Can art instruct science? William Blake as biological visionary

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From the original article in 2006. Author: Ray Peat.

"As the true method of knowledge is experiment, the true faculty of knowing must be the faculty which experiences."

"Seest thou the little winged fly, smaller than a grain of sand? It has a heart like thee; a brain open to heaven & hell...."

"Energy is the only life, and is from the Body.... Energy is eternal delight."

"Then tell me, what is the material world, and is it dead?" He, laughing. answer'd: "I will write a book on leaves of flowers, if you will feed me on love thoughts & give me now and then A cup of sparkling poetic fancies; so, when I am tipsie, I'll sing to you to this soft lute, and shew you all alive The world, where every particle of dust breathes forth its joy." (1794)

When I started studying William Blake in the 1950s, it seemed that only English majors knew who he was, but today, I think more people might recognize The Tyger as Blake's than would be able to identify poems by Keats, Byron, Shelley, or Wordsworth. After 200 years, his writing seems contemporary, while other poets' works have become dated, and are valued mostly as cultural background. But I don't think this means that his work is any easier to understand than it was when he wrote it. It means that other poets tied their writing to frameworks which have receded into the background, while Blake's words were chosen in a way that allowed them to travel across the centuries without loss. Even though such universality is a goal of science as well as of art, most of what passed for science in the 18th century is today of only historical interest.

Everywhere in our culture, authoritarian ignorance has disproportionate influence. Most of the published work in our culture treats the succession of authoritarian academic/scien- tific/political cults as if this were simply the way history and human nature work, and must work. But this mechanical historical process is only superficial, and below this surface, individuals and groups have always lived as though time behaved very differently for them. William Blake was a person who investigated this discrepancy between official cultural progression, and real human possibility, and his ideas might be able to do essentially what he suggested they could do**:** Provide a way to by-pass the officially established mechanistic view of reality, into a more fully human reality. Since Blake ridiculed established doctrines in medicine, chemistry, mathematics, and Newtonian physics, many people have dismissed him as a religious nut, but the way in which he criticized them indicates that he simply believed that they were bad science**;** he also criticized conventional art and morality, because he believed that they were destroying art and morality.

A group that was active in the 1950s, called Synectics, developed several mental procedures that they found to be useful in teaching people to solve problems creatively. These included ways to improve thinking by analogy, to get people out of the ruts of conventional thinking. Personification, fantasy, biological imagery, "making the familiar strange," they found, seemed to tap into natural biological and mental processes to increase the ability to direct energy toward valid solutions to practical or artistic problems. They found that experts had to overcome their special knowledge before they could usefully solve problems in "their field," and they showed that much of the mystery could be removed from the creative process. Simply putting aside dogmatic mental frameworks was crucial.

When you believe that you have adequate, expert knowledge, a passive, logical, deductive form of mental activity seems appropriate. Deduction always goes from a higher level of generality to a lower level of generality. Mental passivity therefore is likely to be associated with the belief that we have the decisive knowledge already stored in memory. If we believe that we *create* higher degrees of generality, as appropriate solutions to novel problems, then we are committed to an active mental life. Perception, combined with the discovery and invention of new patterns in the world, will be actively oriented toward the future, while the deductive, merely analytical, manner of thought will be tied to the past.

Blake's work, I think, is of continued and increased interest because he discovered something of great importance, namely, how to avoid dogmatisms of all sorts. Many students who are assigned to write about a poem of Blake's are puzzled, and ask what it means. When they find out that they understand the words and the syntax, it turns out that the only problem was that they were taught that they had to "interpret" poetry. And that they don't think he could have meant what he said. Most twentieth century students are too stodgy to accept Blake's writing easily. In the 1950s, some people couldn't understand Alan Ginsberg's poetry, because they didn't think anyone was allowed to say such things. That is the kind of problem students have with Blake.

But it's not just high school and college students who can't believe that Blake meant what he said. I recently reviewed the comments on The Tyger that have been published in the forty years since I wrote my MA thesis on Blake, and it seems that these academic experts are having the same kind of problem. Dostoyevsky wrote about this problem in The Double—it is the problem of self-assertion, of seeing oneself reflected everywhere in the world. In Dostoyevsky's story, Dream of an Odd Fellow, the theme is stated even more clearly—the world is very boring, and ***everything seems the same as everything else,*** until you can escape from a certain interpretive framework, to see what is really present to you. In Blake's phrase, if the many become the same as the few when possessed**,** "more, more," is the cry of a mistaken soul**;** Blake said, over and over, that the many do not become the same as the few, that we are always moving into a new world as we learn more, except when we find ourselves in the mental manacles of interpretation.

It's easy to forget how pervasive philosophical interpretation is in everyday life and in the so-called sciences, and how much the sciences owe to long-standing theological commitments. Within the last generation, many influential people have said that facts don't matter (and I suspect that their favorable reception has owed everything to that attitude.) In the early 1960s, there was a controversy going on between two schools of thought in linguistics and the philosophy of science, the Katz and Fodor controversy. I think Fodor was in the minority at that time, at least among the most prestigious professors in the United States. Fodor said that if we wanted to know about language, we should find out how the language is used, by watching a variety of people using it. His opponents said that, if they were competent to speak the language, they didn't need to do anything except to think, to understand everything about the language. Fodor was an empiricist, his opponents were rationalists. In mathematics, most people are still rationalists. A large school of contemporary thought about computers, called "Artificial Intelligence," is operating within a rationalistic framework. Chomsky's "generative grammar" was ultra-rationalistic, and was easy to set up in computers, though it was perfectly useless in itself. Some physicists hold a philosophy of science that is essentially rationalistic. In Plato's time, *all knowledge* could supposedly be derived by introspection and the analysis of innate ideas, and education consisted in "drawing out" the knowledge that was innate. (Aristotle, who didn't subscribe to Plato's rationalism, has nevertheless been blamed for holding opinions that weren't sufficiently supported by observation. This was probably because he occasionally relied on the opinions of others, rather than because of any serious defect in his philosophical-scientific method.)

It's important to remember that Rationalism, as used here, isn't simply a "love of reason," which is what is often meant when people speak of "rationalism." In its historical use among philosophers, rather than being just a devotion to rationality, it is a specific doctrine which denies that experience is the source of knowledge. Historically, Rationalism has been closely allied with mysticism, as an affirmation that knowledge comes from a source beyond the ordinary world of experience and beyond the individual. At the present time, it serves authoritarian science rather than authoritarian theology, though the basic doctrine is the same.

Several contemporary schools of literary theory, sociology, anthropology, even biology, trace their ideas back to Ferdinand de Saussure's analysis of language, reading into it a highly rationalistic doctrine for which there is no actual basis. Saussure's most important idea was that it is impossible to analyze language into its structural units without simultaneously seeing its use in relation to the world of meanings. Without its meanings, it just isn't language. This is a profoundly anti-rationalist insight, since it shows that symbols take their existence from the experience of communication. But once the symbols exist, they function by the ways they establish distinctions, "this" being defined by the ways it has been used in distinction to "those," "that," etc. Every time a word is used, its meaning changes a little, since every use occurs in a new communicative situation. The contemporary rationalistic academic trends prefer to isolate only the principle of "meaning through opposition," since it supports the rationalistic illusion of operating strictly on the symbolic level. The "symbolic level" is only an abstraction, and doesn't exist independently.

A few decades ago, there was a movement called General Semantics that tried to make people more conscious of the way symbols relate to reality. Their ideas were based on a distinction between the "concrete" use of symbols, and the various levels of abstraction. These distinctions, however, made sense only within a certain theory of how language works, which I think was wrong**:** It asserted that, if time and space were divided into sufficiently small units, symbols and language could be precise and factual. It ignored the distinction between reality as experienced, and reality as represented in theory. If you keep subdividing a person, John Smith, into smaller moments, you find that there is nothing that represents the known person. The person that you are really referring to is actually a summation of many moments—the summation is the only "concreteness." The person you know is a synthesis, and it is that imaginative synthesis of facts to which the concrete symbol refers. Generality exists in our knowledge of the world, and the distinction between concrete and abstract is likely to create confusion, and reinforces a specific ideological system. Incidentally, the word "concrete" derives from the roots "grown" and "together," so it is very close in its core meaning to "synthesis." A well constructed generalization can be concrete, and a seemingly simple term, such as "electron," can be "abstract." (Blake said that a line, no matter how finely divided, was still a line; a line exists in our imaginative synthesis of the world, and it is only a denial of that synthesis that can divide its unity into "infinitesimals.")

Mathematics has its value in representing certain relationships or patterns, but the rationalistic illusion that the meaning is independently contained and fulfilled by the "algorithm," has led many people into dogmatisms and serious errors. "Coefficients of reality" are often neglected. In practice, you are not very likely to be mistaken if you assume that mathematical descriptions of physical states are always erroneous.

In the 17th and 18th centuries, progress in technology and industry was already making rationalism seem inadequate, but it still served the social purpose of allowing the ruling class to claim that the doctrines it wished to enforce had the support of timeless, innate and universal principles. There was supposed to be a Great Chain of Being, a hierarchy in which the king and the lords were just below the angels, and Reason was a mathematically clear description of the way things were, and should be. As the chain of being finally broke up at the end of the 18th century, the king brought in the Rev. Malthus to explain how war, poverty, and disease served the divine, or kingly, purpose, by controlling population growth, justifying misery and social antagonism in a new way.

There were philosophers, such as John Locke and David Hume, who argued that much of our knowledge is gained through the senses, and there were satirists, such as Henry Fielding, who ridiculed the supposedly divinely sanctioned class system, but Blake took a much simpler, but more radical position, in saying that "Reason isn't the same that it will be when we know more," and that reason is only the ratio of things that are presently known, and not the source of new knowledge. Blake kept the idea that experience is the source of knowledge, without reducing "experience" to the "senses." Blake didn't deny the existence of some innate ideas**;** he didn't think we were born as a "blank slate," but there is more to the mind than what we are born with. Imagination and invention and mental striving were able to generate new forms. This commitment to experience as the source of knowledge, rather than just analyzing a stock of "innate ideas," made Blake's world one that was oriented toward the future, toward invention and discovery, rather than to memory, established knowledge, and tradition. In

its essence, it was antidogmatic.

Rationalism is a system of symbols, in which each symbol is demonstrated to have its own proper place and status. To the extent that reason is held to be "innate," the system will be prescriptive and judgmental, rather than simply descriptive, explanatory, and illuminating. When an alternative system is proposed, it may be considered a "heresy," if the system from which it dissents is both rationalistic and authoritarian.

Except for the dangers involved in committing a heresy, it is very easy to follow the implications of the system that one finds in one's own mind, since self-assertion contains no principle of corrective contradiction. Essentially, **rationalism consists of thinking something is true because you thought of it.**

I think of the philosophical Rationalists as being the bureaucrats of the mind, making everything tedious and boring and repetitive. Eliminating Rationalism, then actual individualized full mental life can begin.

Even a heresy, if it is based on rationalism, is past-oriented, and dogmatic. Over the years, scholars have ascribed most of the important heresies, as well as mainstream religious ideas, to Blake. Whatever interpretive system the scholars favor, they are able to find it in Blake's work. Calling Blake "a mystic" is especially useful when the goal is to claim that the critic is getting at the deepest levels of meaning in Blake, even though there is no clear meaning for the word in contemporary English, and Blake didn't use the term in a way that suggested he would approve of having the word applied to himself.

Blake's notes written in the margins of books make it clear that he wasn't simply adopting anyone's doctrinaire opinions, and that he was able to find useful ideas in the thoughts of others even when he disagreed with them on important issues. Blake was not a rationalist, but he agreed with Bishop Berkeley's understanding of the importance of distinguishing thought from language. He recognized that Descartes, Locke, Hume, Newton, had inadequate ideas about the nature of "matter," but he didn't accept the simplistic doctrine of extreme rationalism that matter doesn't exist.

When people consider Leonardo de Vinci, they usually make the point that he had mastered every field of knowledge, and so the question of "sources" and "influences" doesn't come up. In the 18th century, London was the cultural center of the world; European, Asian, and ancient cultures and ideas were discussed in books, magazines, and conversations. Being an engraver, a painter, a poet, and a political activist, Blake's circle of acquaintances was as wide as anyone's could be. England has had, probably since the 17th century or earlier, a counter-culture of opinionated dissenters. I suspect that the people who spent several years studying the classics for a university education were somewhat culturally deprived, relative to the people who participated in the rich unofficial culture, where new ideas in art, science, and philosophy were being discussed. London was also the center of a world-spanning empire, a tyrannical class-system, and an industrial-commercial revolution. The past and the possible futures could be seen from Blake's vantage point.

Among all the published opinions about things that influenced Blake, I have seen only a few discussions of his treatment of scientific ideas, mainly his rejections of Newton's mathematical and physical assumptions, and very few comments on Blake's position on the major philosophical controversies of his time. A biologist, Jacob Bronowsky, wrote a book about Blake, but Bronowsky's own biological, historical, and linguistic ideas were relatively conventional. Even though Blake's work is full of images from biology, the critics ignore the fact that Emanuel Swedenborg published very advanced biological research in the middle of the 18th century, and that Erasmus Darwin was known for presenting his ideas on biological evolution in poetry (especially Zoonomia). The title of Blake's book, The Four Zoas, has apparently never led scholars to ask whether it had anything in common with Zoonomia. Even though Blake made many disparaging remarks about Swedenborg's religious books, many people have claimed that Blake was influenced by Swedenborg's religious doctrines, while ignoring the possible influence of the scientific work.

Although the idea that "contradiction produces change" is associated with Hegel's "Dialectic," it was an old and well known theme in philosophy. When Blake's idea, that "without Contraries there is no progression," is seen in context, I think it is appropriate to think that to a great extent, Blake derived the idea from a consideration of the sexes. "Generation," so often discussed in relation to the biblical "fall of man," always leads to the issue of the productive interaction of the sexual contraries. The issue of sexual love permeates Blake's work. I suspect that Blake produced even more explicitly sexual work, but since most of his work wasn't really published, when his wife died in 1831, the bulk of his manuscripts and paintings were subject to the whims of their unsophisticated owners. But on the basis of his existing work, it is reasonable to say that sexual and imaginative energy was the motor that Blake saw producing intellectual advancement. This male-female principle of change was more fully explored by Blake than by anyone previously, since he made it concrete and personal, rather than abstract. Working in history, human energy ran into the constrictive, limiting elements, the tyrannies of policy, philosophy, and commerce. For Blake, the interaction of energy with those limits became a philosophy of freedom and revolution.

While Blake discussed the importance of perception in understanding the world, he was remarkable in the care he took to make it clear that he saw the world "all alive," in which grains of dust or sand, birds, worms, ants, flies, etc., perceived and experienced in ways that were not different from those of human life. Bishop Berkeley, who said that the material world outside the philosopher's mind doesn't exist, added as an afterthought that it exists in the mind of God. If consciousness is the only guarantee of existence, there was no problem in the existence of Blake's world, in which everything was alive and conscious.

Everyone finds it almost obligatory to describe The Lamb as a symbol for Jesus, but then they find the Tyger's symbolic meaning more problematic, and—from Coleridge in the early 19th century down to the newest publications at the end of the 20th century—people are boggled by the "obscurity" of The Fly. But in that poem, Blake makes it clear that there is no obscure symbolism, when he says "then am I a happy fly, if I live or if I die," etc. The animal poems are expressions of Blake's evolutionary, vitalistic, cosmology. The tyger, at least, would be too much for a creationist doctrine to handle. If worms and flies and ants are conscious and in the same situation as human beings, the bonds of sympathy and forgiveness

are universal.

In a world that's alive and developing, new knowledge is always possible, and imagination has the prophetic function of reporting the trends and processes of development, illuminating the paths toward the future. Reason is subordinate to invention and discovery.

The dualistic conception of matter as distinct from energy and consciousness is a constrictive illusion put in place by the forces of empire, and the living reality would be freed from the inert husks of the wrongly conceived natural world, when in the future the world was freed of tyranny. After Blake, it would be nearly another century before others would see that the crude materialism of Newton and the Natural Philosophers was essentially a life-denying culmination of the worst trends of official religious dogma.

A complete survey of Blake's references to Christianity would be voluminous, and not all of them are immediately clear, and require a careful placing in the context of the ideas that were being discussed in London at that time. But it's hard to reconcile the common description of him as a mystic with his reference to "Old Nobodaddy aloft," or with his comment that Jehovah gives us a knock on the head, and Jesus soothes it. He always defines god in human terms, so from the conventional viewpoint, he would probably be considered as an atheist or pantheist, but he didn't describe himself or his friends as atheists. When people called Tom Paine an atheist, Blake defended him against the charge. Other friends, Mary Wollstonecraft and William Godwin, were sometimes called atheists, but in their writings, they never expressed very unconventional religious ideas. When we recall that in the early 1990s, George Bush expressed the idea that atheism should be illegal, it is easy to imagine that people in 18th century England wouldn't have felt that it was safe to be called atheists.

In 1803, Blake apparently said something like "damn the king," while getting a drunk soldier out of his yard, and was tried for sedition or treason. He was acquitted, because his far more scurrilous written comments hadn't been published, and it didn't occur to the government to look for documentary evidence to support their case. The fact that he printed his own work, and sold only a few copies of his books to affluent friends, probably saved his life, but it accounts for his obscurity during his own lifetime.

Tom Paine's writing was published and widely read in prerevolutionary America, but he was considered a criminal in England, and Blake was credited with saving his life by helping him escape to France. Politically and ethically, Blake's writing is similar to that of Paine, Godwin, and Wollstonecraft (often called the "first feminist"), but his language is usually more vivid. It was probably the clarity of his political opposition that made his work unpublishable during his lifetime. The first "complete" collection of his work was published in 1927, and until that year, very few people had seen more than a few of his most famous poems.

Blake printed his work by hand, without a press, by writing the text backwards on copper plates, surrounded by his drawings, and then etching away the surrounding copper, so that the image remained elevated, and could be inked and printed as if it were a wood-block. If he hadn't devised this method for printing a few copies of his books, it isn't likely that much of the work would have survived.

Shortly after the French Revolution, William Wordsworth was associated with the Blake-Wollstonecraft-Godwin group's defense of the revolution, but he moved away from the ideals of that group, and adopted more socially acceptable ideas. He finally became England's poet laureate. Liberty, equality, and brotherhood were replaced by blandly conformist ideas.

The type of individualism that Wordsworth came to advocate was interesting because it was a rejection of exactly that part of Blake's belief that Blake considered to be the essence of Christianity, namely, forgiveness, brotherhood, and bonds of sympathy connecting all beings. In its place, Wordsworth adopted a memory-centered doctrine. During Wordsworth's lifetime, his ideology was exceedingly successful, but its rationalistic overtones have kept it tied to the past; it had nothing to offer the future. I think we can get some insight into Wordsworth's mind by considering that, on the basis of reading Blake's *Songs of Innocence and Experience,* he decided that they were written by an insane person. (Blake was aware that slow-witted people, who couldn't follow unconventional thoughts, often considered him to be crazy.}

Everywhere in Blake's work, it is clear that he never underestimated the possibilities of the future, and never imposed false limits onto anything, but he didn't tolerate vagueness or empty abstraction. Sharp definition was essential, and unique particulars were the basis for beauty and knowledge.

For Blake, the dialectical principal was a feature of the world itself, but it also informed his method, his technique, and his "rhetoric." One of Blake's powerful insights was that intellectual clarity is achieved by contradiction, opposition, contrast, making distinctions as well as comparisons. The principle of intensification through opposition had special features when it was developed in his painting and writing. Blake gave much of the credit for his style of thinking to the process of spending thousands of hours in the practice of etching. The image you create in the conventional etching technique is made when acid "bites" into the lines that will be inked; in Blake's new technique, the image is made permanent by the acid's corroding away of everything except the sharply defined image. The decisive, dividing, line is essential. Anyone who has spent even a few hours of intense effort working in dry-point or etching understands that, when you stop, the appearance of the world is altered by changes that have taken place in your eyes and brain. Often, his "metaphors" are literal imaginative insights that have great generality. This kind of knowledge distinguishes the work of a craftsman from that of an academic. The probability is that Blake's art led him to appreciate compatible ideas when he found them, and it doesn't seem likely that he was "influenced" by them the way an academic is influenced by books, since Blake had his own "sources" that are generally neglected by intellectuals.

Blake found that contrasts made meanings clear, and made language vivid. Heaven and Hell, Clod and Pebble, Lamb and Tyger, Angel and Devil, Greek and Jew, Innocence and Experience, presented contrasts that encouraged the reader to think about the range of possibilities Blake had in mind. He was always consciously trying to energize the reader's mind to get out

of dogmatic ruts, to look at things freshly, so he often used the polarities in ways that would surprise the reader, ironically reversing familiar references. A pious commonplace would be contrasted with the disturbing realities that it normally hid. Both in his writing and in conversation, Blake was often playful and teasing, and over-serious people have usually taken him too literally.

Academic commentators are so often attached to their erudite pieties that it seems that they can't read English. In the 18th century, a clod meant just what it means in the 20th century, either a lump of dirt, or a lunkhead. In the Clod and the Pebble, when the Clod speaks the properly sanctimonious phrases, justifying its oppressed misery with a dogma, we have a clue regarding Blake's attitude, but then he makes it perfectly clear by speaking of Heaven's despite, literally, Heaven's malice (a concept that appears many times in different forms in other parts of his work). Either the commentators assume that the word "despite" had a different meaning in the 18th century (it didn't), or they assume that Blake made an error of diction, because they choose to alter the meaning to "despite Heaven." Just as judges aren't allowed to change the wording of the laws that they interpret, literary experts aren't allowed to rewrite texts to make them better suit their interpretation.

The same insensitivity to the world of concrete experience that has allowed so many commentators to read their own ideas into Blake, ignoring what he said in plain English, makes satire and irony and sarcasm inaccessible to many people who otherwise seem intelligent; this is especially apparent when scientists comment on literature. Forming an imaginative synthesis of the writer and his meaning requires mental flexibility and energy, rather than just analytical acuity.

Everyone who described Blake's physical appearance remarked on his large head. Blake commented that he didn't like to travel or undergo physical strain, because of its effects on his health. The brain is an energetically expensive organ, which consumes large amounts of glucose. A very large brain puts a special burden on the liver's ability to store energy, and is likely to make a person conscious of physiological processes. Blake's descriptions of the process of seeing show that he was integrating his experience into his knowledge, describing brain physiology, incorporating his perceptions and the best scientific knowledge that was available to him, into a philosophical description of the place of conscious life in the world. The pulsation of an artery was the unit of time, a red blood corpuscle was the unit of space, enclosing eternity and infinity, eliminating arbitrary and abstract entities, and placing human life within cosmic life, while revealing cosmic life within the individual.

The idea of a "biological cosmos" seems strange only when it is considered against an ideology which maintains that life is alone in an immense dead universe. The assumption of a dead, unintelligent, randomly moving physical world is the creation of a series of theological ideas, which Blake perceived as essentially Satanic. Blake used the language of these theologies, but inverted them, showing the ways they were used to obscure reality, and to impose a perverse way of life onto the living world.

Fred Hoyle, the astronomer, said "If this were an entirely scientific matter, there is little doubt from the evidence that the case for a fundamentally biological universe would be regarded as substantially proven." (1989)

Over the last few decades, biologists feel that they have established the "biochemical unity of life," in which biochemical cycles and genetic codes are widely shared. The idea of ecological interdependence has come to be recognized as an essential part of life, or (as demonstrated by Vernadsky, and suggested by Hoyle) a cosmic principle. Blake often called himself a Christian, and defined Christianity in many novel ways, as art, love, politics, science, but specifically, in his version of Christianity, forgiveness was an essential idea, and nothing lives for itself only. Blake's Christianity as Art was a concrete part of living, and he ridiculed some of the abstract theosophical definitions of god that were common in his time. When his remarks are considered against the background of Spinozistic pantheism, it is the intensification and personalization, the avoidance of abstractions that could permit the attribution of passivity or inertness to any part of reality, that stand out. When he said that the world is alive, he meant that it is a defect of perception that makes Newton's world seem passive, empty, and dead. A few years ago, a movement that called itself "deep ecology" tried to absolutize the ideas of ecology; Blake's view of the interactive unity of life was as well thought out as any that preceded Vernadsky's cosmology.

Rather than elevating any of the ideas of Christianity to an absolute doctrine, Blake used them as parts of an organic whole. The principle of forgiveness was presented as the appropriate response to a world which is always new. The desire for vengeance comes from a delusive commitment to the world of memory. Virginity is constantly renewed in the world of imaginative life. While Blake said that you can't forgive someone until they stop hurting you, the desire to be forgiven indicates that there is an opportunity to resolve the problem.

Although most mathematicians and computer-so-called-scientists are committed to a rationalistic, past-oriented view of their mental operations, and some scientists accept that ideology along with mathematics, the valid, discovery-oriented sciences have to be future-oriented. A first step in avoiding dogmatic assumptions might be phrased as "remembering what you are," a living being, and asking how you know things: The interaction with other beings, exchanging energy and information with the environment, experiencing yourself in the world.

Holistic medicine and holistic psychology came into existence as attempts to overcome the dogmatic compartmentalization of reality that is endemic. Whenever rigidity is a problem, looking for ways to create new patterns that by-pass the petrified pattern can lead to a solution. Parkinson's disease and other physical problems have been approached using techniques of intensified or varied stimulation. Increased stimulation--even electromagnetic stimulation-- appears to open alternative patterns. Music, dance, and swimming have been used successfully to improve fluidity in various neurological diseases. Kurt Goldstein (*The Organism*) worked with brain injuries, and found that the brain has a variety of ways to restore a new balance. Raising the amount of energy that's available can allow natural processes to create a better synthesis. Political and social problems that are culturally determined may follow rules similar to those of organic brain disease.

Optimal assumptions, when assumptions are necessary, are those that don't commit you to undesirable conclusions. For example, in the 1950s, some people made the assumption that nuclear war was inevitable, and made large investments in

"fallout shelters," which were conceived in terms of world war II bomb shelters, and so resources were diverted from other investments, such as education, which didn't in themselves foreclose future possibilities. Self-fulfilling prophecies and self-limiting assumptions are often built into supposedly practical activities.

The assumption that cancer is genetically determined, and the assumption that regeneration is impossible in the heart or brain, are self-limiting assumptions that have been immensely destructive in biology and medicine. There was no reason to make those assumptions, except for the rationalist culture. Physics, biology, and cosmology are manacled by many unnecessary assumptions. The limits of adaptation, the extent of life's potential, can't be discovered unless you look for them, but the sciences have built many artificial limitations into their systems.

Avoiding unnecessarily limiting assumptions, looking for patterns rather than randomness, looking for larger patterns rather than minimal forms, avoiding reliance on verbal and symbolic formulations, expecting the future to be different—these are abstract ways of formulating the idea that the world should be seen with sympathetic involvement, rather than with analytical coldness.

Almost everything which has been denounced as "teleological" has turned out to be much closer to the truth than the mechanistic views that were promoted as "more scientific," and many horrors have been committed by people who have said that nature shouldn't be "anthropomorphized," that subjective feelings shouldn't be attributed to "the experimental material." The surgeons who operate on babies without anesthesia are operating on the assumption that any being which can't say "I'm going to sue you" is unable to experience pain.

When we analyze the ideas of chemical reaction equilibrium (burning something, for example), or biological adaptation or growth or learning, and see that they are strictly directional in time (which is the basic meaning of "teleological"), and consistent with Aristotle's description of causality, we can see the mysticism that has been imposed on our culture with the idea that "teleological explanations are unscientific."

Blake was clearly aware that the reason for making limiting assumptions was to maintain control, and to profit from another's suffering. Seeing that the sadistic assumptions that were put in place to regulate human life rested on a dichotomizing of soul from body, Blake's correction was to replace them with a unity of consciousness and substance, a living world rather than a dead world.

An imaginative study of his work has the potential to rouse one's abilities and to open an unlimited world of possibilities. "I give you the end of a golden string, Only wind it into a ball, It will lead you in at Heaven's gate, Built in Jerusalem's wall." Blake knew that his work, like anything new in the world, could be understood only by an active mental process.

Every communicative act is original, and understanding it is an invention, a projection, ***an imaginative synthesis.*** We can sometimes finish another person's sentence, the way we anticipate the notes in a melody**;** we predict the intended meaning. If the symbols carried the meaning in a passive rationalistic way, the person receiving the symbols would receive nothing new. *Intellect is a process of imaginative synthesis, or it is nothing.*

Blake devised "a system" that would make it possible to think about the world without unconsciously making a commitment to the false limits. He showed, by working within this new philosophical synthesis, that Art, Science, and Politics are structurally and substantially interdependent. The question I asked in the title, "can art instruct science?" isn't the right question once you see the world from Blake's perspective, since Science is Art, and both must be based on experience and imagination.

Blake used, in a new way, the things that were available in his culture, to reveal the process of creation, on all its levels. He consciously used language in a new way, to free the reader from the stereotypes of conventional language. His methods are relevant, as he knew they would be, for other times and situations.

Notes and quotations

I happened to read Swedenborg's scientific work just as I was getting interested in concentrating on becoming a biologist, and I realized that it was his scientific knowledge that shows up in Blake's imagery, far more than his theology, which Blake obviously despised. By chance, just after I finished my master's thesis on Blake, I got a job at a Swedenborgian college (Urbana University), where I saw in traditional form the small minded theologism that Blake had seen in Swedenborg. As a result of those experiences, I greatly appreciated the book, *The Heaven and Hell of William Blake,* by Gholam-Reza Sabri-Tabrizi, which apparently hasn't been very well received academically.

Blake's imagery indicates that he had a great interest in the physical and biological sciences, and he apparently had some direct contacts with the leading scientists in London, some of whom are lampooned in *Island in the Moon*. Some of Swedenborg's discoveries were probably discussed in these groups.

Although Swedenborg's original works in anatomy and physiology were probably his most impressive contributions, he was also a pioneer in paleontology, cosmology (the nebular hypothesis, in particular), magnetism, crystallography, metallurgy, and endocrinology.

E. P. Thompson's *Witness against the Beast* is an extremely valuable source for clarifying Blake's vocabulary.

Synectics, W. J. J. Gordon, Harper & Row, 1961. Describes how metaphorical thinking was used for solving practical problems, in the Synectics Research Group in Cambridge, Mass.

In the "scientific" philosophies of Blake's time, it was common to speak of matter and its primary and secondary qualities. Blake understood that this view of matter was a derivative of awful theologies**:**

"And this is the manner of the Sons of Albion in their strength

They take the Two Contraries which are calld Qualities, with which

Every Substance is clothed, they name them Good & Evil

From them they make an Abstract, which is a Negation

Not only of the Substance from which it is derived

A murderer of its own Body: but also a murderer

Of every Divine Member: it is the Reasoning Power

An Abstract objecting power, that Negatives every thing

This is the Spectre of Man: the Holy Reasoning Power

And in its Holiness is closed the Abomination of Desolation"

[Jerusalem, 10]

What is a Church and What Is a Theatre? are they Two & not One? can they Exist Separate?

Are not Religion & Politics the Same Thing? Brotherhood is Religion

O Demonstrations of Reason Dividing Families in Cruelty & Pride! [Jerusalem plate 57]

And he who takes vengeance alone is the criminal of Providence;

If I should dare to lay my finger on a grain of sand

In way of vengeance; I punish the already punishd: O whom

Should I pity if I pity not the sinner who is gone astray! [Jerusalem plate 45]

"Imagination has nothing to do with memory." (comment on Wordsworth). **"Knowledge is not by deduction, but Immediate by Perception or Sense at once."** (comment on Berkely).

With Demonstrative Science piercing Apollyon with his own bow! J12.14; E155

Generalizing Art & Science till Art & Science is lost. J38.54; E185

"For Art & Science cannot exist but in minutely organized Particulars"

Since the difference between a Rationalistic view of the world and a creative view is largely a question of the reality of time, it's worth mentioning the work of an astronomer whose cosmological view was based on the reality of time:"Possibility of experimental study of properties of time," N. A. Kozyrev, Russian, September 1967, USIA document in English, 49 pages, 1971. J. Narlikar more recently did similar work, including his collaboration with H. Arp, described in Arp's *Seeing Red: Redshifts, Cosmology, and Academic Science,* Apeiron, Montreal, 1998.
