiation led to quantum theory that called into question even the notions of Einstein. It is at the

quantum scale that the "granularity" or discreteness – a discontinuity that Planck himself accepted (and an additional discontinuity beyond those associated with black holes) – supersedes the analytical continuity of space while the emptiness of classical space gives way to the relatively violent quantum fluctuations in the vacuum. It is here, too, that classical identity and the notion of a detached observer (subject) is challenged once again, as the very process of observation (measurement) disturbs that which is being measured, thereby blurring the separation between the observer and the observed and perhaps even calling into question the notion of scientific objectivity.

Rosen extends his discussion to string theory (including logical positivism, by implication), even suggesting that the string must be both indivisible (as basic building blocks) and spatially extended – both subject and object – an apparent contradiction that subverts the "object-in-space-before-subject" paradigm (and in this reviewer's view, further calls into question some basic assumptions about space and time).

Recognizing that as a human enterprise, science reflects the changing cultural context in which it is enmeshed (a point echoed by others such as Arnold Mindell), Rosen turns his attention to modern and postmodern art. Drawing upon the works of Monet, Renoir, Pissarro, Picasso, and others, he contrasts the depth or three-dimensional quality of Renaissance art with the flat-looking art of the Middle Ages. Observes Rosen, the Renaissance entailed a step in the development of a more focused view, one in which the world was now experienced from the detached perspective of a more individuated subjectivity.

One characteristic of modern art, observes Rosen, is the shifting of attention to the art of perception itself. Monet's ***Bar*** illustrates this with its two vantage points that create perceptual uncertainty, which disrupts the viewer's involvement with the object perceived and shifts his/her attention to the act of perception itself, creating an ambiguous blending of subject and object. In impressionist art, the artists are concerned not only with objects that they perceive but also with their own impressions of those objects, their own perceptual processes.

For its part, Cubism, seeking to banish the specter of apeiron, went on to be "objectively perceptive." In Cubism, the alter-perspective no longer hovers in the background but brings all perspectives into the foreground simultaneously, like a God's eye view of reality in which the artist detaches himself or herself more completely from the classical field of perception. Unlike the more perceptual Impressionist art, Cubism is perceptual, as perception cannot reconcile the opposing perspectives. Like Einstein, Cubism includes perceptual processes in a way in which all perceptive views (reference frames) are simultaneous, but on the canvas instead of in four-dimensional spacetime. In this way, the developments in art parallel the attempt of science to meet the challenge of apeiron, an attempt that involved a more abstract mode of experience in which attention shifted from concrete objects perceived to the act of perception and its space as new kinds of objects.

Continuing, Rosen draws upon examples from the visual media – photography (which, by abolishing time, is a discontinuity), cinema (which restores the illusion of continuity but is really a compilation of frozen instants, between which the viewer bridges the perceptual gap), and television (which "puts humpty-dumpty back together again" by reconstructing discrete,

deconstructed images to make them continuous). Turning to postmodern television including MTV, he notes that broadcasts consist of several pieces of brief duration, with each peace itself highly fragmented, although he does not comment on the possible relationship with attention spans. Drawing a parallel with the replication of the continuum ad infinitum in the subspaces of the Hilbert space, Rosen suggests that mass production compensates for its loss of meaning and that people watch television more but enjoy it less, in the manner of an addiction.

Likewise, continues Rosen, the silicon chip, like the wave function, contains information implying a vast range of potential activities – virtual mass-energy that is fully actualized only when hardcopy is produced and that is otherwise erasable without a trace, unlike the already actualized mass-energy associated with the imprint of a typeface. Television lets one confirm one's own identity via attachment to images, so that we define oourselves in terms of emotions, negative and positive – although the corresponding "real events" may be "out there."

Rosen then discusses relevant writings of the great philosophers – Kierkegaard (who advocated that people pay attention to the relationship between subject and object), Nietzsche (who rejected all concepts of external causation and a supernatural agency – "God"), and Husserl (who insisted that Consciousness be treated as strictly internal, known through intuition rather than sensory perception). For example, Nietzsche refers to a circle of eternal self-creation and self-destruction, deeds that spring forth from the shapelessness of apeiron, a circle without a goal unless the circle itself is the goal, the will to power – taking command of one's own life instead of falsely attributing circumstances to the action of external forces, be they mortal or divine. This sea of forces is similar to apeiron, except that in apeiron, there is not only the will but also its absence, not only power but also its dissipation (another point with parallel in age-old teachings, although this is not stated explicitly).

It is here that Rosen digresses into commentary on social issues, noting Kierkegaard's suggestion that when people face the challenge of becoming individuals (individuation), they are more likely to take refuge in the abstractions of the crowd – where they can maintain the fantasy of being masters of their world, invulnerable, without putting themselves at risk (a de facto comment on mob psychology). Similarly, Rosen himself proposes that a gambler keeps returning to a casino to resolve ambiguity, not to win or lose. This hypothesis suggests an exciting explanation for the thrill factor that is evoked by elections, sensational trials, and sports events!

Recognizing that objects can be studied in terms of phenomenology, Rosen proposes (in a manner akin to that of Gödel and Husserl before him) that subjectivity forever evades study by intuition, because the entity doing the investigating entails a new higher-order subjectivity that goes uninvestigated, as if there is always another layer of the proverbial onion to peel. As Kurt Gödel had found, a mathematical system cannot prove both its completeness and its logical consistency, as this would require appealing to a more comprehensive mathematical system, which would then have to prove its own consistency, etc. Similarly Husserl could not attain objective closure on logical subjectivity, since this would require a more comprehensive, more abstractly inclusive system of self-objectification, which would require further subdivision of Consciousness, and so on.

In this context, Rosen also discusses physicist David Bohm's quest for an all-encompassing "infinite totality" beyond the open hierarchy of implicate-explicate levels, a seeming paradox (or attempt to avoid one) that Bohm himself had acknowledged, given his construct in which there is not only one implicate order (mind-like, from which the explicate order originates); rather there are deeper, more comprehensive levels and no bottom level, with each level having a certain ambiguity. He had sought to develop new mathematics to describe the mind-like interior realm objectively but found that every objectification that explicates what had been implicate or subjective brings a new level of subjectivity. With both the implicate and the explicate orders acting like mirrors, Bohm's quest (as Rosen puts it) appears to be an attempt to extricate himself from the "hall of mirrors" in a manner akin to extricating one's fingers from the Chinese finger puzzle. That is, the more one struggles to become free of apeiron, the more he/she is entrapped within it. Yet together, the two kinds of order point more accurately and deeply than either alone can do, continues Rosen.

Rosen's final chapter draws examples from topology – for example, the Necker cube and its volumetric equivalent, M. I. Escher's graphic ***Belvedere***, and the Moebius strip, all with their visual ambiguities. In the case of the cube, one appears to see both perspectives at the "same time"; yet, both perspectives are not experienced simultaneously, nor does one simply follow the other. The experience is that of an unbroken flowing from one to the other. Furthermore, it is difficult to grasp the perspective-reversing process directly. They coincide and are completely interdependent – that is, it is not possible to erase one without damaging the other.

Continuing the illustration, Rosen goes on to present different levels of ambiguity (reversibility). Each single component of a reversible cube is itself reversible – convex or concave – and then the mirror opposite constitutes a third order of reversal. The same action that resolves mirror opposition at one level creates new opposites at another level. Likewise, says Rosen, the Moebius strip has two sides only locally, and the points on opposite sides are intimately connected. Thus, one side flows unbrokenly into the other to form a single side, and yet each side maintains its distinctness.

For its part, the Klein bottle (which as Rosen observes, represents "swallowing the serpent") brings back the discontinuity, in that it cannot be constructed (in three dimensions) without the hole that lets it pass through itself – but the hole makes it topologically imperfect. Furthermore, the hole blurs the distinction between the object and subject, between that which is contained and the containing space. The bottle is not a mere object, simply enclosed in a continuum, says Rosen. It is not opened to the view of a detached, uncontained subject – although one may attempt to circumvent the container-contained dichotomy by asserting that the Klein bottle contains itself. In presenting theorist Paul Ryan's schema for the Klein bottle, Rosen notes that there are three basic features – "part contained," "part uncontained," and "part containing." The "part contained" is the space just inside the neck, where the bottle opens out to form the perimeter, which passes over the "uncontained" aspect, which is the "loop" between the "neck" and the "flare." The self-intersection represents discontinuity. So the diagram illustrates the "continuously discontinuous" circulation of dialectical Being, in marked contrast with the object ("contained"), the containing space, and the subject ("uncontained").

Rosen then turns to the despair found in postmodernism, where it is realized that the modernist extrapolations of continuity cannot deny the discontinuity (the black hole, or the hole in a Klein bottle) – the hole that tells us that we cannot avoid a regression into chaos. His ensuing discussion of the reflection, self-reflection, and pre-reflection in the context of the Klein bottle has parallels with various creation myths.

In this context, Rosen goes on to discuss the reflexive nature of text and language (subject, object, and predicate), specifically that a word (whose signifier serves as a surrogate for the subject) refers solely to that which is "other" and that the subject (signifier) does not meaningfully refer to itself. This is indeed a remarkable observation, although a reader might question whether Rosen's discussion is based on several languages including those of non-reductionist (Eastern, Native, and Aboriginal cultures) or only on Western languages. Rosen's studies also raise the intriguing possibility of modernism's long-term implications for language, given its aim "to surpass classical signification by turning the classical subject into an object." At the same time, he is careful to note that the reciprocity of the subject and object does not constitute literal fusion – not in terms of what humans can experience.

Suggests Rosen, the modernist sign is self-referential. "In modernism, attention is withdrawn from the end-products of reflection and meaning is relocated in an abstraction of the process itself…What actually happens is that the classical posture is maintained at a higher level of abstraction." That is, the object-subject becomes a new object before "a new, higher order subject." In other words, "what had been the gaze of the subject [that is, gazing at the reflection of his/her eyes in the mirror] now itself appears as an object gazed upon by a subject that is one step removed from the original." This maintains the classical relationship of object-in-space-before-subject and the separation between the two, albeit at a higher level. An implication is that the classical subject "loses its privileged position as the unquestionable base of knowledge, as the transcendent, never-to-be-viewed perspective point from which all else is viewed." This recursive process continues *ad infinitum*, notes Rosen, with implications for identity, ultimately negating it, "exposing the 'black hole' at its center." Subjectivity, then, "is the detached position *from* which all objects are viewed, or better perhaps, from which all is viewed as object." Comparing the still unexplored dimensions or interwoven topological structures of apeironic Being to the several alchemical distillations required to attain the alchemists' goal of a total union of opposites, Rosen states that "knowledge of apeironic Being is by no means complete."

Returning to the Klein bottle, Rosen proposes that it "… is a signifier that paradoxically signifies itself." "The hole in this Kleinian text is the 'perfect size and shape' for our inwardness, and, like a black hole in space, it draws us toward it, extending to us a pregnant invitation to fill it with the whole of 'our selves' – that is, to fill it with a Proprioceptive awareness of *Apeiron*. This is how the Black Goddess brings light to herself." But, he asks provocatively, "Can we read our own reading? Can we read the hole in the Klein bottle in such as way that we relax the compulsion to regard it as merely a hole…?" Concluding, he proposes that "… it is precisely at this inner horizon that the conceptual and the experiential can flow into one another without interruption. It is here that we can realize the intimate harmony of outside and inside, of object and subject, of the bounded and boundless. That is to say: the harmony of *Apeiron* can be realized in full by the Goddess herself."

The epilogue asks why problems the problems of humanity seem to be only increasing, perhaps to ominous proportions, in spite of good intentions of many highly intelligent and inventive individuals. He suggests that this is because "what 'we' have never fully questioned is this very *we*" – and he goes on to say that since the rise of reflective consciousness, we've been seeking to know ourselves – as Socrates would have people do. But Rosen suggests that the quest for individuation has been frustrated because human reflectivity "has always been geared to turn whatever it seeks to know into an object, including itself. In this way, it has alienated itself … It is our self-alienation, then, I submit, that has brought us to the brink of catastrophe." As an alternative Rosen advocates that "The reflective individual must break the centuries-old habit of moving away from himself toward his object, must move backward into himself to the prereflective source of his reflection. There he will find that he is not merely a free-standing subject after all, nor is he merely an object. Instead, 'he' is *the embodied fusion of subject and object that constitutes the paradox of apeiron*. So – if effectively addressing humankind's current crisis means gaining self-knowledge – it is *apeiron* we must come to know."

In the end, Rosen asserts that oneness (individuality) can be achieved only by participating in the many of apeiron. He calls for a dialectic of the one and the many that favors neither the unity of fixed form nor the formless multiplicity. In other words, unity in diversity and diversity in unity – an age-old teaching. He argues that apeiron – far from signaling the end of differentiation – is the key to its completion. In this light, it is hoped that he will write a sequel that examines the binary nature of identity that underlies much of contemporary politics and religion, in which you know who you are because of people who are not like you.

In tracing the age-old quest to tame apeiron, Rosen argues convincingly that modernism never accomplished this. In the mid-19th century, modernism tried to reduce the ambiguity by abstraction, maintaining the positive – determinate law, fixed identity, scientific objectivity. However, in the mid-20th century, it ended with a lapse into ambiguity again. Turning to postmodernism, Rosen notes that it, too, has been a futile effort to tame apeiron, attempting to reduce ambiguity by one-sidedly affirming the negative, subjectivity, and by turning an object into an "anti-object" – which like antimatter, is unstable. The ambiguous oscillation between the subject and object poles, inherent in modernism, is now undesirable. At low oscillation frequencies, it is possible to fix one's attention on a single side, but there is also less contrast. Conversely, at higher oscillation frequencies, there is more ambiguity but also more clarity. To this end, the book begs the intriguing question as to how these "oscillation frequencies" might relate to attention spans, particularly in a stimulation-intensive, fast-paced society in comparison with other cultures that Rosen examines.

Parts of the book read like straight philosophy, especially ontology, and some readers may be uncomfortable with the level of abstraction. Yet this may be unavoidable, since the book discusses abstraction itself. Even so, there is much that the "abstraction-challenged" reader can glean from the book. At the same time, *Dimensions of Apeiron* presents interpretations and implications that are not commonly taught in physics courses, and it strongly hints at a level of reality more basic than the observable universe – matter, energy, and spacetime – perhaps reflective relationships. In examining the underlying themes that cut across the sciences, the liberal arts, and the fine arts, *Dimensions of Apeiron* is a useful guidepost, not only for next-

generation science but also for the future itself, and it is accordingly recommended as a resource for futurists.

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