

Time, Temporality, and the Scientific Investigation of Reality

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Abstract

This article examines select correspondences between the physics and phenomenology of time that beg elucidation and position phenomenology to contribute to the scientific investigation of reality. Its analysis yields four observations. (1) The inherent tendency of things to change asymmetrically is the basis of time and temporality. Physics calls this tendency the “arrow of time.” Phenomenology calls it “ἀρχή κινήσεως” (*arché kiníseos*). (2) The physics and phenomenology of time posit isomorphic interpretations of reality. They both interpret reality as a unity of time, space, and beings. They also posit isomorphic interpretations of space. An analysis of the notions contemporary physics sometimes appears to presume suggests it is not immune to the prejudices induced by an ontic appropriation of reality, however. It also suggests a potentially constructive role for phenomenology in the scientific investigation of time and space. (3) Physics and phenomenology reveal time as a relation between one set of transformations measured against another set of transformations. (4) The human tendency to fall into the everyday comprehension of time may be complicating the scientific investigation of time.

Keywords: Time, space, temporality, physics, phenomenology, consciousness, intentionality, existence

1. Introduction

Contemporary physics—that is, physics generally understood as beginning with Albert Einstein’s “miracle year” of 1905—revolutionized our understanding of time when it falsified notions of time and space as absolutes and disclosed

them as an absolute unity (“space-time”) that unfolds asymmetrically (Greene 2004, 49, 59). It radicalized our understanding of time when it revealed the deep interconnectedness among time, space, and beings and discovered the flow and shape of space-time were contingent on an object’s velocity. Physics observes that the total transformations that comprise an object’s reference frame, that is, the object and everything moving with it, slow down and contract in the direction of its travel relative to its speed. The faster an object travels the slower its rate of time (time-dilation) and the greater its contraction (length-contraction) (Stannard 2008, 4-6; Stenger 2000, 68, 70, 87). Because every thing in the universe is always moving, even if the motion is the effect of gravity (*i.e.*, acceleration produced by a curvature of space), there is a “relativity of simultaneity” among all things. This means every thing is running at different times relative to every other thing (Greene 2004, 55, 65, 67; Stenger 2000, 67). Space-time is absolute because the combined speed of an object’s motion through space and time is always precisely equal to the speed of light (Greene 2004, 49), the speed of light is the “same in all reference frames” regardless of an object’s velocity (Stenger 2000, 69), and “no particles or signals of any known type are superluminal, that is, they cannot be accelerated to move faster than the speed of light” (Stenger 2000, 73; Greene 2004, 49).

Time dilation and length contraction usually are not noticeable in everyday life because the velocities of objects are generally an insignificant fraction of the speed of light (Stenger 2000, 70). Time dilation and length contraction also are not noticeable for the observer within non-inertial (moving) reference frames traveling at a significant fraction of the speed of light. Time and space for this person appear unchanged within his reference frame regardless of his velocity and can only be noticed by observers in inertial reference frames (Stannard 2008, 7). For example, if a person travels in a spacecraft moving at a significant fraction of the speed of light, space and time within the vessel would appear normal to him. If he could see outside the vessel, he would notice clocks ticking faster and space warping (stretching) to adjust for his speed. If

a person in an inertial reference frame could observe the vessel, he would notice any clocks inside of it ticking slower and the length of the spacecraft and everything inside of it contracted in the direction of its travel.

Modern physics also observes that reality always unfolds asymmetrically. It runs one way and one way only, “forward.” This one-way directionality stands in “pronounced contrast” to the “laws of Nature,” which are “essentially symmetric under time reversal” (Zeh 2007, 1). Physics calls this asymmetry the “arrow of time.” The arrow of time refers to increasing entropy, or the inherent property of things to move from ordered (symmetrical) to increasingly disordered (random) states with a consequential elimination of free energy. The most important “classes of phenomena” characterizing time’s arrow are radiation, thermodynamics, evolution, quantum mechanical measurement, exponential decay, and gravity. These arrows “represent the formalization of time in kinematic terms” and are often “regarded as even more fundamental than the dynamical laws themselves” (Zeh 2007, 5-6). Interpreted in terms of its arrows, especially the “Second Law of Thermodynamics,” time comes to light as a metaphor abstracted “from relative motions and their empirical laws” (Zeh 2007, 6, 12). It represents a relationship between one set of transformations measured against another set of transformations. The measurement of transformations with clocks is a significant expression of that metaphor. The fact we so readily associate clocks with time rather than the transformations they measure suggests its power. It further suggests the fundamental nature of the processes it represents and their intimacy to everyday life. It is problematic to discuss time without referencing the clocks we use to measure it.

A comparison of the contemporary physics and phenomenology of time suggests select correspondences that beg elucidation and position phenomenology to contribute to the scientific investigation of reality. Edmund Husserl and Martin Heidegger provide the most comprehensive phenomenologies of time. The focus of their reflections is not time per se, but time as such, or temporality. They throw different dimensions of temporality into relief, crystallize our thinking about time, and

reveal the interconnectedness between temporality, consciousness, and human being. They also provide a fuller understanding of temporality when read together than when read separately and can be coupled into a single analytical framework through the equivalencies between their renditions of transcendence. Both phenomenologies use transcendence as their “general point of departure” and interpret temporality per the commutability of its terms: that is, on the interchangeability of the “meaning is what is meant” (*νόησις ἐναι οὐ νοεῖται*) and “what is meant is its meaning” (*νόημα ἐναι οὐ νοεῖται*). Husserl’s understanding of transcendence (and by that intentionality) is “omni-present” in Heidegger’s rendition of transcendence as World, or There-being (*Dasein*, existence) individuated as being-in-the-World (*In-der-Welt-sein*) (Spiegelberg 1982, 362). The relation between *νόησις* (*noesis*) and *νόημα* (*noema*) corresponds remarkably with the relation between There-being and its disclosedness. The same way *noesis* transcends (passes beyond) itself and the thing it intends to the thing’s meaning, or *noemata*—such that *noesis* and *noema* belong “together inseparably” (Husserl 1960, 39), every phenomena is an intention, and every intention is the “meaning of its meant” (Husserl 1960, 46)—There-being transcends beings to their being (meaning) and comes to pass as its “There.” There-being is the disclosure of beings and the meaning (being, thingness) of the beings (things) it renders manifest (illuminates) within its disclosedness (unconcealment) (Heidegger 1962a, 171).

2. The transcendental-phenomenology of time

Husserl and Heidegger individuate temporality as a totality. The first renders it vis-à-vis human consciousness. The second renders it vis-à-vis human existence. Husserl’s transcendental-phenomenology of time describes temporality as a meaning-flux that binds “experiences with experiences” into a matrix of interconnected and overlapping meanings whose significance manifests phenomenally as the recollection, apprehension, and projection of meaning (Husserl 1931, 236; 1960, 75). Temporality is the “*fundamental form*” of

consciousness and dynamically structures this “universal synthesis” into an “openly endless unity and wholeness” (Husserl 1960, 43). It shapes each and every experience, imbues them with directionality, and amalgamates them into a flowing continuity of fractal-like arrays of self-similar intensions that simultaneously signify a past, present, and future such that “every intention has its intentions, which lead from the now to a new now, and so on: the intention toward the future and on the other side the intention toward the past;” and even retention has “its memorial intentions of the future” (Husserl 1966, 140).

Husserl distills the problem of time into three questions: *What does it mean that something has happened? What does it mean that something is happening? And, what does it mean that something will happen?* His responses to these queries illustrate the focus of his transcendental-phenomenology of time and effort to interpret temporality per its intentional structure and constitution (Husserl 1931, 231-234; 1960; 1966). Husserl indicates temporality as phenomenal (human) time and the meaning of time consciousness (Husserl 1966, 23). He calls the recollection, apprehension, and projection of meaning the “*lived experiences* of time” and respectively signifies them as the phenomenal past, present, and future (Husserl 1966, 24, 27).

The phenomenal past and future ensue principally from the noetic side of consciousness (Husserl 1966, 63). They are products of “intentional performance” or “active genesis” (Husserl 1960, 70, 77), not “self-given,” but, rather, “presentified,” and represent a “‘new constitution’ (*Neukonstitution*) or ‘re-constitution’ of reality” whereby consciousness largely intends its own significance (Lauer 1959, 88). The phenomenal present is constituted differently. It manifests more from the illumination of the *noemata* than from intentional performance because its directionality is overwhelmingly *already there*, revealed by consciousness rather than produced by it. “Immanent to constitution” rather than “immanently constituted” (Sokolowski 1970, 86), the balance of its significance originates noematically. How we take that meaning, of course, is another matter. In everyday life, the phenomenal present is lived as a stream of elusive “nows”

flowing asymmetrically between a recollected past and projected future. We dispel this significance when we suspend our spontaneous participation in “time” and reduce the present to its immediate givenness. Phenomenological reduction reveals the elusive flow of the present as an outcome of intentional performance, intentionality more as presencing (*γένεσης, génesis*) than becoming (*γινόμενον, ginoménon*), and, insofar as we suspend our spontaneous participation in “time,” the spatiotemporal horizon of our intentional acts as a spatiokinetic horizon. The reduction discloses the originary kinetic dimension of presence, or “ἀρχή κινήσεως” (*archí kiníseos*)—“the origin and dominating force (ἀρχή) of the moved-ness of beings whose nature is to be moved (*κινούμενα*)” and another word for φύσις (*physis*) (Richardson 1967, 313)—as the basis of temporality’s characteristic flow. This is why it is so difficult, if at all possible, to meaningfully bracket a “phenomenological nucleus” (Husserl 1966, 35), “source-point,” “now,” or “primal impression” (Husserl 1966, 5). There simply is no flow from where to extract a phenomenological nucleus because what first appears to be inherent to “time” turns out to be a product of intentional performance (Lauer 1959, 70-71). Instead, all we see is presencing: the immediate givenness of everything in its manifold differences, archetypical relatedness, and asymmetrical dynamism.

The relationship Husserl posits between the *noemata* and temporality is central to his transcendental-phenomenology of time regardless whether the primary source of the known object’s givenness is constituted noetically or manifests noematically. Time “arises from *my* relation to things” (Merleau-Ponty 1962, 412), and phenomenology “cannot explain the constitution of time without reference to the constitution of the temporal Object,” to the thing consciousness intends (Husserl 1966, 43). The *noemata* shapes and drives temporality; it structures and powers it. The asymmetrical, kinetic essence of phenomena, the fact that everything we intend regardless whether its genesis is active or passive is always changing one way and one way only, “forward,” drives “temporal determinations of every kind” to join “in a certain way as necessary consequences to every instance of coming to be and

passing away that takes place in the present” (Husserl 1966, 34). All intentions resonate with this one-way phenomenal dynamism. Immanent to consciousness is a power that unceasingly propels it away from its retentions, directs it toward a range of possibilities that comprise its future, and drives the sedimentation of meaning that effects the “tail” or “running of” of duration” (Husserl 1966, 34, 48).

3. The existential-phenomenology of time

Heidegger investigates temporality’s more *average* dimensions. He elucidates the meaning of time within an existential analysis of There-being that discerns temporality’s immanence to existence. His existential-phenomenology of time renders temporality as a pre-reflective manifestation of three primordial questions: *Who have I been? Who am I? And, who will I be?* These questions define the ontological (existential, phenomenal) meaning of past, present, and future, or, respectively, There-being’s “having been,” absorption in beings, and projection of its potentiality-to-be. They also distinguish temporality as the other side of concern (*Sorge*)—There-being’s intrinsic “need for the comprehension of being” (Heidegger 1962b, 244-245) and final “whereunto” of all meanings and references (Heidegger 1962a, 119-121, 274; Kovacs 1990, 61). Temporality is the ecstatic (*εκστατικός*) manifestation of concern, and the past, present, and future are its “*ecstases*” (*εκστάσεις*), or the ways There-being’s existentiality and indigence manifest within transcendence (Heidegger 1962a, 377; 1962b, 244-245). Temporality is the total, directional unfolding of There-being’s immutable drive towards its unattainable completeness (existentiality), its factual dependence on beings to be, and the impulse ingredient to the certain possibility it will one day absolutely not be (the phenomenon of death) (Heidegger 1962a, 227, 230-232, 244-245, 416; 1962b, 227). The past, present, and future constitute a totality (“temporalizing”) whose ownmost significance is “*primarily* futural” because in all three moments There-being is in “time” using “time” to comprehend and achieve “the way that it can be” (Heidegger 1962a, 386-387). There-being, a “dynamic

incompleteness” (Richardson 1967, 70) and “potentiality” for which “its own Being” is its capital “issue” (Heidegger 1962a, 183)—stays “*ahead-of-itself*” in the past, present, and future to be its own possibilities (Heidegger 1962a, 275, 279, 386).

Viewed existential-phenomenologically, the essence of temporality has nothing to do with clocks nor is it a “pure sequence” of elusive “nows,” without beginning and without end” (Heidegger 1962a, 377). The understanding of time as an elusive sequence of “nows” measured by clocks is an aspect of fallenness. Fallenness is the everyday alienation from being resulting from the ineluctable absorption in beings. An existential (structural element) and not an ontological defect, fallenness indicates the common mode of human being wherein There-being gives itself over to its internal need to dominate things to be, forgets its originary relatedness with the World, and loses sight of the equivalency between temporality and existence. Fallen from its ontological status as the disclosure of beings, There-being appropriates itself as a thing (subject) among things (objects) and time as a thing removed from existence. The fallen conception of time is bound up with There-being’s finitude. There-being must control the beings it depends on, including, most importantly, the body, to be, because it is these things in their thingness (There-being *is* what they *are*), and the best way to dominate them is to engage them ontically (as things removed from human being) and stay ahead of them through a conception of time that is linear and quantifiable: we facilitate our engagement of beings through an ontic appropriation of time independent of the transformations it signifies and as an object removed from the “self.” Moreover, because There-being *is* the (phenomenal) body, which perhaps is the most intimate indicator of ontic and ontological time, it must also contend with the phenomena of death, the “seal of its finitude” (Richardson 1967, 76), its “*distinctively* impending” (Heidegger 1962a, 294), and its indomitable “end and totality” (Heidegger 1962a, 285). As much as one tries to stay ahead of the body, it ages and one dies; the “phenomenal body,” an “element” of being-in-the-World and “potentiality” of There-being (Merleau-Ponty 1962, 106), always lies just beyond our ability to dominate it up to the point of death. As rendered by

existential analysis, then, the “now” is not eternally elusive because time is fleeting, but because There-being is profoundly finite. It is There-being’s completeness and control of beings that are always eluding There-being, not its now.

4. A comparison of the physics and phenomenology of time

A comparison of the physics and phenomenology of time yields four observations about time and the scientific investigation of reality.

1. The inherent tendency of things to change asymmetrically is the basis of time and temporality. Physics calls this tendency the “arrow of time.” Phenomenology calls it “*archí kiníseos*.”
2. The physics and phenomenology of time posit isomorphic interpretations of reality. They both render reality as a unity of time, space, and beings. They also posit isomorphic interpretations of space. An analysis of the notions contemporary physics sometimes appears to presume suggests it is not immune to the prejudices induced by an ontic appropriation of reality, however. It also suggests a potentially constructive role for phenomenology in the scientific investigation of time and space.
3. Physics and phenomenology reveal time as a relation between one set of transformations measured against another set of transformations.
4. The human tendency to fall into the everyday comprehension of time may be complicating the scientific investigation of time.

4.1. The arrow of time and *archí kiníseos*

There is a remarkable parallel between the formalization of time in asymmetrical, kinematic terms, or what physics calls the “arrow of time,” and the phenomenological discernment of temporality’s noematic basis as *archí kiníseos*. The arrow of time, especially as it is embodied in the Second Law of Thermodynamics, posits time as transformations that move from ordered (symmetrical) to increasingly disordered (random) states. Similarly, the

identification of There-being's dependence on beings as a central element driving temporalization points to the "thingness" of things as an essential part of temporality's basis. Not only does There-being—consciousness appropriated in the broadest sense, including its existential dimensions—depend on the things it encounters, it is those things and an inherent quality of all things is their intrinsic tendency to change. The notion of There-being as its disclosedness, as the meaning of the things it intends, the *noemata*, signifies it is changing in accordance with the incessant, asymmetrical change phenomenally immanent to the things it unveils within its presence. The meaning of existence at every level is asymmetrically kinetic because the meanings of the beings There-being illuminates are always changing asymmetrically.

It is surprising that Heidegger failed to fold the notion of immanent, asymmetrical change more explicitly into his existential analytic. *Archí kiníseos* underscores the relationship between temporality and There-being's finitude. The fact that things, including the phenomenal body, which is always less than it was and the ultimate "having-been," are always changing profoundly aggravates There-being's dependence on beings. It relentlessly challenges There-being's power to control things and is a fundamental reason why There-being must stay ahead of itself in "time" to be. *Archí kiníseos*, especially as manifested in the development, decay, and death of the body, is the dynamism driving the confrontation between the possibility and impossibility of There-being's being. The understanding that There-being is the phenomenal body and the phenomenal body is always changing asymmetrically is why There-being is dying as long as it exists and distinguishes the phenomenon of death as a fundamental ontological arrow of time.

4.2. Isomorphic interpretations of reality

Physics and phenomenology posit isomorphic interpretations of reality. They separately conceive of time, space, and things as a unity. Physics tells us it is not just objects that dilate and contract relative to their speed but absolutely everything comprising their frames of reference. This observation implies that at a fundamental level time,

space, and objects are bound into an entirety inclusive of the subject. The “entanglement” quantum mechanics observes between nonlocal particles further suggests a deep unity or connectedness among time, space, and things. The corroborated observation that some properties of particles can be “subtly intertwined” with the outcome of measured properties of different particles at a completely different location even if nothing is seen traveling between or connecting them suggests “space cannot be thought of as it once was: intervening space” (Greene 2004, 80). Instead, it suggests that although objects seem to be separated by space, at a basic level they also may be ubiquitously local and, hence, fundamentally unified.

The phenomenological rendition of reality as World, or the totality of beings that show themselves in their manifold differences, essential relatedness, and inherent dynamism, is similar to the conception of a unified reality proposed by modern physics. The World is the There of human being, that which There-being discloses, and the unity of *noesis* and *noema*. The differences among things may differentiate them phenomenally, but they do not sever them from one another within the context of existence. The World is phenomenon, and phenomenon, interpreted as a totality, is transcendence, or the way There-being comes to pass as the meaning of the things it discloses. In this totality lies “the ontological meaning of the ‘coupling together’ of space and time” (Heidegger 1962a, 420). The World may subsume different phenomena, including the being of space and time, but the things it subsumes in their thingness are always connected within a total meaning matrix. The fact that we commonly overlook the phenomenal unity we share with things, the World, and each other does not detract from their originary relatedness, but instead reflects There-being’s fallenness.

Noteworthy parallels also surface when we compare the physics and phenomenology of space. Physics is increasingly evidencing that space is not nothing, but has thing-like properties. Space bends, warps, curves, and stretches. It responds to the presence of acceleration, mass, and energy (Greene 2004, 75). Likewise, phenomenology reveals space to have a characteristic thingness and dynamism. There is a

kinetic quality to space that shines forth even when we bracket its existential significance, the phenomenal dynamism of the body, and transcendence. Space may be empty of apparent form and substance, but, appropriated phenomenologically, it is not nothing. Space is remarkably meaningful despite its characteristic “emptiness” and embodies an essential dynamism independent of its human significance. It resonates with its ownmost structure and meaning. The being and meaning of space configures consciousness, existence, and World. At the same time we move through space, space wraps around our movements; the phenomenal body is continuous with the phenomenon of space. Space is a facticity. It is already-There, given with World. We must deal with it to be and intend it in our day-in-day-out comportment with beings.

The parallels noted between the physics and phenomenology of time and reality do not propose to equate their conclusions. They also do not propose to leverage ontic conclusions to evidence ontological ones or assert more than an initiated understanding of contemporary physics. Their aim, rather, is to throw into relief possible presuppositional leanings that may be biasing the scientific investigation of reality. Assertions contemporary physics makes about its new and evolving understanding of the universe, for example, that space is no longer understood as “intervening space” or time and space are no longer posited as separate absolutes, betray a general point of departure that inclines toward a fallen comprehension of reality—one where every thing in the universe, including space and time, is disconnected from every other thing in the universe, including the universe itself. This seeming tendency flies in the face of how reality is immediately given in experience: phenomenon. Reality first reveals itself to us as a “that” (*eidōs*) before we distill it into a “what” (*idéa*). It does not show itself as a universe of subjects and objects disconnected from one another in space and time, but rather as a totality where things come to light both in their multifarious distinctions and essential relatedness. These observations suggest a potentially constructive role for phenomenological methods in the scientific investigation of reality. The contemporary physics of time and space may benefit by (1) more

aggressively suspending its presumptions and prejudgments about reality and (2) appropriating reality more as it is straightforwardly given and less how it is commonly taken.

4.3. Clocks, transformations, and relations

The physics and phenomenology of time indicate clocks only measure one set of asymmetrical transformations (*e.g.*, those that constitute a clock) relative to other asymmetrical transformations (*e.g.*, planetary movement). They further indicate that not only do clocks fail to measure anything remotely similar to the everyday conception of time, it is unlikely there is anything like the everyday conception of time to measure. Physics equates time with its arrow, or entropy. Despite assertions that the universe should match the “time-reversal symmetry” supported by physical laws (Greene 2004, 147), there is no time in entropy. There is only entropy in entropy. Things may unfold toward higher states of entropy, relative to other things unfolding, and faster or slower depending on an object’s velocity, but they do not unfold in time. They unfold in space. We may call this unfolding “time,” but the name only appears to confuse the scientific investigation of reality by inclining us to look for time in places other than where it may be located. The apparent confusions effected by inconsistencies in the interpretation of time—or, what Husserl calls, the “difficulties, contradictions, and entanglements” that surface by “blending” ontic and ontological notions of time (Husserl 1966, 22, 31)—may be one of the reasons physics still struggles to agree on a “definitive, fundamental definition of time” (Greene 2004, 225).

When we render time either through physics or phenomenology we see time *per se*, the “thing” identified as something fundamental to reality, may not be nothing at all, but it may be far different than what we commonly anticipate. Time is something. It is a relation, and this relation, despite its ability to influence the system where it is located (*e.g.*, the cybernetics of time), only makes sense hermeneutically. Sometimes these relations have physical characteristics, such as when they denote the interaction among planetary objects. In other instances, the only significance they have is the

meaning we assign them, for example, the correlation between the emissions of cesium atoms at the National Institute of Standards and Technology (NIST) and a plane landing in Phoenix, Arizona. In all instances, however, their temporal significance is ultimately interpretational. The basis of time may be defined ontically, but its meaning is fundamentally ontological. It emerges in the context of existence and the power of transcendence to comprehend the meaning of things. The interpretation of time ensues within the more basic, lived observation that everything is always changing and is not equal to it.

4.4. The hermeneutics of time

The phenomenology of time suggests the tendency to (1) fall into the everyday comprehension of time as a sequence of “nows” endlessly stretched out in a line between past and future and (2) confuse ontic and ontological notions of time may be challenging the ability of modern physics to investigate time. Professor Greene alludes to this possibility when he remarks that everyday experience “fails to reveal how the universe really works, and that’s why a hundred years after Einstein, almost no one, not even professional physicists, feels relativity in their bones” (Greene 2004, 77). The problems physicists often note they face investigating time further suggest a susceptibility to drift into an everyday or fallen conception of time. Janna Levin says time “completely” defies our attempts to define it as a “thing,” because it is “momentary” and the only definitions of time we have “harken back to the notion of time itself.” David Albert observes, “Time is the thing that everyone knows intimately, until you ask them to tell you about it.” Max Tegmark says, “There is basically no aspect of time which I feel we really fully understand.” And Alan Guth notes, “What is time?” is really the 64,000 dollar question to physics” (Greene 2011).

Modern physics complicates its ability to investigate time insofar as it drifts into fallenness. It becomes vulnerable to hermeneutical contradictions whose tenacity and illusiveness are sourced to the immanence of “time” to existence and the tendency to fall into a dichotomous appropriation of reality.

Phenomenology attacks the hermeneutical problems internal to the scientific investigation of time by distinguishing between ontological and ontic time and disclosing temporality's intimacy to comprehending and living. The phenomenology of time surfaces nothing to suggest there is a past, future, or flowing sequence of nows outside of their phenomenal significance, but instead identifies them as essentially products of intentional performance. The self-givenness we attribute to the past, future, and flowing present independent of what is intentionally produced is the side effect of the ontological blackout induced by the everyday absorption in things and alienation from the primacy we share with the World. It is a fallen conception of time that fails to convey temporality's ownmost significance and represents a turning away from its immediacy to the human situation.

The notion of human being as the temporal production and manifestation of meaning is a basic conclusion of phenomenological analysis. Phenomenology shows "time" is internal to everything we do, everything we think, and everything we are. It is intimately woven into language and another word for intentionality and transcendence. Indeed, so basic is temporality to the way we know and live the "world," that it may be more accurate, and definitely less ambiguous, if we replace the terms "consciousness" and "existence" with "temporalizing." "Time" defines us not just because it is the way we structure the World, but also because it is a concrete expression of the indigence ingredient to human being, most notably the phenomenon of death. Death induces our attention to time. If we did not die, we likely would have a radically different conception of time and reality where the comprehension of being would incline away from the temporal (fleeting) and lean toward the spatial (eternal). Life would center more on the concern for space and power to be it than the concern for time and certainty of losing it. We probably also would tend to dwell more in the ontological comprehension of being than in the ontic absorption in beings given there would be less need to attend to things. Our attention would incline more toward being as the "clearing" or "open space" where

things come to light and less on the things we rely on to accomplish our to-be.

These comments do not aim to gainsay the conclusions of modern physics, which lie well outside the scope of phenomenological analysis. Their intent is to throw light on the ontological presuppositions, assumptions, and tendencies that may be hindering the scientific investigation of time and reality. The history of science consistently demonstrates that the greatest enduring challenge to scientific research is our comprehension of reality and the extent to which we will defend it even when it is wrong. Phenomenology's ability to question and elucidate the appropriation of reality well positions it to address this problem, especially when it comes to the scientific investigation of time. The questions of time and human being are inextricably woven within the same problematic. Time is not just a thing among things. It also is a lived, integral part of the human situation and in many ways synonymous with life "in the broadest sense of the word" (Minkowski 1970, 18). When we scientifically investigate time, we cannot escape considering who we essentially are: temporalizing.

REFERENCES

Greene, Briane R. 2004. *The Fabric of the Cosmos: Space, Time, and the Texture of Reality*. New York: Alfred A. Knopf.

Greene, Briane R. 2011. "The Fabric of the Cosmos: The Illusion of Time." NOVA: <http://www.pbs.org/wgbh/nova/physics/fabric-of-cosmos.html-fabric-time>.

Heidegger, Martin. 1962a. *Being and Time*. Translated by John Macquarrie and Edward Robinson. New York: Harper & Row Publishers.

Heidegger, Martin. 1962b. *Kant and the Problem of Metaphysics*. Translated by James S. Churchill. Bloomington: Indiana University Press.

Husserl, Edmund. 1931. *Ideas: General Introduction to Pure*

Phenomenology. Translated by W.R. Boyce Gibson. New York: The MacMillan Company.

Husserl, Edmund. 1960. *Cartesian Meditations: An Introduction to Phenomenology*. Translated by Dorion Cairns. The Hague: Martinus Nijhoff.

Husserl, Edmund. 1966. *The Phenomenology of Internal Time-Consciousness*. Translated by James S. Churchill. Edited by Martin Heidegger. Bloomington: Indiana University Press.

Kovacs, George. 1990. *The Question of God in Heidegger's Phenomenology. Northwestern University Studies in Phenomenology and Existential Philosophy*. Evanston: Northwestern University Press.

Lauer, Quentin. 1959. *Phenomenology: Its Genesis and Prospect*. New York: Harper & Row.

Merleau-Ponty, Maurice. 1962. *Phenomenology of Perception*. Translated by Colin Smith. London: Routledge & Kegan Paul.

Minkowski, Eugene. 1970. *Lived Time: Phenomenological and Psychopathological Studies*. Translated by Nancy Metzger. Evanston: Northwestern University Press.

Richardson, W. J. 1967. *Heidegger: Through Phenomenology to Thought*. The Hague: Martinus Nijhoff.

Sokolowski, Robert. 1970. *The Formation of Husserl's Concept of Constitution*. The Hague: Martinus Nijhoff.

Spiegelberg, Herbert. 1982. *The Phenomenological Movement: A Historical Introduction*. Third edition. The Hague: Martinus Nijhoff Publishers.

Stannard, Russell. 2008. *Relativity: A Very Short Introduction*. Oxford: Oxford University Press.

Stenger, Victor J. 2000. *Timeless Reality: Symmetry, Simplicity, and Multiple Universes*. Amherst: Prometheus Books.

Zeh, H. Dieter. 2007. *The Physical Basis of the Direction of Time*. Edited by A.C. Elitzur, M.P. Silverman, J. Tuszynski and R. Vass. 5th edition. The Frontiers Collection: Springer.

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