

Introduction

The discovery, or, one should say rediscovery of psychedelic drugs in the middle of the 20th century was essentially a scientific discovery, yet little attention has been paid to the context of this discovery in relation to the history and philosophy of science itself. A great deal of attention has been instead concentrated on the connections between modern knowledge of psychedelics and the shamanic traditions, the long history of religious use of psychoactive plants and preparations, and the possible modern extensions of these ancient psychedelic traditions for medical purposes. It is, of course, to be expected that this would have been the case - it was the natural course for psychedelic research to take.

But in order to understand more fully certain peculiarities that have followed upon the psychedelic rediscovery, we can benefit from an examination of how this discovery fits in with the history of the scientific tradition itself. I think that it is ONLY from such an examination that we can understand our present situation where it seems, only small and often professionally isolated groups of people take seriously the legacy and implications of the psychedelic rediscovery, where the overwhelming majority of scientists now active know not the least accurate thing about psychedelic drugs and in fact actively oppose and reject the idea that the drugs are good for anything at all.

For many it apparently seems that such rejection and repression is something unusual in science, something that the psychedelic pioneers did not deserve; For many it apparently seems that when truths are revealed by research - even when they are revolutionary and perhaps shocking for many - those truths must by the very nature of science be soon accepted and developed by the mainstream.

An examination of the history of scientific advance, however, reveals something quite the opposite, and a study of how science really operates in practice may give us some added courage to persist in what so many others consider a mere folly.

Thomas Kuhn and the Psychedelic Revolution

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As far as I can tell, Thomas Kuhn had nothing at all to say about psychedelic drugs or the several uses to which they can be put. The title of my talk today might therefore seem rather inappropriate, were it not for the fact that Kuhn DID have VERY MUCH to say about revolutions — scientific revolutions that is, the kind of general upheaval of fundamental concepts that occurs in the various scientific disciplines from time to time. Thomas Kuhn, as you may be aware, constructed an entire theory of scientific revolutions: what they are, how and why they occur, who brings them about — and in so doing he in fact re-defined what science is in many ways.

What connects Kuhn with psychedelics then, is that the rediscovery of psychedelics in the middle of the 20th Century promised revolutionary changes in several fields of scientific enquiry and medicine, and, as I shall claim later on, a revolution in the concept of scientific study itself. I refer to a *re-discovery* of psychedelics of course, because as we all know, the use of these substances is very ancient, pan-global, and probably goes right back to the beginning of human existence. Psychedelics had to be RE-discovered because modern industrial civilisation has been one of the very few human societies generally unaware of psychedelic plants, and without any general use of them for curing, initiation, religious and heuristic practises, and so forth.

The potential revolutionary changes that this re-discovery should have brought about would have been well described and their genesis and growth well-predicted by Kuhn's theory if it weren't for the fact that practically all these revolutionary promises still remain unfulfilled, stifled by a long anti-psychedelic backlash. This backlash was first brought about in the late 1960s by social and governmental forces in the USA, perpetuating a long and dismal Puritanical trend in America that brought the world the great folly of modern prohibitory policies. But soon after, the scientific establishment itself seemed to become infected with this disease-like situation, so that today it is the rare scientist who

has any inkling whatever that the rediscovery of psychedelic drugs might be something not only interesting, but extremely important and potentially revolutionary. Despite the truth of the matter, so obvious to those in the know, to say that the psychedelic rediscovery was one of the most important social AND scientific developments of the 20th century would be to invite unremitting ridicule from the great majority of scientists alive today.

Such reactionary resistance to scientific revolution, although a great disappointment and in general an apparent discredit to the legitimacy of so-called scientific progress, is nevertheless the normal state of affairs, as Kuhn's findings show. When closely examined from Kuhn's perspective on the history of science, the scientific enterprise is seen to be almost unbearably conservative – a history filled with repression of new and revolutionary ideas. We all are familiar with such examples of repression as the Vatican's crusade against Galileo, but Kuhn shows how the scientific community itself has often been as repressive of scientific innovation as any religious or social group.

There is no better teacher than Thomas Kuhn, therefore, to instruct us on how and why the psychedelic revolution has been so long stalled, apparently a failure and without significant influence on over four decades of scientific and intellectual advance. Kuhn's general theory of scientific revolution may even assist us in understanding how to finally bring meaningful psychedelic research into the scientific mainstream, where it most certainly deserves to be. I refer here to "meaningful" scientific research because it is also obvious to those in the know that limiting research to using psychedelics as medical drugs for the treatment of conditions of disease and abnormality rejects the major part of their potential. Of course, the entry of psychedelic research into the "scientific mainstream" would necessarily alter the very nature of science, perhaps leading to an abandonment of the worst aspects of its cock-sure reductionism for a more pragmatic way of studying and understanding the most complex phenomena in the universe, among which, the scientist himself. And we are all, to some extent, scientists.

Who was Thomas Kuhn, then? He was professor emeritus of philosophy and linguistics at the Massachusetts Institute of Technology until his death in 1996, and he was perhaps the greatest historian of science in recent times. His seminal work, *The Structure of Scientific Revolutions*, even by virtue of the long and heated criticisms it has received since its first publication in 1962, must be rated as perhaps the most important book on the subject ever to appear.

The Structure of Scientific Revolutions is important not just for historians or philosophers, however, but for every person believing

himself capable of scientific investigation or analytic thinking, even at an amateur level. There has been much written, and taught even in our secondary and university schools, about the scientific method, about how scientists conduct research and practice their craft. But Thomas Kuhn, with one magnificent treatise, revolutionised the very concept of what a science is, and how it proceeds. Kuhn even calls into question the widely-held notion that scientific knowledge makes some kind of cumulative progress toward ultimate understanding.

The Structure of Scientific Revolutions is not long nor difficult *per se*, but contains such new and radically brilliant ideas that it takes quite some time and several readings to absorb fully. Many writers, including Kuhn himself, have attempted to compose a concise summary of the theory the book presents, but in view of the lively and sometimes heated debate pro and con for his ideas, it should be obvious that no cursory treatment can do it justice. This caution must include my own presentation today, and the aspects of his theory that I shall discuss are by no means all there is to Kuhn's theory. I have merely chosen some key features of the theory with which we can better understand the topic at hand, the scientific re-discovery of psychedelic drugs.

Perhaps most sought when trying to summarise Kuhn is a precise definition of that famous word he introduced to the philosophy of science, that word which has become so often heard in reference to fundamental concepts or ideas, the *paradigm*. Kuhn himself defines a paradigm as a "one or more past scientific achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practice." But as a close approximation that we can more easily understand in context, we may think of a paradigm as an inter-related set of fundamental concepts, values, beliefs and techniques which defines a mandatory way for approaching scientific problems at a given time and in a given discipline. The paradigm is the stage upon which the play of scientific investigation takes place – a platform which defines the setting, context, limitations, and boundaries for the research agenda. Although the paradigm may become thought of as an accurate description of an aspect of reality, in truth the paradigm is more like a map or model, an approximation or framework for organising currently available data and defining permissible research.

It may at first seem odd to talk about "permissible research" in science, for the picture we may have of science and scientists is one of freedom of enquiry — the idea that at least some scientists explore reality with no holds barred, wherever their search for truth leads them. But Kuhn shows this to be a myth. Operating within the framework of a given scientific paradigm, the actual situation is quite different than the

myth. Kuhn writes,

"A paradigm suppresses innovation, it can even insulate the community from those socially important problems that are not reducible to the puzzle form typical of normal science, because they cannot be stated in terms of the conceptual and instrumental tools the paradigm supplies."

In this quotation Kuhn refers to "normal science", and we should now consider this and two other key concepts.

Normal science is what practically all scientists do all the time when no scientific revolution is imminent, and in description it may sound rather banal to the uninitiated: it consists essentially of a "mopping-up" operation where the details of a given paradigm and its allowed applications are elaborated with greater and greater. It seems, as Kuhn says,

"...an attempt to force nature into the preformed and relatively inflexible box that the paradigm supplies. No part of the aim of normal science is to call forth new sorts of phenomena; indeed, those that will not fit the box are often not seen at all. Nor do scientists normally aim to invent new theories, and they are often intolerant of those invented by others. Instead, normal-scientific research is directed to the articulation of those phenomena and theories that the paradigm already supplies."

From what we have just learned about science and its paradigms, we can already see quite clearly the threat to normal science that the rediscovery of psychedelics and altered states of consciousness provided. It was an outright menace to several scientific and medical disciplines, a paradigm-destroying innovation that was destined to be repressed for a long time to come.

Two further important concepts of Kuhn's theory are the paradigm shift, and the scientific revolution. Briefly, all scientific paradigms eventually run into problems, when anomalous experimental findings accumulate to the point where that paradigm begins to show its failings. If the problems persist and cannot be resolved under the dictates of the existing paradigm, a paradigm shift must then eventually occur, where a new paradigm, defining in a new way the fundamental concepts and research agenda to be followed, then *replaces* the old paradigm. As this process takes precedence over the continuation of normal science, a scientific revolution is said to be taking place.

To understand in practice what Kuhn means by a paradigm, and what a paradigm shift is, it helps to see what the terms mean concerning a specific scientific revolution. The most used example of a

scientific revolution and its associated change of paradigm has been the Copernican revolution in astronomy. Copernicus, as you surely know, was the first to advance the heretical idea that the sun, and not the earth, was the centre of our planetary system. The earth-centred astronomy of Ptolemy, which had been around since the time of Christ, had worked admirably well for a long time, being able to predict the positions of stars and planets with an accuracy that sufficed until as late as the 16th century. But with the invention and improvement of the telescope and the improving scientific abilities of astronomers, experimental anomalies began to appear, especially for understanding and predicting the motion of the planets.

Two important points to notice in this example are that:

1. The concepts of a paradigm and a paradigm shift are clearly illustrated. The Copernican revolution had at its root the change of paradigm from the concept of a geocentric to a heliocentric planetary system. But as we examine further examples of scientific revolutions we will discover that a scientific paradigm may be somewhat more complex, involving a group or set of closely related fundamental concepts or past scientific achievements.

2. The second key point in the Copernican example is the appearance of increasingly important experimental results in conflict with accepted theory and expectation - this is the sign of an impending crisis, paradigm shift and scientific revolution.

Another observation we may make on the basis of this example is that as long as a science seems to be working, making satisfactorily accurate predictions and supplying enough questions for scientists to work on during a period of normal science, it matters little whether the paradigm might be based on a completely false idea, derived not from science but in this case on religious dictates, namely that the earth was the centre of the universe. We may feel that today science is far more immune to such error, but the example of the scientific repression of the results of psychedelic research argues otherwise.

I'll just briefly mention a few more examples of scientific revolutions and their associated paradigm shifts so you get a better idea of what is involved, and then we will go on to consider how the rediscovery of psychedelics should qualify as the initiator of several scientific revolutions yet to come to fruition.

In geology, we have one of the most recent scientific revolutions to have occurred. This example also involves an easy to understand paradigm shift consisting of the transformation of a sole concept. Before the middle of the 20th century, the earth's continents were assumed to be stationary, in a sense locked in their positions to the

crust of the earth. This was the fundamental or paradigmatic belief taught to all students of geology. In actuality, the concept needed not even to be taught, for it seemed to be completely self-evident. Accumulating experimental anomalies in evolution, geography, paleoanthropology, and other fields, however, quite rapidly led to the theory of plate tectonics, in which the continents were understood to be floating on a liquid-like global interior, and therefore free to drift about, collide with one another, and so forth. This new paradigm expanded the research agenda and thus allowed the explanation of many observed geologic, evolutionary, and geographical phenomena that had remained mysterious and unexplained, and for the most part ignored, during the reign of the stationary-continent paradigm.

In physics, of course, we have one of the most important scientific revolutions ever to occur, from the logical, billiard-ball physics of Newton to the paradoxical, tricky to understand and nearly impossible to visualise relativistic and quantum physics of Einstein, Heisenberg, Bohr and their contemporaries. In this example of course, the paradigm shift involved a complex set of interrelated fundamental principles and concepts including the nature of light and radiation, of space-time, of matter itself.

In chemistry, the theory about the process of combustion, the burning that men had so closely observed ever since the taming of fire in prehistoric times, underwent a paradigm shift with Lavoisier's discovery of oxygen. Until then, and probably due to the long observation of what fire seemed to be, burning was thought to be a process whereby something was released from the object in question. After all, the flames emanating from a burning object must have led, from time immemorial, to an *idée fixe* that something was coming out of the substance. Until the mid 18th century, an increasingly complex theory of burning was devised, a theory that posited a substance called phlogiston as the carrier of heat, and thus the substance that was liberated from a burning object. As chemical balances became more precise, however, experimental anomalies began to mount: it was discovered that at least some substances under combustion seemed to get heavier, rather than lighter if phlogiston were actually to be emanating from them. In a last-ditch effort to save the phlogiston theory, some eminent scientists even proposed that phlogiston must have negative mass! With Lavoisier's discovery of oxygen however, the oxidation theory of combustion very soon laid phlogiston in its grave, whether of negative mass or not!

I think from these few examples you can now understand the basic nature of a scientific revolution and its underlying paradigm shift. You may have also remarked that in each of these cases the paradigm shift

involved a change of general view from what might be thought of as an archaic idea to an esoteric one, where a general and ancient perception based on simple observation had to be replaced by concepts that simply were not obvious to early man nor to the naïve observer. The idea that the earth was the centre of the universe, that the land masses were fixed in place on the globe, that physical objects were hard and solid, that flames indicated that something was emanating from a burning object — all these could be derived from what we may think of as simple primitive or naïve observation. These ideas, the paradigms of their time, had to be replaced with anti-intuitive and seemingly paradoxical ideas, and we see this in spades when it comes to the psychedelic rediscovery. Not least among the naïve beliefs that the psychedelic rediscovery discredited is the idea that man the scientist could always and reliably be an independent, objective observer of phenomena, and it is a delicious paradox that his own supposedly objective scientific investigations with psychedelics mandated this conclusion. It is also of interest that the naïve ideas that needed to be replaced were not ancient and primitive ones as in the other cases I just mentioned, but instead were the basis of the age of scientific investigation.

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Now let us look at some specific examples of how the psychedelic rediscovery might have revolutionised some fields of science and medicine.

To begin, it is appropriate to consider the field of psychiatry and psychotherapy, for it was here that research with psychedelics began, in Saskatchewan, Canada under the direction of Humphrey Osmond, Abram Hoffer, and their associates, and almost simultaneously with Stanislav Grof and his associates in Czechoslovakia.

Stan Grof relates in his book *Beyond the Brain* how difficult it was for him to accept the research data that was flooding in from his group's work with LSD. Grof had been a fairly strict Freudian psychoanalyst, as one might expect of someone trained in medicine and psychiatry in the early 1950s — perhaps the heyday of the psychoanalytic movement. Yet Grof found that one by one the major tenets of the Freudian view — we might call it the Freudian paradigm — had to be abandoned as a result of his LSD research. In this long and arduous process, a new paradigm for research and understanding in the field of human mental health and illness, and in human consciousness itself began to take shape. In his book *Beyond the Brain* Grof presents a framework for this new paradigm, and even devotes an introductory chapter to the

consideration of Kuhn's theory of scientific revolution as a way to show the reader the nature of the process of change that was beginning.

Hoffer and Osmond in Canada were at the same time coming to a radically new view of what psychotherapy could be — not a medical curing analogous to the treatment of an infection with an antibiotic, but something more akin to a voyage of personal self-discovery where the use of psychedelic drugs acted as an adjunct or catalyst to the production of radical and rapid personality change. Personality change had been in former times far more associated with religious experience and conversion than science or medicine. Such an idea was of course another severe test for Freudian psychoanalytic theory, and for the medical concept of drug treatment itself.

An important organising principle in Hoffer and Osmond's psychotherapeutic research was derived from their observation of the Native American's use of peyote in their religious observances, and the observed fact of greatly reduced alcoholism in members of the Native American Church. They observed time and again the initiation of new members who had formerly been severely alcoholic, and who subsequently were cured of their drink problems with a reliability far surpassing any alcoholism treatments western medicine could offer.

Thus was born an ambitious and successful project of using both mescaline and LSD, not as a classic "drug cure" for alcoholism, but as a way to catalyse personality change in their patients or clients, which then led these persons to "cure themselves", so to speak — to come to terms with their lives in ways they could not have achieved before. Of course, the methods developed by Hoffer and Osmond were in some respects a throwback to the shamanic paradigm of curing, where the doctor is not an independent, objective scientist using disease-specific drugs that work solely on the basis of their pharmaceutical properties. The shaman takes a journey of psychological and spiritual self-discovery with his client so that they both may experience the source of the problems, and thus effect a cure.

It has been remarked, not completely in jest, that in western medicine it is the patient who takes the drugs, whereas in the shamanic tradition it is the doctor who takes the drugs. Hoffer and Osmond's work treating alcoholics necessarily depended on giving psychedelic drugs to the patients themselves, but it is interesting to note that these once-mainstream psychiatrists rapidly came to the conclusion that in order to give psychedelics effectively to patients, it was indispensable that the doctors, and even the nurses in attendance, should be as familiar as possible with the altered states of consciousness produced by the drugs. And there was only one effective way to do that: as in the

shamanic tradition, the doctors took the drugs, often many times.

Slowly but surely a new paradigm for psychiatry and psychotherapy was taking shape, but resistance from the scientific and medical establishment was to be expected, as Kuhn shows is the normal state of affairs. Criticism of LSD therapy — especially after the use of psychedelics by university students had become somewhat of a scandal in the US — became another kind of scandal, a scientific scandal of major dimensions. In a particularly cogent analysis of the situation in their book *The Hallucinogens*, Hoffer and Osmond neatly demolish their critics in the space of a few pages. Yet completely in accord with Thomas Kuhn's predictions, those who would introduce a new paradigm face not only an uphill battle but much more serious consequences, no matter how necessary the new outlook might be based upon the revealed failure of the old paradigm.

Were Hoffer and Osmond aware of Thomas Kuhn's work and the predictions of great hostility to their research? They give no clue, but they do quote the philosopher Michael Polanyi, who in his 1956 article in *The Lancet*, seems to have presaged some of Thomas Kuhn's major points. Polanyi writes,

"To the extent to which discovery changes our interpretive framework, it is logically impossible to arrive at it by the continued application of our previous interpretative framework. In other words, discovery is creative ... in the sense that it is not to be achieved by the diligent application of any previously known and specifiable procedure..."

We see here that Polanyi is, in Kuhnian terms, talking about the kind of discovery which represents anomalous findings that lead the discoverer to proposing a new paradigm. When Polanyi says that revolutionary discovery cannot be achieved by previously existing procedures, he is saying the same thing as Kuhn, that the process of normal science cannot itself lead to paradigm shift and scientific revolution. Kuhn himself stated quite firmly that "Paradigms are not corrigible by normal science at all".

Michael Polanyi continues,

"We can now see the great difficulty that may arise in the attempt to persuade others to accept a new idea in science. To the extent to which it represents a new way of reasoning, we cannot convince others of it by formal argument, for so long as we argue within their framework we can never induce them to abandon it. Demonstration must be supplemented therefore by forms of persuasion which can induce a conversion. The refusal to enter on the opponent's way of arguing must be justified by making it appear altogether unreasonable.

"Such comprehensive rejection cannot fail to discredit the opponent. He will be made to appear as thoroughly deluded, which in the heat of the battle will easily come to imply that he was a fool, a crank, or a fraud... In a clash of intellectual passions each side must inevitably attack the opponent's person."

And this is precisely what happened to many researchers who worked with psychedelic drugs. Today the mainstream scientific community routinely and ignorantly classes the entire fraternity of psychedelic pioneers in the same category as Tim Leary, or worse.

Obviously, no scientific revolution has yet taken place in mainstream psychiatry and psychotherapy, yet the anomalous experiments and the outlines of a new paradigm remain in place in the scientific literature and in the minds of a few scientists and physicians.

What would have a revolution in psychotherapy have looked like? This is a difficult thing to predict, as any revolutionary changes must necessarily be. But surely it would now be widely recognised that Hoffer and Osmond were right to insist that the personal experience of psychedelically altered states of consciousness is indispensable and "absolutely essential" to the understanding of not only patients but for understanding consciousness itself. Trained in altered states of consciousness, a psychiatrist or psychotherapist then becomes a much closer parallel to shamanic healers of the distant past, a desirable thing, for the following reason: reductionist science works well with inanimate things, plants and even with primitive animals, but with humans, who can never be considered "just" as objects, objective science must forever remain incomplete.

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In the field of computer science and technology a revolution does seem to have taken place, and at first we might be tempted to attribute that to the often-heard claims that many of the modern computer's pioneering inventors had not only been familiar with psychedelic drugs, but used them as a pathway to the creativity that led to their inventions. Be that as it may, we would more accurately have to say that the revolution was therefore not in computers themselves, but in the use of psychedelic drugs as a psychological tool, as a way of augmenting creativity. The so-called computer revolution does not qualify as a scientific revolution, first of all since we are dealing more with a technology rather than a science, and secondly because we did not undergo a paradigm shift. The fundamental principles of digital computing have long remained the same.

However, the idea that drugs could augment creativity was certainly revolutionary and paradigm threatening. It is an idea which goes

against the general, if unscientific convictions that drugs are exclusively substances used in medicine to restore normality; it is an idea that discredits the conviction that normal consciousness is the *summum bonum*, the best, most efficient and desirable state of human awareness and that its alteration can come to no good end; it is an idea that shows the absurdity of the notion that drugged consciousness MUST be a degraded and delusional state, beneath the dignity of any civilised person, that aboriginal use of drugs for any purpose whatever merely illustrates the backwardness and primitive nature of such peoples. These naïve observations, like the naïve observations of the earth-centred universe, come down to us as little-questioned "truths" from ages long past. In the case of drugs, such ideas represent a very old paradigm of western human psychology whose origin lies as far back as the Holy Inquisition, when European powers took it upon themselves to persecute the inhabitants of the Americas, purportedly to save their souls but more realistically to confiscate the entire hemisphere. The Inquisitors took the native use of consciousness-altering drugs as a sure sign that they should be considered sub-human, and undeserving of ownership of their lands. This legacy has come down to us little altered, so that today it seems an automatic opinion about drug users that they are somehow degraded, not in their right mind, and needy of correction and treatment. To propose that drugs might be capable of not only benignly altering human capacities but actually improving them is obviously a heresy, a threat to the colonial, patronising attitude that typifies modern science's view of ancient peoples and their ways.

The seeds of revolution in this branch of psychology had certainly already been planted by 1964, when Frank Barron presented a paper to a symposium in California entitled, "The Creative Process and the Psychedelic Experience". The research of Willis Harman and James Fadiman soon began documenting the experimental proofs of the connection, and their paper "Psychedelic Agents in Creative Problem-Solving: A Pilot Study," would very likely have been a revolutionary turning point in the psychological study of creativity had not their research been cut off in mid-stream by government fiat. If you simply do an internet Google search for Harman plus Fadiman you can easily find their research papers, well worth reading. The title of their article in Aaronson and Osmond's book, *Psychedelics*, is even more indicative of revolutionary paradigm change: "Selective Enhancement of Specific Capacities Through Psychedelic Training." Since the late 1960s, no research has been permitted along such lines, and yet another potential scientific revolution suppressed.

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Although the remarkable changes in computer technology do not strictly qualify as a Kuhnian revolution, a primary outgrowth of advances in computers may yet illustrate for us another potential and genuine scientific revolution that has been suppressed. Since the first neurological experiments where nerves leading to the muscles in the leg of a frog were electrically stimulated, leading to muscle contraction, the paradigm of digital computing in the nervous system has taken hold, slowly but surely.

Due to the great demand for more and more advanced computers for high-technology enterprises such as aeronautics, space exploration, modelling of complex systems — not to mention military applications and hardware — there has been practically unlimited research money available for those who study digital computing, and for those who strive to describe the properties and operations of various physical and biological systems in terms of digital computing. Neuroscience and cognitive science have been big beneficiaries of such research money, and the mainstream of these sciences accepts almost without question or deep analysis that digital processes account for what the brain does. After all, research grants depend on the adoption of this paradigm.

The easiest way to see the “digital paradigm” of brain operation is perhaps through consideration of the view of neuron operation that we have, and what those neuron activities are taken to mean. Although the properties and actions of a neuron’s chemical receptors and the synaptic space between neurons has been shown to be incredibly complex, when it is all said and done what happens in the neuron is a simple on-or-off electrical pulse that transmits the so-called “signal” down the neuron’s shaft, or axon, toward the next synapse and neuron in line. A simple on-or-off, all-or-nothing pulse can only be interpreted in digital terms, no matter how many layers of complexity one tries to load on top of this most simple of processes.

All the while, it is well known why the brain cannot be a digital computer. First of all, it is not fast enough. Nor complex enough despite the great multitude of neurons it contains. A task like face-recognition, which a person equipped with a brain can do almost instantly and without any sense of having completed a difficult task, cannot be nearly as reliably achieved with the most powerful computers operating at processor speeds of several Gigahertz and with data-transfer speeds approaching the speed of light. The brain operates at a few hertz, and with very lethargic “data-transfer rates.” Other such examples are easy to find. Clearly the “digital data-bit transfer” paradigm of brain operation, as I call it, with the neuron’s action potential representing the fundamental unit of “information”, must be a paradigm awaiting a well-deserved funeral, if only a new paradigm could first be created to

widen the research agenda. As Kuhn makes clear in his book, no matter what problems a paradigm may run into, it is never abandoned until a new paradigm is ready to take its place. Even then, a great many defenders of the old paradigm continue on like the eminent scientists who attributed a negative mass to phlogiston, defending what often is their life's work to the bitter end — their own deaths.

A new paradigm for neuroscience has in fact been waiting in the wings for quite some time. Some of the basic ideas of the paradigm were first proposed in part by Karl Lashley as long ago as 1942. Continuing Lashley's work after a decade-long association with him, Karl Pribram first published several papers on his new view of brain operation, and finally a masterpiece of a book on the subject entitled *Brain and Perception: Holonomy and Structure in Figural Processing.*"

Pribram's views, popularised in a 1982 book entitled *The Holographic Paradigm and Other Paradoxes*, edited by Ken Wilber, really do represent an entirely new and revolutionary paradigm for neuroscience and cognitive neuroscience. The enlarged research agenda that the paradigm would justify might well be able to clear up many of the current mysteries of the mind, such as how instant associative memory recall may work, or how all the modular processes of the brain such as the multiple aspects vision, hearing, smell, all appear to get combined into a unitary experience, the so-called "binding problem" that consciousness researchers have been tearing their hair out trying to explain.

I don't have time today to tell you the details of this new approach to brain and consciousness, but again, you should be able to find interesting papers and books on the internet by following links to "Karl Pribram".

It is interesting to note, and this is what connects this particular paradigm shift to psychedelics, that Karl Pribram was very close to other scientists and researchers interested in psychedelics, and took his inspiration from many such persons. Pribram's work has all the hallmarks of having arisen through at least the indirect potentiation of exceptional creativity derived from psychedelic training, as per the work of Harman and Fadiman. This may well be a major reason why his work is widely ignored by the neuroscientific mainstream and ignorantly criticised even by such major scientific figures as Francis Crick.

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One could easily propose that the psychedelic rediscovery would have even further revolutionary effects on other scientific disciplines such as anthropology, and paleoanthropology as I proposed in my talk here two years ago, or even economics, ... few sciences would remain

untouched if untoward resistance had not suppressed the psychedelic revolution itself.

Psychedelics and their associated discoveries possibly demand scientific revolutions not only in several scientific fields, but in the concept of scientific exploration and discovery itself. It is for this reason perhaps that these revolutions have been so long and so effectively repressed. To have one scientific revolution at a given period of history is already a difficult and sometimes long suppressed enterprise. But to have multiple revolutions in even disparate scientific fields would require major scientific AND social upheaval, especially given the way that science is funded today by major corporate and governmental organisations. And the revolution would not stop there: such an immense reorganisation in science would inevitably lead to a revolution in social mores, attitudes, and finally in civilisation itself and the politics by which it is directed. Whether such a multi-faceted revolution can be brought about is perhaps mankind's greatest test since that which occurred so long ago, when he had to decide what to do with that first experience of the psychedelic forbidden fruit in the Garden of Eden.

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