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One of the strongest binary oppositions among the *categories* of current conceptual thought, one that almost uniquely characterizes modern Western civilization, is the one between the concepts *"faith"* and *"science"*. Now it is an obvious fact that Western civilization currently dominates the bulk of the human race at this juncture in its history. It is a dominance that includes ideological, cultural, and imperial manifestations. Regardless of whether anyone in this room actually identifies with Western civilization as a matter of individual or collective identity: It is still no exaggeration to say this opposition colors nearly every aspect of *our* civilizational existence, not just within the perimeters of faith or science but also the social, economic, political, academic, and cultural aspects of our lives. Thus it comes as no surprise that the Western civilizational understanding of the concepts "faith" and "science", each with its own associated *category* of concepts and relations, also dominates the intellectual discourse of those within its sphere of influence. It is my contention that the future development of human cosmological knowledge will require, among other things, a critical and *objective* critique of these two concepts and their associated categories, where the word 'objective' is being used in a very specific sense.

Within modern Western civilization itself, mainstream intellectual discourse operates within what modern logicians call a *universe of discourse*. Within that universe, the binary opposition of the categories "religion" and "science" is pretty well-established. This is the case whether one is a priest, a communist, a liberal capitalist, or adherent of nearly any other cosmological and praxial commitment. By 'cosmological' we mean "pertaining to questions regarding the origin, meaning, and destiny of world, including both macrocosm and microcosm". Furthermore, the consensus of Western civilization has been to assign to faith its own universe of discourse or *category*, and to science its own universe of discourse or *category*. The question then arises: Can the properties discussed in science be coherently predicated of the objects of the category of religion? Can the properties discussed in religion be coherently predicated of the world of the category of science? If the binary opposition between these two forces them into two distinct and separate universes of discourse, then how can we coherently apply the

objects and properties of one universe of discourse to the other? The title of this conference is “Religious Faith and Social and Applied Sciences”. The question arises: Does science help us solve questions of religion and faith? Can religion and faith help to solve questions in science? Is it not as incoherent to apply religion to science (and vice-versa) as it is to apply concepts of botanical properties to the proof of mathematical theorems (and vice-versa)? Let us begin to examine this question.

First, what do we mean by ‘coherently apply the objects and properties of one universe of discourse to the other’? Without getting too technical: A universe of discourse is basically a closed collection of objects of thought under discussion by members of an intellectual community; the objects of thought and concepts of that collection are generally understood by those participating in the discussion. For example, in the universe of discourse of natural numbers (0, 1, 2, 3, and so forth), we may say, e.g., “Every number is either even or odd”. There is no need to mention the property ‘natural’ before mentioning the object ‘number’; this is because the universe of discourse is understood. Another aspect of a universe of discourse is that it determines the range of concepts of objects over which concepts of properties can be *coherently* predicated. For example, given the properties even and odd, the object of thought “This tree is even” is neither true nor false, but *incoherent*. That is, the concept *tree* (botany) and the concepts *odd* and *even* (number theory) do not belong to the same universe of discourse; hence it is incoherent to predicate evennes of a tree. A declarative sentence may express either a coherent or an incoherent object of thought; if coherent, that object of thought can be either true or false. Thus, within the universe of natural numbers: the object of thought “Some number is even” is coherent and true; “Every number is even” is false but still coherent; “Some tree is even” is neither true nor false but incoherent. A coherent object of thought is usually called a *proposition* in the strict sense of ‘proposition’. But even incoherent objects of thought can be called propositional in *form* if not in *content*. Thus the object of thought “Some tree is even” is propositional in form but is not, strictly speaking, a proposition per se.

Second, what do we mean by the binary opposition of “faith” and “science” in Western intellectual discourse? Today the word ‘faith’ has a usage in English which is basically a synonym for ‘religion’. Indeed, we could just as easily have

spoken of the binary opposition between religion and science. The synonymy of these two words is rather unfortunate. Both the synonymy and the binary opposition of "faith" and "science" has its roots in the universe of discourse of early Christian theology – itself a product of Western civilization. In early Pauline Christian discourse there are three other binary oppositions that are relevant to the connotations of the word 'faith':

- Salvation versus Damnation

  According to the cosmological and anthropological vision of Pauline Christianity, the human being exists in one of two *states*: salvation or damnation. The meaning and goal of life is to achieve the state of salvation and to live life from within that state. What makes this a binary opposition is that these are *states* per se, not *processes*. That is, salvation and damnation are, in principle, separated from each other by a quantum leap; neither is *graded* per se. Put another way: One is either saved or damned. The theological doctrine of *original sin* is closely connected with this.

- Faith versus Knowledge

  The quantum leap from the binary state of damnation to that of salvation is accomplished by a state of *faith*. Put in the form of an equation: Salvation is a function of faith. In particular, salvation is a function of faith in the salvific efficacy of the sacrifice of Jesus Christ on the Cross. This salvation-giving faith has content which is expressed in a propositional form often called *dogma*. The crucial point is that salvation is not a function of *knowledge* that the dogma are true; nor is it a function of the *search* for knowledge of the truth of the dogma. Rather, it is a function of pure *faith* that the propositions are true, independent of either knowledge or the search for knowledge. Hence we find the traditional Church praxis to the effect that *seeking knowledge in matters of faith is heretical*. After all, the *search* for knowledge could introduce doubts, and doubt could imperil the salvation of oneself and even of others if one were to share them. Of course there did develop within the Church a rationalist tradition that sought to ground faith within philosophical reason, as illustrated in Church fathers such as Thomas Aquinas, Duns Scotus, and Nicholas of Cusa. But salvation was never dependent on such efforts. And rival frameworks of situating Christian salvation as a function

of knowledge or the search for knowledge (as promoted by the Gnostic Christians) were suppressed (often ruthlessly), if not eradicated entirely.

The issue is not a pedantic one. Imagine if a framework of Christianity, such as one of the Gnostic "heresies", whose fundamental equation was that salvation is a function of knowledge, had won out in the early Christian polemics. In an alternate universe one could see something like the word 'gnosis', the greek word for knowledge, as the synonym for 'religion' instead of 'faith'. The implications of that shift for the entire intellectual discourse of modern Western civilization would be immense. The thought is worth a deep reflection.

- Above versus Below

  The metaphysical backdrop of Christianity is the absolute divide between the above and the below. There is a world above of good, spirit, salvation and faith. Then there is a world below of evil, matter, doubt, and damnation. Through faith one escapes from the world below to the world above. This metaphysical framework was influenced by Plato's divided line and by Zoroastrian theology. In the case of Plato, the world above is the world of reality, being and knowledge (viz. the world of the Forms or Ideas); while the world below is the world of illusion, becoming, and opinion (that is, beliefs whose content is impossible to *know* to be true, in a strict sense of 'know'). The world above is characterized by absolute independence from time, space, and materiality. The world below is fundamentally characterized by time, space, and the movement of matter in time and space, yet is dependent on the world above. But the binary opposition between the properties of these two realms was so great that even Plato's mind apparently could not come to a definitive conclusion as to how to bridge the chasm being the two realms, to explain just *how* particulars in the world below participate in or exemplify the forms above, or *how* the forms in the world above are instantiated in the world below.

  In the lands of Zoroastrianism, a monotheistic tradition in its roots, the binary opposition between Good and Evil developed in the direction of theological dualism, where the binary opposition between Good and Evil moved inexorably to the logical conclusion that each is an independent, uncreated reality

from preeternity. Christianity inherited and developed this metaphysical dualism as a backdrop to the binary framework of salvation and damnation.

It is important at this juncture to emphasize that it is *not* the case that every cosmological and praxial tradition understands the situation of the human being within a binary framework of salvation and damnation; nor is it the case that every cosmological and praxial tradition considers that the aim of human existence is to be achieved through faith alone, independent of knowledge or of the search for knowledge. When we ask a Muslim, Jew, Buddhist, or Taoist, "What is your faith?", there is a subconscious assumption of the traditional Christian framework that divides faith from knowledge, that divides spirituality from materiality. Just as importantly, one would not normally ask a communist or avowed secularist, "What is your faith?" So a cosmological and praxial commitment that is not based primarily on faith-based spirituality – communism or liberal capitalism for example – would not be considered a "faith" or even a "religion". Thus the synonymy of 'faith' and 'religion' is unfortunate, as a I alluded above. This is, in part, because all systems of cosmological and praxial commitment belong to the same general category.[1]

On the science side of the binary opposition: The word 'science' comes from the Latin 'scientia', which means "knowledge". Although not quite synonyms, in much of the intellectual discourse of Western civilization the two words are treated as though they are near synonyms. Some scholars, such as the mathematician William Lawvere (a founder of formal objective logic and also my teacher), have called science "the highest form of knowing". In particular, the word 'science' is used today to mention an enterprise to achieve knowledge of the material world and its movement within physical space and time by means of *quantifiable* testing and prediction, and to organize and to express that knowledge in a rational manner. We will call this *science in the narrow sense*.

This modern narrow conception of science is also related to the ancient binary oppositions between above versus below, faith versus knowledge, and salvation versus damnation:

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[1] The academic word 'Weltanschauung', a German loan word in English, comes close to denoting the general category of systems of cosmological and praxial commitment. The Arabic word '*dīn*' comes even closer.

- Above vs Below

  The Platonic grand canyon between the world of being and reality above and the world of becoming and illusion below gave way to the Neoplatonic and medieval binary distinction between the *mundus intelligibilis* or *intelligible world* (accessible via the mind) and the *mundus sensibilis* or *sensible world* (accessible via the senses). This finally gave way in the late European Renaissance to the binary distinction inaugurated by Descartes between *res cogitans* or *mental, spiritual, immaterial substance* and *res extensa* or *physical, bodily, material substance*. In its metaphysical aspect 'extended' connotes material extension in physical space and time. In its epistemological aspect, 'extended' connotes *quantifiability*; the extension of matter in space and time can be *measured*, often to amazing degrees of accuracy and precision. Mental substance, on the other hand, is neither metaphysically extensible or epistemologically quantifiable. So, like Plato, we run into a conundrum engendered by a binary opposition: How can mental substance interact with bodily substance and vice versa? This binary opposition or dualism between mind and matter gives rise to the famous mind-body problem in modern philosophy. The difficulty of maintaing the binary dualism leads to a division among later philosophers: Idealists maintain the fundamental reality and being of mental substance, and relegate material substance to mere derivative phenomenon or "noumenal" inaccessibility; materialists or physicalists maintain the fundamental reality of physical matter, and regard mental substance as just a special case of physical substance.

  Now the rise of modern physics, particularly the Newtonian revolution, brought with it a hitherto untold power in the ability of human beings to quantify the movement of matter in space and time. For Western civilizational consciousness, science in the narrow sense becomes "the highest form of knowing", as Lawvere puts it. This epistemic power, combined with the difficulty in holding the dualism of mind and body, leads naturally to a civilizational physicalism (even if philosophy continues to produce idealists of different varieties). And that physicalism, taken to an extreme, leads finally to *scientism*. Scientism amounts to the view that *all* knowledge is scientific knowledge, and that all knowledge is restricted to that which can be demonstrated via scientific means (using 'scientific' in the narrow sense of 'science').

- Faith versus Knowledge, Salvation versus Damnation.

  As we move from the Renaissance through the Newtonian revolution and into the European so-called "Enlightenment", science in the narrow sense comes to be identified more and more with knowledge proper. Where does that leave the Christian Faith and the Kingdom of Salvation in the world above (Heaven)? Because Christianity never insisted on any need to *know* that the dogma are true or to *seek knowledge* per se, Christianity could largely, even if grudgingly, accommodate itself to the growing secular-versus-sacred dichotomy that grew to characteriz Western civilizational consciousness. The rationalism of the scholastics could not compete with Newtonian science: With respect to the larger consensus of intellectual discourse within Western civilization, it was finally demolished by Immanuel Kant.

  Although it is officially rejected by the Catholic Church – within which rationalist scholasticism survives up to this day: In practice *faith* has become *fideism*. With the rise of post-modernism and cultural relativism, and the immense influence of these two in the liberal arts in recent times, matters of faith, salvation, and damnation are considered to be merely matters of opinion, using the word 'opinion' in the Platonic sense of "impossible to know in any strict sense". The intellectual discourse of the West promotes a "pluralism" where the pursuit of truth in so-called matters of faith is replaced by a quest for mutual cultural understanding virtually immune from questions of genuine knowledge. Either way, whether one has firm faith in the truth of a particular set of propositional forms or dogma, or whether one takes a pluralist approach, the result is a kind of fideism where faith, with its limited range of applicability in the world above, is placed in a category beyond knowledge.

Thus, in an interesting irony, the ancient dictum of Western Christianity that seeking knowledge in matters of faith is heretical is adopted by the intellectual discourse of Western civlization in a new form. In the debates on religion versus science, faith versus knowledge or reason, there is a backdrop that, in general terms, is agreed upon by both sides:

- There is a realm of science in a narrow and material sense, where knowledge is sought and where faith does not apply.

- There is a realm of faith in a naarrow and spiritual sense, where salvation (or something analogous to it) is sought, faith is its key, and where knowledge need not be sought; or the seeking of knowledge is not required; and in any case knowledge of these matters is actually impossible.

This is the binary opposition between religion (in the narrow, faith-based sense) and science (in the narrow sense of 'science') that characterizes the bulk of both the intellectual discourse of Western civilization as well as its popular consciousness. For a believer in fideism, there is a realm of truth and reality that science, and hence knowledge, does not have access to. For a believer in scientism, whatever exists is ultimately physical or material, so the world of faith or anything else outside of what is fundamentally quantifiable simply does not exist. Some, in an anti-realist vein, go even further and hold that one cannot even *coherently assert* the existence of anything unless it is scientifically verifiable. However, despite the diametrical opposition between the two sides:

- The concepts "faith" and "science" under discussion, along with their associated properties, constitute very specific constituents of a unique (meta-)universe of discourse, that of modern Western civilization.

- In general, *both* believers in scientism and in fideism at the extremes (as well as most of those in between) are operating within the same meta-universe of modern Western intellectual discourse, that of the binary opposition of religion and science.

For what follows: By 'category of "religion"' I mean a category of thought that includes the Western-civilizational concept "faith" as well as associated concepts and properties. By 'category of "science"' I mean a category of thought that includes the concept "science" (in the narrow sense of 'science') as well as associated concepts and properties.

The American logician Quine, as paraphrased by the logician and historian of logic John Corcoran, has claimed that a given universe of discourse "represents an ontological commitment of the discussants". As Corcoran emphatically points out, this is misleading. It is not necessarily the case that a believer in scientism and another in fideism (or a believer in some position on a spectrum in between the two extremes) is each committed to the same structure of external reality

based on the concepts contained within the categories of religion and of science. For example, a firm believer in scientism will recognize the category of religion, with a range of applicability in the world above, without any commitment to the existence of any of the objects of faith or of the world above. We are making the more limited claim, namely, that the Western civilizational categories of faith and science form a shared framework of discourse and debate between, e.g., a person of "faith" or a person of scientism.

The same goes for the scientist of so-called "faith". In affirming both faith and science he is left with a binary dualist dilemma just as vicious as that faced by Plato or that faced by Descartes. An illustrative example of this all-too-common schizophrenia is to be found in the words of the British physicist, mathematician, philosopher, and Templeton-Prize winner Freeman J. Dyson.[2] Dyson speaks of the binary opposition between religion and in terms of "windows":

> The most we can ask of religion and science is that they respect each other's autonomy and should cooperate in tackling ethical problems. If the twenty-first century is to bring bring relief from wholesale misery and violence, it can only be in the active struggle for social justics and international peace.... Religion and science should not view each other as two systems of laws that must be forced into accord. A better metaphor to describe religion and science today is as two windows, looking out on the world in different directions. Some of us see more clearly through one window; some of us through the other....
>
> Science and religion give us views of the universe that are both illuminating and both, to some degree, true. But they cannot be seen simultaneously.

In this passage Dyson affirms the binary opposition of religion and science ("autonomy"). Further, he asserts that each has a range of access to truth. Each constitutes a unique window through which reality may be glimpsed. Yet, due to their binary opposition and autonomy, neither window can in any strong sense

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[2] The Templeton Prize is awarded each year by the Templeton Foundation to someone who has made an "exceptional" contribution to the "spiritual dimension" of human life in science, philosophy, theology or practical works.

inform the other. A chasm ensues, and we are left with an irreducible epistemic dualism.

I would like to suggest that this dualism is fundamentally unsatisfactory. If Dyson is correct, then apparently the only significant thing conferences such as this one can accomplish is to merely provide a forum where religion and science can "cooperate in tackling ethical problems". This relates to something I mentioned earlier, that the pursuit of truth and reality is replaced by a quest for mutual cultural understanding virtually immune from questions of genuine knowledge. In this case, neither window can contribute to the search for knowledge in the other window. One cannot, according to Dyson, coherently apply that system of concepts that constitutes the category of religion to the system of concepts that constitutes the category of science and vice-versa.

Dyson appeals to the principle of complementarity and wave-particle dualism in quantum mechanics as an analogue to his religion-science dualism. However, the principle of complementarity as promulgated by Bohr (and rejected by Einstein and others) is not a universally agreed upon interpretation of the scientific facts. And even that principle only compounds the problem here. Dyson expresses the principle as follows:

> "When one *looks* at light one way it *is* a wave, and when one *looks* at it another way it *is* a particle, but one can never see the wave and the particle at the same time". [My emphasis]

Thus there is no objective reality to light other than its experienced aspects. So if we take this analogy seriously, there is no real world, only experienced aspects. And we cannot say that these are aspects of *something* because that something would be a reality behind the aspects that constitute the only thing whose existence we can confirm! This analogue to the principle of complementarity does not, as Dyson suggests, "add enormously to the depth and mystery of things." Rather, it eliminates reality and leaves us with a subjective phenomenon, just as when that principle is applied in quantum mechanics.

I would like to suggest that the objective world is one whole that cannot be arbitrarily broken into binary oppositions based upon a current civilizational consensus. Rather, in the spirit of Heraclitus, Hegel, and Whitehead, I would suggest that the world is an interrelated, even continuous, whole. The chasms and

dualisms that we derive largely result from committing the fallacy that Alfred North Whitehead calls the "fallacy of misplaced concreteness". This is the fallacy where the intellect abstracts from its experience of external reality (or some significant subsystem of it) a set of concepts, and then identifies the external world with the extension of one of those concepts. Often, the concepts involve some binary opposition or mutual incompatibility (such as mind and body, spiritual and material, or faith and science). In such a case one either has to pull an intellectual high-wire act and maintain both concepts (dualism), or else abandon one of the concepts and identify reality (or some significant subsystem of it) with the extension of the other concept (reductionism).

In the case of religion and science I would like to suggest a possible road out of the impasse. To use Dyson's language, the world of religion is one window, the world of science is another. Put another way, the world of religion (including the concept "religion" and concepts of associated objects and properties) constitutes one universe of discourse or *category*; the universe of science (including the concept "science" and concepts of associated objects and properties) constitutes another universe of discourse or category. Is it really the case that neither can *inform* the other?

In the effort to overcome the dualism we will explicitly engage in an exercise of *objective logic*. The expression 'objective logic' itself is due to Hegel; the sense in which we are using it here is due to the contemporary mathematician William Lawvere, who contrasts its sense with that of 'subjective logic'. As a formal science, objective logic is a relatively new and very abstract discipline, closely connected or identified with that branch of mathematics called category and topos theory, of which Lawvere is one of the seminal developers. Yet the formal development is inspired by a very old idea, one that finds it roots in the so-called "religious" traditions. Objective logic as a formal science is rather abstract and has a reputation for being quite formidable, even for the mathematically inclined. Part of my current research is to make the project of objective logic more accessible and clear at an informal level. Briefly:

In our thought and meditation on some significant subsystem of the world around us, we seek to *mirror* that subsystem in a system of concepts that will to a significant degree *reflect* the reality of that subsystem. That system or class of

concepts (of objects, properties, or processes) will then, for a given set of investigators, constitute a mutually agreed-upon category or universe of discourse between the investigators. The observer seeking to mirror that subsystem of the world, to the degree that one is engaged is a struggle to *genuinely* reflect that subsytem, is engaged in *objective* thought.

Once a system of concepts is defined, we can identify or express propositions in that universe of discourse. Some of these propositions we may identify as *axioms* that we hold to be true: From them we try to deduce other propositions implied by those axioms. If the axioms are true, then every proposition deduced from those axioms is also true. The rules of thought governing the effort of deduction are *subjective* in the sense that thought is now restricted to movement within a single universe of discourse or category. Even if the axioms are false it does not affect the rules governing deduction: The cogency of a chain of reasoning that actually shows that some proposition is logically implied by a given proposition does not depend on whether or not the given proposition is true or false. That is, the correspondence (or lack thereof) of a given proposition to some subsystem of the world has no bearing on the movement of thought to deduce that the given proposition implies another proposition of interest. Yes, in order for the deduction to constitute a proof of some proposition of interest, the premises must all be true. But the chain of reasoning to establish a relation of implication between the premises and the conclusion does not depend on the truth of the premises. By virtue of this fact Lawvere calls deductive logic *subjective logic*.

Let us extend this idea. Operating strictly within a given category or universe of discourse constitutes a *subjective* endeavor. There are many such universes; each discipline of human investigation may contain within it many other categories. The science of mathematics is one example, where each major sub-discipline constitutes a category within the larger universe of mathematics. Thus algebra consists of certain objects and relations that constitute a particular category. The same goes for topology. Sometimes one gets stuck on an algebra problem. In order to solve it, maybe a concept from topology will help. Or vice versa. Can we turn an algebraic problem into a topological one? or a topological problem into an algebraic one? In the effort to do this one has to figure out how to translate concepts from one universe of discourse to another. In the movement from one category to another new concepts may be discovered that will enrich research

in both categories. Put another way, each original category itself may find itself transformed in important and fundamental ways, and new categories may be discovered. Indeed, a study of the transformations between topology and algebra resulted in a new branch of mathematics, algebraic topology.

The movement of thought from one category to another is analogous to the movement of the thought of the investigator in one's effort to *mirror* the world (or a subsystem of it). Speaking from a cosmological perspective: The investigator oneself is a universe, a *microcosm* seeking to reflect within oneself the *macrocosm*, the world external to oneself. From this point of view we can view *objectivity* as involving stepping outside of a given universe of discourse of interest into another, accompanied by the effort to translate that other universe into the given one and vice versa. This could be the effort to translate the macrocosm (or a significant subsystem of it) into a system of concepts and objects of thought. But it can also involve the movement of thought from one category into another. This study of the cogent movement of thought to translate or transform the concepts of objects, properties, and relations of one category or universe of discourse to those of another, with a view towards critiquing and clarifying the original concepts and deriving new ones, is the science of objective logic.

Thus given any two categories of discourse, especially but not restricted to sub-universes within a single discipline, we can investigate the translations and transformations between them, and rigorously derive new concepts that will then be crucial in driving the discipline forward. Each universe of discourse may constitute a "window", to use Dyson's expression. But each window has an aspect that is pointed to the reality that it is about, and another window to other categories.

Sometimes an objective logical investigation will reveal that two categories that were initially thought to be separate and distinct turn out to be instances of the same category or objects within a newly discovered category. For example, Lawvere discovered that certain aspects of mathematical logic are actually geometric in nature, so that parts of deductive logic could be studied as special cases within the category of geometry (*geometric logic*).

In the case of religion and science a similar investigation is demanded. Let us begin to apply a very informal objective logic to the matter. We will do this via a critique of Dyson's framework of the two windows.

Dyson takes a key element of the meta-universe of discourse of modern Western intellectual thought for granted, viz. the binary opposition of religion and science. Earlier we explored the background of this system of concepts and provided some of the seeds for its deconstruction. Let us continue, and very informally look at some of the objective-logic issues involved.

First, we note that the categories of religion and science are not utterly unrelated. Just as the categories algebra and topology are two subdisciplines of mathematics, the Western-civilizational categories of religion and science lie within the larger discipline of investigation of cosmology (origin, purpose, and desitny) and praxis. As Dyson himself acknowledges, both categories provide windows to the same world and the same reality. Yet they are utterly "autonomous" in Dyson's view. From the point of view of objective logic that is not an *objective* view of the matter. Let us investigate further.

According to Dyson,

> Why are we unable to look through both windows simultaneously? Because the rules of the two games are different. The essence of religion is faith and the essence of science is doubt. Not all theologians subscribe to any particular faith, but theology without faith would have no meaning. People must believe in something before they can embark on theological inquiry. On the other hand,... people must doubt everything before they can embark on scientific enquiry.

Just how different are the two "games"? Dyson says that the essence of religion is faith. In the sense we have described faith earlier, this is not necessarily the case. Not every so-called "religion" sees the essence of religion as faith. This is a projection of aspects of Pauline Christian doctrine on the rest of the phenomenon of religion. Certain traditions of Gnosticism, early Islam, early Taoism, and others would strongly disagree with this statement. The equation "Religion is a function of faith" cannot be universally applied within the category "Religion".

Dyson also suggests that the essence of science is doubt. I would suggest that this view of science is mistaken, even though it comes from a major scientist. The essence of science is not doubt, but the search for knowledge. If we take the word 'science' in the narrow sense, its essence is still the search for knowledge.

"Theology without faith would have no meaning." In at least one sense of these words the claim is false. It is quite possible for atheists and agnostics to do theological research, and many do. It is not the case that "People must believe in something before they can embark on theological inquiry," if by 'something' we mean some particular *theological* object or belief.

But in a more general sense of 'something', then the claim has no uniqueness to religion. A scientist does not start from a position of zero belief. At a minimum, a scientist believes in the possibility of knowledge in some strong sense. A scientist believes that there are answers to be discovered in the course of experimentation, research, and intellectual struggle with a set of phenomena under investigation.

People must doubt everything before they can embark on scientific inquiry. This is also false. Scientists work within paradigms (such as Newtonian physics of absolute space and time, or Einsteinian physics of the the relativity of space and time). Scientists work within communities of investigators and build upon each other's research and discoveries. The paradigms of science and the researches of others are often assumed starting points. These assumptions constitute a kind of faith.

Yes, it is often the case that a paradigm must be abandoned, or previous research and discovery is found to be flawed. A researcher may abandon one paradigm for another. Then old results have to be explained in terms of the new paradigm. In the search for knowledge doubt plays a crucial role aiding the objectivity of the researcher.

But the same thing happens in the category of religion. A theologian may abandon one theology for another. A member of one religion may convert to another. As Leon Weiseltier points out in his critique of Daniel Dennett's scientism

> [Dennett] writes often, and with great indignation, of religion's strictures against doubts and criticisms, when in fact the religious traditions are replete with doubts and criticisms.

Further, a scientist also starts from a position of *faith*. In spending 40 or more years of one's prefessional life searching for a cure to AIDS, a given researcher has *faith* that an answer is there to be discovered, even if that given researcher is not the one to discover it.

Although one can argue that there are important differences between a scientist and a theologian, finding the crucial distinction between them in a binary opposition between faith and doubt does not hit the mark.

One way out of this binary oppostion is to look at the concepts “faith” and “doubt” multi-dimensionally. Instead of doubt versus faith, we can speak of one dimension of certitude and doubt, and another dimension of faith and knowledge. Certitude is a feeling of sureness about something. One can have certitude of something which is false; one can have certitude of something which is true. In human experience, doubt and certitude form, not a *binary opposition*, but rather a *spectrum*. In the course of time one can feel certitude of the truth of a given proposition on one day, have stronger certitude the next, followed by various degrees of doubt the next day, and so forth. Let the certitude-doubt dimension be a vertical axis.

In the dimension of faith and knowledge: One can have faith that a true proposition is true. In this sense, faith involves the belief that something is true without knowing it to be true. In the course of research, someone may aquire evidence that rises to a level of awareness that the proposition is true. Continued investigation may lead to conclusive evidence and hence knowledge that the proposition is true. The point is that, again, faith and knowledge belong to a *spectrum of true belief*, not a *binary opposition*. Let the faith-knowledge dimension be a horizontal axis.

Given a true proposition, the struggle to attain knowledge will involve the experience of various states of doubt or certitude. For a scientist: At any stage of the spectrum of faith and knowledge, even right on the very verge of knowledge, one may experience extreme doubt, or experience extreme certitude. In the Christian or salvific sense of ‘faith’, Faith (with capital ‘F’) is ideally accompanied by strong certitude. In the life of a mainstream Christian, periods of extreme doubt and certitude may also occur. An increase in Faith largely involves, not an increase in salvation nor a movement towards knowledge per se, but rather an increase in certitude.

The difference between the variety of Christian faith and between the faith one finds in science is that Faith is, along the spectrum of faith to knowledge, is static, whereas the spectrum in science is or should be dynamic. *But this is not an*

essential *feature of religion.* This is a particular feature of official, mainstream Christian Faith but is *not* the case with all historical varieties of Christianity, let alone all so-called "religions". And even many Pauline Christians in practice engage in a struggle for knowledge beyond the limits of faith on the spectrum of true belief. But note that scientists can also be static in their adherence to a particular paradigm, a particular avenue of research, a certain school of theory, and so forth. Revolutions in science do not happen every day. Indeed, as Kuhn points out, it is arguable that thinking outside of the box or accepted paradigm of research is the exception in science, not the norm.

Once a man came to a great-grandson of the Prophet of Islam, Jaʿfar ał-Ṣādiq. He was in great distress and told the Imām that he wanted to confide something to him. The Imām told him to go ahead. "I am starting to have doubts about the existence of God," the man said. The Imām smiled and replied, "Don't worry; that is the beginning of genuine belief that ends in knowledge". Although much of later Muslim-civilizational theology did move into its own unique framework of static Faith as Pauline Christianity did, the primordial epistemological instinct of Islam sees faith in a much more dynamic context, as a step on the road to a knowledge the Muslim is commanded to seek "from the cradle to the grave."

From the vantage point of our informal investigation into the objective logic of the categories of science and religion, it seems clear that the conception of religion as understood by Dyson (which mirrors that of Dennett and others), is far too narrow. The search for knowledge can be found in both religion and science. Doubt is found in both religion and science. A dynamic conception of faith can be found in both religion and science. Static paradigms of belief can also be found in both religion and science. There are scientists and religious people who exhaust their lives in the search for knowledge, and who will change their paradigm or convert out of a dedication to the pursuit of truth.

Dyson makes other banal claims as well. For example, "religion and science require different ways of looking." Religion requires silence while science is "noisy". It is not difficult to provide counterexamples to these and related broad claims. One area of particular relevance our informal investigation is Dyson's critique of Einstein's attitude towards the relation of religion and science. Einstein is famous for the statement, "Science without religion is lame; religion without

science is blind". We cannot engage in a detailed analysis of the context of Einstein's dialectical proposition here. It does, however, reflect Einstein's own investigation into the objective logic of the categories of religion and science.

In claiming that science without religion is lame, Einstein is insisting that the search for scentific knowledge involves a deep and abiding faith that the world is comprehensible to human reason and is thus knowable. Here Einstein appears to be assuming a Western-civilizational understanding of 'faith', but we need not quibble with that here. The general point is that the genuine pursuit of science requires something akin to a religious spirit. Dyson rejects this point, insisting that "Many excellent scientists have no profound faith of any kind". Perhaps this is the case. But, along the lines of our earlier discussion, excellence in the pursuit of science does indeed presuppose at least *some* faith in the possibility of scientific knowledge, even if that faith is not "profound".

There may indeed be, as Dyson mentions later, scientists for whom "science is a way to earn a living rather than a way to contemplate ultimate reality." But there are also adherents of religion who have little-to-no interest in contemplating the origin, meaning, and destiny of their existence. Again, the line between the two windows is not nearly as sharp as Dyson thinks it is, if there is any absolute line at all.

Dyson unjustly accuses Einstein of "science-worship":

> He tried to identify science with religion, to bring science and religion so close together that they cannot be separated. This religion of science-worship was right for him personally but it is wrong for the majority of scientists and for the majority of religious believers. It denies both to science and to religion the freedom to be themselves, the freedom to be different.

Aside from the apparent relativism of locutions such as 'right for him…wrong for the majority', there are other serious problems in Dyson's critique. First, Einstein does not *identify* science and religion; he makes a *dialectical contrast* between the two categories. Binary opposition and identity do not exhaust the possibilities of relations between two contrary (as opposed to contradictory) objects or properties; dialectical contrast is another, often overlooked possibility. Two objects or two properties may involve one another without being identical.

Dyson misses this crucial point. Employing objective logic on the other hand, even subconsciously or informally (as Einstein was doing), engenders a sensitivity to issues of dialectical contrast. This is the case, in part, because the question of how one category is objectively mirrored or transformed into another category itself involves a struggle with and discovery of dialectical contrasts between the two categories.

More simply put, all Einstein is saying in this half of his dialectic is that, in an appropriate sense of the word 'religion', genuine science has a religious dimension.

Dyson's insistence that Einstein "denies both to science and to religion the freedom to be themselves, the freedom to be different" constitutes an extreme subjectivity. It's like saying, "I want to be free, so don't tell me about my objective relations with others; I don't want to be responsible for that". Freedom that goes against objectivity is not really freedom; it is a kind of blind slavery, in this case blind slavery to a civilizationally-conditioned binary framework of faith versus science, each with its separate sphere of influence in the realms of spirituality and materiality respectively.

An objective-logic approach to the categories of science and religion does not restrict the freedom of either one. Rather, it expands and challenges the investigators in each category to expand beyond their self-imposed limits and boundaries, beyond their "windows" so to speak. This brings in the second half of Einstein's dialectic, which states, "Religion without science is blind." Curiously, Dyson skips this half of the statement entirely.

In our analysis of the categories "religion" and "science" in the context of the civilizational framework of the modern West, we have emphasized that they involve an almost unique sense of 'faith' and a narrow sense of 'science'. Although I do not claim Einstein saw it this way, I see the second half of his dialectic as an expression of something that comes out of this informal investigation into the objective logic of these two categories: Religion and science must both be challenged to come out of their boxes.

In the case of religion, it cannot be blind to the spectrum of true belief and the search for knowledge. The freedom to have faith and certitude without a genuine

quest for knowledge is another slavery of the kind mentioned above. It is, to use Einstein's words, a kind of blindness. Note however that I said, "knowledge", and not "science" per se. In our informal objective logic we have to take another important contrast into consideration; that of *above* versus *below* or, more commonly, *spiritual* versus *material*. It is far beyond the ambition or scope of this paper to explore this contrast in great depth, restricting myself to some very general ideas.

In Western civilizational discourse the concept science is generally defined in a narrow sense as discussed earlier. But that sense is restrictive. The quantificational power of science in the narrow sense does not by any means establish the assumption that knowledge of objects not subject to the instruments of science is impossible. Both the restriction and the assumption are civilizational and subjective. Belief is independent of subject matter. Hence true belief is independent of subject matter. The most *objective* way to proceed at the very outset of a search for knowledge would be to treat the full spectrum of true belief as independent of subject matter. So given a true belief, there may, at least in principle, be a path from faith to knowledge. The path may be difficult and full of struggle, but the possibility cannot be denied from the outset. If the spectrum of true belief is independent of subject matter, knowledge is independent of subject matter. And if knowledge is independent of subject matter, it is independent of materiality, spirituality, or any other aspect of reality. Enforcing an artificial or arbitrary cutoff on the spectrum of true belief with respect to a general category of investigation is a manifestation of extreme subjectivity.

Our stab at an objective logic of the categories of religion and science is a preliminary one. There is much work to do to make this exercise more precise and useful. At the same time, the following ideas appear to flow from our discussion:

For one thing, we must begin to consider a *broad* sense of 'science'. As noted above, William Lawvere calls science the "highest form of knowing". In an appropriately broad sense, science becomes not merely the highest form of knowing but the very *art* of knowing itself. This art is, in principle, independent of subject matter, independent of civilizationally-conditioned restrictions or prejudices of materiality or spirituality.

Similarly, religion cannot be restricted to mere faith in an allegedly non-quantifiable reality. The maxim, "Trust but verify!", must retake its rightful place in the category of religion. The rest of the spectrum of true belief is there to be explored. Religious beliefs must be tested and challenged, not necessarily on the basis of a science restricted to matters of physical quantification, but on the basis of an open and fully *objective* search for both knowledge and for the *appropriate* conditions for knowledge in every domain of human experience. Beyond the current fad of religious pluralism a new *objectivity in religion* is sorely needed.

Even through this informal exercise in objective logic, we can see possibilities to *enrich* the concepts of those working in the categories of religion and science. We may consider this a *challenge* to both religion and to science. Religion and science, each in an appropriately broad sense, both belong to a dialectical struggle to develop a coherent and practical cosmological and praxial framework that reflects the real world. However, they must first be taken out of the artificial boxes Western civilizational consciousness has imposed upon them, and each must be appropriately challenged to rise above its limitations. It is then that the properties discussed in religion and science can be coherently and productively predicated of each other, within a higher category that constitutes a genuine art of knowing.

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