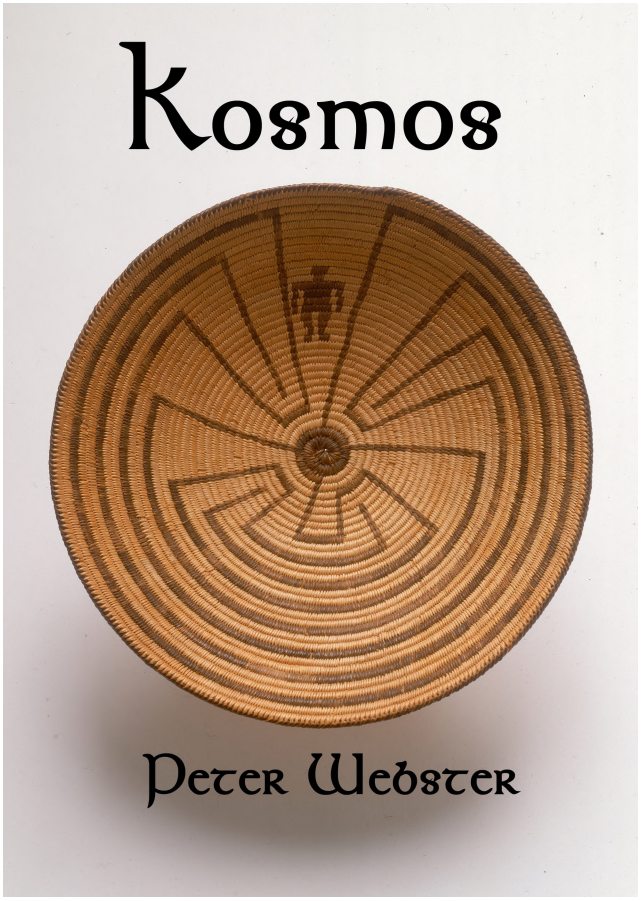

Kosmos

A Theory of Psychedelic Experience

Peter Webster

...Who believes not only in our globe with its sun and moon, but in other globes with their suns and moons,

Who, constructing the house of himself or herself, not for a day but for all time, sees races, eras, dates, generations,

The past, the future, dwelling there, like space, inseparable together.

From Kosmos, by Walt Whitman

Cover image: “Basket Tray with Man in the Maze”
Akimel O'odham (Pima) circa 1900
©National Museum of the American Indian,
Smithsonian Institution (catalog number 11/415)
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Introductory Remarks

I began writing this book more than thirty years ago when, due to circumstances not worth mentioning here, I retired from “active service”. The so-called drug war was ramping up mightily and it seemed that the 1960s were finally about to be completely demonized and the significance of the period dismissed or even forgotten, especially any remembrance of how important and catalytic of personal and social change certain “drugs” had been. My intentions for the essay were therefore to tell a little of my history in connection with what I had learned about the era I grew up in, how I—and the era—had been affected by psychedelics, and also to present a “Theory of Psychedelic Experience” that would provide a framework for understanding what these substances do and how they do it.

After some preliminary study and the writing of two or three chapters, I laid aside my book project for awhile and began writing drug policy reviews and articles for a few publications such as the *International Journal of Drug Policy.*[1] It still seemed in those days that with the right persuasion our western governments might be coaxed into backing off from the destructive policies of Drug Prohibition honorably, if slowly, incrementally. How naïve. But at least the effort sharpened my writing skills a little—of benefit for my primary project.

Further work occurred sporadically as I researched the scientific and popular literature for material I would need to promote my core ideas about psychedelic drugs. During this period and as part of my study I also created one of the first online collections of the classic psychedelic literature, The Psychedelic Library, still available today. The project helped greatly to refresh my memories of the '60s, and re-create for me the feeling of optimism that the classic writing and research had produced back then.

Additional periods of “doing other things” brought me—too rapidly!—to the present when I finally realized that if I didn't finish this project soon I might never do so. The recent popularity of the KINDLE e-book readers and format for self-publishing was the key to some dedicated finishing-up that led to the computer file you see now on your “device”. I had previously published a “physical” book with a friend[2] but was a bit disappointed that the result, although a handsome volume indeed, nevertheless required a list price that could only discourage many from discovering what we had to say. Being able to make the present essay available at a very affordable price was just the prod I needed, even if that meant foregoing the prestige of such a respected publisher as we had previously.

The reader will surely notice that much of the text of the first chapters was written quite some time ago. But rather than completely rewriting my earlier work according to new studies I had located, I decided to leave “as-is” the earlier chapters—with the addition of a paragraph and/or a footnote here and

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1 *International Journal of Drug Policy* Some of these articles, and a few others are available at Research Gate.

2 Gosso & Webster, *The Dream on the Rock: Visions of Prehistory*. State University of New York Press, 2014

there to bring the topics up to date. I think this choice will better show the progression of my thoughts from early days until the most recent. It will be for the last chapters to tie everything together, correct and re-formulate some aspects of the earlier writing, and draw final conclusions.

1. The Drug-Takers

A drug is a substance that, when
injected into a rat, produces a paper.

— Anonymous

We humans are inveterate drug-takers. In the modern age, drug-based remedies for every medical condition under the sun seems the norm, with some of the most powerful and rich industries on the planet competing to provide us with a pill for our every complaint whether life-threatening or trivial. Humankind's age-old trust and fascination with substances that can cure or effect other significant bodily changes is surely an important factor in our modern predilection for them. Whether this enterprise has become somewhat counter-productive for public health is a matter to be carefully considered: scandals concerning drugs that don't cure what they are supposed to cure, or those with side-effects that might make one prefer the disease, absurdly inflated prices for "new" drugs that aren't even as effective as those out-of-patent ones they are supposed to upstage... The list of abuses is long and surely supports an argument that the human necessity for health should provide profit solely for those requiring its restoration and maintenance, and all costs of manufacture, distribution, administration, and research of the necessary products be supplied by progressive taxation and the entire process monitored by non-profit, non-partisan professional organizations.[3]

But this essay is only marginally concerned with the pharmaceutical industry and modern curative medicine. I am more concerned here to tell the story of some other kinds of drug: those plants and preparations that have been used since time immemorial to alter the way in which we perceive. True, these substances were routinely used over many millennia in a similarly curative way as our modern drug collection, (albeit under a radically different guiding paradigm), and they can also be used in our modern age as important items of the pharmacopoeia. Yet their most important potential role for continued human evolution has only hesitantly become obvious. In fact, it is the same role that they have been playing all along since the *naissance* of psychologically modern humans about seventy thousand years ago, a role that for the most part has been ignored, even forbidden by "Western Civilization" for hundreds of years.

The goals of this newly-realized partnership are two: the first being a personal transformation for the individual, a coming-of-age experience as practised widely among tribal societies. Traditionally done as ritual practice for the young, a coming-of-age for we moderns need not necessarily take place during one's early years, but could also be a mid-life event. Aldous Huxley, Cary Grant and many others, serve as examples of those who have awakened

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3 Angell, Marcia: "The Truth About the Drug Companies," *The New York Review of Books*, July 15, 2004 • Volume 51, Number 12.: "The combined profits for the ten drug companies in the Fortune 500 ($35.9 billion) were more than the profits for all the other 490 businesses put together ($33.7 billion) [in 2002]. Over the past two decades the pharmaceutical industry has moved very far from its original high purpose of discovering and producing useful new drugs. Now primarily a marketing machine to sell drugs of dubious benefit, this industry uses its wealth and power to co-opt every institution that might stand in its way, including the US Congress, the FDA, academic medical centers, and the medical profession itself."

to a fuller life through such initiation. Then secondly, the partnership could provide a way to assist us to ameliorate the so-called human condition, to catalyse a *collective* transformation of the being that evolutionary necessity has produced. No longer need we direct our energies primarily for competitive survival and reproduction as all species have been required to do, using our special individual talents and intellect for that end and only to the degree required by the situation, emergency or other pressing demand presenting the occasional opportunity to improvise. Now, we have a chance, perhaps just a slim one, to collectively overcome the deleterious side-effects of our evolutionary baggage.

> I believe that the psychedelics provide a chance, perhaps only a slender one, for *Homo faber,* the cunning, ruthless, foolhardy, pleasure-greedy tool-maker, to merge into that other creature whose presence we have so rashly presumed, *Homo sapiens,* the wise, the understanding, the compassionate, in whose fourfold vision art, politics, science, and religion are one. Surely we must seize that chance.[4]

History is replete with examples of *individuals* who have overcome such instinctive tendencies, but that same history shows just how governed we are collectively.

In the following chapters I will attempt to organize all that I have learned, experienced, surmised, and even guessed about humankind's long association with “psychedelic drugs”, a term I will use more carefully than has become standard. Meaning literally “mind-manifesting”, an imperfect and incomplete description certainly, the term nevertheless seems preferable to any of the “scientific” labels that have been suggested over the years, such as the inappropriate “hallucinogen” and deplorable “psychotomimetic”. A term more recently popular with many insiders is “entheogen”, yet I think this implies a rather one-sided evaluation of what the substances seem to do.[5] For present purposes then, a “psychedelic drug” will indicate a chemical substance or whole plant, or preparation made from a plant or plants, that seems to have *no discernible specific and repeatable effect on each and every individual* who takes the substance, yet which—through a neurological mechanism yet to be described—undeniably and often powerfully affects perception, thinking, self-image, philosophical and metaphysical conceptions and convictions... A seeming paradox: a drug with no definable specific effect that nevertheless affects the most important aspects of being!

Psychedelics – Deep vs. Surface Effects

Yet obviously a psychedelic drug must have some “actual effect” deep inside the nervous system, but what we see “on the surface” does not lead us directly to deciphering what the core effect might be. This has been a major problem for the modern understanding of psychedelics and their potentials, and a major topic for this treatise. It will take quite a lot of explaining. The problem arises from the notoriously incomplete understanding of the interplay between neurology and human consciousness, so I will have to venture into these topics in a detailed but often speculative way. A further complication that I would note is—and this applies to psychoactive drugs in general—that a given drug has a core, neurological effect which in an as yet unexplained way leads to the overt (psychological) effects, but also often has an important “noise factor”. Some drugs such as LSD I rate as being the most clear, with

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4 Osmond, Humphrey: *Mental Hospitals*, 8 23-29 (1957)

5 We should perhaps also pay homage to Humphrey Osmond and Aldous Huxley, two great pioneers of the study of psychedelic drugs, for “psychedelic” is the term they have given to us.

very little noise—especially in the long "re-entry period" of the experience. One tends to remember every detail of the experience with great clarity, and often feels he or she would feel (be) like this all the time if not for being prevented from doing so by distraction or habits of "ignore-ance". Other drugs such as the medieval concoctions used to induce hallucinations of flying and consorting with devils are noisy indeed! Yet—a further complication—sometimes the noise can be an important contributor to the net effect (as with *ayahuasca,* perhaps).

LSD (*lysergic acid diethylamide*) is of course the most notorious of the psychedelic drugs, and is in fact a recent discovery (1938-1943). But its "surface effects" closely parallel those of the two other major psychedelics, mescaline from peyote and a few other species of cacti, and psilocybin from a number of mushrooms. These two plants—and many other psychoactives—have been used for so long that no one can say when, why and how they entered into the human drug repertory. So although LSD is a discovery of the modern age, it is really nothing new as far as psychedelics go. In fact, naturally-occurring variants of the *lysergic acid* compound *were* used in antiquity in both ancient Greece and the Americas.[6]

The discovery of LSD was, however, the spark that ignited modern scientific interest in these substances. And what an unusual discovery it was! After many decades official opinion still seems to be unsure just what the discovery amounts to, whether a godsend or a scourge. This book intends to remedy this uncertainty: we will see that "official opinion", often as superficial and unreliable as any the "man in the street" might express, has in the case of psychedelics evolved into total absurdity. As for those who panicked with the "new" discovery and labelled the substances psychotomimetics or hallucinogens, I have often thought that even if LSD merely caused one to go completely nuts for a few hours before returning more or less to normality, it would *still* be one of the most interesting discoveries of the 20th Century. Imagine! To enter into that mysterious, greatly feared and pitifully misunderstood condition called *insanity* at the mere ingestion of a tiny amount of white powder! And to (usually) make it back unscathed to tell about it! Wow!

Psychedelic Experience – A Kind of Insanity?

As should become evident in what follows, however, the "insanity" of a psychedelic experience is neither psychosis nor hallucination. (Neither is it a free round-trip ticket to Nirvana!) The error in official scientific terminology is certainly a holdover from the early days of psychedelic research, conducted by psychiatrists who had little to compare the experiences to except pathology. The failure to correct the error in later years, however, was a product of the not unwarranted professional fear of being on the career-damaging side of a controversy, one created in this case not by the scientists themselves but by

6 Webster, Perrine & Ruck "Mixing the Kykeon" in *ELEUSIS: Journal of Psychoactive Plants and Compounds,* New Series 4, 2000, online at http://psychedelic-library.org/Mixing the Kykeon Final Draft.pdf . See also Webster, P. "Kykeon Chemistry" in Wasson, Hofmann and Ruck, *The Road to Eleusis – Unveiling the Secret of the Mysteries,* Thirteenth Anniversary Edition, 2008, North Atlantic Books, Berkeley California.

prohibitionist moral entrepreneurs and CIA spooks.[7] [8]

If not madness, then what is the nature of this psychedelic state of mind that results from ingesting one of these drugs?[9] And what does the psychedelic experience reveal about the state of "normality" we depart from and more or less return to?

A Theory of Psychedelic Experience

The present essay is an attempt to answer not only the obvious questions about psychedelics, but to assemble a comprehensive Theory of Psychedelic Experience, an overview from several perspectives of how a psychedelic experience feels to the voyager, how and why it may affect his views and beliefs, how psychedelic perception happens on a psychological and neurological basis and why it appears to be similar or identical to states of consciousness sometimes attained spontaneously or through meditation and other age-old techniques. Necessary to such understanding, I also touch on the history and prehistory of mankind's use of such substances including possible evolutionary implications, and among yet further topics, what all this collected evidence might mean for the future. To do this, I have drawn ideas from many scientific disciplines, and combined that with results of my own personal experiences of psychedelic states. I have included some of the views of others who have explored these realms, and spiced up the entire brew with a hefty dose of speculation and even some wild guesses that hopefully will become more believable as the global picture is developed throughout his book.

The project seems necessary and timely, since my reading of post-1960's science, history, political and social analysis, and even biography, shows quite plainly that what passes for an accurate view of the 1960's revolution and its close association with psychedelic experience is missing the mark by an increasingly wide margin. It is this association, of course, that brought awareness of psychedelics to a wide audience, that provided the raw material

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7 The term "moral entrepreneur" was coined by Howard S. Becker. See Becker, Howard S. (1963): *Outsiders: Studies in the Sociology of Deviance*. New York: The Free Press. pp. 147–153. The term may in general have both positive and negative connotations, but my use here indicates a strong condemnation of those who seem to believe they have a superior knowledge of how other people should live and behave, and are prepared to enforce their intolerant views no matter what the consequences.

8 On CIA Spooks and their contribution to the psychedelic "controversy" see H.P. Abarelli, Jr., *A Terrible Mistake – The Murder of Frank Olsen and the CIA's Secret Cold War Experiments*, 2009: Trine Day LLC. Walterville Oregon

9 There exists considerable disagreement about which substances should be included when speaking about psychedelics, but for the purposes of this essay I shall consider LSD as the drug most deserving of the term, with the naturally occurring alkaloids of the peyote cactus and psilocybe fungi also qualifying. The experiences produced by these three are essentially similar enough so that research findings applying to one are generally valid for the others too. Pre-prohibition research by Hoffer and Osmond *(The Hallucinogens,* Academic Press, 1967*)* also showed that even experienced research volunteers were usually unable to tell which psychedelic had been administered. All other psychoactive drugs that many might consider as psychedelics—and this includes ayahuasca, ecstasy, various phenethylamines, cannabis, and many others—will not be discussed here as such, although some of them might actually serve as or substitute for a psychedelic drug in certain circumstances. Even tobacco has historically been used to incite shamanic trance that must in a certain sense be considered a psychedelic state of consciousness. The line must be drawn somewhere, however, and in terms of reliability, clarity of the produced altered state, minimal "noise" or negatively interfering effects, universality of application, accurate memory of the experience and other factors, only the three mentioned substances are here classed as psychedelic. All the other mentioned drugs and preparations will be referred to as "psychoactive"; some may be truly hallucinogenic such as the medieval witches' "flying ointments", others such as "ecstasy" may more accurately be thought of as "empathogens" or "entactogens".

for the aforementioned controversy, that provided a necessary spark igniting 1960's counterculture, that encouraged scientists of many disciplines to engage in research, that incited prohibitionist elements in the public eye and government to create a veritable moral panic leading to laws that for a time essentially ended legitimate research... And so we must understand all that has happened since the 1950's psychedelic début in that context.

I will readily accept the criticism that I have few official credentials to be writing about topics such as neuroscience, psychology and cognitive science, or even the more obvious aspects of human evolution. Perhaps a team of experts in these fields should get together to write the Theory, but since much time has passed without the least indication that such a team will ever be formed,[10] and we children of the 60's are disappearing from the scene at an increasing rate, I thought I would go ahead and take the risk while there are still long-time psychedelic voyagers around who might enjoy the result of my efforts.

I suppose it is for them especially that I am writing, as well as for the ensuing generations of youngsters who might become interested in just what all the fuss was about way back when their (great) grandparents were inventing new freedoms... As for any professional scientists who might be reading this, I would ask some leeway for my non-expert use and perhaps abuse of your disciplines, and recommend that you view this Theory as a whole, as a puzzle that has been cobbled together from many pieces that perhaps didn't quite fit, yet nevertheless admit that the overall picture that has resulted does seem to be in relatively good focus. I will do my best in the following chapters to show how the interlocking pieces of this puzzle show support for and even necessitate each other, and thus why the Theory must be evaluated and accepted (or rejected) as a whole.

The cross-fertilization of the Theory from various disciplines has permitted some clarity in the overall picture the Theory presents, but along the way has required some questioning and even provisional revision of certain widely-accepted paradigms. Here, too, some criticism will follow, but according to Thomas Kuhn, defending the faith is encountered not only among the religious, but also those "religiously attached" to certain scientific views.[11] Kuhn also chronicles the fact that those workers who ignite scientific revolutions are most often young, and outsiders to the field they revise. Although young only in spirit, I am as noted, certainly an outsider, so I will take refuge in Kuhn against attacks that demonstrate an unwillingness to admit that *all* science is provisional and subject to renewal, and that my present task *requires* that I take some liberties with current scientific viewpoints. Many have attempted to understand the psychedelic experience from within current accepted paradigms, and to my mind, none have succeeded very well. But to demolish or revolutionise certain paradigms of science is hardly my goal—I am all for letting sleeping dogmas lie—yet if it turns out that a side-effect of a more complete understanding of psychedelic drugs leads to such an eventuality, I will be greatly amused. While some sciences have attained a near perfection that makes major revolution highly

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10 What would be required is an interdisciplinary team with experts from the biological sciences, from psychology and psychiatry, mathematicians and physicists, even poets, historians, theologians and musicians, all of whom having the requisite experience with psychedelic states. Not an easily assembled group!

11 Kuhn, Thomas: *The Structure of Scientific Revolutions*. The University of Chicago Press, 1962. The replacement of a paradigm—rendered obsolete by accumulated anomalous data—by a new paradigm has often been a lengthy process. Old die-hards defending the former are usually the "authorities" in control of the situation while those having introduced the new paradigm are the "young upstarts" who "nobody listens to"—the tale is well told in *Structure*—required reading!

unlikely, some others, notably the “sciences of man”, may well be ripe for revolution. And it is here that I have found some current ideas in conflict with what psychedelic states of consciousness show us.

The Necessary Pathway

As I hinted above, the necessary pathway of evolution has produced in *Homo sapiens* an unfinished work. This was an unavoidable outcome of evolutionary development: the so-called human predicament could not have been otherwise. Only man himself can—intentionally—now bring about the betterment and perhaps even the perfection of his species. How to achieve this goal? None of the methods tried so far seem to have succeeded on a scale sufficient to avoid a deplorable present and very nasty future for planet earth, and in the opinion of some, at least a few have made matters far worse. In view of the rapidly materializing global catastrophes we all know are threatening and now largely unavoidable, we dare not ignore a new approach —even one that may seem fanciful, unprecedented, yet upon close examination based on our own history and prehistory.

2. 1968 - Off to Mexico

If at first the idea is not absurd,
then there is no hope for it.

—Albert Einstein

New York's version of the Summer of Love has turned decidedly sour. Now the slogan of the moment is no longer “Peace and Love” but rather “Up against the wall, mother-fucker”. Increasing popularity of speed (methamphetamine), cocaine and heroin seems to be a factor, drugs that might well be thought of as anti-psychedelics. And for me the bring-down does not end there: I have been called up to risk life and limb in Vietnam. Time to leave on an adventure more propitious, and if risky, at least by my own choosing. Little did I suspect that the adventure was destined to occupy the next quarter-century of my life.

Along with a few friends, I follow in the footsteps of many others, both professional and amateur, who have sought to know more about the astonishing collection of psychoactive plants indigenous to the tropical and semi-tropical regions of the New World. Native Americans had discovered these plants many thousands of years before, and without exception they came to be of major importance for the tribes and civilizations that grew to prominence long before the arrival of the White Man.

A friend from university days has come along, offering to assist me in my project of finding and experimenting with some of these mysterious plants. Another is to meet a friend who has established a modest trade with rural farmers who grow the famed variety of cannabis known as Acapulco Gold. Another seems merely to be along for the ride. And of course we are all in that stage of youth where little risk is perceived in launching into the most adventurous of projects with little more than a total faith in one’s ability to improvise. From the wisdom of middle age, this could only be seen as a recipe for disaster; from the perspective of youth, it is the essence of opportunity.

I have brought along some rudimentary laboratory equipment and my assistant and I install ourselves in a little rented bungalow on the outskirts of Guadalajara. We plan expeditions into the countryside both near and far to look for the psychedelic plants which beckon like some species of Holy Grail oh so unholy to that society we left behind. At the public market buying oranges we discover we have already succeeded in our first objective, for on the upper level there is an entire wing of the market devoted to stalls selling traditional medicines and shamanic items of the most diverse character. Whole Peyote cacti are suspended in rows along the shop windows, and are hawked to gringos passing by. It is difficult to judge whether the twinkle in the eye of the shamanic apothecary at the prospect of daily increasing sales of such a common item is even greater than that in the eye of the prospective rebel from American Ignorance about to embark on the most ancient voyage of mankind.

We negotiate for a fifty kilo sack of Peyote cactus to be delivered the next day and depart. To say that our spirits and anticipation are high captures only the most sublunary aspects of the moment. Over glasses of orange juice, about the safest drink available in Mexico, my assistant and I review our plans for isolation of a total alkaloidal extract of the sacramental plant, a preparation that should produce the exact effect of peyote taken the traditional way, but

without the nausea and discomfort produced by the high content of soap in the raw plant material. The active psychedelic fraction of the plant we know contains several closely related alkaloids, and we want to test the hypothesis that this blend of alkaloids produces a psychedelic experience superior to that of synthesized mescaline, the principal alkaloid of the mixture. We have both taken the synthesized alkaloid in New York on one or more occasions, and although the resulting experiences were complex, mysterious, highly instructive, and certainly intense yet gentle, we feel that there was a certain lack, difficult to put your finger on, of the sense of spirituality described by those anthropologists and other researchers who had undergone the experience with the natural product during the Native American ceremonies. The ritual and setting of such ceremonies play a major role we know, but our intent is to test the effect of the psychedelic preparation itself in determining outcome.[12]

The next few days are occupied with slicing, preparing, and drying the cactus tops, and we even replant the conical tuber-like remains so that they have a chance to regenerate the parts we have amputated. A kitchen blender facilitates a primary extraction with aqueous alcohol, and a series of liquid-liquid extractions to remove the soaps, chlorophyll and other miscellaneous impurities results in our proud possession of a small flask containing an amber, semi-crystalline syrup, practically odorless but having the characteristic taste of synthesized mescaline sulfate. From here, chromatographic or other simple processes would be capable of separating the mixture into its component alkaloids, but we are interested in this natural blend and load several double-zero gelatin capsules with two hundred milligrams of the syrupy elixir. From this vantage point, the prohibitionist fanaticism of the land we left only a few weeks ago seems as remote as home probably seemed to those first barbaric explorers who pillaged this land and tried to eradicate forever the knowledge of the mysterious substance we have just bottled. How different our intentions from those of our ancestors!

Anyone who has tried to write an account of even a mild psychedelic experience will know the minimal power of words to describe that which is not only indescribable, but beyond language itself. Language seems to me as merely a sort of resonance to experience, a symbolization coming somewhat after the fact, and capable of dealing with only the established habits and routines of thought and perception. The totally novel experience, if such a concept be allowed, can have no ready-made language patterns to activate. And perhaps an inverse effect is true as well: in meditation, we are told by its adepts, the quieting of the inner dialogue leads to a purified perception of reality, unsullied by the categorizing imperatives of language. Freed from such restrictions, *every* experience is potentially unique. Even the most trivial of everyday situations has its originality, but it is the learned, devastatingly efficient habits of mind which cause one to feel that it is necessary to *cope* with a plain and mundane reality rather than *celebrate* a unique and mysterious one. Hence boredom at the apparent sameness of the events of daily routine displaces the inescapable but elusive magic of even a moment of plain-old-everyday life lived with true freedom.

Somehow the Peyote extract we took the next day produced such a freedom from the known. Pure experience seemed to flow from some mysterious source to which the resonance of language was not only lacking, but completely superfluous. Those of us who sat together during that voyage sensed this astonishing reality not with fear, nor despair at the inability of normal conscious processes to analyze or explain this strange way of

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12 As I would slowly learn during the coming years, the matter is at once more complicated yet in the final analysis, quite simple. If that sounds paradoxical, please bear with me.

perceiving, but rather it seemed that this state of mind, this method of perceiving reality, was aboriginal, the way things happened long ago when humankind was only beginning his long journey into civilization. And what was more, we clearly realized that this aboriginal mode of perception was not at all primitive, nor limited in its ability to deal with modern life. On the contrary, it utilized and *required* the entire capacity of one's being, it was in fact larger and more comprehensive than normal everyday, routine consciousness. It seemed that this was the way the mind would work all the time if it were not being *impeded* by the afterglow of the aforementioned evolutionary necessities as well the narrow forms humankind *had imposed upon himself* through the establishment and maintenance of certain styles of civilized societies. From that point of view, it was obvious that Western Man had, step by step, backed himself into a spiritual corner from which, although he had achieved impressive control of the mundane, mechanical aspects of reality, he had lost something not primitive, but essential. Thus it seemed that the Native Americans, who had used these miraculous plants as existential medicines since the beginning, had kept possession of that something which the white man had long ago lost, and the Native American societies that resulted were by comparison ecological in the true sense of the word, having a balance and corresponding lack of destructive contradiction both within their societies and also in relation to the environment.

During the next few days, I began to realize that with the new restrictions on research with psychedelic agents, and the continued marginalization of the remnants of Native American societies, Western Civilization was attempting to drive the final nail in the coffin of a vast body of psychedelic knowledge—that current trends were the culmination of a 500-year-old process designed to eliminate an embarrassment to the conviction that wisdom and progress were the rationale behind the spread and hegemony of European Civilization to every corner of the earth. And not only the rationale: Western Civilization now appeared to claim to be the *sole possessor* of the very *concepts* of wisdom and progress. Anything that could be done to dampen this enthusiasm to ignore, vilify, and destroy everything that was not Modern, not Advanced, not Scientific, not Civilized, I saw as not only a worthwhile project, but as an undertaking one would be *required* to do on the basis of simple moral principles. I had no alternative but to apply any modest talents or abilities that I might possess to discovering the mechanisms by which these psychedelic chemicals produce their effects not only on the brain, but on the mind and spirit; to finding the link between the widespread use of such substances among the most ancient tribes of men, and what that might indicate about the evolution of the human species; to understanding what the current fanatical attempts to prohibit the use of these substances and even stifle further research by qualified scientists indicated about the underlying psychology of the Modern Western Attitude; to discovering whether knowledge about these and other aspects of psychedelic use might provide a key so badly needed by the whole range of the sciences of man to overcome widely recognized limitations of these sciences not only to explain but above all to improve the deplorable condition of human social interaction in this century of disaster. Were these the medicines of a long-lost age, of no further use to humankind in his now modern world, or could we discover that they might still be useful, perhaps essential for a future which did not include the suicide of the species and the ruination of the planet?[13]

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13 2018 Update: "Suicide of the species and the ruination of the planet" have become the talk of the town these days, but for those who have forgotten, or who were not yet cognizant, it was already quite obvious to we 60s "revolutionaries" that ecocide, ruination, and probable extinction were the *inevitable consequences* of what Western Civilization and its "end-stage capitalism" were all about.

The moral imperative that I perceived then, combined with the normal predilection by youth for daring deeds, left me with little doubt as to my future course of action. The probability that I would find it necessary to become an outlaw was of no great consequence to me—it was an exciting concept that it might be possible to be an outlaw from American Civilization and be morally justified in doing so. In fact, I was already an outlaw, a draft-evader, and I had just been dabbling with forbidden fruits in a most *serious* way, as a scientist practicing his art in defiance of the law of the land. How rare the opportunity to be able to practice a *forbidden* science in this day and age! The concept itself put paid to many arrogant assumptions about the rationality of the American Way of Life and its justification for eliminating any and all competition to its oxymoronic philosophy.

Rigor

I cannot pretend that the work in which I engaged over the next several years was serious research on a par with what our modern academic institutions would accept. But in light of the severe handicaps that have always been the limiting factor for progress in the understanding of controversial or forbidden subjects, I think I may have nevertheless achieved something of value toward a broadly based Theory of Psychedelic Experience. Of course there were others, many others, in fact, who were working on pieces of the puzzle presented by modern man's rediscovery of the ancient psychedelic medicines. Some researchers who, previous to the newly instituted restrictions, had been working on the most diverse and interesting aspects of the effects and uses of psychedelics both therapeutic and aesthetic, continued their work in diminished, or at least different ways. Although they were forbidden to give a psychedelic drug to any medical patient or (more importantly) research volunteer, substitute methods for activating a psychedelic state were used, sometimes with reasonable success. Some other workers continued with theoretical work based on previously accumulated data, and a very few obtained permission to continue with biochemical experiments with psychedelic drugs given to various laboratory animals. Sadly, permission for such work seemed much easier to obtain when the proposed research might show that the psychedelics were harmful, broke chromosomes for instance, or lived up in some way to the irrational fears of the prohibitionist elements in American institutions. But even if some of these experiments were little more than overdose parties for rats, they did produce valuable data on, for example, the sites of action of psychedelics in the brain.

Even more tragically, however, some very gifted workers left psychedelic research entirely, unable to continue meaningful work. Prohibition of the use of some substance like alcohol, tobacco, tea, cannabis, opium, or anything else you can name, is historically so easily shown to be self-defeating, that it bewilders the rational mind to attempt to understand the philosophical outlook of those otherwise intelligent humans who propose that man can be protected from purported folly by the simple expedient of the passage and enforcement of law.[14] One would have to hypothesize ulterior, perhaps unconscious motives on behalf of those who propose and maintain prohibitions, or conclude that they are not rational human beings at all.

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14 On moral entrepreneurism and the folly of drug prohibition, there are a great many books to choose from, see particularly Wagner, David (1997) *The New Temperance: The American Obsession with Sin and Vice*, Westview Press, Boulder, Colorado. My online review provides an excerpt, "Demonizing the 1960s," of particular relevance for our present purposes concerning the conservative reaction against the 1960s freedoms and psychedelic drugs. See Webster, P. "Holy Wars," *International Journal of Drug Policy,* 10, Issue 1, 1998 pp63–69. The review is available at *IJDP* online at or at The Psychedelic Library. Required Reading!

It is even more difficult to understand the philosophy of prohibition of an avenue of scientific research. This is not to say that there should be no control whatsoever of scientific research activities by peers in universities and specialized agencies of government. If over-enthusiastic pursuit of profit by biotechnology companies seems to be leading to potentially dangerous situations such as widespread and untested release of bio-engineered organisms into the environment, safeguards must be installed: the biotechnology enterprise is not simply eradicated by fiat. Government agencies and legislative bodies have not seemed unduly worried about proven deleterious world-wide effects of research on nuclear energy or weapons. The prohibitions on psychedelic research may well indicate ulterior motives and hidden agendas by those at the center of power. More importantly, if more difficult to analyze, the prohibition must indicate some inherent collective psychological conflict at the very core of the belief system of Modern Western Civilization. It is as if, collectively, we have no greater fear than that engendered by the rediscovery of a most ancient, important, and uplifting practice and phenomenon, the psychedelic experience. This is most curious.

In the wake of repression then, there arose another group of psychedelic researchers, which like other groups down through the history of acts of repression by the powerful, was effectively driven underground to an at least temporary obscurity. In the middle ages there were the alchemists, purportedly looking for ways to make gold from something less valuable, a project that certainly would meet the approval of the acquisitive ecclesiastical authorities of the time. The true, hidden alchemical quest, if we can believe some modern interpretations, would not at all have met the approval of an authority proclaiming its monopoly on spiritual matters. No one today would deny the historical existence of the underground aspect of alchemy in the middle ages, a pursuit which of course bordered on witchcraft, wizardry, and sometimes sheer lunacy caused perhaps in some cases by exposure to toxic heavy metals such as lead and mercury, favorite substances for the alchemists. Nor will the modern historian of science deny the influence and importance of much of the work of the alchemists for the succeeding generations of researchers who made the beginnings of a modern science out of a diverse collection of arcane experimental data. But the existence of underground science today, practiced by a fraternity of no less colorful and sometimes equally as crazed individuals as the alchemists, must be dismissed as a fairy-tale by those authorities who have been instrumental in bringing about the very situation from which underground science must necessarily grow.

Underground science has many limitations and difficulties that the establishment scientist never need suffer. There are no universities and publicly financed institutions allowing research to flourish and researchers to enjoy a reasonable standard of living including the respect of society and sometimes even fame and fortune. Under severe repression, underground scientists have little chance even for peer review of their work, not to mention journals for publication of their papers, or conferences, research grants, awards..., and always the threat of moderate to severe penalties meted out by the Inquisitors.

To be fair, there do exist a few journals, and some excellent books that have been published during the Years of Inquisition, and even a few conferences have brought together luminaries in the field of psychedelic research. Since the late 1980's, a few limited research projects with humans have been approved using some types of psychedelic drugs in treatment programs for addiction or other psychological problems, or in metabolic studies.[15]

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15 The paragraphs here represent a general view of the situation in the 1980s, when they were written. More recently, research – especially in Europe – has gained further freedoms for study, see for instance the review by Preller and Vollenweider, "Phenomenology, Structure,

3. Morning Glory

In any field find the strangest thing
and then explore it.

— John Archibald Wheeler

Later on that year. We have been building up a stock of seeds of the "Heavenly Blue" morning glory, *Ipomoea violacea*, a vine that grows widely in this area of Mexico. A short drive out of the city in any direction leads to the discovery of some extensive stand of the plant, and we look for groups of boys playing and gather them 'round for a short lesson on economic realities. It seems that we offer hard pesos for anyone who will gather these funny little black seeds for us, and be here on this spot in exactly one week. Returning after a week we usually find only one or two of the boys has taken us seriously and actually collected even a coffee-can full. But when the scales come out of the back of the pickup, and hard cash changes hands for what would seem to all excepting gringos a worthless commodity, eyes widen with dreams of transistor radios. Mexico is a tragically poor nation, and our harvest of seeds has, upon last inventory, attained rather amazing levels with very little expense.

True Research

Our Peyote experiments have been a resounding success. We have sent capsules of our extract to several aficionados of psychedelic preparations, and received very positive reports comparing the natural alkaloidal blend favorably with both natural peyote and other psychedelics. Institutional researchers would of course immediately dismiss our results as anecdotal and subjective, and we certainly have not troubled ourselves to do "double-blind" experiments as would be expected for "scientifically legitimate" results. The legitimacy of our results is, for better or for worse, not dependent on institutional acceptance, but upon the opinions of those whose wisdom we have come to respect. A Peyote shaman, asked to perform a double-blind ceremony using our preparation, would be as correct to ridicule the idea as we would be in ridiculing the institutional scientist for criticizing our lack of such protocol. We quite enjoy the eclecticism of the middle ground we have staked out for our research paradigm.

The modern institutional requirements for acceptance of research have been sometimes accused by even notable scientists as not only too strict and exclusive, but also as being ignorant of the methods of a great deal of

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and Dynamic of Psychedelic States" in *Current Topics in Behavioral Neuroscience,* Springer-Verlag 2016. Yet the alleged goals of research are still predominantly *medical,* the drugs being tested and used for curing medical or psychological conditions, i.e., the attempt to *restore* an individual to a state of psychological health. As this book asserts, this is not at all the most important potential for the use of psychedelics. Consider for example the work of Harman and Fadiman et al. in the 1960s, where moderate doses of psychedelic drugs were administered to talented individuals to test the ability of a psychedelic state of consciousness to augment creativity. See Willis W. Harman and James Fadiman, "Selective Enhancement of Specific Capacities Through Psychedelic Training" in *PSYCHEDELICS, The Uses and Implications of Hallucinogenic Drugs*, Bernard Aaronson and Humphrey Osmond, editors, Doubleday & Company, 1970. Paper available at The Psychedelic Library

exceptional and ground-breaking science before the present period.[16] Single-case studies, subjective reports, experiments which are not, in principle, repeatable, and other (according to modern dogma) "non-scientific" methods we are free to use and interpret with our own guidelines. When an unrepeatable, subjective experiment leads us to an heuristic or empirical model and thus provides a component for a theory which then accurately predicts the way for further research, criticism based upon the nature of the original experiment sends the distinct message that the critic has "his eyes in his pocket and his nose on the ground". And in the field of psychedelic research, trying to achieve the "hardness" of results that academics insist is so important is often like trying to catch the wind.

The psychedelic experience is by its very nature unrepeatable, each one is unique, and this has led to difficulties in defining the "effects" of psychedelic drugs. In the next chapter I will deal with the multitude of purported "effects" of psychedelics and why experimentation has so often led to confusion when the presumption of classical cause and effect relationships is the guiding paradigm of experiments.

More Experiments

The one significant disappointment of the Peyote extract is that it is unstable. Within even one week, a 500 milligram dose is just perceptibly less potent, and within a month the potency of the dose is significantly reduced. Since the stability of the dried cactus tops had been reported to be exceptional, a noted authority on the subject calling the buds "practically indestructible", it is obvious that the "impurities" we have removed in our process are essential to preserving psychedelic activity of the raw alkaloidal mixture. This result, combined with the necessity of processing large volumes of material to produce enough extract for even twenty or thirty doses, make any practical use of the product prohibitive. It is expensive to produce and fragile. In addition, we feel that any attempts to produce a stable preparation by further processing would probably nullify the advantages of the broad-spectrum alkaloidal extract principle that we have tested. We have therefore turned our attention to preparing and experimenting with extracts of the morning glory.

At least two species of morning-glory seed have been used since antiquity as divinatory agents by the Amerindian shamans of Mexico. The *Ipomoea violacea* we have collected seems to grow just about everywhere, and is, in fact, the exact same plant that horticulturists have introduced in Europe and the U.S., the ornamental "Heavenly Blue" morning-glory vine. The second psychedelic species, *Rivea corymbosa*, we have found only further south, but in the scientific literature its reported habitat is the entire coastal area of the Gulf of Mexico. We obtained about a kilo of seeds from a local source, but did not seek out larger quantities since our supply of *Ipomoea violacea* was quite sufficient, and of the two species, was also the most potent.[17]

An interesting page in the history of the biochemical study of alkaloids was

16 See "Criticisms of LSD Therapy and Rebuttal" in *The Hallucinogens*, Hoffer and Osmond, Academic Press, 1967, pp197-205. (And at The Psychedelic Library) Humphrey Osmond was one of those rare scientists equally at home in the research institute as in a Native American peyote ceremony, and his research is illustrative of the open-mindedness yet scientific rigor which go hand in hand to produce great scientific advance. Dr. Osmond was the one to introduce Aldous Huxley to psychedelics.

17 For further information on the two species of morning-glory and their use by Mexican Amerindian tribes including a few isolated groups still today, the reader is referred to the *Botanical Museum Leaflets of Harvard University*, November 22, 1963, Volume 20, No. 6. This issue contains an important article by R. Gordon Wasson, a luminary and one of the originators of the science of ethnobotany, and another article by Albert Hofmann, inventor of LSD, and discoverer of the active principles both of the morning-glory and the Psilocybe mushrooms of Mexico.

recorded the day in 1960 when Albert Hofmann presented his findings about the identity of the alkaloids of the morning-glory to a symposium in Melbourne, Australia. Until that day, it was believed that the only natural source of the lysergic acid alkaloids was the parasitic fungus of grasses, *ergot*. In the plant kingdom there are extremely diverse plants, from primitive fungi to the highest species of flowering plants, that produce the biochemical substances known to chemists as alkaloids. These natural plant substances are widespread, and so diverse in their nature that no simple or unique reason for their evolution can be postulated. And their diversity and complexity is such that it is rare to find the same alkaloids in two different plants even if they are close evolutionary neighbors. When Dr. Hofmann announced that the alkaloids of the morning-glory vine (a plant far removed on the evolutionary tree from the more primitive ergot fungus) were also derivatives of lysergic acid, many in the audience of scientists were plainly incredulous. Despite the impeccable reputation of Dr. Hofmann and the Sandoz Laboratories of which he was a director, more than one group of scientists attempted to disprove the findings. One group thought that the seeds used must have been contaminated with some species of ergot-like fungus and published a paper to the effect. Painstaking further work in which seeds were carefully dissected and shown not to be infected with any type of fungal spore or growth finally proved the location of the alkaloids to be concentrated in the embryonic material of the seeds.

We had obtained reprints of all the relevant scientific papers in New York and were now ready to prepare a large sample of the morning-glory alkaloids for further experimentation. As with our peyote extraction, we wished to obtain a total alkaloidal extract of the seeds even though it had been postulated by some that only one alkaloid of the group was the active psychedelic component. Hofmann had suggested that probably four or five lysergic acid derivatives might be active: lysergic acid amide, isolysergic acid amide, lysergol, elymoclavine and perhaps ergometrine. We thought it of great significance that the first two of these compounds, and the last as well, have a structure practically identical to LSD. The fact that the use of LSD-like psychedelic agents had been as significant as of the Peyote cactus or psilocybin mushrooms, at least in this area of the world, made claims that LSD was a modern, synthesized, and therefore “unnatural” psychedelic drug seem rather ill-conceived.

Hofmann and his co-workers had made several tests of the psychedelic activity of their own extracts, both as broad spectrum mixtures and also of the separated alkaloids, but their self-administered dosages had not reliably produced much more than minor effects. Our first goal would therefore be to obtain an extract which, when taken in a dose roughly equivalent to that used in Native American ceremonies, produced some effects of significance. We based our extraction procedures both on published analytical work, on generally accepted routines for chemical extraction of alkaloids, and gave some consideration as well to the methods used by the shamans in preparing seeds for their ceremonies. In tribal use, the seeds are first ground to a fine flour, then soaked in cold water. After a short time, the liquid is filtered off and drunk. This would indicate firstly that the active components were readily soluble in water, and secondly that other components of the seed, not so readily soluble, might possibly interfere with the psychedelic effects or produce diverse effects of their own. Such a hypothesis might explain the inconsistent results of some workers who had experimented with *Ipomoea* or *Rivea* seeds and found them lacking in activity.[18]

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18 For a more recent discussion of the subject, see my article “Kykeon Chemistry” in *The Road to Eleusis – Unveiling the Secret of the Mysteries,* Thirteenth Anniversary Edition, North Atlantic Books, Berkeley California.

Lysergic Acid

A second goal for our work would be to try to obtain pure lysergic acid from the seed extracts by chemical hydrolysis.[19] A rather large industry had evolved since the turn of the century which produced the alkaloid ergotamine from a laborious process of growing the ergot fungus on rye grass. Ergotamine had been a widely used lysergic acid alkaloid for decades, but recently other derivatives of lysergic acid had been found to be more useful for most pharmaceutical purposes, and to produce them, the ergotamine yield from ergot was first hydrolyzed to lysergic acid, then appropriately reacted with various amines or other compounds. It was work of this type that had led Hofmann to synthesize LSD by reacting pure lysergic acid, via an intermediate, with diethylamine.[20] We intended to evaluate the possibility that morning glory seeds might someday provide an alternate, or even better source for lysergic acid than the ergot/rye process.[21] We would at the same time be determining if it were possible for an underground chemist, using morning glory seeds instead of ergotamine (which was tightly controlled and difficult to obtain in the West), might produce small amounts of LSD with very little risk. I say small amounts, because the alkaloid content of morning glory seeds had been assessed at barely 0.06%, and assuming normal losses and other factors it would therefore be necessary to process perhaps a hundred kilos of seeds or more to produce even a gram of LSD. Still, due to the vanishingly small effective dose of LSD, such a process was far more a practical possibility than that necessitated by the required minimum dose of Peyote extract, more than two thousand fold that of LSD.

Threatened

To me, it was one of the greatest absurdities ever perpetrated that persons of reasonable attitude and situation, and with proper guidance, might not have access to substances which had proved not only valuable, but essential to so many societies of man down through the ages. If societies that we ignorantly called primitive could use these medicines to advantage, where was the logic in the belief that suddenly these same substances presented some kind of grave threat to man in the Twentieth Century? One of the top prohibitionist agitators of the time had made the preposterous statement that LSD was “the greatest threat facing the country today...more dangerous than the Vietnam War.”[22] If certain excesses and unwise use of the psychedelics were appearing in American society it was not very difficult to see that if one single thing could be designated a cause of the problem, it was the prohibition itself. And how could a society purportedly so grounded in the logic, rationality, and intellectual pursuit illustrated by its great scientific achievements come to be so hoodwinked, so *deprived* of its rationality, so easily led into absurdity,

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19 See the final sections of this book for information on the hydrolysis of lysergic acid compounds.

20 Additional information on these chemical transformations can be found in the last sections of the book.

21 We were unaware at that time that two pharmaceutical companies, Sandoz and Farmitalia, were perfecting methods to grow the mycelium of ergot in stirred vats filled with nutrients. This process was able to produce high yields of an alkaloid much easier to use for further synthesis than ergotamine, paspalic acid. With the introduction of this method, other processes depending on production and harvest of either ergot or morning glories would be of little comparative utility for the synthesis of the several semi-synthetic pharmaceuticals based on lysergic acid. Ergotamine itself, however, would remain a widely-used medication for migraine and prevention of postpartum hemorrhage.

22 A statement by C.W. Sandman, Jr., chairman of the New Jersey Narcotic Drug Study Commission.

when it came to the subject of “drugs”?

One clue came from the observation that it seemed necessary to have had some personal experience with the substances. This very same problem had been observed in the early days of psychedelic research, before their prohibition. Almost without exception, the researchers who had themselves taken psychedelic drugs produced much more intelligible and significant work than those who had abstained, for one reason or another. But soon the abstainers were publishing accusations that personal exposure to the substances had caused researchers to be biased, even that they had suffered permanent deformations of personality, were delusional and no longer competent to judge the results of their own experiments. Two researchers, Cole and Katz, went so far as to flatly state in a paper that “only claims made by therapists who have not themselves taken LSD are valid”. As Osmond wryly observed, the same critics who were accusing enthusiastic researchers of having suffered permanent personality changes due to their use of psychedelics, were at the same time *denying* that such personality changes could be brought about in experimental subjects or patients!

It seemed to us that if such irrational battles were raging in the halls of academia, the only hope for the common man to see behind the curtain obscuring the wisdom of the ages was to be persuaded by a friend to find out for himself. The knowledge of psychedelics was then something that would have to pass from hand to hand among friends of mutual trust and respect; that same knowledge would be met publicly only with outright rejection, or worse. Despite the apparent confidence of Modern Civilization that it was the very epitome of rationality, the issue of the prohibition of psychedelics had to be diagnosed as indicative of grave underlying contradictions in the paradigms and beliefs of that civilization. And the nature of these contradictions could only be understood by viewing them as a collective psychological phenomenon, a view which took on a certain forcefulness and poignancy from within the psychedelic experience itself. What a privilege to be party to such knowledge! And it was more than mere knowledge, it was Wisdom for it made you weep to see it thus, and to realize the odds against counteracting or curing the situation, even on the simplest of levels. To correct *one's own* metaphysical outlook in the midst of such confusion was already a tricky task for most, even *with* psychedelic assistance.

4. Effects of Psychedelic Drugs[23]

It is perfectly natural that man himself
should be the most unintelligible
part of the universe.

— Alan Watts

The extract of *Ipomoea violacea* that we had prepared radiated power, just sitting there in its flask. A light amber, odorless syrup which, in the darkened laboratory fluoresced brilliantly blue under ultraviolet light, it was an extreme contrast with the series of messy, difficult to purify, dark-colored and discouraging volumes of intermediate sludge we had treated, and brought to mind the Curies and their arduous separation of a few tiny crystals of glowing radium from a mountain of pitchblende. The difficulties had, however, taught us much about ways in which we would modify our processes for future work. As for the extract, the following day would see the first test of its activity, with myself as the guinea-pig. I was by this time hardly a novice in self-administration of my own preparations or in the estimation of what effects they might have. I was, in fact, quite adept at taking most any supposed substance of enlightenment and avoiding nasty complications if the brew turned out to be bogus. On many occasions in New York, more than a little caution had been required to avoid not only the classic "rip-off" but also the inevitable dangers that Prohibition naturally produced. Once, a purported sample of magic mushroom I was offered proved to be only a few wasted store-bought C*hampignons de Paris* laced with powdered datura seeds. Although hallucinogenic, the experience of datura was not for me the least

23 I will forgo a chapter on the history of psychedelic use, as I have little to add to the many accounts that have been published. I will, however, have much to say about *pre-history* in a subsequent chapter. The reader should be warned, however, that the use of a vast array of psychoactive drugs since time immemorial has not merely been the province of a few oddball tribes, primitive and remote, or something that can be safely ignored when theorizing in anthropology or human biological and social evolution. Nothing could be further from the truth. Psychoactive drug use use appears to be the rule, rather than the exception, in every corner of the earth where man has developed. And not just in times we may safely relegate to the stone age: I have already mentioned the strong likelihood that lysergic acid alkaloids were important in Greek Civilization over a period of nearly two thousand years. Once acquainted with the wealth of evidence concerning early use of psychedelic and other psychoactive drugs, the reader or researcher who then picks up a new book on anthropology, religion, human evolution and the evolution of consciousness and finds no relevant entries in the index, will have immediate and compelling reasons to question the author's scholarship! The discontinuance of use of psychedelics for most non-Western societies seemed to coincide with the arrival of European "civilizing" influence, yet stubborn traces of psychedelic use persisted widely until modern times, as witnessed by recent studies of Central and South American Amerindian tribes, and of course the widely known use of peyote by members of the Native American Church. The discontinuance of psychedelic use in Western Civilization itself coincided with the rise of the Roman Church as the primary political power in the world. From the early centuries of the Christian epoch, the use of such substances was declared the occupation of heretics, outcasts, witches, primitives or other similarly uncivilized, satanic elements. The Church, of course, saw no contradiction in the wholesale slaughter of such groups for their own good. Continuing psychedelic use over the centuries in many parts of the world has thus been a carefully guarded secret, and modern estimates of its frequency and importance are probably grossly underestimated. An update on the Church would be appropriate here however: Several recent publications by Carl Ruck and co-authors have amassed considerable evidence that the medieval and Renaissance Catholic Church *insiders* were no strangers to psychoactive drug use!

insightful, nor did it leave me with an experience which hinted at dimensions normally closed to everyday perception. I spent a few unrewarding hours also with Owsley's famous STP, which in the original dose was far too strong for human consumption. Fortunately I took only a quarter-dose, there having been evidence of difficult times for others with this synthetic drug.

The morning-glory extract provided not a nasty surprise, but a powerful surprise none the less. It was in many respects the most powerful experience I had yet encountered. Perhaps the methods of our extraction had yielded a product more representative of the shaman's recipe than the preparations obtained by other investigators, who reported only modest psychedelic effects. The experience of that day was hardly modest, from the beginning moments it certainly did not fail to inspire reverence and humility, no matter what the direction to which I managed to guide it. The colors and geometric patterns, the rippling waves so often seen in watching clouds in the sky, the slowing of time and other typical effects so frequently described in the literature had some time ago become only minor and unattended aspects of psychedelic experience for me. Certainly, I still noticed these effects, if I took the trouble to pay attention to them. But the psychedelic experience had become for me far more an arena for the Herculean task of attempting to achieve the truly original perspective for exploring the fundamental questions that man has posed since the beginning of time. It was the task of freeing oneself *completely* from preconceptions, from habits of thinking that affected the outcome of seeking in unknown and unconscious ways. And of course, it was paradoxical, if not impossible to erase these filters of comprehension completely. To a very significant extent, comprehension *consisted of* these filters. Nevertheless, the psychedelic experience seemed to go quite a good distance in providing this ability, if one were ready to use it. Particularly the experience of that day.

The Shaman's Task

An additional very serious question that I have examined practically every time I undergo an experience is that of my position in giving a psychedelic drug that I have prepared to another person. The peyote extract, and now the morning-glory alkaloids would be given to friends, and their friends perhaps, and it seemed necessary to explore where the experience of these substances might lead for others than myself. As I indicated above, I would recommend datura for no-one, and Owsley's "STP" I would strongly recommend against. In the case of providing a psychedelic that I myself have prepared, it is a great responsibility, not so much for any immediate risk that an experience might entail, but rather in the sense that one thus becomes a shaman who *initiates* another human being into awareness of that mysterious something that forever remains just out of reach. The responsibility is to ensure that the one initiated shall see the significance of this event, of this process of initiation. If not, the ability of a person to achieve such insight may be made more difficult from that point on, and it is his shaman who is to blame. It is like saving someone's life, in the way some oriental philosophies understand it, if the initiation is successful. Many people, of course, are capable of initiating themselves, I certainly had, and so had many others I had known. But to manufacture psychedelic substances and distribute them widely and at random, as had been done recently in the United States, left something important out of the equation describing the power of these substances to affect important changes in those who experienced them, and in society at large. On the other hand, I could not ignore the argument that the prohibition had denied man one of his most fundamental rights, and according to the wisdom expressed by the American Constitutional scholar Alexander Bickel,

> We cannot, by total reliance on law, escape the duty to judge right and wrong... There are good laws and there are occasionally bad laws, and it conforms to the highest traditions of a free society to offer resistance to bad laws, and to disobey them.

The details of the morning-glory experience that day had much more to do with my personal idiosyncrasies of the time than with issues relevant to the present narrative. At a high point of the experience, a minor earthquake occurred which, for the life of me, seemed to be provoked by my patterns of thought, seeking answers to questions that had a certain air of being forbidden, questions that no mortal could support the weight of significance the answers would unload upon him. The whole scene would of course be dismissed as an hallucination by my analyst, if I had one. But the earth tremor was real, and it did coincide with the climax of certain thoughts I was entertaining. Although the details of such experiences may sometimes represent battles of the self against its own quirks and limitations, and on a personal level I have quite satisfactorily concluded what the experiences of that day had to teach, one still gains a cumulative and more generally applicable knowledge from profound psychedelic experience. And I believe it was the experience of that day that first started me thinking about the "effects" that these substances produced, trying to understand how they could be so different from person to person and from experience to experience. (And the experience of that day seemed to indicate that psychedelics might possibly cause earthquakes!)

Awesome Effects

Some researchers had proposed that the effects of psychedelics were more the result of *set and setting* than of the drug *per se*. This seemed to be a useful model as far as it went, but really it didn't go very far in my opinion.[24] The *setting* of a psychedelic experience was simply the surroundings, the comfortable living room or beautiful garden to be contrasted with the sterile and sometimes threatening atmosphere of the hospital wards where some early research had been carried out. The *set* was defined as the attitudes, motivations, preconceptions, and intentions of the individual, in combination with the introductory ideas and instructions that were provided by the researchers or guides, if any. Here is a short illustrative example:

> Language, however, may...be used to develop a negative set and setting. Jean Houston (1967) has described one of her initial observations of LSD administration. The subject was told by the psychiatrist that he would have "a terrible, terrible experience" filled with "strong anxiety and delusions." The drug was administered in an antiseptic hospital room with several observers in white coats watching him. As the effects came on, the psychiatrist asked such questions as, "Is your anxiety increasing?" At the end of the experiment, the subject was in a state of panic. The psychiatrist announced to the group that LSD is indeed a "psychotomimetic" substance, which induces psychotic behavior. [25]

Now here is a shaman who has failed most miserably in his responsibilities! What was so appalling about some of this early "scientific" research with psychedelics, was that it was structured not with just an ignorance, but a *willful* ignorance of methods used by the aboriginal practitioners of the same curing arts as the modern psychiatrists professed to practice. Peyote shamans

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24 After all, I could just as logically claim that the experience of *my normal everyday day* is determined by the set and setting of that day!

25 "The Effects of Psychedelic Experience on Language Functioning", Stanley Krippner, in *Psychedelics*, Aaronson and Osmond, Doubleday & Company 1970.

in the western states of the US were very likely that same day conducting psychedelic sessions in a somewhat different manner:

> The ritual developed by the Native American Church illustrates the use of language to produce a positive set and setting for the ingestion of peyote. A ceremonial leader, the head chief, initiates the singing of songs and co-ordinates requests by individuals for special prayers. The ritual is so arranged and so coordinated to the needs of the communicants that the maximum possible likelihood of a positive spiritual experience is enhanced.[26]

If the prospect of singing for his patients would seem absurd to the modern psychiatrist, he is also willfully ignorant of the great many psychedelic studies in which recorded music and other aesthetic input was successfully used to create positive set and setting. The work of Hoffer and Osmond, or of Masters and Houston are good examples:

> The LSD treatment is conducted in a comfortable, aesthetically pleasing, spacious room, in no way suggestive of a clinical setting...the therapist wears ordinary street clothes or something more casual, depending on the needs of the patient. No medical or scientific "uniform" should be worn. The session should be presented less as therapy than as educational and developmental experience. The therapist steps out of his role as "doctor" and becomes more the patient's mentor and guide, who will lead him through the unique world of psychedelic experience and enable him to profit from it...The patient should be exposed to a rich variety of sensory stimuli... Objects, when touched may seem vibrantly alive, and when looked at, may seem to breathe or undergo successive transformations. An orange that is handed the patient may appear to be a golden planet; from a piece of cork may emerge a series of striking "works of art." Joyous music usually is played to help direct him emotionally. Typically, the patient will announce that he is hearing music as if for the first time. All the senses are given an opportunity to respond "psychedelically."[27]

"Psychedelic drugs, such as LSD and mescaline, give rise to awesome and extraordinary mental changes in which perceptions are so altered from normal human experience, they cannot readily be described." Many similar statements have been made, this one is by Solomon H. Snyder in his book *Drugs and the Brain*.[28] If, as I claim, the concept of set and setting as the determining parameter of the content of psychedelic experience has only limited value for understanding statements such as Snyder's, we need a new model which not only is capable of showing what cognitive and neurological mechanisms could facilitate such experiences, how the drug might catalyze or initiate a chain of events the content of which would depend entirely on the individual, but also showing why statements about the psychedelic experience have so far been themselves awesome and extraordinary yet decidedly lacking in explanatory power.

Additionally, the new model or theory must show why there are such close parallels between psychedelic drug catalyzed experiences, and spontaneous ASCs[29] that in many instances are very similar or even identical to the former.[30] Meditation, fasting, mortification of the flesh, et al., have also been

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26 *Ibid.*

27 "Toward an Individual Psychotherapy", Masters & Houston, *Psychedelics*, (*Ibid*.)

28 *Drugs and the Brain*, Solomon H. Snyder, Scientific American Library 1986, p2.

29 Altered States of Consciousness.

30 See for instance Albert Hofmann's description of a childhood experience in *LSD - My Problem Child*, Foreword

practices aiming at ASCs as Aldous Huxley pointed out. Huxley also writes,

> What the rest of us see only under the influence of mescalin, the artist is congenitally equipped to see all the time. His perception is not limited to what is biologically or socially useful. A little of the knowledge belonging to Mind at Large oozes past the reducing valve of brain and ego, into his consciousness. It is a knowledge of the intrinsic significance of every existent.[31]

Psychedelics thus appear to be just one of many pathways to an identical destination, so a good theory of the neuropsychology of psychedelic drug action and experience must show how identical or similar brain and psychological events occur in all such cases. Such a theory would then expose psychedelic drugs as agents that incite or catalyze entirely natural neurological and psychological processes.

The Effects of Being Human

I am going to propose a view that attributing fantastic and indescribable effects to psychedelic drugs is naïve and misleading. From all we know about the complexity, ineffability, and continually surprising nature of the human mind, attribution of such causal power to a molecule seems a mere projection, and a symptom of the unwillingness to contemplate these characteristics of the human mind directly. Neither can we justify attributing such power to mere molecules in view of what is known about the neurological effects of psychoactive drugs in general. The primary neurological effects of psychedelics, like other drugs which affect the central nervous system, must be relatively simple, localized, and perhaps only minimally connected in time with the supposed fantastic attributes which follow. All the facts point toward a simple, quite easily explained mechanism for the neurological action of LSD or other psychedelics.[32] How the mind reacts to this simple change in nervous system operation is another matter, for here it is the complexity of mind itself in question.

The argument is that what LSD or other psychedelic drugs do neurologically and cognitively is simple, what the mind does complex, and if the event of ingesting a psychedelic substance is followed by some amazing mental events, it must be the case that the mind is capable of such events all on its own, or under a variety of diverse influences. The drug is in no sense analogous to a computer program, causing the brain and mind to submit to its instructions; if it were, the effects of the drug would be far more reproducible and typical.

Before describing what simple mechanism could allow a psychedelic drug to catalyze the events of psychedelic experience, let us take a closer look at what have been touted as the "effects" of psychedelic drugs. My task will be to show how each of these effects is not strictly an effect of the drug itself, but one of the many things the person and his mind *may* do under various circumstances. The choice of the word "catalyze" is appropriate, I think, for in

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31 From *The Doors of Perception.*

32 Viewing research from the most recent years, the neurological effects of psychedelics have been shown to be much more complicated than it originally seemed. Several neuro-receptors are involved, as are most of the modules of the brain and their interconnections. Yet although a given drug—in general—may have multiple effects around the nervous system, it may be that only one of these effects is the significant one leading to the overt, final psychological state. In following sections I will illustrate these claims with a proposed neurological mechanism that subsequently leads to the induced ASC. What I intend to show is that the net result of all these neurological effects is not a vast multiplicity of cognitive and psychological "effects" but a single, hidden cognitive effect *which itself then leads to that multiplicity through essentially voluntary thinking and perceiving pathways*.

chemistry the action of a catalyst is to lower an energy barrier which prevents a reaction from happening, without actually taking a combinatory part in the reaction itself.

As a starting point in my theory therefore, let us think of the effect of a psychedelic drug as eliminative of some obstacle, rather than additive: the drug functions as a facilitator of inherently possible processes, a substance which by its neurological action *allows or assists* certain natural processes to occur which might otherwise be rare or improbable. In the following list, let us see if we can understand each "effect" not as something that a psychedelic drug *does,* but as something which *we* might do, if only rarely, under certain circumstances. The list below was originally compiled as a phenomenology of ASC's[33] in general (including hypnosis, religious trance, delirious states, various intoxications other than psychedelic, etc.), and so lends weight to the argument that what we are seeing are *effects of being a human being* rather than direct effects of a drug. The list has been widely agreed to represent the major characteristics observed of the psychedelic state, although some improvement in their description could be imagined. I have edited the descriptions in the original study to a bare minimum.

> A. Alterations in thinking. Subjective disturbances in concentration, attention, memory, and judgment represent common findings...reality testing seems impaired to varying degrees. The distinction between cause and effect becomes blurred, and ambivalence may be pronounced whereby incongruities or opposites may coexist without any (psycho)logical conflict...
>
> B. Disturbed time sense. Sense of time and chronology become greatly altered. Subjective feelings of timelessness, time coming to a standstill, the acceleration or slowing of time, and so on, are common. Time may also seem of infinite or infinitesimal duration.
>
> C. Loss of control. As a person enters or is in an ASC, he often experiences fears of losing his grip on reality and losing his self-control. During the induction phase, he may actively try to resist experiencing the ASC...while in other instances he may actually welcome relinquishing his volition and giving in to the experience.
>
> D. Change in emotional expression. With the diminution of conscious control or inhibitions, there is often a marked change in emotional expression. Sudden and unexpected displays of more primitive and intense emotion than shown during normal, waking consciousness may appear. Emotional extremes, from ecstasy and orgiastic equivalents to profound fear and depression, commonly occur...
>
> E. Body image change. A wide array of distortions in body image frequently occur in ASCs. There is also a common propensity for individuals to experience a profound sense of depersonalization, a schism between body and mind, feelings of derealization, or a dissolution of boundaries between self and others, the world, or universe.
>
> F. Perceptual distortions. Common to most ASCs is the presence of perceptual aberrations, including hallucinations, pseudohallucinations, increased visual imagery, subjectively felt hyperacuteness of perception, and illusions of every variety.
>
> G. Change in meaning or significance. After observing and reading descriptions of a wide variety of ASCs induced by different agents or maneuvers, I have become very impressed with the predilection of persons in these states to attach an increased meaning or significance to their subjective experiences, ideas, or perceptions. At times, it appears as though the person is undergoing an attenuated "eureka" experience during which feelings of profound insight, illumination, and truth frequently occur.
>
> H. Sense of the ineffable. Most often, because of the uniqueness

33 Where the author refers to an ASC, it is an Altered State of Consciousness.

> of the subjective experience associated with certain ASCs (e.g., transcendental, aesthetic, creative, psychotic, and mystical states), persons claim a certain ineptness or inability to communicate the nature or essence of the experience to someone who has not undergone a similar experience.
>
> I. Feelings of rejuvenation. ...On emerging from certain profound alterations of consciousness (e.g., psychedelic experiences, ...hypnosis, religious conversion, transcendental and mystical states), ...many persons claim to experience a new sense of hope, rejuvenation, renaissance, or rebirth.
>
> J. Hypersuggestibility. ...The increased susceptibility and propensity of persons uncritically to accept and/or automatically to respond to specific statements...or nonspecific cues (i.e., cultural or group expectations for certain types of behavior or subjective feelings). [34]

Or consider the following list of effects:

> LSD and peyote are potent psycho-chemicals that alter and expand the human consciousness. Even the briefest summation of the psychological effects of these drugs would have to include the following: Changes in visual, auditory, tactile, olfactory, gustatory, and kinesthetic perception; changes in experiencing time and space; changes in the rate and content of thought; body image changes; hallucinations; vivid images—eidetic images—seen with the eyes closed; greatly heightened awareness of color; abrupt and frequent mood and affect changes; heightened suggestibility; enhanced recall or memory; depersonalization and ego dissolution; dual, multiple, and fragmentized consciousness; seeming awareness of internal organs and processes of the body; upsurge of unconscious materials; enhanced awareness of linguistic nuances; increased sensitivity to nonverbal cues; sense of capacity to communicate much better by nonverbal means, sometimes including the telepathic; feelings of empathy; regression and "primitivization"; apparently heightened capacity for concentration; magnification of character traits and psychodynamic processes; an apparent nakedness of psychodynamic processes that makes evident the interaction of ideation, emotion, and perception with one another and with inferred unconscious processes; concern with philosophical, cosmological, and religious questions; and, in general, apprehension of a world that has slipped the chains of normal categorical ordering, leading to an intensified interest in self and world and also to a range of responses moving from extremes of anxiety to extremes of pleasure. These are not the only effects of the psychedelic drugs...[35]

The authors here do not leave any doubt about their attribution of causes, but to be fair, it must be stated that the more cautious researchers seemed aware, at least to some extent, of the difficulties in such attributions, although without taking the trouble to deny the implication. Hoffer and Osmond put it thus:

> The LSD experience is one about which there can be no argument about priorities between chemical and psychological factors. For there is no doubt whatever the chemical is given first and must cause the biochemical changes *which later find expression* in the psychological experience... A good deal is known about its [LSD's] phenomenal reactivity. What is not known is which one of its many biochemical reactions is the most relevant

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34 Edited excerpts from Ludwig AM (1966) "Altered states of consciousness" *Arch Gen Psychiatry* 15:225–234, also in *Altered States of Consciousness*, Charles T. Tart, Doubleday & Company 1972 pp15-19.

35 *The Varieties of Psychedelic Experience*, Masters and Houston, Holt, Rinehart and Winston 1966, p5.

in producing the psychological changes. [italics added].[36]

The authors could be accused of semantic prestidigitation here, but I think it was more a matter of the difficulty of understanding the psychedelic experience rather than a conscious effort to make a statement that would be right no matter what the actual pathway of cause and effect turned out to be. Many researchers of the time show a dawning awareness in their published works of the unsatisfactory implications of the application of classical cause and effect paradigms to many of the more unusual findings in psychedelic research. But if some researchers did not go so far as to state flatly that LSD *causes* mystical experience, or that LSD *causes* perceptual time distortions, or that LSD *causes* any number of other *effects* which writers are so fond of describing, at most they seemed just to add an additional link in the causal chain, as above. Observe, however, the statements of some (*viz.,* ardent critics of psychedelic research) that LSD *caused* psychosis, or a schizophrenic-like state, or even suicide. Even court-cases, criminal and civil, were resolved on the basis that psychedelic drugs were a logical cause of various acts or behaviors, or even instances of "mental illness".

In the press and other popular writing, several accounts of hellish, or trivial experiences of an absurd nature were published by those who considered themselves agnostics, skeptics or clear-thinkers, "intellectuals" attempting to minimize or ridicule the sometimes mystical-sounding claims of those such as Aldous Huxley, Gerald Heard, or Alan Watts. These debunking attempts uniformly portrayed the results of the reporter's psychedelic ingestion as a kind of Hollywood movie, as if the drug were some roll of science-fiction film forcibly projected upon his otherwise quite understandable and controllable life. "The drug made me do this, made me see that, caused me to think I was a..." etc. If someone had a negative experience, especially if he were a noted reporter or medical practitioner, then his report left no doubt whatsoever about what the cause was, where the blame lay. Naturally, such a critic would certainly not want to *blame himself* for the confusing or threatening perceptions.

I hope that it is now becoming clear that although the ingestion of a psychedelic drug may be the first event of a series of events that culminates in undeniably profound perceptual and psychological changes, the simplistic designation of the first event as the logical cause of the entire chain of following events makes no more sense than my saying that psychedelic ingestion causes earthquakes. The mind-events of psychedelic experience, I am suggesting, are in an important sense just as "exterior" and coincidental to the ingestion of the drug as was the earthquake I experienced on the roof of my little bungalow in Guadalajara. It is my view that attribution of cause and effect along these lines must be abandoned completely, it is a misleading model of psychedelic experience and must be replaced. Even the idea that a psychedelic drug *causes* distortions of perception must be scrapped.[37] The whole idea of causation as it is currently conceived relative to psychedelic experience is a metaphor, but unlike the model as metaphor which is a useful device to understand and predict, the metaphor in this case is an impediment to a clear understanding. This is a major reason why the results of psychedelic research have been so difficult to interpret, and also a reason why it was so easy to criticize, even ridicule both the research and the workers who

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36 "How does LSD Work" in *The Hallucinogens*, Hoffer and Osmond, Academic Press 1967 p211.

37 As I will explain later, even the common perceptual "distortions" noticed, such as vivid colors, geometric patterns, or rippling waves in the sky, are actually things we experience (or *could* experience) all the time but which we ignore and filter out of conscious experience in our "normal" state of mind.

produced it.

> When I took the drug myself, I found that I was suffering from the delusion that I had been psychoanalyzed. I had spent seven and a half years on the couch and over $20,000, and so I thought I had been psychoanalyzed. But a few sessions with LSD convinced me otherwise.[38]

The Normal Human

As a first step in my replacement of the trivial model of psychedelic experience, I am going to reverse the situation at hand and ask, not what causes the psychedelic experience, but rather what causes us to be in our "normal" state of mind most, if not all of the time? We might say that the brain in its normal neurochemical state is sufficient cause. The champions of reductionism of course maintain that the mind and its experiences cannot be anything *but* states of the brain's neurons; this is, of course, Francis Crick's "Astonishing Hypothesis".[39] I, among more notable critics of such strong reductive materialism, would call it (at best) a Premature Hypothesis, considering the present rudimentary state of scientific knowledge about the nervous system, not to mention consciousness itself. If recent criticisms and counter-arguments against the reductionist position have been less astonishing,[40] they *have* been more accurate in illustrating present limitations in understanding causation at and especially *across* the various hierarchical levels of complexity between the physics and the biochemistry of neurons at one extreme, and consciousness and mind at the highest levels of organization. A few paragraphs illustrating the difficulties and paradoxes of the concept of causation might be in order, although the topic is hotly debated and I will gain perhaps as many critics as converts from my personal observations:

If, (due to the ambiguity of causation when one attempts to apply the concept across levels of description or complexity), the neurochemical *state* of the brain is not strictly and exclusively a *prior cause* either of normal or extra-normal states of mind, this is of course not to deny that there are *correspondences* between brain processes involving neurons, cognitive processes involving systems of brain parts, and conscious experience involving the total organism. Nor is it to deny the possibility of learning things about one level from studying another. It is the attribution of causation of events between one level of this hierarchy and another which is fraught with difficulties. Processes at one level are simply not strictly reducible to processes at another, in spite of their mutual interdependence.

The distinction here is important, if seemingly paradoxical, and may possibly be understood better by the observation that two entirely different cognitive processes arriving at two entirely different "states of mind", must have the potential to occur from *exactly the same* original neurochemical state of the brain. Stated a little differently: exhaustive examination and description

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38 Mortimer A. Hartman, Psychiatric Institute of Beverly Hills, 1959

39 Francis Crick, *The Astonishing Hypothesis*, Charles Scribner's Sons 1994, see page three for example.

40 See for example Alwyn Scott, *Stairway to the Mind*, Springer-Verlag 1995. For a more recent criticism of prime importance for understanding the so-called mereological fallacy and the multiple ways that cognitive neuroscience falls prey to it, see Bennett and Hacker, *Philosophical Foundations of Neuroscience.* Blackwell, 2003. Not only Crick, but many of the current crop of consciousness-explainers are thoroughly but fairly raked over the coals! A reviewer has stated, "It will certainly , for a long time to come, be the most important contribution to the mind-body problem there is." Required reading! Two excerpts can be read at The Psychedelic Library.

of a given brain state or series of brain states (if it were possible) cannot *in principle* predict the overall conscious experience of the owner of that brain. Conversely, two different dynamic brain states might well have the possibility of corresponding to the same conscious experience. If these considerations were not the case, free will would necessarily be an illusion and absolute determinism unavoidable; only the extreme fringe of philosophy seriously believes this to be the true state of mankind. Absolute determinism is, of course, the position that everyone, all the time, is determined by antecedent, irresistible physical conditions, so that free will becomes meaningless.

What I am claiming here, no doubt much to the disdain of many contemporary experts, is that attempting to discover the precise and unique "neural correlates" of some state of mind or perceptual process, not to mention consciousness itself, is little more than a fool's errand. As a complex conscious organism, *I use my brain* to accomplish certain tasks and goals, in an entirely analogous way as *I use my arm* for a tennis shot. There are no exact, unique, reproducible "muscular correlates" of a tennis shot, and even if one could experimentally arrange that a test subject could encounter exactly the same impending tennis shot several times in a row, the subject would no doubt accomplish that shot with a great many possible combinations of muscular operations yet achieve the task in way indistinguishable from any other. Even at a simplistic level, if the subject did two shots in close sequence, some of his arm muscle cells would be recuperating and resting from the first shot, so of necessity the "muscular correlates" for the second shot would be far from identical to the first. How could it be any different using my brain to think up such an argument as presented in this paragraph? Or are there unique and exact "neural correlates" for concocting an argument that demolishes that possibility?

The situation is discussed with exceptional clarity by Willis Harman in his address to the First Tucson Consciousness Conference in 1994. Harman concludes his address,

> We must not minimize the fundamental nature of the challenge implicit in consciousness research. Western science is about understanding cause. It is a tenet of modern society that that science can lead us toward the ultimate explanations for phenomena. However, the very conviction that a complete nomothetic science is possible—that everything can be ultimately explained through inviolable scientific laws—rules out consciousness (mind, spirit) as a causal reality. At the same time, everything in our personal experience affirms the importance of our ability to choose, and our deep inner guidance toward the better choice. This poses a fundamental dilemma. Either we must deny our own innate wisdom because "science knows better," or we have to face the fundamental inability of science in its present form (quantum physics and all) to give us an adequate cosmology to live by and to guide our society by.[41]

I see the error of attribution of causation concerning psychedelics as representative of the same error on the larger scale of the whole question of mind-brain relationships. In most current models of consciousness, of which there recently have been many, there seems to me a fundamental ignorance of the logical repercussions of saying, for instance, that the mind, or consciousness, must be *caused* by the brain. John Searle, the author of one of the more cautious and measured treatises on consciousness[42] nevertheless

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41 Hameroff, Stuart R. *et al., Toward a Science of Consciousness: The First Tucson Discussions and Debates,* MIT Press, 1996. Harman's paper can be read at The Psychedelic Library

42 *The Rediscovery of the Mind*, John R. Searle, Cambridge: The MIT Press, 1992.

writes,

> It is an amazing fact that everything in our conscious life, from feeling pains, tickles, and itches to—pick your favorite—feeling the angst of postindustrial man under late capitalism or experiencing the ecstasy of skiing in deep powder—is caused by brain processes. As far as we know the relevant processes take place at the micro levels of synapses, neurons, neuron columns, and cell assemblies. All of our conscious life is caused by these lower-level processes, but we have only the foggiest idea of how it all works.[43]

Searle suggests that objections to brain-to-mind causation result from a "flawed conception of causation", and he attempts to split the concept in two: event-causation (a causal relation "between discrete events ordered sequentially in time"), and non-event causation which he illustrates with the example of the collective properties of the molecules of a table "causing" its apparent solidity. But I would suggest that these two concepts of causation are so radically opposed that it would at a minimum be best to avoid using the same term for both processes. Event-causation rests comfortably within the same level of description, whereas Searle's non-event causation violates that comfort. If non-event causation is called instead "facilitation", suggesting that in such a process there are entities and aspects which arise mutually rather than depend causally upon each other, we may lose the security of believing that we know something of the underlying mechanisms of mind-brain relationships, but gain a more pragmatic basis for further understanding. Let us view a collection of wood molecules as "allowing" or "facilitating" the properties we recognize as "table", in the same sense that a valley allows or facilitates the flowing of a river through it: in neither case is causation meaningful if we wish this term to retain any concrete usefulness. Does the valley cause the river? (Actually, the river has caused the valley through the process of erosion!) Yet without the valley: no river! Without the molecules: no table! The table was "caused" by the *menuisier* who built it: to use the same term in the attempt to see how properties arise mutually with the object or process which manifest those properties only confuses. Causation would logically have to operate bi-directionally in such instances, and thus lose its meaning entirely. Again, it is clear that attempting to apply the concept of causation across different levels of description becomes paradoxical at best.

So we see that across the various hierarchical levels between the physics and chemistry of neurons of the brain and the human mind, it is very difficult if not impossible to attribute clear-cut principles of causation. Causation seems to enter the picture at each and every hierarchical level, and is not wholly reducible to prior causation at another level of organization. About all that can be said with confidence at this point is that brain and mind facilitate and reflect each other, like the valley and the river, but in no logical sense do they cause each other; that they are parallel processes, and for an analogue of this seemingly paradoxical statement I would compare the mind-brain duality to particle-wave duality in quantum mechanics. The wave attributes of electromagnetic radiation do not *cause* the particle attributes, nor *vice versa.* The two seemingly contradictory and mutually exclusive properties always accompany each other, and whether the one is observed or the other depends entirely on one's point of view, *i.e.,* the experiment one performs. Once again we see the importance of *point of view,* or levels of description. Attribution of causation between levels is inherently meaningless. This is so far a very rudimentary model, I admit, and gives little

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43 "The Mystery of Consciousness", in *The New York Review of Books*, November 2, 1995, p60.

help for forming testable hypotheses. But we should not feel there is some cosmic guarantee that we *can* devise an understandable model in this case. There is, after all, some paradox in the using of mind to understand mind, and we should expect some limitations.

Thus the argument that the normal brain causes normal mind, or that psychedelics cause expanded mind or consciousness, are both fallacious explanations. Nevertheless, we can, and have found changes in brain operation which are *caused*, in the classical sense, by the psychedelic drugs. If we can combine the facts of these changes with the vastly improved (yet still very rudimentary) knowledge we now have of the sequential, parallel, and cybernetic cognitive processes that occur in the various brain systems under a wide range of conditions, and test the resulting overall model of neural signaling against an improved cognitive or psychological model of the psychedelic state of mind, a new theory may be in the making. To restate some of the essentials of this theory: it will have to be a theory of processes, parallel processes that are complimentary ways of understanding an overall aspect of reality, of processes of cybernetic control and feedback, of processes in which classical cause and effect may be at best a blurred and uncertain property. If it is objected that inapplicability of cause and effect seems unreasonable, remember that physics had to confront the same kind of paradoxes earlier in this century, and succeeded admirably. There is good reason to believe that theories of the ultimate structure of mind and consciousness will be no less and probably more mired in apparent paradox than theories of the ultimate structure of matter and energy.

A Starting Point

But I am getting ahead of myself. Let me first deal with the cognitive and psychological models of the psychedelic experience, for these were the aspects that I first explored, and it was through the construction and testing of these models that I was able to devise models of neurological functioning which could explain the cognitive processes that I had observed. Now the cognitive model I am going to describe will be for the moment a “naked model” having no structure to support it, and since the model will be a radical departure, in some ways, from the way we currently believe our cognitive processes to operate, it will be easy for the reader to dismiss it. Bear with me as the pieces of the puzzle fall into place around the chosen starting point.

Remember that above I asked that the first consideration should be: “let us think of the effect of a psychedelic drug as eliminative, rather than additive: the drug functions as a facilitator of inherent processes, a substance which by its neurological action *allows or assists* certain processes to occur which might otherwise be rare or improbable.” I also mentioned above that the psychedelic experience seems to provide a certain freedom from habits of thinking, it almost ensures that one is more sensitive to one’s own prejudicial ways of seeing, hearing, perceiving, reacting, reasoning and deciding.[44] So far I have used the term “thinking” (as in habits of thinking), rather broadly, including within its domain all sorts of mental processes. I will presently re-define thinking to denote two distinct categories of mental processes, the first pre-conscious and largely automatic, the second comprising the processes we normally think of (!) as thinking: reasoning and deciding, for example. The necessity to provide some careful definitions is evident simply from the number of ways I have used “think” in this introductory paragraph, as well as

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44 There are also *physical habits,* such as they way we write, or perform physical acts, and these seem of a different category than the habits of thinking I am dealing with here. Nevertheless, as we shall see, the two are intimately related. A habit of thinking, for example, may trigger a habit of physical behavior.

the obvious overlapping of meaning with other terms. Starting with the common usage and understanding of such terms therefore, I will try to provide more precise and operational meanings as I go along.

Habit Routines

Considering the power of psychedelic experience to repress in some way, or at least make one more aware of habits of thinking as they happen, I am unavoidably led to the idea that such habits are a far more important factor in the normal operation of the brain/mind then has been supposed. But for a long time, something (perhaps the Behaviorist legacy), seems to have stifled not only the study of consciousness but also the pursuit of any technical understanding of what a habit is, psychologically and neurologically. The word "habit" is used only non-technically in the literature, with few exceptions, since the time of William James (who remarked in his treatise *The Principles of Psychology, "*When we look at living creatures...one of the first things that strike us is that they are bundles of habits"). But it seems to me that a habit, and there is no denying that we "have" habits galore, must consist of something more definable, more describable technically; the concept must have a more heuristic value than merely leaving the term to fend for itself in popular use.[45] A habit, or as I will now call them, *Habit Routines*, must be something very much like a memory,[46] but different from a memory in that it is routinely and automatically retrieved and employed with little or no awareness of its presence or effect. The use of the word "routine" here implies that the "habit" is essentially always a conglomeration of tendencies, perhaps a nested set of habits to think and/or act, a pre-programmed pattern for thinking and behavior.

In looking for a possible site for the storage of habit routines, analogous to the idea of memory storage, it occurred to me that probably the "data"[47] of memory and the data of habit routine was the same data, but that it was accessed in different ways, perhaps by different systems in the brain. When a memory of past experience is accessed,[48] either intentionally or by some

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45 In *The Oxford Companion to the Mind* for instance, although "instinct" and other terms frowned upon by Behaviorists have generous entries, "habit" has no entry whatsoever. On the other hand, Howard Margolis, a student of Thomas Kuhn, has written two admirable books concerning "habits of mind" and how they govern perception, judgment, and even scientific beliefs. See *Patterns, Thinking and Cognition*, 1987, and *Paradigms and Barriers, How Habits of Mind Govern Scientific Beliefs,* 1993, both University of Chicago Press.

46 When speaking of memory here, I refer to what is now generally called "long-term memory."

47 I enclose the word in quotes to denote my dissatisfaction with the current computer-oriented models of much of neurological and cognitive science. In using such words as data, information, computation, etc. when speaking about brain, mind and consciousness, one does less of explaining than "conjuring away the barriers between man and machine, between consciousness and mechanism." (Raymond Tallis in *Psycho-Electronics*). But it is very difficult not to use such terms today, so ingrained is the idea of some equivalence between mind and machine. I hope that the reader will see that as my theory develops, along with new ways to understand the important differences between man and machine, the use of such terms will slowly be replaced by new concepts which obviate their need. Thus I will from this point in the text suspend the tediousness of quotation marks for every concept I intend to question, provided the reader will keep in mind the limitations I have expressed. In addition, we must remember that unless we are to fall into the mereological fallacy here, we must recognize that "memories" are not "stored in the brain" although the wherewithal for a person to *experience* a memory must necessarily be present, perhaps not at a specific location in the brain but distributed. More on this in the next chapters.

48 As Bennett and Hacker point out, however, memory needn't be exclusively of the past: "Memory is the faculty for retention of knowledge; what is remembered need not be of the past, but must be something one previously knew or was aware of. *ibid., Philosophical*

random cue, what pops into awareness is a scene, a representation in the various sense domains of a specific and time-delimited event or series of events. We have a memory *of* some specific and bounded fragment of the past, although one memory may then cue another representing another period of time altogether. I call this access of memory, *Logical Memory Access*, or LMA. It is logical in that the specific characteristics of the memory, the various informational fragments from each sensory modality which are accessed, are related in time and place and represent a sequence of events as they appear to have happened.[49]

When a *habit routine* is called up for use, a process I call *Habit Routine Search*, or HRS, the elements of the routine do not seem to be bound by the same time and place considerations: they may represent fragments of data that were recorded at many different times and situations, but with one or more defining parameters relevant to dealing with the situation for which the habit routine has been summoned. LMA and HRS are therefore two different means of accessing the data of long-term memory for two different cognitive tasks. LMA yields a conscious memory, HRS yields an unconscious evaluation/thinking/behavior pattern.[50]

I may now advance the hypothesis that the habit routine search is a constant and primary process of cognitive activity of the mind, carried out by brain systems, and furthermore that it is the main and essential, underlying and pre-conscious process in the activity we know as *thinking*. This part of thinking, (let us call it thinking1), I will define as the unconscious associational and evaluative process including habit routine search which precedes, by just that fraction of a second, the awareness of what is thought and perceived through the use of language or other representational modalities such as the imagination and manipulation of visual scenes, the use of gestures, the creation of music and art; these processes are called

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Foundations of Neuroscience, p154

49 Recent terminology as well as theory in the field of memory research has blossomed. The process of LMA which I define here would be said to access autobiographical or episodic memory; additionally there have been proposed the terms procedural, semantic, implicit and explicit, short-term, long-term, and working memory to describe other aspects of memory. I shall define and use these terms as needed as the model is developed.

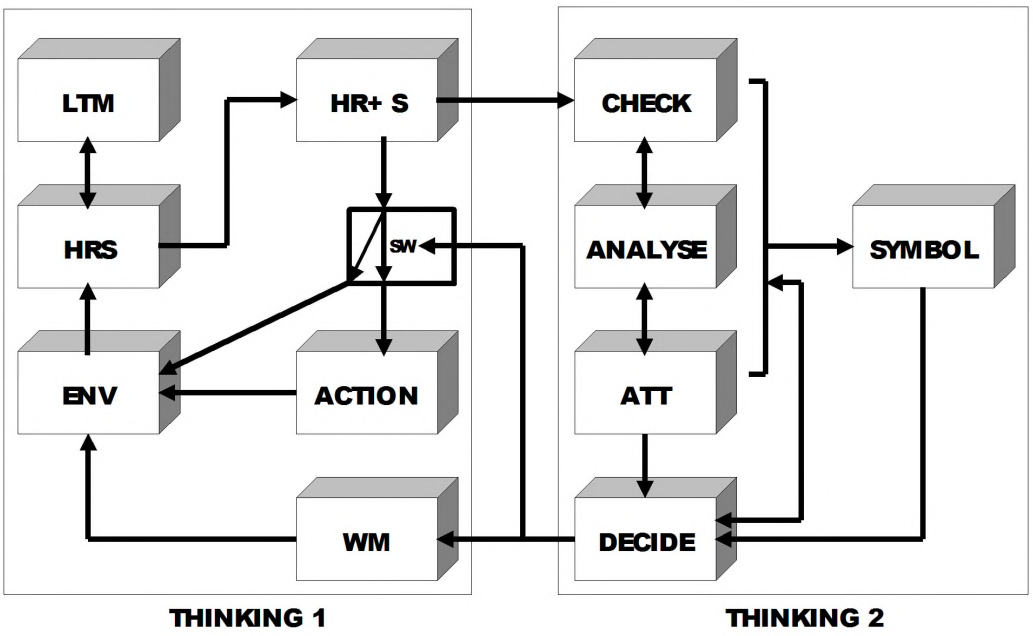
50 Perhaps an analogy would be helpful here. We might think of a unit of memory as like a single frame of a motion picture. In LMA, a sequence of frames is called up, and experienced as a sequence or “film clip,” in temporal order, and with conscious reference to the time and conditions where the frames were recorded. This is not to say that the process may not become degraded, with loss of data, loss of reference to time and place, erroneous mixing of different memories, etc., the ideal expressed merely illustrates the type and mechanics of the process to be understood. HRS, however, would access a variety of single frames recorded at different times and places, a sort of collage of single frames, associated not as a temporal sequence, and not consciously experienced, but unconsciously selected and employed according to a thematic agenda specified by subject content corresponding to current perception. Thus if stopped on the highway by a “law enforcement officer” for no apparent reason, we may be rather hurriedly accessing, in the data of all memories of dealings with the police (our own and knowledge of such dealings by others gleaned from friends, newspapers, etc.), for every possible habit routine that might assist in estimating what is going on. Specific memories of similar scenes might appear fleetingly, but far more important would be the unconscious evaluation patterns supplied by habit routine search that would allow and assist our judgment to calculate just how to react to any eventuality, given the particular parameters of the current situation. Thus if he has just gotten off an excessively chromed Harley-Davidson, has black ray-bans, razor-sharp creases on his shirt and a penetrating snarl we will automatically react somewhat differently than if he were a school-crossing patrolman, tips his hat and says he thinks our signal light might be out. No deliberate calculation or access of actual memories via LMA is necessary, yet the “data” of many memories is obviously being employed, unconsciously and automatically, to guide our evaluation of and reaction to the situation.

symbolization.[51] And since the mind/brain is cybernetic, current sensory or environmental input must always include or be mixed with input from trains of thought leading to the instant we are experiencing.

Thinking2

Thus the determining parameters for HRS consist of the environmental moment (the total sensory input), plus ongoing feedback generated by conscious reaction to the current habit routine that is continuously being generated. We can use the term "thinking2" to denote and include all those secondary processes we would normally call thinking, including symbolization, checking and logical analysis, reasoning, decision and feedback of instructions or modifying parameters to ongoing thinking1. Thinking2 has the properties that some would label as consciousness, but I would, at least for the moment, like to avoid using the word, if only to simplify my descriptive task.

The feedback of instructions and parameters to ongoing thinking1 probably uses what is now called working memory, a short-term limited-capacity memory buffer or store which is the subject of much contemporary research and debate. There are apparently several aspects or domains of working memory: one or more short term stores for spatial and visual information, another for auditory information, perhaps divided between speech-based and musical functions, and perhaps working memory stores for combinations of sensory and cognitive data as well. For the moment I will hypothesize an "information" storage site in the brain which holds instructions provided by one set of thinking functions (thinking2), for the execution of another set of thinking functions (thinking1) which provide the raw material for the process as a whole. Thus the habit routine search of thinking1 in the data of long-term memory is modified and guided by instructions from the decisions of thinking2 held in working memory. These decisions may be deliberate, or largely automatic yet available for introspection. Figure 1 represents a simple flow chart of the processes so far described.[52]



51 The model described here has parallels to ideas suggested by C.H. van Rhijn, see "Symbolysis: Psychotherapy by Symbolic Presentation" in *The Use of LSD in Psychotherapy*, Harold A. Abramson, editor, Josiah Macy, Jr. Foundation, 1960.

52 All illustrations, diagrams and text files, and some internet pages referred to in this e-book can be accessed at http://www.psychedelic-library.org/Kosmos/ FIGURE 1

FIGURE 1. Flow Chart of Cognitive Processes. ENV=Environmental moment, all sensory input at the given moment. HRS=Habit Routine Search function, projects ENV into LTM and retrieves the Habit Routine. LTM=Long Term Memory. HR+S=Assembled habit routine plus selected Sensory information. ACTION=implementation of habit routine in physical action or approval of cognitive disposition; may be rejected in "SW", switch controlled by conscious decision. The HABIT ROUTINE is both a template containing relevant sensory data from ENV, and at the same time a prefabricated plan for reaction to ENV and its WM (Working Memory) input. HR+S is delivered to Thinking2 for Checking, Analysis, Attention, to which Symbolization resonates. These conscious processes are then used for Decision to accept or reject the habit routine and optionally provide input parameters via WM affecting further HRS. Thinking1=unconscious processes not available directly to introspection. Thinking2=conscious processes, but may be automatic and unattended unless Attention is active. Decision based on either unattended processes, or processes scrutinized with Attention and/or Symbolization. Decision may accept, reject, supply parameters, and request further HRS. Decide has a double-headed arrow back to other thinking2 activities to indicate that there are cycles of thinking2 processes possible before deciding then alters ongoing thinking1 processes. Checking and Analysis are merely representative of all such functions which could be said to consciously deal with ongoing cognition, Reasoning, Calculation, etc., could also be included. Checking, Analysis, Attention, and Symbolization could be said to constitute components of Perception or Awareness. Note that the process of LMA is omitted for the present.[53]

To restate the model then, thinking1 is the overall automatic and unconscious process of the comparison of current sensory input plus the result of previous symbolization, checking and decision, (thinking2), with information stored in long-term memory accessed through the process of *habit routine search*. We are not normally aware of the thinking1 processes at all. Decision, which may be active or passive, (and is mostly the latter), is consequently fed back into the thinking1/HRS process as an additional defining parameter for ongoing HRS. It may also act as a switch nullifying the implicit actions recommended by the ongoing habit routine. This is no doubt a very arbitrary and primitive attempt to formulate a schematic flow model of some of the overall ongoing everyday processes of the human mind. And it certainly, along with all other possible models, must be a great over-simplification. But let us just take it as a first faltering step in the direction we think (thinking2!) we want to go in our understanding of psychedelic experience.

The Rock

Let me illustrate the above proposed processes with a short cognitive story, the kind of scene that happens to us all quite frequently, but which passes with little recognition of just what is taking place. I live in the mountains in an area that has seen rural subsistence farming for a thousand or more years. During this long period, the mountainside has been divided and maintained into flat cultivable strips separated by rock walls put together with no mortar, but a lot of care. Nevertheless, with every prolonged period of rain, the earth swells and a piece of wall somewhere is bound to collapse, needing repair. Occasionally, a rock or two will get rolling and wind up several terraces away from the point of collapse. Thus in my walks around the property, it is common enough to see a grey irregularly-shaped stone, or several, in the midst of the pathway, even

53 Looking at this 25-year-old chart I invented from the perspective of today, as I write and prepare for publication, it seems that some terms and connections could be construed as being quite arbitrary. I could probably make some extensive changes yet arrive no closer to the cognitive reality of thinking than I did long ago. So, as I warned, I will just leave this "as-is" - it is, after all, just an *ad hoc* model along the way to an eventual theory. The importance of HRS, however, and the possibility to alter and even suspend it I will keep as one of my essential hypotheses for describing how psychedelics work.

when no immediate point of wall damage is evident.

Recently, walking down to the garden, in a mood of simply passively enjoying the walk, thinking not really about any particular topic, perhaps on the border of that state known as day-dreaming, nothing out of the ordinary seems to be happening when...

According to my cognitive model above, we could say that as I am walking, thinking1 is doing its normal, unconscious and preemptive job of actively using all sensory input to compare the current ongoing activity of my walk with all that I have learned and experienced, accessible in long-term memory. The component process of thinking1, HRS, is constantly retrieving the simplest, most readily available, most applicable habit routines which match the parameters defined by the totality of sensory environmental input and my pre-organized intention (walking down to the garden), and these habit routines are then supplied, firstly, as templates for the automatic regulation of all ongoing process including the perception and reaction to the surroundings. Secondly, the habit routine, along with relevant fragments of the sensory data itself, is supplied to thinking2, which at this moment of daydreaming, is doing very little analyzing, reasoning, or deciding about the surroundings. The component process of thinking2, symbolization, is however representing the sensory data (most of which is merely the information of the current habit routine) and making it available for awareness, so that I "see, hear, smell, feel, enjoy..." (and perhaps even explain to myself in language: the mountains are nice today!) my entire surroundings, although I pay no special attention to anything in particular. There is even an ongoing, if vague internal dialog occurring, partly about the surroundings, but also about other matters entirely. This I am not particularly paying attention to either. Thinking2 is relaxing, simply passively "enjoying" the stroll. Unless thinking1 gives some extraordinary signal that something is amiss, or unusual, thinking2 is quite content to let thinking1 supply all interpretations and responses to ongoing activity (action). Thinking2 is therefore interfering minimally, if at all, in the thinking1 processes through the prerogatives of reasoning and deciding feedback via working memory.

Until...when suddenly, I spy a grey rock in the pathway ahead. As I said, this is not an unusual occurrence, but since I have not seen a rock at this spot previously, thinking2 goes into action, prodded by the novelty signaled by thinking1, and "notices" the novelty and reviews (checking) the actions of thinking1 which has presented the habit routine that, there before me, just like several times in the past, lies a rock that has rolled down from some wall up above. This is a habit routine of interpretation of environmental data (ENV) and carries the action recommendation to accept the novel object as "grey rock". The cognitive processes begin to operate fast and furiously now, even though this is no emergency, just a minor novelty. Fleetingly I am aware of the analytical checking process in thinking2 that indicates, yes, it rained quite heavily last week,[54] so here is the result. Another thread of checking goes on, seemingly at the same time, which finds the information that there is a wall, two or three terraces up from this point, that is known to be in poor repair and likely to have collapsed. I am aware that somehow this analysis happens at lightning speed, almost instantaneously, and that the symbolization in language with which I can "explain" these positive checks on the habit routine

54 This process must also use a habit routine, thinking2 feeding instructions to thinking1 to search for justification that its previous interpretation of "grey rock ahead" is possible. A habit routine is then found which relates the cause and effect pattern learned previously about rain and out-of-place rocks. I do not specifically remember as memories the rainy days and the displaced rocks encountered, but use only "frames" of these memories to obtain the fact that rain has recently occurred on a scale which is known from experience to produce grey rocks in pathways.

comes slightly after the fact, perhaps after the checking process has already told thinking1 that its habit routine is acceptable, proceed with normal operation. Thus the checking and deciding function in thinking2 seems to be independent, and faster than the symbolization of thinking2 which seems only to resonate to the former operation.

I am just about to approve the habit routine as an accurate and true representation of the novelty which lies before me when, and this happens so quickly as to be almost simultaneous with all that has been so far described, something seems amiss. Perhaps the color was slightly wrong, or perhaps I detected some movement in the object, but with a sudden suspicion like that which one feels when one realizes he has been lied to, thinking2 sends out a strong command to thinking1 (the classic double-take!): suspicious interpretation! Find alternate habit routine! These commands also occur well before any symbolization process can "explain" what is going on. And lo and behold, with this extra prodding and data, the HRS comes up with the more accurate suggestion that here lies a dirty, partially crumpled plastic bag from the local supermarket. This habit routine was probably one of several more that could be called up, in a series of increasing complexity and unlikelihood, and indeed, if the bag had been red, rather than dirty white (almost grey), the "plastic bag" interpretation would have been the first accessed, being the most likely given the ENV parameter of the color red. (All the rocks here are grey.)[55] An interesting after-effect occurs here: I notice that during the next few moments I can view the object and willfully transpose its identity back to that of grey stone, but this ability fades and finally I am unable to interpret the object as anything but plastic bag. The dependence of perceived reality upon preconceptions, *i.e.*, habit routines, is especially demonstrated by this residual if fleeting ability to see the object as either interpretation.

Now if it takes the above amount of words to analytically describe what occurred in probably a half-second, my statement that there are limitations in using the mind to explain mind takes on some relevance. And the above is certainly an oversimplification! For instance, I believe that thinking1 and HRS can be multitasking, to use a computer analogy. Thinking1 and associated HRS can be interpreting the ongoing activity as described above, and simultaneously be working on another thread of material in reference to my internal dialog, which I mention above as possibly being about something completely different than my walk. I can be actively talking to myself about some subject in which I have many severe prejudices (which are being accessed as habit routines by thinking1), all the while noticing grey rocks, plastic bags, or whatever, which also require the HRS system to interpret. Whether the two threads are simultaneous or "time-sharing", I would not yet care to say. As for even further aspects of complexity, I have also made no mention yet of how the factors of significance or value (*salience and valence*) are attached to the sensory data accompanying a habit routine. More on this later.

Let me postpone further theoretical considerations for a bit to consider how the psychedelic experience fits with the hypotheses presented so far.

The function of a psychedelic drug, according to my theory, is to interfere in some way with the Habit Routine Search function of the brain, and I will call this the Habit Suspension Model of the effect of psychedelic drugs.

Since the habit routine search mechanism has very probably several functional neural pathways and brain parts which support its operation,

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55 This knowledge must also have been retrieved and used through HRS as a parameter ensuring that a grey object be interpreted as probably a stone, and an object of decidedly non-grey hue as not-a-stone.

different psychedelic drugs may affect the system by differing mechanisms yet yield very similar overall results. All further supposed effects of the ingestion of these substances are not direct effects of the drugs themselves, but rather are consequences, which very probably are *perpetuated and magnified* by cybernetic mechanisms, of the changes brought about in the HRS system of the brain.

Now I do not mean to imply that habit routines are destroyed by the influence of psychedelics, or that the habits are completely suppressed or inaccessible during the time of drug influence. It is much more a process of *temporary delay* or *change in significance and value* of habit routines and their consequently changed use in ongoing cognitive processes. The strength of the effect seems dose-dependent. The habit routines seem to arrive slightly out of phase, if I may be allowed an electromagnetic analogy, and presented thusly to thinking2 do not seem correct or valid recommendations for ensuing evaluation and decision. And it is the habit routines used for perception, analysis, reasoning and symbolization (I will call them the cognitive habit routines[56]) that are primarily affected: habit routines which are used to coordinate movement, such as walking or manipulating objects, are only slightly affected, if at all. Unlike alcohol or some other drugs, even high doses of psychedelics have very minimal effects on physical coordination. As Huxley noted on his first mescaline experience: although he wondered, when it was suggested that he take a walk in the garden, whether he would be physically able to leave his chair, once launched into the act he noticed no difficulty or change in coordination.

Now we may state something about the "causes" of the normal state of mind and the psychedelic state: the normal state of mind is facilitated by the constant process of HRS which finds appropriate, personality- and situation-typical responses for all ongoing activity. A "response" may be an interpretation or complex perception, an attitude, an emotional reaction, a "prejudice", or a pilot for actual physical action. These responses are habit routines representing the summed totality of ways in which similar situations were dealt with in the past, and these habit routines are presented to thinking2 as pre-structured ways of perceiving and dealing with the ongoing situation so as to minimize or practically eliminate the necessity for thinking2 to doubt perception or alter the response through analytical decision making. Unless thinking2 is signaled of some unusual significance that warrants attention, it may not even become aware of the decisions made on its behalf by thinking1. The process is cybernetic, an endless loop of causation, a process which, after a small delay, *may* enter consciousness as language and other reflective activities in the process defined as symbolization.

The normal delivery of HR's by the HRS mechanism for use in ongoing cognitive activity *is* precisely what we call a normal state of mind, a state in which the checking ability and analysis of thinking2 does or needs to do very little. A good analogy would be driving along a well-known road in light traffic: practically all required actions are automatically provided for without conscious effort or the need for evaluation by the analysis and checking of thinking2. This applies to all physical routines needed to steer, brake, etc., but more importantly to the routines of perception, judgment, and planning needed to decide, for example, whether the child ahead is probably going to ride his bike too close for safety. Although everyone would accept the analogy,

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56 And here I think that we are dealing with two classes of habit routines, some simple habit routines of perception are probably called up by the arrangement of sensory environmental data itself, i.e., in thinking1, whereas habit routines of analysis and symbolization must be habit routines that are called up by thinking1 on behalf of thinking2. I will therefore sometimes refer to a habit routine complex, signifying a composite habit routine comprising multiple aspects and multiple interlocking recommendations for action.

I will perhaps not make many friends suggesting that the totality of life is also a simple matter of habit routines (sometimes of somewhat greater complexity than those dealing with highway driving!), separated at infrequent intervals by brief bursts of creativity which may be little more than responses to novelties or temporary emergencies. Psychology textbooks may be full of research showing how automatic most actions and thoughts really are, but the reader automatically (!) takes the position that the description is relevant to others, the objects of study, and certainly not to him who is right then scrutinizing the phenomenon. We may deduce, perhaps, that a very powerful habit routine is the one which gives us the impression of being constantly and fully aware, in an analytic, deciding, and creative sense, of our surroundings and thought processes, that habits play only a minor, inconsequential and optional role in thinking.[57] Again, the psychology textbooks are filled with studies which indicate the contrary.

For the moment I must postpone showing the distinction between physical habit routines on the one hand, (as for example the physical, learned routines employed in the actual driving of the car, above), and perceptual and cognitive habit routines on the other. For now, we could say that cognitive habit routines, among their other functions, may constitute a pilot for the selection and implementation of *motor routines* used to guide and control actual physical movement. I believe that two quite independent systems of the brain are used to store and implement the instructions for these activities. This would explain why, according to my model as well as experimental observations, cognitive and perceptual habit routines are strongly affected by psychedelics, but physical coordination is practically untouched.

It is the normal and preemptive operation of the HRS mechanism which is the impediment preventing the normal mind from interpreting sensory and feedback input as anything but common, routine, normal, everyday input.

We are very much the slaves of the habit routine mechanism, and this is to be expected from an evolutionary standpoint. HRS is the mechanism all organisms having even moderately developed nervous systems use to deal with any and all situations which do not present a crisis, situations of normal significance and value for ongoing existence. The habit routine is a short-cut, a pre-established pattern allowing an organism to comprehend and deal with commonly encountered situations quickly and with a very minimum of neurological, cognitive effort. More primitive animals with very little cognitive ability in reserve must rely strongly upon the HRS system. The habit routine mechanism was probably a very early evolutionary development in the animal kingdom for it would have conferred obvious important advantages over any animal which had to treat every single event as unique, an animal which would not gain the benefits of practice and learning about a wide range of everyday

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57 This might be understood as a habit routine which thinking2 installs in memory through the process of constantly seeing its power to alter the surroundings. The habit routine is that thinking2 is in control, while the reality is that, most of the time, it is on vacation. And, just to ensure that philosophically inclined readers do not accuse me of taking a side in a long-standing debate about perception, I would insist that I am not making philosophical claims here so much as neurocognitive ones. The Habit Routine theory does not make a case for the “traditional” philosophical argument that we do not actually perceive external reality, but instead merely subjective occurrences of the mind, the position of a long line of philosophers from Descartes, Locke, Hume down through Bertrand Russell and contemporaries. But neither am I agreeing with the proponents of the "common-sense" view of perception, sometimes referred to as "naïve realism". Neurocognitively I am claiming that both of these positions have some truth in them but are nevertheless ignorant of the big picture. Relying on the HR mechanism, yes, we are not actually perceiving external reality in the raw, but that can be overcome in a moment under varying situations so that at least some of external reality is perceived as-is.

situations.

Effects Reconsidered

Let us now review the list of “effects” outlined earlier and see how they can be understood in terms of the Habit Suspension Model. As an introduction to the phenomenology of ASCs, I asked, “let us see if we can understand each ‘effect’ not as something that a psychedelic drug *does*, but as something which *we* might do, if only rarely, under certain circumstances.” Pretend, for the moment, that you have never even heard of psychedelic drugs. This may not be easy, but for someone with some measure of practiced control over his habit routines, in reading the list, I think it would be quite normal to be able to say, “Yes, I’ve experienced something like that”, or at least admit that someone they know had had similar experiences. In short, the only thing that makes any of the categories awesome or strange, is their purported causal connection with psychedelic drugs. Take the famous alleged time-distorting power of psychedelic drugs. If you were having a very busy and interesting afternoon with your favorite hobby, you might look up at the clock and remark, “holy cow, five-thirty *already!*”. But if you heard from some tabloid-reported source that LSD made you feel it was only about four o’clock when actually it was five-thirty... (or *vice versa*).

I think it is obvious that we have habit routines for dealing with the everyday perception of the passage of time, so that when we look at a clock, it is really only to confirm what we already sense about the time of day. If you look at your watch, and it has stopped even twenty minutes previous, something seems immediately wrong unless you are particularly distracted with other tasks. Even upon awakening from a deep sleep in the middle of the night, I quite often find that I know the time to the nearest ten minutes, in spite of living far out in the countryside away from hourly chimes or audible traffic patterns. In the above case of intense absorption in some activity, we have habit routines available such that *we expect* it to actually be later than it feels, so that when we express amazement that it’s already five-thirty, the knowledge that we have been busily engaged does more than a little to take the edge off the amazement, so to speak.

All this is common knowledge. But where my theory begins, is in the attempt to describe the data and systems by which this simple everyday process is implemented, and drastically changed by various influences including psychedelic drugs. The hypothesis that it is installed potential habit routines that deal with everyday perception of time gains some credibility from the knowledge that time perception was quite different before the advent of widespread mechanical time-keeping devices. In medieval Europe, daylight hours were longer or shorter according to the season, something that would probably wreak havoc with our modern sense of time until we had long practice installing the newly required habit routines to deal with the situation.

My theory also departs from simple common knowledge in its attribution of such fundamental importance to the use of habit routine; rather than a habit being an occasional type of response to certain situations,

> It is now proposed that the habit routine search is the principal operation in thinking1, always a precedent to awareness and thinking2, and that the habit routine presented to awareness for decision making *always* constitutes the preemptive or default response, seldom overruled by the active analysis and decision of thinking2 except in cases of emergency or particularly unusual significance of events.

Familiarity breeds indifference, as Aldous Huxley noted, but the cognitive mechanism by which such an aphorism might operate has until now never

been proposed. All situations for which a satisfactory habit routine may be summoned are dealt with as automatically, and with as great a measure of indifference, as possible. The artist, the great composer, the creative genius in any field may succeed in seeing the significant when presented with the merely routine,[58] but this is not the normal state of brain operation, nor is it the type of brain operation that evolution has caused to be predominant. Evolution says to us, "Watch out! Don't use your thinking2 excessively or you will damage your credit rating![59] Save all that improvising for life-threatening or mate-attracting situations".

And this is why psychedelic drugs appear to be so overwhelmingly powerful. When awareness is effectively cut loose from the normal and reliable flow of habit routine, *everything* seems changed, odd, with unusual, sometimes overpowering, but not immediately explainable changes in significance. And as I have indicated, this very change is actively recycled and augmented by cybernetic feedback wherein current evaluation and checking of awareness is fed back into the stream of thinking1 which is seeking out further habit routines, now including parameters which instruct it to look for the unusual, and these new habit routines themselves are then delayed, suspended, or changed in significance. Item C in the phenomenology of ASC's, the sense or fear of loss of control, can be easily understood from the foregoing. An individual's reality, what he automatically believes to be normal and true in his estimation of the world around him, is entirely a matter of the habit routines he has collected, and himself installed, whether by intentional or unconscious practice. If the individual is not prepared to surrender his cherished notions, if he cannot overcome the obvious implication that reality, seen without the aid of preconceived habit routines, *must appear relative* and not absolute, feelings of loss of control are the naïve interpretation to be expected. (And of course, the lesson being taught is, "What control?")

As for the other items listed previously as "effects" of psychedelic drugs, it should not now be difficult to see how they are all the result of an individual's having reduced reliance on his habit routines which define how he sees, thinks, perceives objects around him, perceives his own body and state of mind, the meaning and significance he attaches to otherwise ordinary thoughts and perceptions, and so on. So-called perceptual distortions are merely ordinary perception divorced from the normal preemptive preconditioning of the habit routine complex through which such perceptions are symbolized. To those who wish to believe that psychedelic drugs cause hallucinations and bizarre perceptual effects, the proposal that perception under the influence of the psychedelic experience is in fact closer to actual reality than normal perception (which is heavily "distorted" by our habit routines) will appear absurd. But the "habit of thinking" (as in Margolis' analysis, see footnote 39) which prevents a paradigm shift necessary to understand the psychedelic experience may well be just this: the whole of our experience has established the conviction, in truth a deception, that what we perceive is automatically and without doubt, *reality*. Although most current theories in psychology recognize the lie, as individuals we still carry on as if this were a mere scientific technicality which appears in certain laboratory experiments, but not to us who are aware enough of the problem to be immune to it. The example illustrated by the grey stone anecdote shows how misinformed we are in this conviction.

Some of the items in the phenomenology of ASC's may be understood as secondary or cascade effects of the more primary results of suspended habit

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58 The question presents itself: Who can best be trusted to decide what is, and what is not routine, the creative genius or the bored assembly-line worker?

59 Modifying a line from Terry Gilliam's classic film, *Brazil.*

routine: hypersuggestibility might be interpreted as a result of the feelings of loss of control, sense of ineffability, and change of significance wherein the suggestions of the guide or researcher are given greater weight in the vacuum of normal comprehension of ongoing cognition. Change in emotional expression would likewise be a secondary effect derived from perceived alterations in thinking, feeling of loss of control, etc. The suspension of the normal framework of habit routine for interpreting and symbolizing ongoing experience should obviously result in the sense of ineffability. Feelings of rejuvenation may result from suspension of personality habit routines that have become contradictory or self-destructive, or even just downright boring, their temporary suspension leading the individual to realize that they are mere routines, and capable of being reformed once seen for what they are. Here we are led to the hypothesis that the personality itself can be understood as a malleable and alterable collection of habit routines; some early psychedelic research suggested as much, and made use of the idea by successfully treating many personality disorders with psychedelic therapy.

Indeed, the very existence of what we call "personality" as such a strong, pervasive property of a human being argues for the prevalence, importance, and predominance of habit routines and the HRS as the primary cognitive process. Personality, world view, beliefs, desires, opinions, are all understandable as complex assemblies of habit routines. What the Freudians have for so long called the unconscious, may simply be the totality of potential habit routines that can be accessed![60] A memory is not a memory until it is accessed, therefore an unconscious memory is an oxymoron. But a habit routine, (whose elements consist of the very same data), is not only an unconscious potential pattern for perception, comprehension, and behavior, it is in addition and quite normally, accessed and employed unconsciously, and the process is not ordinarily available to introspection.

To return to the pathway for just a moment, from my own personal experiences with psychedelic drugs, the grey stone in question would probably have appeared, at first and very briefly, as an object of some significance (it was new to its location) but *without* an habit routine to immediately identify it. The first thing my thinking2 would sense would be mystery, the object seen as an *unknown.* Very quickly thereafter, I think it is common during psychedelic experience for the HRS of thinking1 to present *multiple* interpretations of the object (hence one or more interpretations would logically have to be an "hallucination" or an "illusion"); I might have sensed two or more possible identifications at once, whereupon the relativeness of its novelty and significance might stimulate further fundamental changes in my interpretation, and so on. As this process is cybernetic, it can quite run away with itself, so to speak, and the ordinary become fantastic through successive interpretations and alterations of meaning and significance.

The multiple interpretations, the multiple habit routines appearing simultaneously, might be the mechanism whereby it has been noticed by researchers that psychedelic experience can assist in the "recovery and eliciting of vast quantities of unconscious material." It is as if thinking2 is signaling, in the absence of a dependable habit routine, "quick, send me all the habit routines you've got, there's a big mystery going on here." And then the habit routines that do arrive are also out of whack... (but also potentially very revealing of the personality and the "unconscious"). At this stage there is little to be done except to relax and observe the process as it unfolds. It is instructive to the personality to be shown how dependent it is on normal and perhaps quite artificial automatisms, and it is instructive concerning the

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60 Warning! The reaction to such ideas must also be primarily a matter of habit routines representing one's investment in previous theories.

underlying nature of reality to observe first hand how its interpretation is also totally dependent on preconceived structures of the mind which may be more or less arbitrary, if not outright deception. If this be madness, psychosis, or folly, a moderate dose of it is certainly more than a homeopathic remedy for the far greater sickness which quite obviously afflicts modern man today.

The Significance of it All

To conclude this chapter, I will quote at length another account of psychedelic experience and the “effects” as noted by the experiencer. The narrative is that of Aldous Huxley, probably the most famous and widely-read account of psychedelic experience to date:

> I took my pill at eleven. An hour and half later I was sitting in my study, looking intently at a small glass vase. The vase contained only three flowers—a full-blown Belle of Portugal rose, shell pink with a hint at every petal's base of a hotter, flamier hue; a large magenta and cream-coloured carnation; and, pale purple at the end of its broken stalk, the bold heraldic blossom of an iris. Fortuitous and provisional, the little nosegay broke all the rules of traditional good taste. At breakfast that morning I had been struck by the lively dissonance of its colours. But that was no longer the point. I was not looking now at an unusual flower arrangement. I was seeing what Adam had seen on the morning of his creation - the miracle, moment by moment, of naked existence... [I was seeing] a bunch of flowers shining with their own inner light and all but quivering under the pressure of the significance with which they were charged... [And] the books, for example, with which my study walls were lined. Like the flowers, they glowed, when I looked at them, with brighter colours, a profounder significance. Red books, like rubies; emerald books; books bound in white jade; books of agate, of aquamarine, of yellow topaz; lapis Lazuli books whose colour was so intense, so intrinsically meaningful, that they seemed to be on the point of leaving the shelves to thrust themselves more insistently on my attention...
>
> At ordinary times the eye concerns itself with such problems as Where? —How far?—How situated in relation to what? In the mescalin experience the implied questions to which the eye responds are of another order. Place and distance cease to be of much interest. The mind does its perceiving in terms of intensity of existence, profundity of significance, relationships within a pattern...
>
> From the books the investigator directed my attention to the furniture. A small typing-table stood in the centre of the room; beyond it, from my point of view, was a wicker chair and beyond that a desk. The three pieces formed an intricate pattern of horizontals, uprights and diagonals - a pattern all the more interesting for not being interpreted in terms of spatial relationships. Table, chair and desk came together in a composition that was like something by Braque or Juan Gris, a still life recognizably related to the objective world, but rendered without depth, without any attempt at photographic realism. I was looking at my furniture, not as the utilitarian who has to sit on chairs, to write at desks and tables, and not as the cameraman or scientific recorder, but as the pure aesthete whose concern is only with forms and their relationships within the field of vision or the picture space. But as I looked, this purely aesthetic Cubist's-eye view gave place to what I can only describe as the sacramental vision of reality. I was back where I had been when I was looking at the flowers—back in a world where everything shone with the Inner Light and was infinite in its significance...
>
> 'This is how one ought to see,' I kept saying as I looked down at my trousers, or glanced at the jewelled books in the shelves, at the legs of my infinitely more than Van-Goghian chair. 'This is how one ought to see, how things really are'... for the moment, mescalin had delivered me [from] the world of selves, of time, of moral judgments and utilitarian

> considerations, the world (and it was this aspect of human life which I wished, above all else, to forget) of self-assertion, of cocksuredness, of over-valued words and idolatrously worshipped notions...
>
> [T]he investigator suggested a walk in the garden. I was willing; and though my body seemed to have dissociated itself almost completely from my mind—or, to be more accurate, though my awareness of the transfigured outer world was no longer accompanied by an awareness of my physical organism—found myself able to get up, open the French-window and walk out with only a minimum of hesitation. It was odd, of course, to feel that 'I' was not the same as these arms and legs 'out there,' as this wholly objective trunk and neck and even head. It was odd; but one soon got used to it. And anyhow the body seemed perfectly well able to look after itself. In reality, of course, it always does look after itself. All that the conscious ego can do is to formulate wishes, which are then carried out by forces which it controls very little and understands not at all. When it does anything more—when it tries too hard, for example, when it worries, when it becomes apprehensive about the future—it lowers the effectiveness of those forces and may even cause the devitalized body to fall ill. In my present state, awareness was not referred to an ego; it was, so to speak, on its own. This meant that the physiological intelligence controlling the body was also on its own. For the moment that interfering neurotic who, in waking hours, tries to run the show was blessedly out of the way.[61]

What a wonderfully poetic way of describing the normal collection of habit routines that rendered the world ordinary, plain, of merely routine significance: Huxley calls his habit-routine governed personality "that interfering neurotic who, in waking hours, tries to run the show." He notes that his awareness "was not referred to an ego", i.e., that the habit routines of personality that preserve self-image, self-importance, selfness, were no longer available, his awareness "was, so to speak, on its own." And the following line: "All that the conscious ego can do is to formulate wishes, which are then carried out by forces which it controls very little and understands not at all," is nothing but a poetic description of the operation of checking and decision of thinking2 feeding back instructions as parameters for further habit routine search operations via working memory. If we do not control them, at least we may now understand them somewhat better. And note the number of times that increased "significance" is mentioned...[62] As I will soon explain, this is precisely the key we need to unlock a new and comprehensive understanding of the psychedelic experience: Huxley got it right on his first try!

> ... for the moment, mescalin had delivered me [from] the world of selves, of time, of moral judgments and utilitarian considerations, the world (and it was this aspect of human life which I wished, above all else, to forget) of self-assertion, of cocksuredness, of over-valued words and idolatrously worshipped notions...

In a word, mescaline had delivered him from habit routines. If the Habit Suspension Model of psychedelic experience is correct, or at least useful, we may begin to see the enormous power of the HRS mechanism to shape our

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61 Aldous Huxley, *The Doors of Perception*, 1954, Chatto & Windus. Quotation assembled from various sections of the essay.

62 And consider again Ludwig's phenomenology of Altered States of Consciousness, item G. Change in meaning or significance. "After observing and reading descriptions of a wide variety of ASCs induced by different agents or maneuvers, I have become very impressed with the predilection of persons in these states to attach an increased meaning or significance to their subjective experiences, ideas, or perceptions. At times, it appears as though the person is undergoing an attenuated "eureka" experience during which feelings of profound insight, illumination, and truth frequently occur."

every impression, our every word and deed, for if the profound changes of psychedelic experience are nothing but reduced access to acceptable habit routines, we would have to say that habit routines are the cognitive water we swim in, omnipresent and supportive of our every intellectual movement, yet (until now) perfectly transparent and undetectable to ordinary scrutiny.

At the risk of seeing habit routines everywhere, for a new theory often incites such excesses in its newly acquired adherents, I think it safe to say that most of the "effects" noted by Mr. Huxley, and in the preceding examples as well, can be adequately understood in terms of the Habit Suspension Model. In Mr. Huxley's case, considering his great personal interest in art, the Perennial Philosophy and mystical and spiritual matters, his compassion for the human situation, and his humility, the effects he describes demand such an interpretation.

5. Neuromechanics - Part 1

We perceive by means of the kaleidoscopic mirror of this life. This means that our ability to perceive is at once tyrannized by our expectations, and at war with them.

James Baldwin - *The Evidence of Things Not Seen*

Being an outlaw may have its share of sudden and tragic surprises. But the worst of misfortunes that a person may suffer is in my view the slow, life-long and silent tragedy of those who do not, or will not abandon so-called security when opportunity knocks. To be simply dragged along by the responsibility to safety may be instinctive, but it is hardly creative nor does it lead to the fulfillment of the more precious potentialities of being human. To arrive safely at the stage of life where it is certain that the halfway point has passed, yet not even have an interesting story to tell, would be for me a far greater tragedy than the several which awaited.

During the later stages of our morning-glory researches, news reached us that two friends, who had been missing for a few days, had been ambushed and shot dead while on an expedition into the mountains of Michoacán. Several times previously they had brought back with them the most amazingly potent cannabis for us to sample; in those days seedless marijuana, or *sinsemilla*, was almost unknown back in the 'States. I remember introducing *sinsemilla* from one of their mountain forays to a few friends in New York who were well acquainted with all the varieties of hashish and pot that international smuggling could bring to market. With the exception of that rare piece of especially strong Lebanese Red, the *sinsemilla* won all contests.

In spite of the new climate of live-and-let-live on both coasts of America, for several marijuana smoke-ins had occurred and were mostly tolerated (it even seemed like legalization would not be too long in the offing), in Mexico association with any aspect of marijuana classed one immediately as a *contrabandista*, and subject to the same wild-west outlaw-style of justice as any train robber, or trafficker of guns, hard drugs, slaves, or revolution. The fate of our mild-mannered hippy friends was adequate proof of this. A few weeks previous, we had been invited to a luncheon in celebration of I-was-never-certain-exactly-what, and around the great table of Mexican haute-cuisine sat the chief of police of Guadalajara, a couple of army generals charged with controlling, among other things, the local drug traffic, a half-dozen other government types, and a whole tribe of the most authentic-looking *contrabandistas* one could imagine, including the major marijuana and hard-drug broker of the state of Jalisco. And... we three disguised hippies (we had cut our hair short north of the border to ensure ease of entry into Mexico). Well it was a merry time indeed, I was disappointed that I had not then learned enough Spanish to relate here the details of the merriment. A reaction to the often short life-span of your average *contrabandista*? Perhaps: the assault weapons were casually reposing along the entire length of the dining room wall in a manner surpassing even Hollywoodian depictions of 1920's Chicago. Everybody had brought impressive weapons, but we hippies, of course, came unarmed.

Perhaps the JohnWayneian fables we had been nourished on from early

youth inured us to such signs of impending catastrophe, but the loss of our friends suddenly transformed the mythology of good guys *versus* bad guys into a sobering lesson. Many of the ancient tribes had structured their societies with elaborate and demanding ritual contests whereby the young, expressing their natural and new-found boldness, might gain wisdom with minimal risk, but our own advanced Western society had dispensed with such superstition, with the feeble exception of First Communions and Bar Mitzvahs. And so the young of today find it necessary to express prowess through automotive inanity, alcoholic one-upmanship and other silly sport, the corporal and spiritual fatalities of which seldom prompting scholars to bemoan the demise of ancient ritual. If anything, new layers of laws and regulations, and a few new prisons were expected to do the trick. But I digress.

What the tragedy prompted me to do was not beat a penitent retreat from my errant ways, disobeying laws that were written for my own good, but to remove to safer climes and continue on my researches with redoubled enthusiasm. Since the outlawing of all use of LSD in 1967, the predictable had happened. Clandestine manufacture and distribution had flourished as had bathtub gin several decades before, and parallel to bathtub gin incidents, not all clandestine LSD was of good quality, nor manufactured by those intending that its use be accomplished intelligently. (And as for parallels between alcohol and psychedelic drugs, this is as far as it goes: either, or both, may be legal or illegal, used or abused.) As a chemist, it seemed a worthwhile project to experiment with the various published synthetic methods it was possible to use in the manufacture of LSD, in order to develop the most efficient processes possible. Efficiency here would mean that the process had to employ a minimum of equipment, employ as far as possible easily obtainable chemical precursors and reagents, involve minimal risk from dangerous reagents that would be magnified in a small, not-ideally equipped setup, provide easy and ecological disposal of waste products, and still produce a product of more than just acceptable purity, and in maximum overall yield.[63]

And as a shaman concerned with the existential health of my tribe, it was also my duty to discover and relate all possible knowledge to the people who would need such information to use the psychedelic substances wisely. This aspect of my work turned out to be by far the more difficult, for not only had we lost touch with (eradicated, actually) much ancient wisdom gained over millennia by the shamanic traditions, but the modern political, social, and even scientific climates made it practically impossible to recapture much of that early wisdom in the natural way. The modern situation colored and distorted our abilities to reproduce the mindset that would naturally see the psychedelic experience as sacrament: the modern orientation had first suspected the diabolical, then the insane, and soon thereafter was trying to discover how to use psychedelics as weapons of war and subterfuge—a heavy weight of preconceptions to overcome for the psychedelic voyager.

Luckily, my friends, who were experienced in that sort of thing, were able to import my laboratory back across the border no questions asked. And so I found myself, back in Somewhere U.S.A., (still a draft evader), and with an interest that attracted over the next few years various groups of persons wanting to promote the clandestine use of psychedelic drugs, for reasons which seemed to change from noble to pecuniary in proportion to the success achieved.

Unfortunately the prohibition of psychedelics has for the last quarter-century prevented much progress from being made on elaborating the details of the neurological effects of LSD and other psychedelics in the human brain. As I

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63 My solutions for these requirements are described in the final chapters.

mentioned previously, the very modest amount of work that *has* been done was with laboratory animals, or *in vitro* cultures of nerve cells, and has in general been directed toward toxicological or forensic ends. Thus there is not a lot of reliable data available on how normal doses of psychedelic substances affect normal neurochemistry in normal human subjects experiencing the more valuable and interesting aspects of psychedelic experience.[64]

If for the past several years experiments could have been performed using volunteers, especially experienced psychedelic users, in the attempt to accumulate some reliable data, the task I will now attempt would be far more straightforward. For example, I suspect that if the new and powerful scanning techniques of PET and MRI were combined with the experimental ingenuity of some of the top cognitive neuroscientists to illuminate the brain mechanisms paralleling cognitive processes altered by psychedelics, we would rather quickly find out a lot more about not only the mechanisms of action of psychedelic drugs, but many other neuro-psychological realities as well. If mere speculation about the psychedelic experience has led me to discover a major new brain function (assuming that the HRS mechanism is as important as I suspect, and corresponds to various discoverable patterns of neural signaling in the brain), imagine what a little serious research is likely to turn up. Needless to say, even the underground scientist of independent means is unlikely to have access to Positron Emission Tomography equipment.[65]

Nevertheless, I have gleaned enough data from existing research to at least advance a few preliminary guesses as to the neuromechanics of the Habit Suspension Model of psychedelic experience. But before I venture into this minefield of complexity I must discuss some further implications and illustrations of the habit routine search cognitive process that I have hypothesized. In proposing the habit routine search mechanism as a fundamental but previously undiscovered brain/mind process not only out of necessity to explain psychedelic effects, but also from the perspective of other psychological, anthropological, and evolutionary viewpoints, I hope to build some badly needed bridges between these disciplines utilizing the new model.

The phenomena discussed below, when viewed through the new lens of the HRS model, start to be understandable in a new way. But in addition, since current discipline-specific models leave much to be desired in attempting to explain at least some these phenomena, they *demand* a new and global way of understanding them. The habit routine interpretation is not just an alternative model for aspects of reality already well modeled, but a viewpoint which may be able to unite poorly understood and diverse phenomena under a common theoretical outlook. All of the topics I will mention deserve more space than I can give them here, some would require a lengthy analysis, but at the risk of over-simplification, I don't believe I need an exhaustive treatment to show just how wide the application of the habit routine model might conceivably be. My attempts to propose neurological models also will require reference back to these many topics:

Shamanism

In anthropology, our understanding of the phenomenon of shamanism and the ability of shamans to temporarily divest themselves of their culture-bound cognitive limitations using psychoactive preparations suddenly becomes much

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64 2018: Updating this text to the present situation, there is now a great wealth of available research on these subjects, yet my original theory—to be presented in this and the next chapter—has not needed much change. In fact, it has received considerable justification from recent research—to be described in later chapters here.

65 Once again, I remind the reader that this portion of the text is from my earlier writing. I have kept it here as a convenient introduction to my Theory of Psychedelic Experience.

more than the drugged delusions of the primitive mind as some have suggested. The historian of religion Mircea Eliade wrote in 1951, "But we have seen that, in shamanism itself, narcotics...represent a decadence and that, in default of true ecstatic methods, recourse is taken to narcotics to induce trance."[66] Naturally, if one's whole viewpoint concerning "narcotics" has been shaped by the Prohibitionist Ideal of Twentieth Century Western Civilization, it would have been difficult indeed in 1951 to recognize the true significance of the use, not of narcotics, but psychedelics by tribal peoples. But Eliade's view is still clung to today by more than a few so-called scholars, yet paradoxically their own "culture-bound cognitive limitations" strikingly revealed in the mentioned Prohibitionist Ideal are as in need of cure as were those of the tribal peoples they see as decadent.

The great importance of shamans and psychoactive drugs to so many early societies can now be seen much more in terms of the temporary yet cumulative cognitive advantages that psychedelic experience would have conferred. The success of shamans in curing some of the maladies of tribal members under their care takes on new meaning, as does the use of psychedelic agents in rituals for initiation into adulthood, for divination and the making of important decisions, and more. Psychedelic experience as habit routine suspension unites the understanding of many aspects of the life and evolution of Early Man. And far from being a decadent substitute for "true ecstatic methods" as some insist, psychedelic use was and remains the genuine article for which many less efficacious substitutes were tried and abandoned. The stability, longevity and ecology of many ancient societies could only have been a by-product of cultural wisdom; if limited and narrow from our modern point of view, such wisdom certainly was not accidental, and in some respects represents ideals which modern industrial civilization has not even pretended to espouse. Our knowledge of ancient psychedelic plants and their use is the subject of many excellent books and reviews now available;[67] the knowledge represented in these works goes far beyond the primitive views that were prevalent in 1951.

The transformation of shamanism into organized religion, a much discussed though poorly understood process, was most certainly a process that was paralleled by the discontinuance of the use of psychedelic preparations by the general congregation, although insider knowledge was probably common. Insofar as this transformation has also been one in which doctrine and dogma have not only replaced, but forbidden direct individual experience of spiritual realities, it would be difficult to maintain that the change worked for the benefit of the individual in need of spiritual fulfillment. It seems obvious that the transformation was a political one, brought about by those requiring control over their subjects through the creation and manipulation of cognitive habit routines, and especially the prevention of the use of methods enabling the individual to bypass the limitations imposed on him.

The transformation was certainly not a refinement which led to peace and harmony among early civilizations having organized religions and priesthoods. Lack of peace and harmony among nations and civilizations has, in fact, become the most important behavioral characteristic of the human species insofar as it threatens that species with extinction. Individuals, robbed of their access to direct experience of religious truth (and here there is no substitute: religious truth is something that *must* be personally experienced),

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66 *Shamanism, Archaic Techniques of Ecstasy*, Mircea Eliade, Princeton University Press 1951, 1972 p417.

67 See Richard Evans Schultes and Albert Hofmann, *Plants of the Gods*, McGraw-Hill 1979; Schultes and Raffauf, *Vine of the Soul*, Synergetic Press 1992; and the numerous references therein.

become members of a society which can be coerced by petty tyrants into all sorts of collective insanities. In a future chapter I will extrapolate the importance of early shamanism and the use of psychedelic plants in two directions: firstly to show that a very significant role for psychedelics can be hypothesized in the early evolution of man; and to supply yet one more sermon on the faults of modern civilization and what might be done about it.

Other Methods

The understanding of meditation techniques, sensory deprivation, religious ecstasy provoked by various insults to the body, and the panoply of other methods that human individuals seeking enlightenment and self-transcendence have employed down through the ages becomes unified by the present model of habit routine search and suspension. I propose that all these diverse techniques are more-or-less effective—if often very arduous—methods for achieving what the psychedelic drugs do more efficiently and directly, *viz.*, to suspend one's programming as represented in the personal collection of habit routines. If there is something to be said for the "naturalness" of non-drug methods, methods whereby the individual is purportedly gaining the ability to achieve transcendent states at will, there is even a stronger statement to be made by the obvious unnaturalness of the more violent and self-destructive methods of certain religious ascetics: extreme fasting and mortification of the flesh, such techniques must be seen as quite primitive substitutes for the use of natural psychedelic plants, quite benign by comparison.

Note that I do not propose that these various techniques necessarily affect brain operation through exactly the same mechanisms: the outcome of altered or suspended habit routines may be realized by quite different mechanisms and points of intervention in neurological operation, both neurochemical or self-induced, as I have already suggested. The hypothesis of the HRS system being the fundamental and primary cognitive operation of the nervous system upon which all the ensuing processes of thinking are based, fits well with the proposal that there would likely be many diverse ways to alter the system as a whole, especially considering the cybernetic nature of most if not all brain processes.

Instinct

The operation of what have been called instincts, both in animals and man himself, may now be understood in a new way. Although the capacity and characteristics of memory in animals are generally agreed to be very limited compared with man, the use of data implanted by experience, as well as the genetically-expressed data of the collective experience of a species, not as long-term memory in LMA, but as data for the operation of HRS, seems a promising new approach in ethology.

Person-ality

In psychology and psychiatry we may begin to understand better what the personality is, where and how the neurological data that result in observed personality traits is stored and accessed. A more physiological and operational understanding of the properties of the "unconscious mind" may now be possible, and may extend to understanding how the prevalence of irrational belief can coexist in the same society, even the same individual, with logic and rationality. We may be able to apply the new concepts to the understanding of phobias, neuroses, and personality disorders, the power of propaganda and the phenomenon of crowd madness, the neurocognitive basis of prejudice, and the practice of methods by certain individuals which seem to render them

much less susceptible to these major human weaknesses.

Uniqueness of Man

The fundamental difference between man and animal is an ancient question, still debated from the perspective of many opposing viewpoints. The habit routine model may provide a new assessment of man's uniqueness in his ability to suspend or modify the operation of habit routine at will, (with practice), and so develop and cultivate the ability to be creative. I think it is safe to say that animals have the ability to be creative, at least in a simple way, but they exhibit such ability only when there is little alternative, as in a crisis, or in experiments designed to elicit such behavior. They do not do so out of the exercise of philosophical interest and free will, so much is obvious. Man can, however, cultivate and practice the art, and dwell in a creative state by choice, but this is not to say that most human beings make the required effort to do so to any significant extent. Thus proposed differences between man and animal have to date always seemed merely a matter of degree rather than substance, animals exhibiting any suggested trait simply on a less complex level. Tool-making, language, music and dance, and other examples could be cited. Understanding the difference as a major reorientation from a habit routine governed mode of existence to at least a potentially Creative-Individual Mode may be the characteristic which is more of substance than degree.

The Binding Problem

The so-called binding problem in philosophy and psychology, *i.e.*, the lack of an adequate psychological or neurological theory to explain how unitary consciousness arises out of the multiplicity of sensory signals which arrive at the brain may have a solution using the ideas I have suggested. With the recent elaboration of Parallel Distributed Processing models of brain function, where it is not even suggested that there is a central structure "responsible" for consciousness, the binding problem has become even more mysterious, to philosophers at least. But if our unitary conscious experience is not the experience or awareness of the totality of sensory input (and mental reflection) itself, but rather the after-the-fact experience of our own habit routines *activated by the sensory data*, and overlaid with only a sparse sampling of the sensory data relevant to the habit routine complex called into play, the binding problem disappears.

The relative absence of brain structures which associate all the sensory data from the various sensory inputs and intermediate processing areas to produce overall unitary or "bound" awareness is no longer a mystery, because unitary experience of external reality is an illusion. What we experience are the cognitive or perceptual structures provided by our own habit routines which enable the evaluation of only the most salient or attended to aspects of external reality; we see, hear, and understand only what we have already seen, heard, and understood, plus a small fragment of new sensory data which relates agreement or disagreement, the presence of novelty or sameness. It is through this deceptively small window upon the external that we exercise our apparently powerful abilities of free will and creativity. The power over external events which results, although demonstrably quite limited, seems great, great enough to install in us an illusion of control far greater than the evidence warrants.

If one of the fundamental questions in cognitive science has been whether perceptual data for which there is no conscious awareness can influence behavior, then from the above it can be seen that not only is this possible, but since the total sensory input is used primarily to select habit routine

complexes in thinking1, which is entirely a pre-conscious operation, then the conclusion is that sensory data is *primarily* unconscious and the *primary* "causative" agent in behavior!

Time Delays

The time delay between sensory signaling and the subjective conscious perception of sensation which has so carefully been demonstrated by neurosurgeon Benjamin Libet and other experimenters may also have a simpler explanation than those proposed so far. Libet and others have shown that a pin-prick of the finger, for example, transmits a signal to the cortex of the brain via the thalamus, which arrives in a few thousandths of a second. All sensory signaling except olfaction is similarly transmitted: first to the thalamus which—it is said—acts as a sort of relay-station distributing the signals to the appropriate domains of the cortex. Yet conscious perception of the pin-prick can by various experimental techniques be shown to be delayed by up to a half-second, while "cerebral neuronal adequacy" is achieved.[68] It is proposed that there is then "a subjective referral backwards in time, after neuronal adequacy is achieved, which antedates the [perception of the] experience to correspond to the time of early cortical responses..." [the onset of signaling measured after a few thousandths of a second].

The alternative view that I propose is that the original sensory signaling, passing through the thalamus, is projected to all the appropriate areas of the cortex,[69] and it is this signal, by comparison with all the stored data representing the frames of memory, which generates the habit routine complex which is then used in the thinking2 processes of perception and symbolization. The time delay corresponds precisely to the time necessary for all the thinking1 (pre-conscious) comparisons of current sensory signals with LTM (long-term-memory) to assemble the habit routine complex to be presented to thinking2.

The time delay for the classic "double-take" may be relevant here. Recently I was watching a program about our simian relatives and in one scene we see a monkey walking toward the camera, he then casually looks back for a moment, and returns his gaze toward the camera. After a brief moment he rapidly jerks his head around to take another look behind at something he decided needed attention. The delay between the first and second view should correspond exactly to the time needed to create the habit routine and detect something salient therein, triggering the second viewing. The fact of this occuring with a monkey eliminates possible confusing issues that might occur in attempting to perform such an experiment with humans.

According to my view then, the original signals from the periphery of the body, projected upon the cortex by the thalamus, are not at all the "data" of which we become aware. This original sensory "data" will be selected, trimmed, and mostly eliminated during the process of HRS (habit routine search), and only details from the data which are relevant to the habit routine complex brought to awareness will be included. Thus the greatest part, by far, of the "data" which is experienced, the supposed "bound awareness" of external reality, is merely the data that already existed as LTM.

The problem of how experience is referred backwards in time is also neatly resolved since what is experienced is the habit routine complex generated from sensory data received *at the time* of the pin-prick or other peripheral input: the habit routine complex represents the sensory data at the instant of

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68 See "Neuronal vs. Subjective Timing for a Conscious Sensory Experience", and other reprinted papers of Benjamin Libet in *Neurophysiology of Consciousness*, Benjamin Libet, 1993, Birkhäuser Boston.

69 How this process of projection might be implemented is described in the next chapter.

reception into thinking1, not at the (up to) half-second later instant of perception in thinking2. The variability of the time delay may represent the level of complexity of the HRS process required in each case, a strong sensory signal is perceived more rapidly than a minimal one because less cognitive effort is required to construct a habit routine when the salient data is stronger than the background sensory information. Remember that both strong and weak signals arrive at the cortex with the same small time delay ("a few thousandths of a second").

The idea that "perception is a function of expectation"[70] is, of course, not new. But the dependence has so far been seen more as a minor imperfection or inconvenience, easily over-ridden by careful observation especially by he who is in the act of studying such phenomena. The new view provided by my theory shows that very attitude to be a product of the "minor inconvenience", the magnitude of its influence being directly proportional to the certainty of its negligibility. I repeat: in a very literal sense, we see what we have already seen, hear what we have already heard, think what we have already thought, believe what we have already believed, and I'm afraid in most instances in most people most of the time, little else. Illusions to the contrary may well be provided and sustained by installed habit routines. Disagreement with this analysis may well provide evidence for its accuracy!

Free Will

In a further series of investigations, Libet was able to show a similar and apparently much more mysterious anomaly. A carefully executed series of experiments seemed to call into question the operation, perhaps even the existence of "free will" as we know it. Again, the results were indicated by the existence of various time delays in neural signaling relative to tasks that the subject was asked to carry out. Here is an abstract of the original article:

> Voluntary acts are preceded by electrophysiological "readiness potentials" (RPs). With spontaneous acts involving no preplanning, the main negative RP shift begins at about -550 [milliseconds]. Such RPs were used to indicate the minimum onset times for the cerebral activity that precedes a fully endogenous voluntary act. The time of conscious intention to act was obtained from the subject's recall of the spatial clock position of a revolving spot at the time of his initial awareness of intending or wanting to move (W). W occurred at about -200 ms. Control experiments in which a skin stimulus was timed (S), helped evaluate each subject's error in reporting the clock times for awareness of any perceived event.
>
> For spontaneous voluntary acts, RP onset preceded the uncorrected Ws by about 350 ms and the Ws corrected for S by about 400 ms. The direction of this difference was consistent and significant throughout, regardless of which of several measures of RP onset or W were used. It was concluded that cerebral initiation of a spontaneous voluntary act begins unconsciously. However, it was found that the final decision to act could still be consciously controlled during the 150 ms or so remaining after the specific conscious intention appears. Subjects can in fact "veto" motor performance during a 100-200-ms period before a prearranged time to act. The role of conscious will would be not to initiate a specific voluntary act but rather to select and control volitional outcome. It is proposed that conscious will can function in a permissive fashion, either

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70 References here could be cited back to ancient Greece, I suspect. But a very cogent example is John R. Searle, *The Rediscovery of the Mind*, 1992, MIT Press, p136. See also Nicholas Humphrey, *A History of the Mind*, 1992, Simon & Schuster, chapter 14. Both of these, and other recent popular treatments give a good overview of such hypotheses in 20th Century research, and what they might indicate about the process of perception and the nature of consciousness.

> to permit or to prevent the motor implementation of the intention to act that arises unconsciously. Alternatively, there may be the need for a conscious activation or triggering, without which the final motor output would not follow the unconscious cerebral initiating and preparatory processes.[71]

Although Libet himself commented in the closing section of his paper, "...it is important to emphasize that the present experimental findings and analysis do not exclude the potential for 'philosophically real' individual responsibility and free will", several writers have, at least in popular presentations, rather exaggerated the possible implications of the experiments:

> ...The conclusion is that we are deluded in believing that each of us is a free agent who may decide to take an action. Such a decision is an interpretation we give to a behavior that has been initiated someplace else by another part of ourselves well before we are aware of making a decision at all. In other words, the decision has been made before we are aware of the idea to even make a decision. If "we" are not pulling the strings, then who or what is? The answer is, it is an unknown part that is unfathomable to introspection.[72]

> ...Here we have physiological confirmation of Ambrose Bierce's definition of 'intention' as apprehending the imminence of an action. Behind the scenes the blind brain-mind is determining what action to take, and when to initiate it. And as it sends out messages to the muscles to move, so it also initiates processes that may end up as a conscious *prediction* of the act that is already on its way. Consciousness, however, ignorant of its own foundations, takes this prediction, and re-interprets it as control.[73]

Actually there are some elements of truth in these observations, but they do not support the implied positions of the authors. The peer commentary in the same journal as Libet's original article, it must be said, did not at all suffer from the same exaggeration, but presented a range of quite perceptive criticisms of the methodology of the experiments and suggested several less extreme psychological, neurological and philosophical conclusions, yet Libet was in my opinion able to support his position effectively. But none of the commentators seemed able to simplify the experimental results and their implications with a new model of what might actually be taking place. Let me first describe some further details of the experiments:

Each experimental subject was asked to observe a kind of TV monitor on which was projected a spot of light rotating around the center of the screen. This was the timing device: psychological and sensory events were timed by observing their occurrence relative to the clock-position of the spot of light. The subject could then relate, for example, the timing of a pin-prick or other event such as a decision, to the position of the spot at say, three o'clock. The subject was then asked, at a completely random moment chosen by himself, to suddenly flex the fingers of his hand, and observe the clock-position of the spot of light at the moment of his being aware of having made the decision to flex his fingers. What was consistently found was that an electrical signal in the cortex of the brain, the "readiness potential", would appear about four-tenths of a second *before* the subject signaled his awareness that he had made the decision to flex, and that the actual flexing of the muscles appeared about

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71 *Behavioral and Brain Sciences* 10 (4), (1987) p781. The original article and extensive peer commentary appeared in ibid. 8 (4), (1985) pp529-566, "Unconscious cerebral initiative and the role of conscious will in voluntary action".

72 Richard E. Cytowic, M.D. in *The Man Who Tasted Shapes*, p170, 1993, Jeremy P. Tarcher/Putnam

73 Guy Claxton in *Noises from the Darkroom*, p224, 1994, Aquarian/HarperCollins

two-tenths of a second *after* the apparent time of the decision. The fact that these were considered startling and unexpected experimental results is illustrated by the depth and intensity of controversy that ensued in trying to explain the results within the framework of the various critics' paradigms. What was debated by all was the question of volition. How could the decision to take a voluntary act, which in anyone's book must certainly be a *conscious* event, be preceded by an *unconscious* event of such regularity that the timing of the ensuing muscle movement could be predicted from it?

The answer, according to the habit routine model, is that there was no volition whatsoever concerning the decision to flex the fingers. This was a "decision" pre-programmed to take place as an instruction in working memory for the selection and implementation of habit routines that would lead to the desired movement. The trigger for this decision was another instruction in working memory, the instruction to "*choose a random moment*". The volition involved in the overall process consisted of the voluntary programming of working memory by the subject to carry out the instructions of the experiment, nothing more. And nothing less, especially, for in this process we observe quite unambiguously the operation of free will: the subject chooses quite freely to follow the instructions of the experiment, and consciously programs his working memory with the recipe for carrying out the desired sequence, *viz.*, choose a random moment, notice the position of the timing device, and then flex the fingers.

Owen Flanagan has expressed a similar interpretation of the experiment. But his philosophical intent seems to be to argue against any idea that mind might be anything other than something *caused* by physical, observable-in-principle brain processes. He calls his position on the mind/brain debate "constructive naturalism", but seems to fall into the same trap concerning causation that I mentioned previously:

> I conclude that Libet's results, far from offering solace to the suspicious epiphenomenalist, are precisely the sort of results one would expect if one believes that conscious processes are subserved by nonconscious neural activity, and that conscious processes play variable but significant causal roles at various points in different cognitive domains.[74]

The first proposition, "conscious processes are subserved by neural activity", is in logical contradiction to the second, "conscious processes play causal roles". If the first proposition is taken to mean that for *every* conscious process that may be defined or intuited to exist, then there is necessarily a real, durational, and logical sequence of neurological operations in the brain which precedes and causes the conscious activity (causation must have duration and precede the effect which results), then the conscious process of the *second* proposition must be included: it must also be caused by neurological activity, and so its apparent causative power is only a reaction to previous neurological causation. As I stated above, the mind, or consciousness, is thus reduced to having no actual causative power at all, it becomes an inoperative concept.

I must also reiterate my own position that this argument does not automatically make me a "suspicious epiphenomenalist" nor a closet mysticist. The mind/body debate has, like so many other debates, become polarized into a binary reductionism: if you're not in the one camp, you must be in the other. If you don't believe that the physical manifestation of the brain "causes" all the mental, intentional, qualitative, subjective, and yes, spiritual manifestations of the human (to say "organism" would already be admitting to the reductionism I am questioning), then you must be an advocate of mysticism, *i.e.,* unscientific.

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74 *Consciousness Reconsidered*, Owen Flanagan, 1992, MIT Press, pp136-138.

My previous analogy to the dual nature of electromagnetic radiation is apt, I think, for it illustrates the same debate that occurred in physics long ago: is light a particle or a wave? Or both simultaneously? Does the particle nature of light *cause* its wave aspects? Or *vice versa*? All these questions may only be *asked* from the point of view of classical physics, they only have *meaning* from the classical view. Once quantum mechanical physics enters the scene, no one even attempts to answer the questions on the classical level. If my guess that brain and mind are parallel aspects of a more fundamental reality is nebulous, perhaps it will take on some relevance when a "quantum mechanics of philosophy" will be available. Whether a process of mind studying mind will accomplish such a feat is still an open question.

I hope I may be forgiven for having diverged considerably from my analysis of Libet's findings to repeat an argument of the previous chapter, for I think that the argument and the logical inconsistency it points out lend some credibility to the use of the habit routine model as a way to resolve many aspects of current debate. The habit routine model is far from being a mystical proposition, yet it seems that many questions which previously forced opinion into either the reductionist or mystical extremes are now of less importance. If the habit routine model does not itself show how mind and brain might be parallel and complimentary aspects of the same thing, it at least weakens some arguments that such a view must be unscientific. To continue with the habit routine view of Libet's results:

I would propose that the time of the onset of the "readiness potential" corresponds exactly with the implementation of the instruction in working memory to "choose a random moment", and that the ensuing delay corresponds to the time necessary to activate the habit routine search process to produce a pattern which seems to the subject to satisfy the instruction, "choose a random moment." At this point, the second and third pre-programmed instructions to notice the time, and then flex the fingers is launched, and the ensuing delay again corresponds to the time necessary to select and activate the various habit routines necessary to implement the physical action. The subjective timing of the intention to move the fingers occurs when it does because it must await the success of the first instruction to choose a random moment. When conscious awareness is satisfied that this criterion has been met, it "approves" the continuation of the instruction sequence in working memory. Notice that I have adhered to my intuition that mind and brain are simultaneous, not causative in either direction; in this example the readiness potential is the physical attribute of the larger process which is implementing the instructions of free will.

Hallucinations

I have already alluded to the idea that the so-called hallucinations resulting from psychedelic experience are not "real" or strong hallucinations at all. In this case, normal sensory data, perceived without the usual framework of acceptable habit routines to organize and categorize the perceived sensations, becomes itself seemingly hallucinatory (in the naive subject) because it is perceived "as is". And, as I mentioned previously, the perception of such sensory input, especially if the set and setting of the experience are threatening (as in the above account of a hospital-setting LSD session), will through feedback to further thinking1 habit routine search produce even more bizarre results, greater feelings of loss of control, etc.

Classical hallucinations produced by brain pathologies and various diseases are a quite different phenomenon, as was noted by many of the early psychedelic researchers. It was in fact the widespread dissatisfaction with the term "hallucinogen" (and also "psychotomimetic") which led to the coining of the term "psychedelic" as a properly descriptive name for these substances.

Classical hallucination produced by brain pathology (or as manifested in the delirium tremens of end-stage alcoholism, for example), is probably outside the domain of the habit routine model, although the psychological and cognitive results of certain nervous system diseases may assist in devising the neurological model of habit routine search. In the next chapter I will discuss some types of brain damage which provide such evidence.

Subliminal Perception

Many diverse psychological experiments have been able to show that information from a briefly encountered experience, although not subsequently accessible to normal recall of memory, nevertheless provides data which the subject uses "unconsciously".[75] In recent studies, the terms "explicit memory" and "implicit memory" are used to denote sensory information which can, or cannot be consciously recalled. The terms correspond roughly to what I have called LMA, or logical memory access (explicit memory) and the output of the habit routine search system (implicit memory). But defining the two as different *types* of memory obscures what the habit routine model makes clear: the memory "data" is the same, it is the method of access which is different.

A typical experiment would run something like this: Subjects are given a brief exposure to a word presented on a screen. A 30 millisecond showing is not long enough for the subject to recognize that he has seen anything at all, yet in subsequent testing the word will be identified more frequently from lists of random words than statistics would predict. Research on subliminal perception had been motivated by studies of amnesic-syndrome sufferers, who had often been observed to have intact implicit-memory function despite gravely affected ability to recall autobiographical events. A patient afflicted with amnesia might be taught a procedure, for example, and shown by testing to have retained at least some information that he had learned. Yet he would have absolutely no memory for the time or place nor the procedure in which he had learned this information.

Daniel L. Schacter (footnote 75) has identified five types of evidence for the dissociation or independence of these two memory processes and concluded, "Taken together, the...studies constitute solid evidence for a fundamental difference between implicit and explicit memory." The evidence, I believe, fits the habit routine model like a glove, but it is not at all necessary to propose independent memory systems to explain it. The habit routine model proposes that the same memory "data" from exactly the same distributed sources in the various domains of the cortex, are accessed and assembled by two different processes, one automatic, ongoing, and pre-conscious (HRS in thinking1), the other voluntary, deliberate, and accomplished by feedback of cues assembled from conscious analysis and evaluation of thinking2 (LMA).

The model illustrates how HRS can retrieve information from the briefly perceived, subliminal exposition, yet LMA, which must have reference to a process of duration, cannot access the same data. The film frame/clip analogy is useful here: the 30ms exposure is recorded, just like all sensory data, but it represents only a frame of a film. LMA must access a sequence of frames during recall, a series of time-related frames of a certain duration, a "film clip". This may be a result of the nature of the cues which are used in LMA, or perhaps just the inherent operating characteristics of the brain system which reconstructs conscious memories. Or it might be hypothesized that the memory of an instantaneous cross-section in time, like the 30ms. exposure, would simply not register in consciousness, thus no process of cue-

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75 See "Memory", by Daniel L. Schacter in Michael I. Posner, *Foundations of Cognitive Science*, MIT Press 1989, pp695-697 for a summary and further references of original research papers.

construction necessary to retrieve a memory would be possible.

An interesting experiment suggests itself to attempt to show the operation of information collected and usable as habit routines, but not accessible in LMA. A series of images is shown, all subliminally, demonstrating one of several possible logical relations between several different generic objects depicted in the images. By "generic" I mean that the objects do not have individual or "personal" characteristics, but denote a type, or a class. Numbers or letters in a nondescript font would be a good example, as would simple geometric figures. In each image is also a prominent and unchanging "reference" object which does have intrinsic specific characteristics, a photograph of Jack Nicholson perhaps. The images may be interspersed with other images, both subliminal and perceptible, or they may even be inserted in a short film, for instance.

Afterwards the subject is asked to deduce a possible logical relation between the several types of generic objects, now shown continuously, in one case *with* the reference object shown, and in another case *without* the reference. To deduce any one of the several possible logical relations between the generic objects requires a logical sequence of brain/mind operations, including attention and decision, reference to previously learned knowledge of similar cases, it requires deliberation of a complex nature. The logical relation between the generic test objects implied by the series of subliminal frames, if deduced preferentially over other possible logical relations when the reference object is included, would indicate that habit routines had been installed by the data in the images; the co-presentation of the reference object should reinforce the habit routine learned about the logical relation indicated by the images. And not only would the routines be invisible to LMA, but even recall of the objects themselves would be nil.

Note that some preference for the required logical relation should be present even without the reference object. The prediction is that a small preference should be found without, and a larger and much more significant preference with the reference object present. This is because the reference object has obvious and strong individual characteristics which would be expected to activate the assembly of habit routines in which it played a part, whereas the test objects have little or no specific characteristics. The experiment would demonstrate that even complex logical decisions, supposedly made on the basis of consciously applied information and calculation, are nevertheless guided by invisible and preemptory patterns installed in memory in perhaps involuntary and illogical ways. (What would be logical about preferentially choosing one of several relations among geometric figures based on a picture of Jack Nicholson being present?!).

Context-Dependent Memory

This proposed experiment is a reduction to the subliminal perception level of a more general phenomenon called *Context-Dependent Memory*, which was described as long ago as 1690:

> The British associationist philosopher John Locke refers to the case of a young man who was taught to dance. His lessons always took place in the same room which contained a large trunk. Alas, it subsequently proved to be the case that: "The idea of this remarkable piece of household stuff had so mixed itself with the turns and steps of all his dances, that though in that chamber he could dance excellently well, yet it was only while the trunk was there."[76]

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76 An excerpt from *Human Memory, Theory and Practice*, Alan Baddeley, 1990, Allyn and Bacon, p268.

Experimental studies of context-dependent memory in recent years have established the importance of the effect, but no general cognitive model has been proposed which might explain its operation. The application of the habit routine model may consolidate understanding of several currently studied aspects of memory. Baddeley reports a particularly interesting study, the results of which lend themselves directly to interpretation using the habit routine model. This interpretation of context-dependent memory will additionally lead us into another question of importance for understanding HRS and LMA and how these processes are initiated:

> Is it actually necessary for the subject to return physically to the same environment for context-dependent effects to work, or is it sufficient to imagine the original environment? This was explored in a study by Smith (1979) who had his subjects study 80 common words in a distinctive basement room on the first day, and then attempt to recall them on a second day in either the same room, or in a fifth-floor room with very different contents and furnishings. Subjects who recalled in the original basement room tended to remember about 18 words, significantly more than those who remembered in the different upstairs room, who recalled only about 12. Of particular interest however was a third group who were tested in the different upstairs room, but instructed to try to recollect as much as possible of the original learning environment before starting to recall. They remembered an average of 17.2 words, not significantly different from those who had physically returned to the learning environment.[77]

The habit routine interpretation of these experimental results would be as follows. The original session in which the 80 common words were studied was, like all ongoing cognitive activities, organized around and facilitated by habit routine complexes which each individual has developed over his lifetime of conscious activity. They would be roughly similar for all the subjects, but not identical, some persons obviously having developed routines for study (the memorization of a list in this case) which are somewhat different and more or less effective than those of other individuals. Nevertheless, for a given subject, habit routines typical for that subject are used for the learning process, and the information learned is incorporated into memory as further habit routines based on the learning routines. Thus the learned data is itself organized into habit routines related to those used in the learning. We might think of the learning routine as a sort of template on which the data to be learned is embedded. But more than just the "data" of the words is recorded! All habit routines are potentially re-assembled from the entire sensory and cognitive input of the moment (including the habit routines brought to bear in implementing the ongoing process): if the words were printed in red ink, if Beethoven's Fifth Symphony were playing at the time, if one had an annoying itch, all these, including the general surroundings of the room and the emotional "feel" thus elicited in the learner, are part of the habit routine which contains the information concerning the words studied.

In the above experiment, recalling the words later is improved if the subject is tested in the same room; here the word information embedded in the habit routine created at the time of learning is accessed more reliably by the presence of the sensory input of the room (which matches elements of the original habit routine). But improvement is also noticed just by asking the subject to *imagine* the original learning location. In this instance, the habit routine is activated by thinking2 imagining the original scene and supplying this as an input parameter to HRS via working memory.

It has been noticed in many studies that if the words to be learned can be

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77 *Ibid*., p270

organized in some way, either intentionally with a mnemonic or categorization process, or "unconsciously" by the influence of context, as is the case here, then subsequent recall is much improved. We may view this effect as the production of habit routines having an internal organizational structure, a cross-linking between elements of the routine, so that recall or recognition may be brought about by more numerous cueing situations. The context in which the learning is taking place, the basement room, provides an organizational framework, as would more intentional or contrived methods such as relating the words to certain categories or classes.

This brings us to the related question of the difference between recall and recognition. In word learning experiments, a subject can be tested for his *recall* of words, *i.e.*, the words that he can remember on demand; or for *recognition*, wherein he is given a list of words only some of which were words to be learned. The subject then goes through the list and replies yes or no to each entry. Baddeley discusses the many experiments that have been done and the methods used to correct for various errors inherent in the procedure.[78] It has been shown that, as a rule, recognition is far better than recall, scores for the former being typically twice or more the scores for recall. A single case study (of myself) illustrates the disparity and suggests also that using the experimental paradigm of learning and recall of *words* (as opposed to images, or composite sensory patterns) may not tell the whole story:

In the 1950's and 1960's I often frequented small record shops to buy cheap (I was a student) and usually out-of-print jazz record albums. Album cover design, even then, was crucial in promoting records that were not expected to be big selling items, and so many were quite original in appearance. When sifting through the bins, I almost never erred in knowing if I had already bought an album, yet a printed list of titles was much less helpful. To this day I can look at an old jazz album on display, and tell immediately if I already own a copy in my collection of well over a thousand. A list of titles is much less effective. And if asked to recall the cover art from a well-known album, I will usually fail for most items. Out of a thousand, I can right now bring to mind the cover of perhaps twenty or thirty, yet somewhere in my head is the "data" required to recognize them all. I predict, on the basis of my own experience here, that if experiments on recall *vs.* recognition were performed using visual and perhaps audio material, as well as composite sensory input, the disparity between recall and recognition would far outpace the results found for word study tasks.

Baddeley notes, "The question of how recall and recognition are related is one of the oldest in the study of memory. It is also one that remains complex and controversial." I think that the habit routine model may have some ability to simplify the controversy, for the distinction between recall and recognition parallels closely the distinction I have made between LMA and HRS. In recognition, the result comes about automatically and rapidly through HRS, the effect of context being entirely "pre-conscious", an operation of thinking1 processes; whereas in recall, the context can be consciously recreated to assist in the process as in the experiment above. Thus in the recall of words learned in the basement room, the subject can improve his score by simulating the context, using LMA to intentionally reconstruct the look and feel of the basement room. In the experiment that I have proposed (showing a series of subliminal images containing the constant context or non-generic item), the context item automatically supplies access to habit routines which produce the response. In the basement room experiment the working memory is intentionally programmed with a reconstruction of the context (in the case of the upstairs recall), which then as a parameter for ongoing thinking1 assists in

78 *Ibid*., p271ff.

recall.

Visual Filling-in

Another phenomenon of recent interest and debate which may benefit from a habit routine interpretation is *filling in*. In its simplest aspect, it has long been known that due to the particular structure of the eye, there is a small blind spot on each retina at the position of its attachment to the optic nerve. The portion of the visual scene projected here is therefore not represented in the visual cortex of the brain, yet we have no awareness that there are two blank spots in our field of view. (A simple experiment that all children are taught shows the reality of the blind spot.) The process whereby the brain nevertheless produces an apparent continuous field of view is called filling-in, and some examples of recent research and controversy are nicely summarized by Francis Crick.[79] Although the filling-in of the blind spot may be a quite simple process in normal persons (the retina itself may play some supporting role) a more extensive and higher-order kind of filling-in is known to occur with brain-damaged patients. Crick reviews the research of Ramachandran[80] and his colleagues and concludes,

> Filling-in is probably not a special process peculiar to the blind spot. It is more likely that, in one form or another, it occurs at many levels in the normal brain. It allows the brain to guess a complete picture from only partial information—a very useful ability.[81]

The habit routine model agrees entirely with this assessment that only partial information arrives at conscious awareness, yet an apparently seamless perception of reality results. But the model goes even further in saying that most, or nearly all, of the data we believe we are perceiving is the data produced by the "filling-in" that the habit routine search process has provided. It is not surprising then that such a powerful system can fill in the minor amounts of data lacking due to the characteristics of the retinae, or even of damage to the visual cortex of the brain.

Synaesthesia

Along with the renewal of interest in consciousness and the mind/body problem in the wake of the demise of behaviorism has come a wave of new theories about long-known yet little-understood phenomena such as synaesthesia, the cross-over or confusion of two or more sensory domains. Popular books about such long-standing enigmas have reached a wide audience. In observing the disparity of proposed theories attempting to explain some of these phenomena, it becomes evident that psychology and the study of the mind is still in its infancy. But also, due to the breakneck pace at which research is now eliciting important if uncoordinated results, it seems of paramount importance for some part of this wide area of exploration to devote its efforts to providing linkages between the various disciplines, attempting to design overall theoretical frameworks which deal with all the phenomena on a unified basis. If not, I fear we are in for even greater overall confusion, disagreement, and controversy. In reaction, a new brand of behaviorist,

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79 *The Astonishing Hypothesis*, Francis Crick 1994, Charles Scribner's Sons, in chapter 4, "The Psychology of Vision" pp54ff.

80 Crick lists the references: Ramachandran, V.S., "Blind Spots" *Scientific American* 266:86-91; "Perceptual Filling In of Artificially Induced Scotomas in Human Vision" *Nature* 350:699-702; and "Filling In Gaps in Perception: Part 2, Scotomas and Phantom Limbs" *Current Directions in Psychological Science* 2:56-65.

81 *Ibid*., p. 57.

mechanistic nothing-but-ism is likely to take hold to again stifle creative approaches in man's study of himself. I make these comments here because a recent book on Synaesthesia[82] illustrates the lack of coordination in recent theoretical approaches. I should not single out this book from the many others which have purported to "explain" consciousness or various aspects thereof; reading several of these is more like watching a sporting match than an exposition of a deliberate research undertaking.

The quotation from *The Man Who Tasted Shapes* above, in the section on Benjamin Libet's time-delay research, exemplifies the point, I believe. One-upmanship contests, perhaps encouraged by editors and publishers, take precedence over accurate representation of others' work. As for synaesthesia, Cytowic presents interesting theoretical ideas, but limits them by inaccuracy of presentation of supporting evidence. This is certainly the case where he attempts to present results of psychedelic research to support his ideas.[83] Reported synaesthesia during psychedelic experience has occurred frequently enough to warrant attention. Yet scientific attention is so severely limited by research restrictions that it is certainly a dubious conclusion that psychedelic synaesthesia has anything more than coincidental parallels to naturally-occurring synaesthesia. Cytowic remarks,

> Ethical considerations guarantee that 1950s-era government research into the effects of LSD on humans will never be repeated. While no contemporary research exists, however, the older data about the drug's general effects on the nervous system are reliable.

The statement reveals, I fear, a dual ignorance. If the unethical 1950s-era research he refers to is that undertaken by the CIA, (and highly unethical it was, along with much if not most other CIA "intelligence" activities), then Cytowic displays a glaring unawareness of the research of the dozens of workers who administered many thousands of psychedelic experiences in which ethics were not only respected but a primary consideration. But if Cytowic is ignoring this much greater body of highly ethical research for the abominable fumblings of the weapons and mind-control crowd of MK-ULTRA/CIA fame, it is highly questionable to then express confidence about "older data being reliable."

It is simple enough to explain psychedelic synaesthesia in terms of habit routine suspension, (I will leave it as an exercise for the reader!), but I believe that the habit routine model may also succeed quite well in explaining naturally occurring synaesthesia. Cytowic states that synaesthesia is a product of the limbic system, not the cortex, and with this the habit routine model is in moderate agreement. I will show in the next chapter the interplay between the cortex and various centers of the limbic system which brings about the various habit routine cognitive operations. But rather than having to postulate an enhancement of limbic activities, or the actual crossing-over at some point of sensory signals as others have done, (both of these hypotheses depend on the supposition that it is the bound awareness of all the sensory domains which consciousness perceives), a simple and small change in the limbic activities that access and apply habit routines is the only hypothesis necessary.

Once again we see that if it is not bound sensory awareness of which we are conscious, but rather our own habit routines, the mechanism underlying the phenomenon is easily imagined, rather than requiring several hypothetical nervous system operations unsupported by any existing research. And once again I think, the habit routine model shows its capability to moot certain questions of controversy by providing an overall structure in which previously

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82 *The Man Who Tasted Shapes*, Richard E. Cytowic, M.D., 1993, Jeremy P. Tarcher/Putnam

83 *Ibid*., p128-129.

misunderstood or misinterpreted phenomena are now brought together.

SEEing

Another such phenomenon recently discussed in a popular book[84] concerns persons who have been blind for many years and whose sight is then restored, the "newly sighted". Oliver Sacks relates the rare yet typical case of Virgil, a man blind since early youth due to heavy cataracts. At the age of fifty, he undergoes the relatively simple and risk-free operation for cataract removal. All are hopeful for wonderful results, yet, as has been noted in the handful of cases with other newly-sighted patients, curious and difficult problems arise and persist, and the final result has often been disappointment and tragedy: Not because sight is not restored, but as Sacks relates in a lengthy and fascinating account of Virgil's tribulations, sight seems to be extremely difficult to understand and interpret in such a situation. According to the habit routine model, we could say that firstly, Virgil had no available perceptual habit routines to be activated by visual stimulation, therefore what he "sees" is only color and motion in a practically random and significance-less pattern. With effort and practice, he is able to interpret some of the visual data in terms of the world as he has known it through his other senses, but he has immense difficulty in learning these interpretations: they must be repeated each time anew. For instance, visually he cannot tell his dog from his cat. The instant he touches one or the other however, its identity is obvious. Relating the visual data to the touch is not retained however, for the next time he encounters the animal visually, again he is lost.

Secondly, cognitive aspects of the habit routine complexes are also lacking. This was illustrated by Virgil's inability to see photographs and pictures as anything but random if interestingly colored surfaces, even after he had been practicing with his new vision for awhile. Along with previous cases, he could not see people or objects in the pictures, even after he had learned to recognize them in the flesh. He simply did not comprehend the idea of representation for there were no cognitive habit routines available which would allow and facilitate such interpretation.

And thirdly, since all Virgil's existing habit routines consisted of structures building upon his previously available senses, (it had been remarked how his sense of touch and smell were acute, and far more developed than in normal persons), there was no possibility of intuitive or automatic cross-modal association between his new vision and his established cognitive schemes for understanding the world around him. With a cane, he could walk up a stairway easily, yet the vision of the same stairway gave no comprehension of its three-dimensional structure and how one might navigate it. This, in spite of knowing for certain that what was being viewed was the same object that could be climbed with ease by touch alone. There were no cognitive habit routines enabling a connection between the reality as perceived by the two sensory methods.

I refer the reader to Sack's description of Virgil's symptoms (which one might call them in the sense that they are the result of a deficit, in this case a deficit of habit routines of perception and cognition necessary for the function of meaningful vision). With the elaboration of each strange effect, the habit routine interpretation is easily and effectively summoned to organize and understand the situation as a whole. In one sense, Virgil was in the situation of a young child, trying to learn and establish the habit routines necessary for interpreting a strange and colorful visual world around him. Yet in another sense, since his brain and cognition had already fully developed in other

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84 *An Anthropologist on Mars*, Oliver Sacks, Alfred A. Knopf , New York 1995. See the chapter entitled, "To See and Not to SEE".

directions, taking account of his deficit, he could not hope to achieve what the child does effortlessly. In the young child, the entire cognitive structure of habit routines is nascent and plastic; at fifty years of age this structure is rigid, established, and not amenable to radical change such as the sudden introduction of a new sensory pathway. In such a case as Virgil's we can see that the total absence of habit routines enabling the interpretation of vision renders the visual sensation incomprehensible; visual data arriving in thinking2 awareness without any organizing habit routine structure results only in a profound and, in the end, often tragic confusion which becomes a liability rather than a gift.

Experiencing the Raw

I believe it is difficult, if not practically impossible in some situations, to experience raw sensory data; we cannot avoid experiencing external reality in terms of our own habit routines. Consider what happens when we hear someone speak a few words. If the words are in a language which we ourselves speak, they are immediately and unavoidably transformed into meaning! Try studying some difficult subject while a conversation is going on, or worse, an abusive TV advertisement is running. We are practically incapable of hearing such auditory sensory data as just noise, the meanings of the words keep attracting our attention. But the meaning is not inherent in the sound! If the language is not a familiar one, no meaning is produced! What is the difference? We experience our own habit routines, as I have stated, and when we hear auditory input which calls forth habit routines of meaning, it is these habit routines which are preemptively experienced, not the pure sound of the words. Even for a foreign language, our habit routine search process is still active (if less insistent), trying to pick out short successions of syllables which might have a correlation to our own language, in the attempt to get at least some fragmentary meaning out of the noise. The point is, we are practically incapable of just listening to speech as pure noise, the habit routine search system simply overrides the will to do so. The habit routines turn the sound of speech into meaning, automatically, unavoidably. (Interestingly, in meditation, one practices the art of "quieting the internal dialog", of experiencing reality without analyzing it, without attaching one's own semantic interpretation to it. As I mentioned above, meditation seems to be a method for—perhaps only partially—suspending the significance and use of habit routine in ongoing awareness.)

Now it is not conscious episodic memory, or LMA which gives us the ability to understand language; we do not actively recall the many instances in which we learned the meanings of the words and their combinations. Yet the data that was installed by these instances is certainly being used. For a particular word I may perhaps be able to recall the event of learning its meaning, but this is not what is used for present understanding. Rather, the sum total of all instances in which the meaning took on relevance for me is accessed (to continue with the analogy of a film), as a collection of frames, by the habit routine search process, and this collection of frames is the habit routine called forth through which meaning is produced in awareness. The fact that one can use a word in conversation quite accurately, yet find it difficult to produce a satisfactory definition of that word upon demand, illustrates the two cognitive processes. Providing a definition requires LMA, (or at least considerable conscious analysis of context to deduce what the meaning must be), whereas the automatic use of a word in proper and meaningful context is entirely controlled by the habit routines generated in the thinking1 processes.

If it is easy to see how auditory input of language results overpoweringly in the experience, not of the pure sound, but of the *meaning of that sound,* (and hence the habit routines which produce that meaning), I would ask the reader

to go back over my arguments concerning the other sensory modalities. The experience of vision, for example, must be parallel to audition of language: we do not experience the raw sound, nor the raw visual scene, *but rather the meaning to which we habitually attach that sensory input.* I cannot stress enough, we experience what we have already experienced; the view, if it has been stated in many contexts down through the ages, now represents a new and radical paradigm shift for understanding perception and psychology, for understanding ourselves in a radically new and more complete way.

Illusions

There are textbooks full of examples of visual, cognitive, and even auditory illusions. How do they work? One of my favorites, since I started playing around with a video camera and learning how to control the "white balance" so as to achieve accurate color representation in my films, is the Land Effect, named after the inventor of the Polaroid Land Camera. The absolute values of colors as perceived by a standard measuring instrument, like the charge-coupled-device (CCD) in the video camera, change radically according to the color balance or temperature equivalent of the ambient illumination. As I film my wife in the shade of a north-facing wall, thence to walk out into full southern-exposure sunlight, the colors of her costume undergo a radical metamorphosis in the final film, if I have not correctly regulated the characteristics of the CCD of the camera, the "white-balance", in order to take account of the change in illumination. If I film her in closeup, and set the white balance to automatic, then the costume colors remain fairly true to what we expect, but at a price: the background colors change alarmingly. If I film her little walk from further away, with the white balance locked to the setting which produces the correct background, then it is the costume colors which change. But as I observe the same scene with my normal vision, no apparent metamorphosis takes place: blues are blue, reds are just as red no matter where she walks, the background *and* the costume are perceived without significant change even though the color balance of light actually striking my retinae is changing just as radically as it is at the surface of the CCD. Am I to assume a "white-balance" feedback signal to my retinae, adjusting their characteristics? There are no such neural pathways in the brain. And any such regulation would not be expected to correct for the costume *and* the background simultaneously.

Whatever mechanism is producing this color constancy effect must therefore be in the brain itself, in the processes of cognition, although some pre-processing of "data" has been hypothesized to occur in the retinae of the eyes. Edwin Land and other researchers of the effect have come up with a mathematical model of how various nervous system "computations" of intensity information from the entire visual field might allow constancy of color perception, but I suspect that mathematical computation theories of brain operation are all, in some sense, artifacts which may have good predictive power, but are not really good models for understanding what the brain is actually doing. I, for one, am quite certain that my brain is not calculating integrals or differential equations due to its demonstrated failure to do so on my final "diffy" examinations! Admittedly, due to the very limited and tentative knowledge about the mind that the neurosciences have so far been able to provide, mathematical models may be all we have, in some cases. Computer analogies for mind processes all suffer more or less from this same failing, which is why I may (as noted previously) enclose "data" and "computations" in quotes when discussing mind processes.

Land's experimental findings can be summarized by stating that the perceived color of an object in the visual field does not depend solely on the color of light entering the eye from that object, but on the entire spectrum of

light arriving from all locations in the visual field. The application to the habit routine model of perception is obvious, I think. We would say that the habit routines for the constant perception of color values overrule to a large extent the actual signals relayed by the retina. But if habit routines can counteract actual color changes with such efficiency that we are not aware that any correction is taking place, why then doesn't it happen while I watch the curious effect in the film of the scene that "live", caused no such drastic change? Actually, I have noticed that after watching such a distorted film many times, as when editing it, that I do begin to get used to the odd change in color values, and correct for it, or at least ignore it (which might be practically equivalent). Such habit routines can and are inevitably developed to some degree in artificial situations such as the film editing, but are strong and well-developed for the experiences of daily life situations since they have been practiced and reinforced since early childhood. In agreement with Land's theory, we do "calculate" the color of the object perceived by comparison with the entire visual field. But we do so through the use of habit routines which define what colors to expect when we see sky, grass, stone wall, tree, etc., and such habit routine information is only weakly established, if at all, when divorced from natural three-dimensional surroundings, as in the case of watching the TV film.

There are parallel situations concerning the perception of the constant size of objects. Some very interesting illusions have been produced to confuse our nervous system's ability to tell us the absolute size of an object in spite of the wildly varying size of image projected on the retinae, if the object is moving for example. Again, I believe we can improve upon mathematical models of how size constancy is accomplished with the habit routine model. Constancy is again produced from the constancy of the habit routines in use by the perceptual system. The habit routines *are* what is perceived.

Card Trick

Another quite fascinating illusion that has been around for quite some time was discovered by J.S. Bruner and Leo Postman in 1949.[85] I will quote Thomas Kuhn's account of the experiments for its concision, and also because he raises a couple of interesting points:

> In a psychological experiment that deserves to be far better known outside the trade, Bruner and Postman asked experimental subjects to identify on short and controlled exposure a series of playing cards. Many of the cards were normal, but some were made anomalous, e.g., a red six of spades and a black four of hearts. Each experimental run was constituted by the display of a single card to a single subject in a series of gradually increased exposures. After each exposure the subject was asked what he had seen, and the run was terminated by two successive correct identifications. Even on the shortest exposures many subjects identified most of the cards, and after a small increase all the subjects identified them all. For the normal cards these identifications were usually correct, but the anomalous cards were almost always identified, without apparent hesitation or puzzlement, as normal. The black four of hearts might, for example, be identified as the four of either spades or hearts. Without any awareness of trouble, it was immediately fitted to one of the conceptual categories prepared by prior experience. *One would not even like to say that the subjects had seen something different from what they identified*. With a further increase of exposure to the anomalous cards, subjects did begin to hesitate and to display awareness of anomaly. Exposed, for example, to the red six of spades, some would say: That's the six of

85 Bruner and Postman, "On the Perception of Incongruity: A Paradigm," *Journal of Personality*, XVIII, (1949), 206-23.

> spades, but there's something wrong with it—the black has a red border. Further increase of exposure resulted in still more hesitation and confusion until finally, and sometimes quite suddenly, most subjects would produce the correct identification without hesitation. *Moreover, after doing this with two or three of the anomalous cards, they would have little further difficulty with the others*. A few subjects, however, were never able to make the requisite adjustment of their categories. Even at forty times the average exposure required to recognize normal cards for what they were, more than 10 per cent of the anomalous cards were not correctly identified. And the subjects who then failed often experienced acute personal distress. One of them exclaimed: "I can't make the suit out, whatever it is. It didn't even look like a card that time. I don't know what color it is now or whether it's a spade or a heart. I'm not even sure now what a spade looks like. My God!"...[86] [italics added].

The first italicized sentence raises the question of what kind of illusion is actually happening here. The reaction to the anomalous card is so automatic and reliable that one is tempted to say that it is a *perceptual* illusion taking place, that the subject actually perceives the anomalous card *as* a normal card. But unlike many perceptual illusions, in which the illusion persists even when knowledge of deception is gained, here, as shown by the second of the italicized sentences, the illusion tends to disappear after the trick is discovered. It seems therefore that the illusion is cognitive, having to do with the analysis or evaluation of perception rather than perception itself. A perceptual illusion may rely on habit routines that are fundamental to the functioning of the perceptual system they involve, and thus be very difficult to counteract. An example would be the now famous line drawing which can be seen alternately as a vase, or as two faces in profile, but never both simultaneously.[87] An illusion depending on the analysis or higher processing of perception, as I believe the anomalous card trick shows, can be overcome almost immediately *by the installation of new or modified habit routines via working memory,* which are supplied as parameters for further habit routine search which then takes into account the new data that anomalous cards are likely to be presented. It would be interesting to know more about the few persons mentioned in the experiment who had difficulty seeing through the trick even after they knew about it.

At this point it might be useful to recall my view in the last chapter that at least two different categories for habit routines are postulated, although since a habit routine is a composite of data from many sources, in multiple sensory and cognitive domains, the categories will certainly overlap or be simultaneously applicable in some situations. But as far as it is useful, we may refer to habits of *perception*, and habits of *cognition*. The latter will be understood as the habit routines which are used for analytical and reasoning tasks, or the production of meaning from language as discussed above, while the former produce such things as the visual illusions mentioned.

I have suggested the term habit routine complex to denote that the unitary habit routine which is constantly constructed and presented to the awareness of thinking2 consists of all these types or aspects simultaneously. Thus if we can usefully isolate a part of an overall habit routine and see it as a habit of cognition, or a personality trait, such a dissection will be only a theoretical operation for heuristic purposes. The actual habit routine complex is an entity constructed from all levels of brain/mind operation from simple perceptual

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86 Thomas S. Kuhn, *The Structure of Scientific Revolutions*, Second Edition, 1970, The University of Chicago Press, pp62-64.

87 See Francis Crick, *The Astonishing Hypothesis*, 1994, Charles Scribner's Sons, chapter 4, "The Psychology of Vision" for some nicely illustrated examples of the vase/profiles and other visual illusions.

tasks to complex intuitive, deductive and associational processes such as the expression of personality.

Being Yourself

The very existence of strong, purportedly inalterable "personality traits" seems to me a perfect illustration of the prevalence and importance of habit routines in producing the range of reactions to the daily life process. As with the language example above, we do not use LMA to consciously search our memories for the data revealing how to act in a typical situation, consistent with our established "personality". We react typically, but automatically to certain situations, if not practically all situations, as an observer who knows us well will attest. Others know us by our personality, which when seemingly a bit different due to unusual troubles or a very bad mood, will invite sincere inquiries of "what's wrong? You're not *yourself* today!"

People who know us certainly do not expect radical or even moderate personality change from meeting to meeting; if encountered, someone will surely recommend a few sessions on the couch, or medication. The most startling and tragic event of diseases like Alzheimer's is perhaps not the gradual loss of memory and function, but the loss and/or change of *personality* which accompanies the disease. For the family relative who loved the person as expressed through *personality*, we may hear the lament, "he's just not *himself* anymore." What could the personality be, if not a large collection of routines suitable for automatic use; what data could personality arise from if not the very same data from which we extract conscious memories, yet accessed in an unconscious, rapid and automatic fashion by a cognitive/brain system not under conscious, analytic and deliberative control? The thinking1/thinking2 model outlined in the previous chapter is a far more descriptive and operational framework than simply saying that personality is a property of the "unconscious mind," as if there were some separate compartment, some independent source of data wholly other, completely independent of the conscious mind. *It is the same data*. It is the method of use and the neurophysiology of access which is different.

Cognitive illusions and intellectual traps are more difficult to explain than visual illusions, no matter what the theoretical model. But why shouldn't our opinions and beliefs, our prejudices and expectations, our ideas about reality, our personal metaphysical outlook, the very patterns we use to evaluate what we believe to be truth or lies, also be not only governed by habit routines, but actually be identical with habit routines modified only slightly, in the ongoing perceived normality of daily existence, by the precise monitoring of one's present intellectual intentions? I don't deny that extensive self-evaluation ever takes place, but in most individuals it may take a life-crisis to stimulate it, while the creative genius and artist may dwell there frequently. But since we all need to swim in *some* kind of water, the normal everyday joe has practically no awareness of his habit routines, and the artist little realization that partial immunity to habit routines is his own peculiar suspension medium. But if cognitive, evaluative aspects of habit routines are as important as we see the visual ones to be, psychiatry may be a far more primitive endeavor than had been suspected even by the pessimistic.

Schemas

As so often happens when one invents a model, or attacks some problem with a new way of thinking, a search of the literature reveals that someone has already covered the territory and proposed something very similar. But the habit routine model is itself applicable here: in having re-invented the idea from a new perspective, without having previously been acquainted with older

work, I may have avoided falling into certain traps or habit routines that the original work would have installed in the process of learning it. Thus I discovered, long after coming up with the idea of habit routine suspension as the mechanism of psychedelic experience, that Sir Frederick Bartlett in 1932 had proposed that memory and learning were represented in the mind by being embedded in large scale structures which he called *schemas* or *schemata*, "...an active organization of past reactions, or of past experiences, which must always be supposed to be operating in any well-adapted organic response".[88] But in having developed my own approach first, I arrived at a view of the function of schemas, or habit routines in my terminology, which attributes to them a more fundamental and primary importance than even recent developments of schema theory imply. Daniel Schacter notes that, "Although Bartlett's notion of a schema is rather fuzzy..., and his experimental results have not proved easy to replicate..., his approach has exerted a strong theoretical and experimental influence on cognitive research... Mandler...provides a useful summary of the cognitive conception of a schema:

> . . . [a schema] is a spatially and/or temporally organized structure in which the parts are connected on the basis of contiguities that have been experienced in space or time. A schema is formed on the basis of past experience with objects, scenes, or events and consists of a set of (usually unconscious) expectations about what things look like and/or the order in which they occur. The parts, or units, of a schema consist of a set of variables, or slots, which can be filled, or instantiated, in any given instance by values that have greater or lesser degrees of probability of occurrence attached to them. Schemata vary greatly in their degree of generality—the more general the schema, the less specified, or the less predictable, are the values that may satisfy them.[89]

Baddeley summarizes the characteristics of schemas shared by the various recent interpretations of schema theory. The parallels to my own idea of habit routines will be obvious, but I shall presently point out the important differences in the two conceptions. (Baddeley is here summarizing a paper by Rumelhart & Norman):

> Schemas have Variables
>
> Schemas are packets of information that comprise a fixed core and a variable aspect...
>
> Schemas can Embed One Within Another
>
> Schemas are not mutually exclusive packages of information, but can be nested...
>
> Schemas Represent Knowledge at all Levels of Abstraction
>
> The concept of schema is broadly applicable, from abstract ideologies and concepts such as justice, to very concrete schema such as that for the appearance of a face.
>
> Schemas Represent Knowledge Rather than Definitions
>
> Schemas comprise the knowledge and experience that we have of the world, they do not consist of abstract rules.

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88 F.C. Bartlett, *Remembering,* 1932, Cambridge University Press, p201.

89 J.M. Mandler "Categorical and Schematic Organization in Memory", 1979, quoted by Daniel L. Schacter in *Foundations of Cognitive Science*, Michael I. Posner, ed., 1989, MIT Press, Ch 17, "Memory" p692.

> This is very reminiscent of Bartlett's original emphasis on effort after meaning.[90]

With a little editing, both of these sets of characteristics could be used to define the nature of habit routines. I have in fact learned much about what I expect of habit routines from a study of modern research on schemas. But there is a fundamental difference between the two concepts. Schemas were hypothesized as hierarchical structures *resident in* the mind/brain which provided an organized template on which knowledge and memory was stored, as well as for the incorporation of new knowledge or learning. Habit routines, by contrast, do not have any independent or *inherent* existence until they are called up, actually *manufactured and assembled* from LTM data by brain systems which I shall define in the next chapter. Although in speaking of habit routines, I continually refer to them being accessed or called-up for use, the terminology is only a convenience, for I do not wish to imply that habit routines have any independent *a priori* existence in the storage medium of the brain, which stores only the frames of memory; a habit routine is *constructed*, in my view, each time anew as required by the current ongoing sensory and cognitive state. HRS is thus a process of reconstruction rather than something akin to looking up a reference in a library. Also, it must be remembered that Attention does not *refer back to* habit routines after having received sensory information in need of organization. Quite the contrary, for the information which is at any moment available for Attention has already been constructed from habit routine data via unconscious thinking1 processes.

In addition, much of the research that has been conducted in the effort to illustrate the characteristics of schemas has used language oriented material in the experimental tests. The accuracy of memory in the recall of stories recounted to subjects was studied, for example, to explore how the learning of the story was superimposed upon schemas about typical aspects of stories in general. But since I have proposed that language is itself only a resonance to thinking1/2 processes, (symbolization), occurring well after and only in reaction to habit routine search and resulting thinking2 processes of checking, analysis, and so on, then of necessity habit routines do not themselves exist in terms of linguistic structures. Language itself is not what is stored in LTM, although the means (the data for the construction of habit routines) to produce or reconstruct it most certainly are. I have proposed that the HRS process is one of the earliest to have been evolved in the animal nervous system, and this would certainly not agree with the hypothesis that the data of habit routines was stored in terms of language (an error- and abuse-prone, add-on option only available on the very latest models of animal life!) The study of the manifestation of habit routines through experiments utilizing language therefore misses their essential character. If we can observe the effects of habit routines through the study of symbolization processes we must not overlook the fact that we are not eliciting the properties of habit routines themselves, only their effect upon subsequent mental events.

An argument of economy supports the contention that habit routines are constructed rather than accessed *in situ*. If schemas or habit routines existed already structured in LTM, then a particular important bit of information that related to many different habit routines would have to be stored in many different ways, redundantly, in order to be present in the very many habit routine structures requiring it. If the habit routine is manufactured afresh each time it is needed, the bit of information need only be stored once. This is an oversimplification however, since it is debatable whether the storage of

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90 *Ibid*., pp 336-337

"data" in the brain can be conceived of on the computer model of the storage of "bits" or "bytes" of "data". Nevertheless I still believe the argument of economy above is significant.

Just Models After All[91]

My belated discovery of schema theory as such a close fit to my own model was in one sense a disappointment. It is always gratifying to believe that one's work has originality. But I also found an encouragement: If I had proposed the habit routine model of perception and cognition as a deduction from observations of the effect of psychedelic drugs, (and in this I was sure to have many, many critics), yet the model proposed had so many similarities to a theory which "has exerted a strong theoretical and experimental influence on cognitive research" in Schacter's words, then my ideas about psychedelic experience might not be too far off the mark. I had arrived at a theoretical viewpoint from my study of psychedelic experience which replicated current thinking in cognitive science, about which I had studied very little.

I hope I have been able to convey the nature of habit routines as I understand them. If "Bartlett's notion of a schema is rather fuzzy", I expect that it will also be said that my own notion of habit routines is also somewhat nebulous. But the same could be said of many current theoretical approaches to the working of the human mind. The controversies and radically opposed paradigms in this endeavor are a sure sign that our knowledge is yet primitive and introductory, but also that a fruitful and rapid evolution of understanding may be imminent. In this chapter I have tried therefore, not to propose a precise definition of what a habit routine may be, but rather to illustrate some of the things it *may* be in relation to several known phenomena. I am intentionally leaving the concept of a habit routine open to further development and more precise elaboration. If the habit routine search and suspension model is in fact useful and widely applicable, it will take more time and better minds than mine to develop the idea satisfactorily. It is an ongoing effort on my part to study the great volume of theories, models, opinions, data and sheer speculation that has been advanced in the very difficult task of understanding the human mind and how it works, but professionals in this field who spend their lifetimes in the universities and laboratories are far better equipped than I to continue this work.

Necessarily, I have omitted mention of many research studies about phenomena which seem to fit well with my model, but which would have overly encumbered the present text to describe. If at the end of the last chapter I mentioned the risk of seeing habit routines everywhere, the reader will now see that, if they are not omnipresent, my model at least intimates that they are pervasive in a way that has not at all been suspected in theories of the operation of mind/brain. I believe that habit routines are fundamental, that HRS is the primary cognitive operation of the brain/mind, coming before and providing the very structure for the operations of mind of which we have everyday awareness; and very importantly, due to these characteristics, that *the HRS process is greatly obscured by its own operation*. Only in the modification of its operation (gradual and unsurprising in the case of meditation, for example, radical and unmistakable in the case of psychedelic experience), can we even suspect its existence, and attempt to understand its

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91 I should mention also the similarity of HRS theory to Stanislav Grof's idea of COEX Systems, (Systems of Condensed Experience) described first in his *Realms of the Human Unconscious,* Viking Press, New York, 1975. "A *COEX system* can be defined as a specific constellation of memories consisting of condensed experiences (and related fantasies) from different life periods of the individual. The memories belonging to a particular COEX system have a similar basic theme or contain similar elements and are associated with a strong emotional charge of the same quality." (p. 46)

characteristics and functions and control over us.

In the following chapters I will attempt to postulate neurological mechanisms of the brain which might be associated with the formation, use, and modification of habit routines, as well as some of the other functions of mind that I have discussed. Due to the present state of our knowledge of the nervous system, my attempt will certainly be fraught with error, not least because my own knowledge of neuroscience is self-taught. But I thought it would be useful to at least define some neurological possibilities for the habit routine model, and it has been quite fun to do so. If professional neuroscientists will find it child's play to show where I have erred, I would ask their indulgence to suggest better neurological models rather than use my admitted status as a novice to reject the whole theory of psychedelic experience. In the act of too facile a dismissal of the new ideas, (as has repeatedly happened in the history of science), they might in the present case be providing evidence for the very theory they are rejecting out-of-hand!

> ...Psychedelics actually break habits and patterns of thought. They actually cause individuals to inspect the structures of their lives and make judgments about them.
>
> — Terence McKenna

6. Neuromechanics - The Minefield

The point of philosophy is to start with something
so simple as to seem not worth stating, and to end
with something so paradoxical that no one will believe it.

— Bertrand Russell

Proposing a reasonable neurological mechanism for the operation of the habit routine search process—and its suspension via psychedelic experience—is not the first minefield that I have had to navigate. Back in the U.S.A. it seemed a straightforward thing to continue the research which so few seemed to have the motivation for; several people had offered varying degrees of support for such projects, but as I mentioned previously, motivations are a funny thing. My own seemed at the time to be relatively uncomplicated, and in retrospect, although I may tend to tidy up my autobiographical act with a few convenient omissions and over-telling of some of the high points, *je ne regrette rien.*

Coincidences, mysteries, personal lessons, and strange experiences of the most diverse character, as significant and soul-searching as the Mexican earthquake experience, continued with a very suspicious frequency. I have previously mentioned my ability to bear up under the influence of any drug or shamanic potion, and I sometimes found this ability of even greater value in dealing with the people and day-to-day events playing a part in the unfolding of my work. The idea that the shaman himself must deal with forces and destinies on a far more fundamental level than the members of his tribe is, of course, the very spirit and tradition of shamanism. If powerful psychedelic experiences were to benefit members of the tribe, the shaman must have already explored the same territory, and gone well beyond to the very limits of his abilities. In the present case where the shaman not only administers the powerful medicines, but actually creates them with the tools of modern science, his knowledge and intentions are perhaps even more important.

Thus, in the case of what turned out in some ways to be a rather successful collaboration between myself and a trio of avowedly enthusiastic partners, the passage of time and the achievement of some degree of success seemed to distort the relations between us in a way very reminiscent of a kind of vicious parody of the psychedelic experience itself. Meetings and discussions of plans and goals at first were nothing less than inspiring. Between us we had the connections and ability to obtain the necessary raw materials, manufacture a high-quality product, and distribute it in such a way that it would reach the right people.

We certainly did not advocate or intend any sort of random mass distribution of psychedelics resulting in their misuse or ignorant use, which would only call attention to a situation easily besmirched by adverse publicity. Sensational, fear-mongering publicity had already made it much more difficult to properly initiate or introduce a newcomer to the psychedelic experience. There was certainly a case to be made that many negative experiences were a

direct result of the adverse publicity itself, for in the early, pre-publicity days of psychedelic research, “bad trips” were a rarity, even among alcoholics and psychiatric patients. With normal research volunteers, the statistics noted by the many researchers indicated the astonishing *safety* of psychedelic drugs, not risk. Now the publicity made it seem that, although an Aldous Huxley or Alan Watts might get through a psychedelic experience unscathed, the normal member of society should realize that the potential risk was overwhelming. And this kind of official attitude weighed heavily on the person interested to undergo an experience: even if such a view could in principle be seen for the hysterical, prohibitionist, puritanical mindset that it in reality was, the slightest lingering doubt had the possibility to poison a person’s trust in himself and his shaman.

It is perhaps easier to see demons where there are none to be found. And if demons *are* encountered, the idea that they are exterior, real, and *caused* by something other than oneself is certainly not conducive to understanding their meaning. As the habit routine suspension model demonstrates, the psychedelic experience is no roll of science-fiction film projected upon consciousness from the outside. If demons are encountered, they are in reality our everyday friends seen without the normal range of categorizations which render them ordinary and insignificant.

Skiing the Mountain

The demons which appeared to disrupt our successful enterprise were therefore more real than those of the imagination. I can only suspect a hidden agenda on the part of my co-workers, but the nature of their intentions at the end was so at odds with the honest enthusiasm of the beginning that I suspect that the hidden motivations must have developed over time. From the original enthusiasm there seemed finally to have evolved a plan to demonstrate once and for all that the psychedelic experience was, in fact, illegitimate, or at least unnecessary, its insights illusory, its history merely primitive self-delusion. To arrive at the establishment reactionary position through first having professed a more universal and enlightened view seemed to me altogether impossible. This demon *was* real. And what was I going to do about it?

The final scene was quite surreal. The night before, one of my partners presented me with a five-hundred dollar banknote, subtly making sure that I noticed the portrait on the face of the bill, that of the “assassinated leader”, William McKinley, twenty-fifth president of the United States. At most, I felt only the slightest premonition of the events the next day would bring, for which we were planning a day of skiing, and restaurant to follow. Whether the banknote, and perhaps other similar but unrecognized intimations were apparent I do not remember, but in the morning I decided to take a small dose of LSD, to appreciate a day in the high snowy mountains from a different perspective. In retrospect, I find that I instinctively tended to undergo a psychedelic experience at points in my life where a certain crossroads was about to be reached, when perhaps only vaguely realized intimations of important changes to come had appeared. Without fail, the experience would precipitate whatever it was that was pending, and ignite the insight and decision that would usher in a new direction.

My friends were newcomers to skiing, and I had promised to help them get their snow-legs, so to speak. Upon arriving, I sent them off to the rental shop to secure their equipment, and I took a test-run on the nearest slope. It was exhilarating! Although there was quite a crowd that day, the scene was magnificent. Arriving at base, my friends had not yet reappeared, so I continued on up again to the irresistible heights. The next time down the crowd was getting thick enough to make locating my friends problematic, and in my present state of exhilaration I couldn’t begin to devise a sure-fire

method for finding them. I had to assume that, although our original plan seemed to be going astray, they would nevertheless have suited up and found some incidental help with their first few glides on skis. After a few more runs I began to feel, in contrast to my exhilaration, a gnawing guilt that I had ignored my friends, even if through a concurrence of events which I could not have foreseen. The LSD experience, despite the very modest dose that I had taken, was attaining a peak more spectacular (in more ways than one) than those amongst which I was gliding.

Suddenly my friends appeared, and I knew that my neglect had ruined their day. But the intensity of my feelings, and their reaction as well, seemed all out of proportion to the reality of the situation. There was far more significance afoot than a simple evaluation of the day's events would warrant. My apologies, and their subdued yet somehow exaggerated insistence that it didn't really matter, were a mere facade for the emotion that was all too evident in just a glance. Somehow aspects of the entire relationship in our joint involvement in the psychedelic project were metaphorically represented here, and they were threatening a tumultuous final act upon the stage whose players had to date seemed so reassuringly without calculation or subterfuge.

The situation while driving back continued to intensify. I began to see through the cracks in reality, the physical manifestations of which became more and more a flimsy veil affording less and less protection against immediate dissolution into the hidden dimensions beyond. If my friends were worried about my driving on the slippery roads, I think that they too must have sensed, more importantly, that loyalties and intentions concerning our collective enterprise was the real issue that was coming to a head. At the restaurant, under the influence of good food and wine and associated conversation, the electricity subsided somewhat, and it seemed that things might be patched up with a resulting return to a situation that we all now realized had more of deception than honesty. If we could return to business as usual, we all now knew that on a more fundamental level, all was changed. This is not, and never has been, a situation from which effective shamanism can work its benefits to the full.

Later at their house, in front of a warm log-fire, I continued to ponder on this last point. So far, absolutely nothing explicit had actually been discussed concerning the impending crisis that we each knew to be imminent. An outsider could not have detected that anything more than the superficial was transpiring, yet in each others' presence, a mere glance was like a trumpet fanfare announcing major discoveries about a hidden side of our co-involvement. It must have been past midnight when in walked partner number three, whom I had seen only a few times. He lived quite far away, and I was surprised to see him at this late hour, but the others apparently had expected his arrival. After some lengthy and private discussion in the kitchen, they reappeared, and, very tentatively at first, began to suggest to me a most surprising plan.

I had recently been working on some advanced techniques for making our product in a more purified form, and had been meditating about my experiments probably as a way to suspend thinking about the more serious implications of the day's events. At my partners' first mention of LSD I immediately launched into an attempted discussion of my recent experiments, perhaps also hoping to repair the situation: At every stage of my work it was of primary importance to me to be able to continue, even if this involved having people associated with the project who neither knew nor cared about the larger implications. If a partner was interested in nothing but the cash-flow, for example, I tried to cope with the deficit temporarily until something better presented itself.

The Chocolate Doses

But something was seriously wrong here. One of my partners was now saying to me that he didn't like the effect of LSD, it seemed dirty to him, made him feel sick rather than giving him inspiration. Despite the day's events and the suspicions that had been aroused I was quite shocked, and speechless. Gradually the hidden agenda was presented: what I was to do, was to prepare a large batch of placebos. Make up what I would say was a batch of the purest LSD that had ever been made, give the prepared individual doses away free to all my contacts for distribution, and pass along the message that everyone was to wait until the vernal equinox, then take the new psychedelic preparation together. The trick was, they would be entirely inactive, blank doses with nothing but an implied message from... Yes, from whom? Who was the author of this message?[92] Was this idea a brainstorm of my partners, suddenly having seen a vision that drugs were the tools of the devil? The apparent honesty of our relationship so far in contrast to the way that the plan was presented, and the things that were said that night, including the implied threats (the McKinley banknote was burning in my pocket, I almost flushed it down the toilet at one point, but thought better of it after a bit of reflection), and also the implied promises of new and greater projects and responsibilities for me if I could only see the wisdom of this plan, made it plain to me that the tiger I had by the tail was rather larger than I had heretofore suspected.

Well, the activation of my consciousness by the dose I had taken, and these astounding changes of identity made manifest that day, made the indoctrination as effective as a lengthy torture and brainwash session in Red China. I quite forced myself to believe the idea had some merit, and for the next few days, more than half-heartedly prepared a large batch of chocolate covered placebos in line with the master plan. The chocolate coating was to prevent anyone examining the underlying substrate and possibly suspecting that there was less than meets the eye about this plan for a glorious first-day-of-spring celebration. I had explained it away as an effective means of protecting the dose from degradation by light and oxygen.

I carried through with the ruse to the bitter end, I don't think there were any suspicions among my friends and contacts, and I myself boarded a train for the Grand Canyon to be (1)out of reach when the chocolate hit the fans and (2)in a nice spot in case of the highly unlikely event that the Millennium was actually going to begin that day. It didn't, and the feedback from the experiment was less than respectful. My former partners disappeared from the scene to cope with more petty problems and new coincidences materialized out of nowhere to enable the next stage of my ongoing quest.

The Theory So Far...

At this point I would like to hit the pause button on the original text for a few moments to summarize the arguments so far, and in addition to mention the existence of some recent research that greatly expands the possibilites for my models and conjectures for how a psychedelic experience occurs cognitively and neurologically. This was and remains the primary topic of this chapter. Some of this new research has actually been demonstrating the existence of a

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92 Years later I toyed with the idea that part of the CIA plan that developed from their early psychedelic "research" was to use LSD—starting somewhere in the mid-1960s—as a destabilizing agent introduced into the revolutionary and intellectual groups that were starting to be an annoyance to the governing cliques, as a way to confuse and discredit especially their leaders and thinkers. After all, the CIA's research was geared exactly to that supposed property of LSD: Confuse-an-enemy. But then, much to their distress, psychedelics appeared to be strengthening and unifying the revolutionary tendencies, and thus an about-face was required. I may well have been an unwitting agent in this *volte-face.*

neurologically-defined *Salience Detection Network* in the brain, a hypothesis that I had advanced in the original version of this chapter, written in 1995.[93] At the time, this hypothesis seemed just too wild not to be immediately dismissed by experts, despite the mention contained in *50 Years of LSD* coming close to proposing the idea as a possible contributing mechanism of psychedelic perception.[94] My extension of those ideas into a theory proposing that *radically augmented salience detection was the essential if not sole neurocognitive effect at the heart of psychedelic experience, no matter what the method or substance used,* seemed just a Rube Goldberg invention based on very little data.

In the following sections I will discuss this new research and how it applies to the Habit Suspension Model and Salience Detection. Following the section below summarizing the arguments so far, I present my original Chapter 6, edited somewhat for brevity, so that the reader may see the parallels and differences between the new research and my own rendition of how we detect and react to salience, how this cognitive process is altered during psychedelic experience, and my first ideas of which brain parts and systems might be employed during these processes.

So here is a brief run-down of the facts and conjectures so far, which should be kept in mind as I get into the complicated matter of how we might be using our nervous system during a psychedelic experience.

So far I have discussed:

• There has been a great deal of confusion regarding the "effects" of psychoactive drugs, especially the psychedelic ones. Impossible paradigms and misdirected research have sometimes resulted from the attempt to describe the "effects" of psychedelic drugs in a similar way to the effects of other types of drugs. This includes, as I shall claim in a later chapter, misunderstandings about the therapeutic value of the psychedelic drugs, and what is actually occurring when a "patient" is "treated" for depression, PTSD, end-of-life-anguish, etc.

• A true psychedelic experience or its equivalent can be had via a number of ways both ancient and modern including meditation, breathing exercises and other age-old techniques, and such experiences even happen spontaneously to some individuals. A variety of substances can catalyze a psychedelic experience with more or less similarity and consequences and such substances are known to affect the nervous system in a variety of ways, excluding the possibility of a simple and similar neuro-chemical cause-and-effect mechanism for them all. Even some very "un-psychedelic" substances have been used to catalyze transcendence (the example of shamans' use of tobacco), so it must be said that there are several roads to the destination that

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93 How the SD Network plays a role in HR suspension will be analyzed later in this chapter. As a test for the idea of the existence of a cognitive operation that could be thought of as the automated detection of salience, at that time I wrote to Jaak Panksepp (author of the remarkable *Affective Neuroscience*) about my surmise that the locus coeruleus might not just be *reacting* to salience, but actually *detecting* it. He replied: "Your hypothesis is very much in the right direction. . . indeed, I suspect it is implicitly in the minds of most neuroscientists. It has been long known that the LC sets up attentional processes in the cortex, and there are many sensory and emotional inputs that could achieve this. Lots of neuropeptides feed into the LC, so it is really not necessary to make it the first and only link in the salience cascade, but certainly a prominent one. In short, I see no problem with this hypothesis, and in a sense it is implicit in the neurophysiological finding that LC-NE increases signal to noise levels throughout sensory cortices".

94 *50 Years of LSD: Current Status and Perspectives of Hallucinogens,* Pletscher and Ladewig, editors, Parthenon Publishing, 1994.

psychedelics provide. But none of this really makes any sense if there remains the confusion about “effects” of the psychedelics.

• A new way of understanding parallel but different ways that memory data is experienced in terms of a newly defined psychological cognitive process that leads us to the concept of the Habit Routine Complex, a nested, multifeatured evaluation pattern very similar to ideas that were quite some time ago described in terms of Schema Theory.

• “Thinking” has several distinct operations cognitively, and may be divided into two categories, the first essentially unconscious and inaccessible to scrutiny under normal conditions, the second comprising what we usually think “thinking” consists of.

• Thinking1 - the predominantly unconscious part of the entire process, constantly generates a habit-routine complex similar in my view to “schemas” as mentioned above.

• Thinking2 comprising the thinking operations we are generally aware of, and which then influence the operation of Thinking1. See again my flow chart of these operations.

• “Habits of mind”, as described by Howard Margolis (see reference 45), comes close to my concept of the Habit Routine - they can be invisible to the individual yet control his perception, thinking, and subsequent behavior to an extreme degree. Through life-long experience the habits of mind render the world normal, mundane, mostly of no great consequence or significance. In my opening chapter I stated, “it is the learned, devastatingly efficient habits of mind which cause one to feel that it is necessary to cope with a plain and mundane reality rather than celebrate a unique and mysterious one.” Relieved of habit routines, the world can appear as it did to Adam: “I was seeing what Adam had seen on the morning of his creation - the miracle, moment by moment, of naked existence...” — Aldous Huxley

• The application of this idea to several current and ancient questions and phenomena strengthens the hypothesis of how the HR governs our everyday existence.

• The relationship between the various thinking processes and psychedelic experience suggests the hypothesis of HR suspension as the initial, underlying cognitive effect of psychedelics, as well as for the variety of other methods used down through the ages to achieve Altered States of Consciousness and transcendence. It is the suspension of the HR that lets “reality”—uncontaminated with one's own unconscious prejudgements—leak through to the consciousness of the individual.

Connections (Pause Button Released)

There is an old Negro Spiritual that was in the 1940’s made into a “Jazz Soundie”, the equivalent of today’s rock video as seen on MTV. I have a wonderful 3-minute version of “Dem Bones” by the Delta Rhythm Boys, sung in close four-part harmony; it starts with the refrain,

> ...Ezekiel connected dem...DRY BONES,

Referring of course to Chapter 37 of the Old Testament Book of Ezekiel in which the prophet is commanded to “Prophesy upon these bones: and say

unto them, O ye dry bones, hear the word of the Lord." Whereupon, as in the refrain of the song,

Oh, de toe bone connected to de...FOOT BONE,

De foot bone connected to de...HEEL BONE,

De heel bone connected to de...ANKLE BONE,

And so on up to "de HEAD BONE". I hadn't watched my collection of "Soundies" in quite some time, but humming in the shower late one night, meditating on my recent neurological studies and lack of satisfaction of their power to explain processes of mind except in a very rudimentary manner, the tune suddenly popped into my headbone. It occurred to me that current neuromechanical models of how the collection of parts in the brain is supposed to produce mind, behavior, thinking and perception, was very much a Dry Bones Model of Neuromechanics. (Substituting brain part names into the song quite ruins the rhythm however: de caudate nucleus connected to de...CEREBELLUM, de locus coeruleus connected to de...ANTERIOR CINGULATE GYRUS, you get the point.)

The textbooks carefully told the student what was connected to what, and suggested sometimes that a particular part "was thought to be involved in" or "mediated" some function or other. And to my further dissatisfaction, slowly compiling again and again my own map of brain connections, my studies had revealed that practically every brain part was connected to every other brain part: each brain map I plotted quite soon became filled up with arrows, and quite useless. It seemed that mainstream neuroscience, in spite of its great and rapidly increasing wealth of assuredly precise data, had little to say about the functions of all these parts on a *systems level*; understanding how to get to psychology from neurology, how to get mind out of brain, was still at the level of expecting dry bones to suddenly, as the song's second verse goes, after "dem bones" have been connected,

Dem bones, dem bones gonna'...WALK AROUN'...

The neuroscientists, without such Divine Intervention as Ezekiel had access to, simply were not able to show decisively how connections of the nervous system could produce even simple psychology, much less consciousness itself. My own efforts to suggest brain systems and connections that might allow the operation of the habit routine search cognitive process would therefore be no less tentative and imprecise, certainly due for major revisions as new evidence was discovered.

Fond Memories

In the case of memory, so fundamentally important to everyday life and to the operation of my proposed habit routine system, it is therefore still very much a matter of debate as to how information is stored in or associated with the properties of the neurons in the central nervous system. The "data" representing the various types of memory, including habit routines, must in some sense be "in the brain" or at least "accessible by brain systems" and by extrapolation must somehow be associated with the properties of brain cells and their connections, but the wide diversity between current theoretical viewpoints illustrates more our lack of precise knowledge than an emerging paradigm. Perhaps the most popular model of information storage at present [1996] is that of the adjustment and long-term maintenance of the strengths of the connections between neurons. This is supposed to occur by the modification of the neuron's synapses, the junctions by which neurons

communicate using chemical neurotransmitters.

This “neural network” or “synaptic weight” model lends itself to ready simulation on a computer and is probably on one end of a scale ranging from extreme reductionism, to another extreme which reductionists usually brand as mysticism. An example would be the ideas about memory advanced by Rupert Sheldrake, that the actual memory information is resident in some quasi-independent memory *field* which may allow such phenomena as telepathy, apparent reincarnation and so forth, the physical brain being merely the sender-receiver of memory to the common field by a process of morphic resonance.[95] In looking at the broad range of sometimes very enigmatic properties of memory, and the admitted uncertainty and disparity of views by the experts, no model should be routinely dismissed if it has any explanatory power whatsoever. In the history of science some very wild ideas have more than occasionally led to paradigm shifts and new ways of thinking about reality. Waiting for the "extraordinary proofs" that "extraordinary claims" supposedly require might not always be the most productive approach when a field of enquiry is in a state of flux with several theories competing.

The synaptic-weight model of memory storage probably owes its status to the power and success of computer science, the enormous investments and hence large number of talented scientists working therein providing a momentum of opinion which may unduly limit the credibility of other well-constructed but competing models. It cannot be denied that very impressive mathematical models and computer simulations of “intelligence” have been demonstrated, and shown to have similarities to the ways in which some experts believe human intelligence to operate. It has also been well demonstrated that synapses between neurons (as well as the size and connectivity of the neurons themselves) can and do change their characteristics for varying lengths of time under the influence of learning processes. The power and sophistication of neural network models (see for example descriptions of the operation of the Hopfield Network as a mechanism for the storage/retrieval of information[96]) are certainly impressive. The fundamental questions that remain to be resolved, however, are whether the brain actually works anything like a computer, whether a brain-as-computer can “produce” consciousness, and whether the ancient body/mind question can finally be answered with brain-as-computer models. There is currently raging a most entertaining debate on this subject, some of the most powerful intellects of our time are joining the battle, (see, among others, works by Churchland, Claxton, Crick, Dennett, Edelman, Flanagan, Fodor, Freeman, Gazzaniga, Hofstadter, Humphrey, McGinn, Penrose, Searle, Tallis, Tulving, the list is so long there is no recourse but to leave out mention of many more). [97]

Steven Rose, himself a veteran of many years of research attempting to identify brain sites involved with storage of *engrams* or memory traces, has recently summarized criticism of the computer-like, information-processing model of brain operation.[98] Particularly of interest, as Rose points out, is a

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95 Rupert Sheldrake, *The Presence of the Past*, 1988, William Collins, publisher.

96 A brief but concise description of the Hopfield Network may be found in Crick, The Astonishing Hypothesis, ibid., pp182-185. A more technical and thorough exposition is found in Churchland & Sejnowski, The Computational Brain 1993 MIT Press, p82ff.

97 Since writing these lines in 1996, a new book has appeared that in the opinion of many has swept away much of the debate into the rubbish bin. A reviewer has stated, “It will certainly , for a long time to come, be the most important contribution to the mind-body problem there is.” Required reading! Bennett and Hacker, *Philosophical Foundations of Neuroscience.* Blackwell, 2003. Two excerpts can be read at The Psychedelic Library.

98 Steven Rose, *The Making of Memory*, Bantam Press (Great Britain) 1992, see chapter 13.

critique by the neurophysiologist Walter Freeman, for it is solidly based on research findings: Freeman insists that, although changes to various individual neurons can be observed to happen as a result of learning, the "information" that is learned does not subsequently exist as "bits of data" recorded in these neurons (the computer paradigm). Rather, the memories of the learning exist as fluctuating dynamic patterns of electrical activity generated by the *entire brain.* As Rose puts it,

> [The] experiments say that it, the engram, is not confined to a single brain region. But I want to go further than this, and to argue that in an important sense the memory is not confined to a small set of neurons at all, but has to be understood as a property of the entire brain, even the entire organism.[99]

Holonomy

An intriguing suggestion has been that the storage of information in the brain is analogous to the storage of information in a hologram, a model that was first developed by the neurosurgeon Karl Pribram in the 1960's.[100] The idea that brain activity might be non-local, a process of the generation of distributed waves of activity which interact to form interference patterns, had been suggested in 1942 by Karl Lashley, whose pioneering research on the brain had inspired Pribram during their collaboration at Yerkes Laboratories. Freeman's experimental findings, as well as the observations of Steven Rose above, are exactly what one would expect from a brain operating on holographic principles. The view of memories existing as "fluctuating dynamic patterns of electrical activity generated by the *entire brain",* could not embody holographic principles more strongly.

Although criticism of the so-called holographic paradigm has come from many directions, the parallels between the mathematical and physical facts of optical holography and many known properties of memory and the brain suggest that further research will tend to support rather than discredit the model. In a recent paper Pribram elaborates on some of these parallels:

> The following properties of holograms are important for brain function: (1) the distribution and parallel content-addressable processing of information — a characteristic that can account for the failure of brain lesions to eradicate any specific memory trace (or engram); (2) the tremendous storage capacity of the holographic domain and the ease with which information can be retrieved (the entire contents of the Library of Congress can currently be stored on holofische, or microfilm recorded in holographic form, taking up no more space than is contained in an attache case); (3) the capacity for associative recall that is inherent in the parallel distributed processing of holograms because of the coupling of separate inputs; and (4) the provision by this coupling of a powerful technique for correlating (cross-correlations and autocorrelations are accomplished almost instantaneously).[101]

It is a curious fact of the history of neuroscience that Pribram's work during

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99 *Ibid*., p322.

100 Karl H. Pribram, *Languages of the Brain*, 1971 Brandon House, New York, recently reissued (1988). See also his essay "What the Fuss is All About", in *The Holographic Paradigm*, Ken Wilber (ed.), New Science Library, Shambala 1982. Other articles in this volume discuss the possibilities and limitations of the model.

101 "From Metaphors to Models: the Use of Analogy in Neuropsychology", Karl H. Pribram in *Metaphors in the History of Psychology*, David e. Leary, ed., 1990, Cambridge University Press.

the 1960's and 1970's was almost unanimously rejected by the mainstream: he was for two decades practically the only proponent of the theory of distributed representation of memory (distributed coding) in the brain. At the time, nearly all theoretical work leaned strongly toward the assumption of detector-cell coding,[102] a model strictly analogous to computer, bit-storage processes, with a precise location in the machine being responsible for the storage of a uniquely defined unit of information. Today the mainstream neuroscientists have taken the opposite tack: distributed processing and storage is their byword, yet Pribram's holonomic theory is still widely rejected, even though in an important sense it is part of the foundation of recent theory. Francis Crick's assessment is typical:

> This analogy between the brain and a hologram has often been enthusiastically embraced by those who know rather little about either subject. It is almost certainly unrewarding, for two reasons. A detailed mathematical analysis has shown that neural networks and holograms are mathematically distinct. More to the point, although [artificial] neural networks are built from units that have some resemblance to real neurons, there is no trace in the brain of the apparatus or processes required for holograms.[103]

To state that neurosurgeon Pribram and his recent mathematician colleagues "know rather little about either subject" is a bit stiff, and the observation that there don't seem to be any lasers or such holographic equipment in the brain itself demonstrates ignorance of the two subjects. And apparently Crick has misssed the point completely: as Holonomic Theory makes clear, it is not an "analogy" but the actual method that is used by the brain and its owner to store memory.

Pribram counters such criticism with the warning, "It is important to realize that holography is a mathematical invention and that its realization in optical systems...is only one product of this branch of mathematics." In other words, optical holography is merely a special case of a wider and more fundamental process for the encoding and reconstitution of information. For this reason it was suggested that the term *holonomic*[104] be used in reference to brain/mind properties, a term I shall adopt here. The term holonomic as used in physics, also indicates that the process is not a static, frozen-in-time representation as is a hologram, but a dynamic, continuous one.

Further rebuttal, including a short history of the criticism of the holonomic theory can be found in a recent paper by Pribram and his colleagues.[105] The most recent and complete exposition of holonomic theory is presented in a book covering the 1986 John M. MacEachran Memorial Lecture,[106] delivered by Pribram. The book demonstrates that the holonomic theory has progressed both conceptually and mathematically far beyond its introductory position of the 1960's; it is the original and necessarily simplistic exposition of the theory which is still attacked by the critics of today who remark (along with other

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102 Sometimes called the "grandmother cell" model, in which a unit of learning or recognition (of your grandmother, for instance) was supposedly associated with a single brain cell or strictly local set of interconnections between cells.

103 Francis Crick (1994) *ibid*. p185.

104 Introduced by George Leonard to refer to entities having the nature of a hologram, *The Silent Pulse*, Dutton, New York 1978.

105 "Spectral Density Maps of Receptive Fields in the Rat's Somatosensory Cortex" in *Origins: Brain & Self Organization*, Karl Pribram, ed., 1994, Lawrence Erlbaum Associates.

106 *Brain and Perception: Holonomy and Structure in Figural Processing,* Karl H. Pribram, 1991, Lawrence Erlbaum Associates.

trivial complaints) that “there don’t seem to be any lasers in the brain”.

Other criticism of the holonomic model of memory storage and retrieval has been derived from the perceived contradiction with the accepted dogma that regulation of synaptic weight must certainly be the only possible storage mechanism in the brain. Synaptic weight distributions are quite amenable to neural network, *viz.* computer-like models of brain/mind function, but it was very difficult to see how synapses could function as a storage medium for the interference patterns implied by holonomic models. Yet the idea of learning and memory storage by neural networks is itself by no means universally accepted. Concerning the much-touted ability of computer analogues of neural networks to learn, Jerry Fodor remarked: “Much has been made of this, but, in fact, it’s a tautology, not a breakthrough.”[107]

A very promising idea which would obviate some of these objections to the holonomic model has been the recent suggestion that the site for storage of information is not the synapse *per se*, but associated with the microtubules making up the cytoskeletal structure of the neuron itself.[108] (The synapse is known to be in indirect yet intimate contact with the microtubule structure of the neuron.) This model has the immediate advantage, as Hameroff points out, of increasing the potential effective complexity and storage capacity of the brain by about seven orders of magnitude,[109] but there are many other attractive aspects of the model as well.

2018: An Update

There are a considerable number of recent publications on Pribram's alternative paradigm I found online (when I originally wrote the above paragraphs the WWW was barely in its infancy), including some excellent papers by Pribram himself. Even the Wikipedia entry for “Holonomic Brain Theory”[110] is worthy of some close scrutiny, and contains many references, including those to Pribram's most recent work. And most importantly, Pribram has written a new book.[111] A review by Walter J Freeman[112] provides an excellent overview of the evolution of Pribram's ideas, and should easily convince (some) holonomic paradigm skeptics that there is a great deal more here than one would believe from facile criticisms such as Crick's. A few lines from the review:

> Cognitive neuroscience is in disarray. The neural mechanisms of locomotion, navigation, and manipulation of objects are well in hand, as

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107 *Times Literary Supplement*, London, August 25, 1995.

108 See “Quantum Coherence in Microtubules” by Stuart R. Hameroff, *Journal of Consciousness Studies* 1, No.1, 1994 pp91-118. The possibility of microtubules being the storage site for memory is supported by the finding concerning Alzheimer’s disease, a progressive neurodegenerative disease, characterized clinically by progressive memory loss, cognitive decline, and aberrant behavior. In Alzheimer’s, changes in tau protein lead to the disintegration of microtubules in brain cells.

109 In the brain there are approximately 10^{11} neurons (100,000,000,000), 10^{15} synapses, but Hameroff estimates that there may be 10^{23} dynamic sites or states associated with the microtubules.

110 Holonomic Brain Theory As for Wikipedia's warning at the top: “This article has multiple issues. The neutrality of this article is disputed.” I would have to suspect that the “warning” is the work of some old-paradigm die-hard who has seen his life's work under threat. See again Thomas Kuhn in *Structure of Scientific Revolutions*! In the eventuality that the Wikipedia entry may be altered or even removed, the 2018 version can be accessed at The Psychedelic Library

111 *The Form Within: My Point of View,* Westport Connecticut: Prospecta Press, 2013.

112 *Journal of Integrative Neuroscience,* Vol. 13, No. 2 (2014). Mirrored at The Psychedelic Library

> witnessed by advances in information technology, robotics and space exploration. What we lack is an understanding of the mechanisms of mind... For examples, we do not understand how brains make and use symbols, or how natural languages work, or how to solve the framing problem, or how to illuminate the mysteries of consciousness...
>
> Karl Pribram believes there is a better way than megaprojects to learn how minds work. As a neurosurgeon he believes that the answers must come from studies of brain activities as and when the subjects are performing cognitive tasks with normal brains or brains that are modified by disease or by surgical intervention. At the age of 94 he has written in conversational style an amazingly clear, voluminously detailed, yet easily accessible description of his experiments over the past seven decades in neurocognition by man and animals.
>
> I cannot emphasize the depth and intensity of this conflict [between the currently-dominant neuron-pulse paradigm and Pribram's field/wave/interference paradigm] strongly enough. The battle has been on for half a century between those defending the neural pulse paradigm, also commonly called “the Neuron Doctrine” in a move to take the high ground, versus those conceiving neural activity as alternating between great clouds of pulses on axons and matching waves of dendritic current. The stakes are high, because there is growing awareness among adherents to the neural pulse paradigm that neurocognitive operations are conducted by millions and even billions of neurons, simultaneously. Their temptation is to perseverate by up-scaling existing techniques for recording pulses to match their sampling needs. As a practical matter the requisite hardware would be incompatible with brain survival, as any neurosurgeon will attest. The real issue is that brains have evolved modes of organization that precisely match the needs for holistic organization, which Karl introduces in this book. Readers who subscribe to the metaphor for EEG as the “roar of the crowd at a football game” should recognize that while pulses cannot be resolved in scalp EEGs, wave packets in neurocognition can be extracted and classified, having the properties Karl predicted. Karl has led the way, and his book documents a realistic and comprehensive foundation for the future of brain dynamics... This is his valuable legacy, which will inform the next two or three generations in the ongoing search for solutions to the mysteries of mind.

...Pause Button Released

The combination of the holonomic storage/retrieval paradigm with the hypothesis of micro-tubule based storage sites, or the even better model advanced by Pribram thus seems very promising: Hameroff’s paper even suggests that the microtubules of neurons might provide a location where coherent photons might operate (*viz.*, the kind of light necessary for optical holography).

Holonomic Brain Theory is most assuredly a radically new paradigm that has the potential to marginalize, even render obsolete, much of the way that neuroscience has modelled brain and brain/mind relationships to date. A major scientific revolution is in the making, and as with former such revolutions we will surely experience great and often irrational resistance from the supporters of status quo theories. As a rebel and underground scientist myself, I know well the resistance of old-paradigm diehards to new ideas, and take great care to dispassionately evaluate the new *vs.* the old, especially when “the new” has obviously much to offer toward the construction of my own theory. I have thus adopted the holonomic brain theory as the most likely candidate for implementing the following ideas.

Thinking The Brain

Figure 2 illustrates the location of just a few of the major brain-parts for the

benefit of the general reader. But in the interest of brevity and concision, I will not attempt to diagram or explain entry-level details of the model I shall now present, either in the case of the properties of neurons, or the general views concerning the functions of the various brain components taking part in my own theoretical view. For the interested layman not afraid of some brain exercise, a survey of a textbook such as *Principles of Neural Science* (Kandel, Schwartz & Jessell), would be indispensable for evaluating the proposed model in detail, and comparing it to standard textbook views representing current paradigms.

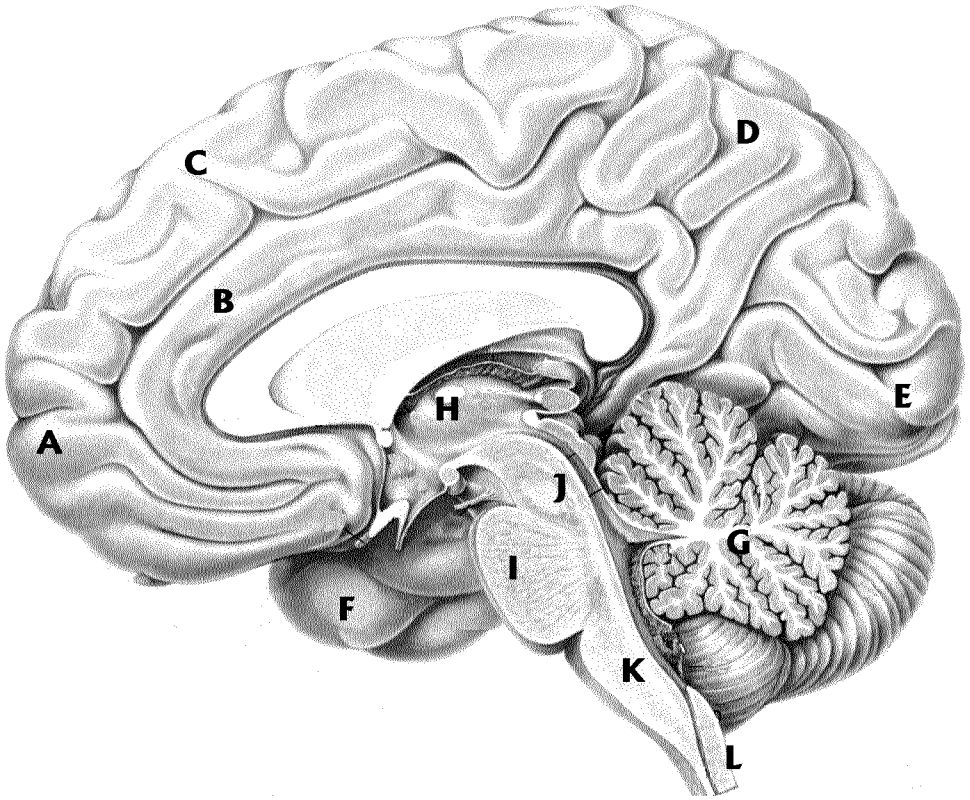

FIGURE 2. The Right Half of the Human Brain.

Viewed from a vertical plane bisecting the brain into its left and right hemispheres. A through F: Areas of the cortex. A: Prefrontal area. B: Anterior Cingulate Gyrus. C: Frontal Lobe. D: Parietal Lobe. E: Occipital Lobe (primary visual cortex). F: Temporal Lobe: most of this area of the cortex is on the outside of the far side of the brain, hidden in this view. G: Cerebellum. H: Thalamus. Encircling the Thalamus are the Hippocampus, the Amygdala, the Basal Ganglia and other parts of the limbic system. I: Pons. J: Midbrain, area in which are found the various brain stem nuclei including the Raphe Nuclei, the Locus Coeruleus, the Substantia Nigra, etc. K: Medulla. L: Spinal Cord.

(Modified from Nieuwenhuys, et. al., *The Human Central Nervous System*).

Note: All illustrations in *KOSMOS* are available in full resolution at http://www.psychedelic-library.org/Kosmos

I have mentioned that most brain areas are connected to most other brain areas, the multiplicity of connections between parts becoming obvious and soon quite bewildering when one starts examining the various brain "maps" in Nieuwenhuys' book, for example (the source of the diagram in figure 2). In addition, it is found that nearly all of the connections are two-way, the connections between the thalamus and the primary sensory areas of the cortex, for example, being reciprocated by nerve pathways (backprojections) in the opposite direction. It is problematic therefore to construct a diagram for the supposed "flow of information" in the brain: if the retina of the eye, for example, sends its "visual data" to the thalamus (which has been likened to a

relay-station for sensory data), and then the thalamus sends this signal to the primary visual cortex for the first stages in the processing of visual information, why should the primary visual cortex send a nerve pathway *directly back to the same area of the thalamus* from which it has just received the data? The backprojection is not insignificant: recent findings indicate in the case of vision that there are *ten times* as many nerve fibers in the "backwards" direction as in the direction in which "information" is supposed to flow! The size and importance of the various interconnections[113] seems to indicate that the actual sensory "information", the environmental data ENV in figure 1, constitutes only a minor part of what is being "processed" in the brain! Current computer "data-flow" models of brain operation cannot explain the facts of the existence and relative importance of backprojections, as even the best workers in the field will admit.

But this is exactly what one would expect for a brain architecture that operated according to the habit routine model of cognitive function. The environmental data merely provides cues for the elaboration of the far more complex informational entity of which we become aware, the habit routine complex. It is far more complex, because it is generated from the entirety of previous experience stored in memory, whereas the actual environmental data is quite limited in scope not least by the limits of the sensory organs themselves. In size and complexity, the nerve pathways carrying the primary sensory information to the cortex are among the less important connections of the brain. To be sure, the environmental input is necessary: when you shut your eyes, vision promptly ceases. But this effect itself may be heavily dependent upon the operation of habit routines. We are all absolutely and automatically certain that vision *must* cease when we close our eyes, and would be profoundly confused, (if not shocked into psychosis!), were it to be otherwise, even for a few seconds.

There is a computer analogy that could be made in the attempt to account for the curious facts of neural reciprocating connectivity, that the signaled area must send back a return signal indicating that it has received information, like two modems do as they talk to each other. But this would not explain why return pathways are so much larger. I would propose that something much more interesting is taking place. In the case of the nerve pathways from the thalamus to the primary sensory cortex areas (and back again) for the various sensory modalities, I believe it is useful to hypothesize that a *reverberation* is being established with the two-way signaling, and that this reverberation *is a dynamic informational entity having holonomic properties*.

The thalamo-cortical reciprocating nerve connections set up for each sensory domain a dynamic reverberating *holoprojection* of information, which is constantly updated and modified with the newly arriving signals from the sensory organs. It would require a much higher density of nerve pathways to set up and maintain such reverberation than to feed in the flux of newly arriving ENV data, thus explaining the relative importance of the brain connections between the sensory receptors, the thalamus, and the areas of the sensory cortex. Llinás and Ribary adopt a very similar position but of course ignoring whether or not Pribram's holonomic principles apply:

> Several factors suggest that the brain is essentially a closed system capable of self-generated oscillatory activity that determines the functionality of events specified by the sensory stimuli. First, as stated above, only a minor part of the thalamocortical connectivity is devoted to

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113 See "Perception as an Oneiric-like State Modulated by the Senses", Llinás and Ribary, in *Large-Scale Neuronal Theories of the Brain,* 1994, MIT Press. On page 113 is a summary of brain connectivity illustrative of the inadequacy of current "information-flow" models.

> the reception and transfer of sensory input. Second, the number of cortical fibers projecting to the specific thalamic nuclei is much larger than the number of fibers conveying the sensory information to the thalamus (Wilson et al. 1984). Thus, a large part of the thalamocortical connectivity is organized in what is presently known as reentrant activity (Edelman 1987) or previously viewed as reverberating activity (Lorente de No 1932). Third, the insertion of neurons with intrinsic oscillatory capabilities into this complex synaptic network allows the brain to generate dynamic oscillatory states which shape the computational events evoked by sensory stimuli... Much neuropsychological evidence also supports this view of the brain as a closed system in which *sensory input plays an extraordinarily important but, nevertheless, mainly modulatory role.*[114] (Italics added)

My extension of Pribram's ideas suggesting the similarity to the projection of a holographic image is intentional, for I believe that, not only are the mathematical principles which predict and describe optical holography applicable to memory storage, but also to the ongoing operation of many of the systems of the brain. In comparison to optical holography, it can also be maintained that the relation between a given unitary nerve signal (the electrical action potential of a neuron) and the overall holoprojection to which it contributes, is analogous to the relation between the unitary nature of one grain of photoemulsion making up a hologram (the “photograph” of the interference patterns produced in optical holography), and the resulting projected holographic image. The single grain of emulsion on the photographic plate may only be either “on or off” like the neuron, yet it theoretically represents the entire holographic projection[115], albeit with a resolution of zero. It is the same for a single action potential: it represents the entire holoprojection, but with zero resolution.[116]

Someone familiar with holography would certainly ask, but how and where are *interference patterns* produced, certainly any holonomic process implies their existence, for it implies the interference of two or more signals? Dropping one pebble into a still pond produces concentric waves, but dropping two pebbles produces an interference pattern between the two sets of waves. So it may be with the nerve signals of the brain. It is well known that neurons in their various nerve pathways have a *background* rate of firing which, for all intents and purposes, seems to be merely random noise. Here is pebble number one. Pebble number two (in the case of the primary sensory holoprojections), is the impinging signal from ENV (of figure 1), the signal coming from the sensory receptors.

Thus the resulting holoprojection is the product of a dynamic interference pattern resulting from at least two distinct signals, and is amenable to expression as mathematical transform coefficients analogous to the mathematical operations which describe optical holography. In the nerve pathways maintaining a primary sensory holoprojection, the microtubules[117] of these neurons record and dynamically maintain the transform coefficients which represent the information necessary for the neuron firings to maintain the reverberation. The coefficients are constantly updated with the sensory

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114 *ibid.,* p 114

115 In producing a holographic image by illuminating a holographic photographic plate (the hologram) with coherent light, the same image is produced by directing the light through only a small part of the plate as is produced by illuminating the entire plate. But the image in the former case carries much less definition, it is of lower resolution.

116 2018: Here I should be speaking about the dendritic field rather than the individual neuron.

117 In Hameroff's model, or the fine structure network in Pribram's model.

signal from the environment, which also exists as a transform of the interference patterns actually received by the sensory receptors. Thus there are two sets of coefficients representing the two signals, together they contain the information necessary to maintain the dynamic holoprojection in time. It will thus be seen that the background firing of the neurons, the resident signal, is not merely random noise, for it is generated from the coefficients resident in the microtubules and represents the holoprojection in temporal cross-section. The constant arrival of the ENV signal produces the dynamic aspect of the primary holoprojection.[118]

But the combination of signals to produce interference patterns does not end with the primary sensory holoprojections, for as I shall explain below, holoprojections *themselves* combine and overlap, they become superimposed under the guidance of certain brain components so as to produce further interference patterns and thus further *composite* holoprojections. It can be seen that the "processing of information" in the brain is therefore accomplished *dynamically in an all-at-once rather than sequential manner,* using entire simultaneous fields of bound "data" from several, or even the entirety of all ongoing processes. The hypothesis of such a process conflicts radically with the computer, neural network model of the brain in which the serial processing (in parallel pathways) of discrete bits of information is the proposed mechanism. If experimental results begin to confirm the holoprojection model of brain operation, they will be a significant argument against the pursuit of strong Artificial Intelligence as it is presently conceived. Let us see how the fields of information I have called holoprojections might function in stages of brain operation beyond the primary sensory realm. First let us take a closer look at the thalamus, which plays so central a role in generating the primary sensory holoprojections which are the data fields upon which further brain activity is based.

The thalamus itself is composed of many different nuclei, widely connected to other brain areas and interconnected as well. Thus in discussing the various functions of the thalamus, it must be kept in mind the great diversity of independent yet interrelated parts and functions comprising this centrally-important component of the brain. In the case of vision, after the signals have passed from the retinae through the optic chiasm which combines and distributes the visual signals from both eyes to the left and right hemispheres of the brain (the thalamus also is divided bilaterally), the visual signal that is to be used for updating the primary visual holoprojection enters a thalamic nucleus called the lateral geniculate nucleus, or LGN. The LGN then signals the first stage of the part of the cortex involved with vision, the primary visual cortex, and it is from this area that we note the very important nerve pathways which return directly to the LGN. It is merely a convenience to say, for example, the signal is "passed" from here to there, and "then" passed...etc., for we must remember that all these processes are dynamic, continuous, and as I have proposed, reverberating and holonomic.

The function of the LGN of the thalamus thus appears to be as a "driver" for the reverberation between the LGN and the first stage of the visual cortex. As I have suggested, this reverberation may be thought of as a holoprojection which has at least two functions. Firstly, this informational entity is the first stage in the generation of (the visual aspect of) the habit routine complex, it contains the information which will activate from the frames of memory

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118 Update from 1998: The proposal that background neural activity is not mere random noise is supported by recent findings indicating that background neuron firing is *fractal* in nature. In the *Journal of Neuroscience* (vol 17, p 5666) Malvin Teich of Boston University notes that "the average release rate [of neurotransmitter packets] fluctuates as dramatically from minute to minute as from second to second. Such repetition at different scales is a hallmark of fractals." (Quotation from *New Scientist,* 16 August, 1997.)

(stored in distributed manner in the same visual areas of cortex), the actual information which makes up the habit routine presented to thinking2 processes. Secondly, since this holoprojection carries, at least potentially, the original or "genuine" visual information, it will be used under certain circumstances to generate aspects of the visual scene that are detected as significant and to which the attention is directed. This will occur by a comparison or superimposition of the primary visual holoprojection with another holoprojection set up by the habit routine search system. (As explained below, significance detection *may* use the primary sensory holoprojections, or the memory data activated by these holoprojections instead).

An additional function of the primary visual holoprojection results in the phenomenon of *iconic memory*, the very short term visual memory trace that has been experimentally demonstrated.[119] An informational fragment of the primary visual holoprojection, since the entire holoprojection is being constantly updated with new visual data, would be expected to have a very short "half-life" comparable to the 200 to 500 millisecond iconic memory (up to three or four seconds under certain experimental conditions). Experiments with iconic memory have shown that it persists for greater periods when preceded and/or followed by a simple dark field containing little or no new visual information. Likewise, it may be interfered with by the process of *masking* in which a bright field of view, or interfering patterns are shown. This is exactly what would be expected for the visual holoprojection model. A paucity of new visual data arriving to update the holoprojection would allow the reverberation to persist "as is" for a greater length of time. Data intentionally designed to confuse or interfere with the iconic memory would have the effect of overwriting the relevant aspects of the holoprojection (the transform coefficients stored in the microtubules (or fine structure) of these neurons).

The extraction of the iconic memory must occur by other systems involved with thinking2 processes, again probably by the comparison or superimposition of holoprojections. There is more than speculation in the idea that such projections might be superimposed and compared to show similarities and differences, for the same kind of process can be carried out with optical holograms (in practice, I am informed, there are technical difficulties to overcome, but no theoretical restrictions). Two slightly different optical holograms, for example, could at least theoretically be projected so that they cancel each other except for the aspects in which they differ: only the differences would appear in the projected image. Likewise, two radically differing holograms having just a few identical features could be projected to emphasize their common features. In the brain, the process might be as simple as the addition and subtraction of the transform coefficients stored in the microtubules (or fine structure) of the contributing neural systems. This would produce another set of coefficients representing the superimposition.

At the same time that the primary visual holoprojection is being generated, of course, all the other sensory systems are generating their own holoprojections, by similar mechanisms involving sensory receptors, the thalamic relay nuclei concerned with those senses, and areas of the cortex. Thus for hearing we get an audio holoprojection from which can be extracted *echoic memory* (analogous to iconic memory). The audio holoprojection is used to activate the audio domain of the frames of memory going into the generation of the habit routine complex. Tactile sensations and proprioception likewise produce their reverberations, and so forth.

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119 A review of the experiments is in *Human Memory, Theory and Practice,* Alan Baddeley pp14-18

The binding and superimposition of all the primary sensory holoprojections is accomplished by a scanning mechanism only recently detected by neurological experiments.[120] This scanning operation is also carried out by a nucleus of the thalamus, the intralaminar nucleus. Now what is scanned is not the actual primary holoprojections themselves, but the memory information which they activate in the various regions of the cortex. This activation occurs as the holoprojection signal transits through the pyramidal cells of the several *layers* of the cortex taking part in the reverberation. The sum total of all ongoing sensory holoprojections, impinging on the memory data distributed in the same areas of the cortex that take part in the set up of the various holoprojections, activates this memory data such that the intralaminar nucleus, acting again as a driver for the generation of a holoprojection, creates the habit routine complex holoprojection. The memory data in this process is thus analogous to the role of primary sensory data in the generation of the primary sensory holoprojection. Remember that we are hypothesizing that this memory data is associated with the microtubules of the neurons (or the dendritic fine structure - Pribram) in the cortex and not their synapses, so while the neurons and their synapses in the circuit between the thalamic relay nuclei and the cortex are maintaining the primary holoprojection using the signals from the sensory receptors, the holoprojection itself, as an interference pattern, is resonating with the stored interference patterns in memory resident in the microtubules.

The habit routine complex holoprojection is the bound informational entity presented to thinking2 processes, having the various properties already described in chapter 3. The memory information used to generate the habit routine is, as just proposed above, analogous to the original sensory information: the sensory signals are used to set up the primary sensory holoprojections, and the activated signals from memory are used to set up the habit routine holoprojection. In each case we have a thalamic nucleus acting as the driver for the process, using an input of transform coefficients to produce the holoprojection. But the intralaminar nucleus scan which sets up the habit routine is deriving its input from the entire cortex, not just the primary sensory areas. The habit routine complex is much more than just primary sensory information taken from memory, for remember that a habit routine contains pre-programmed associations with ideas, with habits of thinking, and it also contains recommended actions (including not only physical responses but thoughts, opinions, implied value judgments, etc.), that represent the sum total of ways in which similar situations were dealt with or reacted to in the past.

The higher domains of the cortex itself are using the primary sensory holoprojections to derive associational information such as that concerning depth perception, for example (from both audio and visual sources in combination), as well as perception of motion, types and categories of perceptions, as well as cross-modal associations. Thus the primary holoprojections generate far more from the memory data than just elementary sensory information. This is why the ILN scan cannot be simply of the primary holoprojections themselves, but of the result of the entire sequential associative process they generate in the cortex. The process extends over the entire cortex. For instance, at the most advanced level of associational processes in the frontal cortex regions, you have a bound, unitary, and multi-sensory short-term-memory of events (and your reaction to these events) that just happened a moment ago, produced by successive stages of associational cortex operation. This memory information is also scanned and becomes part

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120 See “Perception as an Oneiric-like State Modulated by the Senses”, Llinás and Ribary, in *Large-Scale Neuronal Theories of the Brain,* 1994, MIT Press.

of the habit routine complex. In this sense even current experience is very much like a reverberation, for current evaluation of reality is based upon the interpretation of reality just experienced which has been re-injected into the ongoing habit routine complex. Thus the significances that thinking2 decides to examine more closely by extracting information from the primary holoprojections are actively perpetuated. Using this mechanism we can increase the proportion of "raw reality" in the current habit routine to override the "interpretation" of reality that would be supplied by the unmolested habit routine alone.

And here is where the psychedelic experience comes in. The process which is so startlingly activated by psychedelic drugs, is the very same process that we can accomplish, if on a more limited level, as just described. Let us look more closely at this overall process, for it involves the generation of additional composite holoprojections which have more to do with conscious thinking2 operations, including free will, than with automatic sub- or pre-conscious thinking1 processes and their holoprojections.

The nuclei of the thalamus are also important for the generation of these composite holoprojections, but at this stage, other brain nuclei become partners with the thalamus and cortex. Again, these older, more "primitive" parts of the brain act as drivers in dialog with the cortex to produce the composite informational fields.[121] Among the brain components taking part are the locus coeruleus and raphe nuclei of the brain stem, the amygdala, hippocampus, the basal ganglia and cerebellum, among others. It is certainly an ambitious statement to say that I will attempt to explain the role of some these brain areas, but here goes:

First let us consider the role of the locus coeruleus and the raphe nuclei, for it is the nerve pathways connecting these two brain areas with the cortex and with each other that are the primary site of biochemical action of the psychedelic drugs.[122] It is with these nuclei that I must show how significance detection and the suspension of habit routine is accomplished.[123] I would propose that the locus coeruleus is the master functioning body, the driver that through dialog with essentially all brain areas but particularly the thalamus, the raphe nuclei and the cortex, produces the composite holoprojection containing information about significance or *salience* not only in the environment, but also, and perhaps even more importantly, in the ongoing processes of thought leading to ideas, opinions, etc.

Now the statement that the connections between the raphe nuclei, the locus coeruleus, and their connections to the thalamus and cortex are the primary site of biochemical action of the psychedelic drugs is based quite solidly on recent brain research.[124] We know that LSD and other psychedelics, for

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121 I might go so far as to suggest that most, if not all cognitive functions of the brain are accomplished by a dialog among two or more brain parts, and not by a single area acting alone to effect some cognitive result which is then "passed on" to another area. The multiple holoprojection model is entirely in accord with this suggestion.

122 In my lecture on these matters at the 2006 Basel Symposium I presented a series of diagrams that would not reproduce well in this Kindle format. The reader may access these diagrams at http://www.psychedelic-library.org/Kosmos/LC.zip

123 The reader should bear in mind that the ideas expressed here are my views at the time of writing the original version of this chapter. As already stated, the proposal of a multi-part brain system that produces the detection of salience seemed logical to me, but not at all supported by the research of the time. In the following chapter I will bring all this up to date with reference to the latest findings about "Large-Scale Brain Networks".

124 A publication containing the most recent research findings of the important workers in this field is *50 Years of LSD: Current Status and Perspectives of Hallucinogens,* Pletscher and Ladewig, editors, Parthenon Publishing, 1994. The book presents papers submitted to a symposium of the Swiss Academy of Medical Sciences in October 1993.

example, exert powerful influence on the operation of neurons emitting and receiving at their synapses the neurotransmitter, *serotonin.* There remains considerable mystery as to *how* the drugs react with these neurons, whether they activate or inhibit serotonin receptors, which types of serotonin receptors are affected, and so forth.[125] There is also considerable mystery as to *how* these affected neurons might bring about the overall psychological result. The first question remains, at the present state of research, very difficult to answer. But it is with the second question that I believe we should start, for there seems to be enough information now available to formulate a model.

It is generally agreed by neuroscientists today that the locus coeruleus acts as a kind of novelty or significance detector,[126] its activation (in animals) has been shown to increase in response to stressful or noxious stimuli, preferred food and other complex arousing events, and even to changes in body systems such as the level of oxygen or carbon dioxide in the blood. The psychedelic drugs have been repeatedly shown to greatly increase the activity of the locus coeruleus, but not when applied directly to the cells which make up the nucleus. Thus it has been hypothesized that the state of the locus coeruleus must be influenced by another nucleus or system which itself is directly affected by psychedelics. Some relevant facts concerning the locus coeruleus:

> The locus coeruleus (LC) consists of two dense clusters of noradrenergic neurons located bilaterally in the upper pons at the lateral border of the 4th ventricle. The LC, which projects diffusely to virtually all regions of the neuraxis, receives an extraordinary convergence of somatic, visceral and other sensory inputs from all regions of the body and has been likened to a novelty detector. Thus, the LC represents a unique nodal point both for the detection of significant changes in the internal and external environment and for relaying this information to the remainder of the central nervous system. It is not surprising that hallucinogenic drugs, which produce such dramatic changes in perception, would alter either directly or indirectly the function of LC neurons.[127]

In keeping with the holonomic model, I would propose that the locus coeruleus is the driver which produces a composite holoprojection consisting of the superimposition and canceling of primary holoprojections including the habit routine holoprojection to yield a field of information concerning *significances* in the ongoing experience of the organism. The detection of significance, or *salience*, normally is derived from the same memory data from which the habit routine complex is generated, and is merely a repeat detection of salience that has occurred in the past. When the test animal mentioned above is shown a preferred food, for instance, and its locus coeruleus is shown

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125 The latest research has confirmed once more the finding that the 5-HT2a receptor is *necessary* for psychedelic experience, i.e., when blocked by ketanserin, no psychedelic effects occur. See, for example, Katrin H. Preller et al., "The Fabric of Meaning and Subjective Effects in LSD-Induced States Depend on Serotonin 2A Receptor Activation" in *Current Biology* Volume 27, ISSUE 3, P451-457, February 06, 2017., Elsevier. Mirrored at The Psychedelic Library

126 As a test for the idea, I wrote to Jaak Panksepp (author of the remarkable *Affective Neuroscience*) about my surmise that the locus coeruleus might not just be *reacting* to salience, but actually *detecting* it. He replied: "Your hypothesis is very much in the right direction. . . indeed, I suspect it is implicitly in the minds of most neuroscientists. It has been long known that the LC sets up attentional processes in the cortex, and there are many sensory and emotional inputs that could achieve this. Lots of neuropeptides feed into the LC, so it is really not necessary to make it the first and only link in the salience cascade, but certainly a prominent one. In short, I see no problem with this hypothesis, and in a sense it is implicit in the neurophysiological finding that LC-NE increases signal to noise levels throughout sensory cortices."

127 *op cit., 50 Years of LSD,* "LSD and phenethylamine hallucinogens: common sites of neuronal action", G.K. Aghajanian.

to increase in activity, the salience detected is obviously relative to memory data of the preferred food. But when *I* am the test animal in a fine French restaurant, when some unknown yet succulent dish is placed before me, I begin to extract information directly from the primary sensory holoprojections to try to deduce the composition and possible methods of preparation of the mysterious delicacy. Memory information in the habit routine will still be the primary source of information in these deliberations, but my Attention will guide the process to actual examination of the "genuine" sensory data contained in the primary holoprojections. As I mentioned above in introducing the functions of the primary holoprojections, we see that salience detection *may* use the primary data, but normally, and routinely, salience is merely a repeat performance of previous detection, based on the habit routine complex itself.

The connections of the locus coeruleus which accomplish the detection of normal salience from the habit routine data may be simply the interconnections with the cortex. The locus coeruleus receives a modest input from only one area of the cortex, the prefrontal cortex, but it sends its output to the entire cortex. We see again (as in the case of the pathways between the thalamus and the primary sensory cortex) the situation where the "return" signal is far more important than the "input" signal, and this suggests, as in the nervous pathways taking part in the generation of the primary sensory holoprojections, a reverberation, in this case the salience detection holoprojection.[128] The signal from the prefrontal cortex is the final stage of the entire process of association, so it will obviously represent the complex associational memory data of past salience detection that was experienced. The return pathways to all cortex areas might also be thought of as facilitating the cancellation or ignoring of all features of the habit routine except for the salient entities, so that the resulting holoprojection contains only information about these entities. Thus the Attention is directed to the salience which practically jumps out of its surroundings. The locus coeruleus has several inputs besides that from the prefrontal cortex, but these inputs function to modulate the holoprojection generation in various ways. A particularly important control of the process is accomplished by the raphe nuclei.

The raphe nuclei of the brain stem are particularly important to salience detection and to the psychedelic experience because they contain the great majority of neurons of the brain which use serotonin as a neurotransmitter. Some of the earliest work on the effect of LSD in the brain found that "LSD and other indoleamine hallucinogens...have potent, direct inhibitory effects upon serotonergic neurons located in the raphe nuclei of the brainstem."[129] Now it has been well established that the serotonergic neurons of the raphe nuclei project heavily to the locus coeruleus, and likewise that serotonin inhibits the firing of the type of neuron found in the locus coeruleus.[130] As mentioned above, studies have also confirmed the psychedelic agents have as

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128 Another way of thinking about the disparity between "input" and "output" signals again illustrates a basic conceptual fault with the computer model of brain function. In the case of the locus coeruleus for example, it has been stated that since its "output" extends to such diverse regions, its functions must also be multiple and widespread. This view has the underlying assumption that the locus coeruleus is sending information it has processed from its modest input, to many locations where this data is then used for many different functions. But the alternative view I have proposed is that the locus coeruleus accomplishes only one function. The multiple and widely connected "output" pathways are not to be seen as sending information, but rather as *requesting or accessing information* of a widely diverse nature (relating to the detection of salience in many domains, situations, and complexities). The result of this request is then cycled back to the locus coeruleus via its modest input from the frontal cortex, as a reverberating holoprojection.

129 *op. cit., 50 Years of LSD,* p27.

130 *Chemoarchitecture of the Brain*, Rudolf Nieuwenhuys, 1985 Springer-Verlag, p40.

their target at least some of the many types of serotonin receptors on neurons both of the areas signaled by the raphe nuclei, and on the raphe serotonin neurons themselves (autoreceptors). The raphe neurons also project widely throughout the brain, to all areas of the cortex, (strongly to the prefrontal cortex from which the locus coeruleus derives its input), the thalamus, the amygdala, virtually the entire nervous system. Thus I would propose that the raphe nuclei are the principle mechanism of control, the driver which guides the mode of function of salience detection, as well as the manner in which the detection is used and subsequently stored in memory. It appears that Attention and other thinking2 process use the serotonergic system of the brain, based in the raphe nuclei, to direct the detection and use of salience, but not simply by "inhibition" as would be implied by the observed "inhibitory" action of serotonin on the neurons of the locus coeruleus, or the observed "inhibition" of serotonergic neurons by LSD.

It is a curious fact of the human brain, that fully 75% of the neurons therein are supposedly "inhibitory neurons", whereas in the monkey the figure is 45%, and in the cat a mere 35%.[131] Clearly these facts must have some tremendously important significance, not only for the type of functioning they imply of the brain, but in some sense they must tell us something very important about the psychological differences between man and animals, particularly the great disparity of intellectual capacity. A not very convincing speculation has been that the large proportion of inhibitory neurons allows a "streamlining of thinking" in which groups of brain cells are more quickly returned to a state of readiness after some operation.[132] I would propose that the inhibitory neurons do not "inhibit" in such a literal manner, but rather are concerned with the superimposition of holoprojections in which a *cancellation* or *subtraction* of information results, such as the manner in which all peripheral information from memory going into the generation of the salience holoprojection is removed so as to yield a composite holoprojection consisting of *only* the detected entities. It might be said that human mental powers, as opposed to that of lower animals, reside primarily in the ability to discriminate between and detect widely differing types of significance not only in the environment but within thought patterns of abstractions and concerning *ideas* and constructs of the intellect. These human feats, I would propose, are accomplished using the wide network of inhibitory neurons functioning to produce composite holoprojections derived through the comparison and *subtraction* of informational fields one from another, to reveal patterns the complexity of which far outstrips the power of lower animals to detect.[133]

There are probably several brain operations, brought about by combinations of brain parts including a nucleus of the midbrain or brainstem as a driver, which generate such composite holoprojections. The detection of emotional content, or *valence*, is probably accomplished using the amygdala as a driver in dialog with the cortex and other nuclei, superimposing the same primary holoprojections as are used for salience detection. But the salience detection of the locus coeruleus, controlled and modulated by the raphe nuclei connections throughout the brain, generates what is probably the most important holoprojection of the brain/mind, (or in any case, second only in importance to the habit routine holoprojection). And it is upon the generation of this salience detection holoprojection that the psychedelic drugs exert their effects.

Now it was soon noticed, after the inhibitory effect of LSD and similar

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131 From references mentioned in *Stairway to the Mind*, Alwyn Scott, Springer-Verlag 1995, p94.

132 A suggestion of Donald Hebb, recounted in *Stairway to the Mind, ibid.,* p94.

133 The above was written before the recent work that has discovered and mapped the SN, the large-scale-brain-network system that detects salience. This will be discussed below.

psychedelic drugs on the raphe nuclei was discovered, that other psychedelic agents such as mescaline and the phenethylamine family did not produce the inhibition. The *indirect effect on the locus coeruleus was, however, as important as with LSD.* The effect is indirect, for as mentioned, the application of psychedelic agents to locus coeruleus neurons themselves fails to alter their activity. But since the locus coeruleus salience detection system involves the entire cortex, and the serotonergic neurons of the raphe nuclei project to the entire nervous system, it is evident that the control of salience detection would be alterable at many different sites of potential psychedelic drug action. A direct change in the raphe nuclei is the possible primary action in the case of LSD, whereas a change in the *effect* of the signaling by the raphe neurons, either in the locus coeruleus or possibly the cortex itself, might be the mechanism for mescaline. And of course we must remember that HR suspension via augmented salience detection is being proposed as the universal mechanism catalyzed not only by the psychedelic chemicals but also the psychedelic-equivalent experiences produced by many differing methods both ancient and modern. The overall effect is in all cases a change, which appears to be a radical increase, in the intensity and type of salience detected by the locus coeruleus system. I am tempted to repeat some of Huxley's observations about significance quoted at the end of chapter 3, but instead will quote Alan Watts, here writing about his first experiment with psychedelic drugs:

> I have said that my general impression of the first experiment was that the "mechanism" by which we screen our sense-data and select only some of them as significant had been partially suspended. Consequently, I felt that the particular feeling which we associate with "the meaningful" was projected indiscriminately upon everything, and then rationalized in ways that might strike an independent observer as ridiculous—unless, perhaps, the subject were unusually clever at rationalizing. However, the philosopher cannot pass up the point that our selection of some sense-data as significant and others as insignificant is always with relation to particular purposes—survival, the quest for certain pleasures, finding one's way to some destination, or whatever it may be.[134]

I have suggested above that there are two modes of salience detection, the first merely automatic and based upon previously experienced situations, and a second which is based on the genuine data of the primary holoprojections. Remember my little story of noticing the grey rock in the middle of the pathway. Automatic salience detection brought it to my awareness, and interpreted it relative to previous experience. Yet some unconsciously perceived anomalous data, a slight movement, a color not quite in keeping with experience, caused me to suspect an error, and *choose* to examine the raw sensory data itself and Decide that something was amiss. At this point the original habit routine was overruled, and a new interpretation actively demanded by the Attention. This was accomplished by use of the working memory, thought to be a function of and resident in the prefrontal cortex, *the same cortical area from which the locus coeruleus receives its sole input.* Remember also my stated feeling that under the influence of psychedelics, it seems that the habit routines of interpretation in this case would be at least momentarily suspended, and after a moment multiple habit routines might arrive at thinking2 processes. All these observations seem to indicate that psychedelics would be interfering with the habit routine holoprojection, rather than the salience holoprojection. But according to my neurological model so far, it would appear that psychedelic agents interfere with the control exerted

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134 "The New Alchemy" in *This Is It,* Alan Watts, Random House, 1958.

on the salience holoprojection by the raphe nuclei and the serotonergic neurons extending widely to all areas of the brain.

> I would now propose that the profound alteration of the salience holoprojection by psychedelics, illustrated both by neurological data and by the practical observations of Huxley, Watts, and many others, causes the individual, using the conscious mechanisms of thinking2, to himself suspend the dependence on the habit routine holoprojection. It is the cumulative effect of not only added salience detected in the ENV both external and internal, but of the interpretation of this increased salience as itself extremely significant, that leads to a veritable avalanche of salience detection which simply overwhelms normal acceptance of and dependence on the habit routine system.

The habit routines are still assembled and are there in the background, but they are almost completely ignored by Attention, Decision, and other thinking2 processes amidst the flood of salience perceived. Thus, the psychedelic experience is, in an important sense, *voluntary,* and this would explain the ability to achieve such states through meditation and other voluntary mechanisms. That the habit routines are still assembled and available to some extent is illustrated by the common ability during the lucid end-stages of psychedelic experience to recognize a duality in experience: a perception of the way things appear with "the doors of perception" cleansed, and a simultaneous recognition of how the same scene would appear in a normal state of mind governed by habit routine. Such realization extends to the perception of one's personality traits, one's prejudices and automatisms of behavior, from a viewpoint that is essentially *outside* of the self and beyond the ego. In this state I believe, the habit routines have been completely suspended in function, and salience detection is using the information of the primary holoprojections.

At the request of thinking2, the primary sensory holoprojections become the subject of meticulous examination, genuine reality floods through, the habit routines ignored. The raphe nuclei must in some sense be acting as a control mechanism for this switch-over, allowing the locus coeruleus system to create superimpositions of the genuine data rather than the memory data. This switch-over probably occurs in the cortex itself, by the control exerted by the serotonergic neurons from the raphe nuclei which contact both inhibitory interneurons and the pyramidal neurons of the cortex.[135]

Experimental evidence supporting the above model relating the neurological operations of brain systems and the habit routine search and suspension hypothesis of normal and psychedelic functioning has been easy to find in the literature. Of course, due to the current state of neuroscience, it is often found that alternative interpretations of experimental results, leading to radically different models, is possible. Such is the case here, and for any specific experiment which I might use as evidence for my model, others would find it just as easy to use the same data for another view. For this reason, as well as in the interest of brevity, I shall mention only a few examples. A thorough survey would require at least another volume, and the more important chapters of the present volume still await exposition.

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135 Aghajanian in *50 Years of LSD, op. cit.,* pp33-34

A vast body of literature concerning brain function and its perturbation by brain lesions goes back more than a century. A great many studies have been done concerning patients whose brains have sustained damage through accidents or necessary brain surgery, and experimentally, countless numbers of animals of every description have undergone destruction, disconnection or removal of various brain areas in the attempt to localize various sensory, motor, and cognitive functions of the brain. With such a wealth of evidence, it is not hard to find studies that might support almost any model one would care to dream up.

I will mention just a few cases which have been well documented, and which deal with damage to the areas of the prefrontal cortex. This brain area, it will be remembered, has been suggested both in the literature and in my own model as an important center involved with the working memory and with the most complex levels of associative processing by the cortex. Such association might be expected to facilitate complex cognitive phenomena such as the expression of personality traits, decision making and attention, voluntary action and free will, the perception of and reaction to complex social situations, *i.e.,* the most complex and human of cognitive functions. (It is the frontal lobe, and especially the prefrontal area that has seen such a massive expansion and development in the recent evolution of the hominids.) Remember also that it is from the prefrontal cortex that the sole cortical projection to the locus coeruleus occurs. Projections from the prefrontal cortex also extend to the raphe nuclei and the amygdala.

The model I have devised would therefore predict that disruption of frontal lobe integrity should produce alteration of salience detection and the evaluation and expression of emotion, and radical changes in the assembly and use of habit routines, especially as they apply to these most advanced cognitive and affective functions. Since the connections to the locus coeruleus, raphe nuclei, and amygdala hypothesized to be important in my model project from the prefrontal cortex, interference with salience and valence functions should certainly be observed in cases of prefrontal damage. And prefrontal damage resulting in an impaired function of working memory in supplying parameters for the ongoing habit routine search process should produce symptoms identifiable as resulting from impaired generation, access to, or use of habit routine in ongoing cognitive operations.

A very famous case of brain injury in the prefrontal area, recently the subject of a book and various newspaper articles, is that of the construction foreman Phineas P. Gage. In 1848 Gage sustained a massive brain injury when an explosives procedure went terribly wrong and sent an iron tamping bar vertically through the frontal region of his brain. Miraculously, Gage seemed at first practically unaffected, even walking some distance, and conversing with his men on the way to medical attention. It was only later that the peculiar kind of mental deficits that necessarily result from this type of prefrontal injury came to light. The case has recently become the subject of detailed attention thanks to the work of Hanna Damasio, who was able to reconstruct the precise location of Gage's brain damage using state-of-the-art computer techniques to analyze the features of Gage's skull, a museum exhibit at the Harvard Medical School Museum for over a hundred years. An overview of this work together with a detailed examination of the symptomatic evidence in the case is presented in a recent book.[136]

It was said of Gage that he became a different man, his entire personality was radically changed. It seemed that he had completely lost access to his previously acquired social conventions and rules and had become childish,

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136 *Descartes' Error*, Antonio R. Damasio, G.P. Putnam's Sons, 1994, chapters 1 & 2.

irresponsible, yet strangely undiminished in terms of episodic and autobiographical memory, language ability, even, one might say, intelligence. In terms of the habit routine model: In the daily yet complex social relationships in which personality is expressed, it appeared that Gage's behavior was capricious, or even *random*, the habit routines of personality which are among the most complex and highly associative aspects of the habit routine complex, were no longer accessible (reconstructible) from the memory of the frontal cortex and by consequence, his automatic social behavior was based not upon previous experience but was instead *arbitrary and random* rather than merely childish. In theory, it seems, he could still reason out how one should act in a given situation, but when forced into a decision by a life situation, he was essentially powerless to apply such reasoning. This may illustrate how dependent we are on habit routine for making decisions and for the expression of personality. In the case of personality traits, it would obviously be impossible to calculate logically and consciously how to react to a situation in accord with our established personality. The reaction must be automatic and instantaneous. If this is also the case with at least some aspects of decision making, a statement I previously made becomes even more pertinent: "We see what we have already seen..." and decide in ways that we have previously decided to an overwhelming degree.

The symptoms described by Antonio Damasio[137] could well be explained in these terms, but in addition, Damasio describes the case of a prefrontal patient which he had himself examined in detail. The patient, referred to as Elliot, had undergone surgery for the removal of a tumor at the base of the frontal cortex, just above the eye sockets. Surrounding brain tissue had also been removed or damaged, and thus a large portion of the prefrontal cortices were dysfunctional. As with Gage, the largest part of the damage was in the ventromedial (lower-central) area, and many of the symptoms were repeated, such as radical personality change. But particularly striking were symptoms that might be interpreted as resulting from interference with the salience and valence systems involving connections from the damaged prefrontal region to the locus coeruleus, raphe nuclei, and to the amygdala. These symptoms might be categorized as a lack of ability to plan ahead, to make decisions concerning strategy and the immediate future, almost, one might say, a deficit of free will. The obvious intelligence which Elliot retained could not be mustered to organize even simple sequences of activity as required for his job, for instance. In addition, he exhibited an emotional flatness or detachment in striking contrast to his pre-operative character.

Interestingly, a lengthy series of psychological tests indicated that, like Gage, Elliot could *theoretically* make such decisions, such as those pertaining to moral judgments, ends and means problem solving, awareness of consequences concerning both events and social situations, etc. But when a real life situation forced a decision based on habit routine, the theoretical knowledge seemed impossible to apply. In the theoretical situation, we could say that the records of social information in memory were actively and intentionally used to *reconstruct* the required decision from scratch, whereas in the life situation what was required was an automatic referral to the habit routines representing such decisions that had been made over a lifetime: the records of previous decisions as represented in the highest levels of habit routine had been destroyed along with frontal cortex,[138] whereas the previous

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137 *Ibid.*

138 One could view the situation also as an inability of the intralaminar nucleus of the thalamus to include in its habit routine-generating scan the information from the destroyed frontal region. This is probably the more useful if not accurate view, as opposed to the view that frontal lobe "information" has been destroyed.

memories themselves upon which the previous decisions had been based were still intact in distributed areas of the cortex.

The combination of decision deficit with emotional flatness led Damasio to construct a model he calls the Somatic-Marker Hypothesis, and it has attracted much favorable comment.[139] I will not describe it here, but will instead offer my own interpretation of the concurrence of the two symptoms. We could describe an inability to make rational decisions not only as due to deficits in the assembly of the highest levels of the habit routine complex, but also on the basis of faulty salience detection, since the relative significance of events and aspects of reality, both present and in memory, must obviously play an important role in constructing plans based upon contingencies and the evaluation of probabilities and strategies. With both of the above cases, Gage and Elliot, there was a theoretical ability to make decisions, based upon reasoning processes utilizing episodic and autobiographical memory of events themselves. Likewise, reasoning processes and memory would be able to *deduce* significance both in the internal and external environments, but the automation of salience detection would be deficient. The key to understanding the overall syndrome, however, is seeing that the generation of emotional content by a holoprojection driven by the amygdala must be a process based on information in the salience detection holoprojection. It is with the various significances detected in the external and internal environment that emotional expression deals, all routine and superfluous information merely falls by the wayside and is ignored. The SD holoprojection feedback to all areas of the cortex accomplishes this cancellation or ignorance of irrelevancy, to leave the detected significances in stark contrast relative to the background. From this holoprojection of detected significance comes the data from which the emotional value or valence is generated.

It is easy to see, then, that if the salience detection system is perturbed or interrupted, a naturally resulting symptom should be emotional flatness, or even randomly expressed emotion since the amygdala is not itself damaged but merely has little or no accurate information to work with. Elliot himself realized perfectly well not only his inabilities in making decisions in the face of real-life situations, but also how subjects or situations that had once caused him strong emotion no longer evoked any reaction whatsoever. Here we can see that, since he remembers subjects which formerly caused an emotional reaction, he can also theoretically evaluate emotional content just as he can theoretically evaluate salience, reconstructing the information from long-term memory. But it is the automated accomplishment of these functions that has been perturbed, and in real-life, on-the-spot decision making, reconstruction does not and cannot substitute for the automated processes.

According to Damasio's hypothesis, the deficit for decision is based on the deficit of emotional content, but I believe the situation is quite the reverse, that emotion is based on significance detection necessary in the process of automatic decision-making, and that both of these functions are based upon intact operation and connections of the prefrontal cortices to the locus coeruleus and the raphe nuclei.

Now I cannot tell from Damasio's descriptions whether the actual connections projecting from the frontal cortex to the locus coeruleus, amygdala and raphe nuclei were damaged or severed during Elliot's operation. It would seem in Gage's case that the trajectory of the iron bar might well indicate that these connections were destroyed: they are grouped together into the medial forebrain bundle, an important nerve pathway passing directly through the ventromedial area. This pathway also contains the projections returning from the locus coeruleus and raphe nuclei which connect to all areas

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139 *Ibid.,* p173-ff.

of the cortex. Whether the severing of the medial forebrain bundle alone produces a syndrome similar to the actual destruction of prefrontal cortex is not known, but if my hypothesis is correct, the severing of the medial forebrain bundle connections to the locus coeruleus and raphe nuclei should produce a very similar result as is seen in cases such as Gage and Elliot. Damage to the frontal cortices may have to be quite widespread to bring about the same result as the simple severing of these nervous pathways.

There is another type of damage to the frontal cortex which produces rather different results. So far, in the two cases mentioned, the principal damage was to the ventromedial areas, just above the eyes and centrally located. When damage to the dorsolateral areas also occurs, psychological tests indicate an important deficit in working memory accompanies the syndrome. These same tests, given to Elliot, showed no disability whatsoever in his working memory function. Inasmuch as the working memory has been proposed here as an important part of the process of habit routine search, its disruption should alter the process in certain ways. In the cases of ventromedial damage cited above, I proposed that the actual memory information necessary for construction of the highest associative levels of the habit routine complex had been destroyed. But with dorsolateral damage as well, an important part of the system which carries out the habit routine search is destroyed: the ability to supply parameters for the search is impeded.

It was proposed that conscious and unconscious parameters guiding the successive scans producing the habit routine complex were introduced via the working memory. The ILN scan, incorporating WM parameters would, on the succeeding scan retrieve a modified selection of memory information according to the parameters previously scanned. And it was proposed that this "small window on reality" was essentially the only normal way to guide the processes of thinking1 using free will or intentional creativity. In experimental situations we notice deficits in precisely these domains. Fuster, in his book on the prefrontal cortex, states that "In general terms, ablation studies indicate that the cortex of the dorsal and lateral prefrontal surface is primarily involved in cognitive aspects of behavior. The rest of the prefrontal cortex, medial and ventral, appears to be mostly involved in affective and motivational functions..."[140] (such as salience detection and emotional evaluation.)

In human prefrontal patients, a striking experimental demonstration of working memory disruption due to dorsolateral damage is the Wisconsin Card Sorting Test, here described by Dudai:

> The subject is presented with a series of stimulus cards and a deck of response cards. The cards bear coloured geometric patterns (e.g. a single blue star, three red circles), and can be matched by categories (e.g. colour, form, number). The examiner selects a sorting category (e.g. colour), but does not inform the subject. The latter is instructed to place a response card in front of a stimulus card, wherever he or she thinks it should go. The examiner then informs the subject if the response was right or wrong, and the subject uses this information to obtain correct responses in the following matches. After ten consecutive responses, the examiner shifts the sorting category without warning, and the subject must unveil it again to obtain correct matches. The procedure is then repeated with other sorting categories. Patients with prefrontal lesions find this task abnormally difficult. The interpretation is that they have difficulties in using temporarily stored information to regulate their actions.[141]

The function of working memory as a parameter store for ongoing habit routine search is well illustrated by the experiment. The original instructions

140 *The Prefrontal Cortex,* Joaquin M. Fuster, 2nd edition 1989, New York: Raven Press, p74.

141 *The Neurobiology of Memory,* Yadin Dudai, Oxford University Press 1989, p263.

for the experiment, which the subject has little difficulty in following, create a simple habit routine for performing the sorting according to the first learned category. But when the category is changed, the habit routine developed for the experiment remains fixed, its alteration by new working memory parameters is difficult if not impossible. Most prefrontal patients with dorsolateral damage have great difficulty in this test, but Elliot, whose damage was limited to ventromedial areas, passed it with flying colors.

Now the evidence concerning prefrontal damage and its interpretation using my model takes on some additional relevance in consideration of the following experimental findings: In a series of experiments using PET brain scan techniques to observe subjects in altered states of consciousness brought about by psychedelics, the primary effect noted was a significant increase in the activity of the frontal cortices.[142] This result, in combination with Aghajanian's findings of greatly increased locus coeruleus activity caused by psychedelic drugs, lends my interpretation some credibility. Under the influence of psychedelic drugs, the cognitive functions of working memory and habit routine search, salience detection and emotional value detection are all working overtime, and they all are facilitated by the prefrontal cortices. Whether this is all mere coincidence, or an indication that pieces of a very intricate puzzle are falling into place only time and further research will tell.

A vast quantity of experimental evidence awaits the organizing ability of some yet-to-be-discovered overall model of brain function. In reading the many papers dealing with just the prefrontal cortex in the recently published *The Cognitive Neurosciences*[143] for example, one is immediately impressed with both the wealth of experimental information available and the corresponding wealth of models, terminologies, and hypotheses which attempt to organize this information. But such a cornucopia of viewpoints must certainly be a sign that we modelers are very much like the collection of blind men describing the elephant from the feel of merely local areas of the overall beast. Who will be the *vision*ary to discover the viewpoint from which all these models and observations become a united whole? I certainly cannot pretend that the cognitive and neurological models I have presented here fulfill that function. On the contrary, I have made a great many guesses, many of them quite wild, based on my very fragmentary and self-taught survey of cognitive neuroscience. I would be the first to admit the highly speculative nature of the above neurological model that I have presented, and would not be surprised nor indignant if it were said that the area that I was describing was not even part of the elephant!

In my view, the only claim for consideration of my ideas stems from their origin in the attempt to explain the body of evidence that has accumulated concerning the psychedelic experience, evidence which has been almost entirely disregarded by the mainstream of science for nearly thirty years. Had it not been for such neglect, which in part was forced by an idiotic international effort to fight an unwinnable, self-defeating and therefore irrational "war on drugs", it seems to me that several fields of study of human psychology and neuroscience would have by now achieved far greater insight than is the case.

But we can blame not only the drug warriors, the politicians and intelligence organizations, the religious moralizers and puritanical oafs for this ignorance:

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142 F. X. Vollenweider and colleagues in recent papers summarized in "Evidence for a cortical-subcortical imbalance of sensory information processing during altered states of consciousness using positron emission tomography and [^{18}F]fluorodeoxyglucose" in *50 Years of LSD, op. cit.,* pp67-86.

143 Michael S. Gazzaniga, editor, *The Cognitive Neurosciences,* 1995 The MIT Press.

scientists too are to blame, perhaps equally so. It was easy for me, from the outside of the scientific establishment, to see that one of the most important discoveries ever made by Western science was being ignored, even vilified. But from the inside of that scientific enterprise, it was apparently no easier to see what was happening than it was for those inside the traps of religious fanaticism or the carefully cultivated paranoia which is the paradigm for institutions providing much of the raw material for the politicians: the intelligence organizations.

Scientists, at least outside the realm of their own specialties, sometimes seem as prone to narrow-mindedness as are other intelligent yet confused human beings. It seems to be almost instinctual that men follow such narrow pathways through life, and the habit-routine model is certainly also an attempt to show how such narrowness might actually be derived from an inherent, evolutionary-mandated neurological feature of the human organism, rather than something which we must label instinctual for want of a better understanding. The functioning of our nervous systems utilizing the habit routine system might be taken as a convenient excuse for the current deplorable state of civilization, this “century of holocaust,” but now that I have laid bare the roots of the situation, it is a lame excuse at best. In the next chapters I will explore the idea that this inherent neurological and cognitive feature has been an essential (yet now for man a skeuomorphic or vestigial) characteristic in the stages of evolution not only of man, but of all animal life.

7. Deminers Clear a Path

One saturday night, after growing bored with a party, I descended onto a New York City street not far from the Bowery to find myself in the middle of a most unexpected confrontation. At the party I had taken, along with a friend, a very small dose of LSD, very small indeed, for such a milieu is not the place for ultimate explorations. I certainly felt in complete control, the actual power of the dose seemed quite minimal, it had merely added an unusual edge to the antics of the saturday-night-fever of the private discotheque, yet, as soon as I hit the street, I was in the midst of a titanic battle for survival. Once before, while walking a New York City street under psychedelic influence, I had seen in ultimate starkness the meaning of poverty and destitution: an unconscious, horribly dirty and frayed old man passed out in the gutter, his head resting against the tire of....an immaculate Rolls Royce. Despite the intimate contact, how wide the gulf between! In a normal night out on the town, such sights are quickly put out of mind with one unconscious excuse or another, a refusal to see significance in all its horror and glory, a significance which cannot, however, be ignored in the psychedelic state. The habits allowing willful ignorance are simply no longer available.

On this post-party Saturday night I was about to confront, not only an in-depth understanding of such poverty, but to experiment with actions concerning the things that must, or must not be done in such situations. As usual, in the psychedelic state, synchronicities occurred at a disturbingly frequent pace. No sooner was I on the street, than the whole flavor of the party had metamorphosed into a radically opposite vista. Upstairs the youth of the city were revelling, down here the dregs of humanity were biding their time, listlessly meandering around a hell in which they had been imprisoned through the very same process that produced the upstairs revelry. And here I was, fresh from the celebrations and inebriations of the above, and dressed appropriately, in the midst of someting which could *not* be ignored. What should I do? Record the scene for posterity, pick up my car at the corner garage and off to a warm home? If one could cast a spell and have all these abject human tragedies suddenly transported to....the upstairs party? no... their former lives for a second chance? perhaps... the afterlife? What interference here, even theoretical, would make sense? Just what *could* be done, given the power to do it? Perhaps a token gesture to just one person: let me give some money to one of them.

“Hi, I just got out of this party upstairs, and had such a good time that it saddens me to see that you have been down here like *this...* Here, let me give you some bread...” How phony it sounds, how can one even *say* the honest and true in such a situation?

After a suspicious but tired glance, a shrug of acceptance from my chosen token destitute. But... oh, blast!, I’ve got just about *zero* cash on me! I left my wallet hidden in a secret compartment in my car, not wanting to carouse with it at the party! My hand in my pocket, grasping something that feels like a couple of pennies and maybe a nickel, is part of a most punishing synchronicity. My new-found friend, not much more surprised by this development than my original offer, looks at the eight cents in my extended palm and says,

“No, man, keep your money, I don’t need it,” and trudges off down the street to my pitiful attempts at explanation and apology. Even if I could see my attempted gift as an action designed more to assuage my own sorrow at the

scene I was witnessing than produce a meaningful change from across the gulf which separated upstairs from the street, the intervention of fate, depriving me of the wherewithall to accomplish my impulsive initiative goaded me on to yet a further attempt. Just *how does* one accomplish giving when there is not even a request at hand? If I had had a hundred-dollar bill in my pocket and at that moment someone had *asked* for a handout, I would not have hesitated. But here the street was *full* of derelicts, none of them asking the least thing except to be left alone. Just how does one *give* under such circumstances?

At this stage in an experience turned object-lesson, long experience with the psychedelic state had taught me more than once that events can easily ensnare one into a vicious cycle of error. A hard lesson is often not seen at its first exposition and, like the smack on the head with the Zen master's cane, needs sometimes to be a bit painful to sink in. The psychedelic experience itself has such a feedback, the very thing which renders it so potent: The original effect of the drug, as my theory here surmises, a simple increase in the gain of the salience-detection system of the brain, is certainly insufficient to explain the multitude of psychedelic "effects" that can follow. But at the behest of this simple original effect, our cognitive systems go wild: the feedback by which we create custom habit routines for ongoing perception and thinking, in which heightened significance is a factor, then leads to preparedness and expectation of further unusual significance, and when it is found (more often than not!), a further cycle, and yet a further cycle can produce astonishing results. A short review of chapter 3 and figure 1 should refresh the reader's memory as to the mechanism of this feedback process.

Due to the possibility of such rapid, almost catastrophic augmentation of situation which becomes possible in psychedelic experience, I had always followed a simple rule: no matter what one observes and no matter what seeming conclusions one arrives at in the process, *take no irreversible action.* Waiting, if necessary until the reflection of the next few hours or even days has added its wisdom, is not only a safe policy, but in the end the wisest. If events, and their interpretation, build up to an intolerable crescendo, one must remember the rule. Be, above all, the observer of events, including the event of oneself, but take no action whose consequences might in some way be final.

In spite of my rule I was nevertheless compelled to try once again: a not very old but extremely tired-looking gent in western attire, cowboy boots and all, whose every surface seemed worn, frayed, stained, or otherwise used to the limit, was lying on the sidewalk, somehow impossible to ignore.

"Hey man, com'on, it's cold in the street, here, lemme help you up and I'll take you to my hotel room. I've already paid for it and I'm not going to use it since I've decided to drive back home tonight." Again the sound of profound artificiality, my renewed attempt already has taken its inevitable direction, too late to obey the number one rule, here I am enmeshed again in a scene I *know* will knock me down a few pegs.

After some lethargy, my new friend "Tex" is up and about, but not much interested in my offer, rather preferring a drinking buddy to make the rounds with until the next flop in the gutter. Nevertheless, having made the offer, and after fate had played such a mean trick on my last attempt, I try this time to follow through. We amble off toward the parking garage, talking about good old times in Colorado.

The scene at the garage is positively infernal. The two of us, as upstairs-downstairs as archetypes from another dimension, confront the late-night philosophy of the Houston Street all-night-service automotive one-stop emporium, manned by a small crew of African Gods whose unassailable wisdom shall not let pass the least pretence or trickery. Out there by the pumps, many complex conversations begin to take place, and while waiting for the delivery of my chariot I notice from the corner of my eye that Tex and a

few of the regulars seem to be discussing my plight. My car appears from the bowels of the garage and I quickly drive off, alone, to contemplate the lessons of the evening.

Holoperception

The reader may wonder why, in the last chapter, I have ventured so far into Pribram's holonomic brain theory when it might be thought unnecessary to explain psychedelic experience in terms of salience detection. And not only have I “ventured”, but have extended the ideas, proposing for example that many, if not all brain systems generate holoprojections, and that these entities are superimposed, automatically, dynamically, and their total composite superimposed entity may be thought of as identical with consciousness. I then continued with an attempt to explain some cognitive phenomena documented recently by writers in their articles and books on consciousness.

Holoprojections, I would readily admit, may in an *experimental* sense be purely “mathematical”, virtual, and so we may never be able to “isolate” one and bring it up on a computer screen to see what it looks like. Representation of the Fourier transform coefficients may nevertheless actually exist in Pribram's dendritic fine structure, or perhaps the microtubules, but it may well be a practical impossibility to measure or detect them in real time, and with some experimental device use them to produce a holoprojection as one may view a hologram, for instance. The brain itself might be the sole “experimental instrument” that can produce a holoprojection. And to be truly correct: the *person, using his brain,* may be that instrument. An anology might be drawn to optical holograms: the photographic plate on which are recorded the result of the interference patterns would be the equivalent of the pattern of Fourier coefficients somehow resident in the fine structure, and the brain's electro-chemical processes analogous to the coherent light necessary to project the optical hologram. Just as the photographic plate makes no sense without the coherent light illuminating it, the coefficients in the fine structure make no sense without the brain's processes that produce the composite holoprojection.

The holoprojection model may therefore not be experimentally verifiable—nor falsifiable, for that matter—yet nevertheless still provide a useful way to envision what is going on. Indeed, it was by thinking of salience detection as a holoprojection that I proposed the existence of a brain system, the recently confirmed *Salience Network,* that would automatically bring to the fore of consciousness some event, exterior and sensory, or interiorly involved with Thinking2 processes. Indeed, an exteriorly perceived salient entity is forced into consciousness in a way that actually *seems* like it would be a superimposed hologram. One's attention is drawn to it as if it were being illuminated with Hollywood-strength limelight projectors. At a minimum, research in cognitive neuroscience could possibly profit from keeping in mind the holonomic paradigm simply as an heuristic tool.

For me, the point that is necessary to understand is that a global theory, even a very conjectural one, may well be a necessary starting point to guide research, given the enormous complexity of the human brain/mind. If we start rather with some receptor, some signalling pathway and its neurotransmitter, some proposed cognitive manifestation, or any of the individual small-scale brain/mind details, and attempt to assemble all these studies of “parts” to arrive finally at a global comprehension, it would be like a 19th Century electric researcher suddenly and mysteriously receiving an LED flatscreen TV in his lab, and without even knowing that the screen could light up, disassembling the thing in a quest to understand what it does and how it does it *solely on the basis of the nature of its parts*. And even some of the parts would remain a complete mystery. Sure, he'd know what the capacitors do, the

resistors, but not a chance he could deduce the least thing about a “chip” - a tiny black plastic square with 64+ even tinier leads projecting from it. Thus trying to find the Fourier coefficients in Pribram's fine structure might similarly be way beyond our technology, and comprehension, yet the model still be quite useful for understanding, predicting, and guiding research.

Data about our brain/mind “parts” seems to be increasing exponentially, and far out of proportion to our ability to assemble it into a whole. When I was first working on these ideas in the 1990s, it still seemed that the entire dataset could be comprehended globally, and was surely converging on a general theory. No longer. I will not even attempt to invent an updated (from the last chapter) detailed neuro-cognitive account of what a psychedelic drug does from passage into the brain to final outcome. As David Nichols recently wrote,

> We recognize today that serotonin is involved in a number of behaviors, including perception, appetite, sex, sleep, and cognition, among many others. Although it is known that the serotonin system is crucial for these actions, none of them are well understood even today, and because of the complexity of the brain it will be a long time before the exact mechanisms of control and modulation by serotonin there are really understood.[144]

And here we are considering merely the role of serotonin in the brain, and not any of the much larger questions posed by the psychedelic experience.

Coherence

Yet all parts of the theory of psychedelic experience must mesh, as I said much earlier. And the psychedelic experience is surely the most important phenomenon in the history of the planet![145] So I still feel, even more so, that salience detection amplification is the underlying cognitive effect leading to *all* further events of a psychedelic experience, and also to an understanding of all transcendence, ego-dissolution, reality perception, *et al.* that can result from a cornucopia of methods, as previously stated. And that the idea meshes superbly with many other findings and suspicions about ASCs in general, and psychedelic experience in particular. At the same time I sense that a complete explanation of just how salience detection is accomplished at the level of brain systems may well be receding into the distance, and that we may never come to a clear “neuro-mechanical” understanding of these complexities.

I'd like to mention now some very recent work that appears to be converging on my own, and I have as a result a bit of déjà vu from my after-the-fact discovery of the work that had been done with schema theory. The history of science has often chronicled the observation that when good ideas appear, they seem to appear to at least two or three people simultaneously. (Maybe bad ideas can be detected when nobody else seems to be having them?!)

A paper from March 2018 opens:

> Past research has demonstrated to the ability of psychedelics to enhance suggestibility, and pointed to their ability to amplify perception of meaning. This paper examines the existing evidence for the meaning-enhancing properties of psychedelics, and argues that the tendency of these agents to enhance the perception of significance offers valuable clues to explaining their reported ability to stimulate a variety of therapeutic processes, enhance creativity, and instigate mystical-type

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144 *MAPS Bulletin Special Edition*, Vol. 23, No. 1, p20-23 Available at the MAPS website https://www.maps.org/news-letters/v23n1/v23n1_p20-23.pdf

145 A statement designed to elicit guffaws, but as the next chapters will show, is quite reasonable.

> experiences... In this paper I wish to argue for the importance of another often overlooked mediator of psychedelic action, which is fundamental to understanding the effects of psychedelics in therapy, creativity, and spirituality. I am referring to the remarkable tendency of these agents to enhance the perception of meaning, or, in other words, to cause things to appear dramatically more meaningful than they would otherwise seem to be.[146]

My own view is of course that we are not considering a *mediator* of psychedelic action, but the *essential effect* of psychedelic action. The author goes on to cite the same passage as I have from Huxley's *Doors of Perception,* and provides a few references in which authors have mentioned meaning-enhancing properties of psychedelics. Yet, "...it has so far not been the focus of any deliberate and sustained line of inquiry." Let's hope that changes.

Somewhat regrettably, Hartogsohn seems obliged to ask,

> Finally, considering the utility of psychedelics for the enhancement of sense meaning, certain metaphysical questions might enter the discussion. Namely, is it ethically acceptable to artificially bolster the meaning of experiences and relationships? Some might argue that the ability of psychedelics to amplify meaning beyond its normal dimensions turns them into nothing else than mental illusogens that create only illusions of profoundness. When drugs cause their users to find more meaning in their experiences and relationships than ordinary circumstances allow, might this represent an insidious form of self-deception?

Hartogsohn shows the concern to be flawed, but not for the most obvious reason that we are dealing with the *same* experience that mankind all down through the ages has sought in a multitude of ways. If one way to "meaning enhancement" is illusion and self-deception, so are they all even if some involve trying much harder to succeed. If LSD can provide a streamlined, and actually less arduous and risky way to the destination, and that is considered by purists to be "artificial" and thus to be avoided, then we must also argue that telescopes should similarly not be used in celestial observation, and that we should be sceptical of electric toasters when the purists insist that *real* toast can only be made by manually rotating your loaf over an open-hearth fire, etc. Do not *all* advances in science, medicine and technology make something easier to obtain, more accessible to more people, etc.?

I would also suggest that when Hartogsohn uses the word "meaning" as in the proposed effect of "meaning-enhancing properties of psychedelics", he (and other authors cited) should instead be using "salience". One might think the two words could be used interchangeably, but "meaning" usually implies a definition or categorization of something, a further something to be described, as in the meaning of a word (a definition), the meaning *of* something. Salience, on the other hand, stands alone and needs no quantifier. (The event was significant, salient, all on its own, not significant *of something*. In view of the recently discovered and described Salience Network as one of several Large-Scale Brain Networks (see the following section), "salience" would also be the more appropriate and "scientific" term.

Networking

In "Large-scale brain networks in cognition: emerging methods and principles" we read:

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146 Ido Hartogsohn: "The Meaning-Enhancing Properties of Psychedelics and Their Mediator Role in Psychedelic Therapy, Spirituality, and Creativity" Front. Neurosci., 06 March 2018 . Mirrored at The Psychedelic Library

> An understanding of how the human brain produces cognition ultimately depends on knowledge of largescale brain organization. Although it has long been assumed that cognitive functions are attributable to the isolated operations of single brain areas, we demonstrate that the weight of evidence has now shifted in support of the view that cognition results from the dynamic interactions of distributed brain areas operating in large-scale networks.... Much of our current knowledge of cognitive brain function has come from the modular paradigm, in which brain areas are postulated to act as independent processors for specific complex cognitive functions. Accumulating evidence suggests that this paradigm has serious limitations and might in fact be misleading. Even the functions of primary sensory areas of the cerebral cortex, once thought to be pinnacles of modularity, are being redefined by recent evidence of cross-modal interactions. A new paradigm is emerging in cognitive neuroscience that moves beyond the simplistic mapping of cognitive constructs onto individual brain areas and emphasizes instead the conjoint function of brain areas working together as large-scale networks.[147]

First of all, the constant quibble: *The human BRAIN does NOT produce cognition!* WE USE our brains to cognize. Period. The mereological fallacy may sometimes be harmless enough, but if we are to advance toward a global theory of human BEINGS being human, it is advisable not to use terminology that might well lead us to asking nonsense questions and collecting ridiculous data. The above quotation is very recent, yet apparently nothing has yet been applied as a result of Bennett and Hacker's critique, published many years ago.[148] Bressler and Menon are hardly alone in their misuse of concepts, however, and here, fortunately, the misuse does not detract from the important points made.

Pribram's Holonomic Brain Theory might well have predicted this paradigm shift away from the modular and toward the *large-scale network* paradigm , if only indirectly. And my extension of the theory into superimposed holoprojections would make “large-scale networks” a mandatory operational characteristic. “Even the functions of primary sensory areas of the cerebral cortex, once thought to be pinnacles of modularity, are being redefined by recent evidence of cross-modal interactions... [C]ognition results from the dynamic interactions of distributed brain areas operating in large-scale networks.” Holoprojections, for as I have argued elsewhere, the serial, sequential, computational model of brain operation (the brain-as-computer paradigm) would simply not be fast enough to accomplish a task such as salience detection in real time, especially now that such a task, and many others of similar complexity, need to be performed over wide areas of the brain between several nodes and layers of multiple brain areas. To suppose that the volume of “data” required to perform such a “calculation” as salience detection is transmitted back and forth between the required brain areas at the speed of the neurons' action potentials is a theory that just does not hunt. Superimposed holoprojections, by contrast, “calculate” the required result all-at-once, dynamically, continuously, with no sequential calculation followed by calculation, and very little time lag. Another problem with the brain-as-computer paradigm[149] is the “sustainability” of a computed result: Take for

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147 Steven L. Bressler and Vinod Menon: “Large-scale brain networks in cognition: emerging methods and principles” Feature Review in *Trends in Cognitive Sciences* 14 (2010) 277-290. The complete article is available in .pdf, mirrored at The Psychedelic Library.

148 *op. cit.,* Bennett and Hacker, *Philosophical Foundations of Neuroscience.* Blackwell, 2003. Excerpts at The Psychedelic Library

149 I have elsewhere called it the “bit-transfer-model”, where the action potential of a neuron is considered a “unit of data” that is sent to the next neuron and then used to “compute” a further result leading to yet another action potential. Even the idea that neurons do

example a very simple neural network of just a few neurons. Inputs arrive, syntactic computation occurs, and the output is merely a summed impulse or series of impulses. But then where is the computed entity? It is merely instantaneous, and useable only as an ongoing serial input to another network. It cannot be sustained. Conscious experience, if it is to accord with the model, would then require an additional process to combine all aspects to be experienced in consciousness and project or sustain it since our consciousness most certainly exhibits such sustained properties. The holoprojection model requires no such end-stage projection or sustainment because "computations" are not carried out serially and syntactically but holonomically, all-at-once, and automatically sustained as the superimposition of component holoprojections of the entire ongoing holoprojection that is either identical with consciousness.

Wide-Angle View

Starting from the top down, then, a brief overview of psychedelic action: a psychedelic experience "turns up the gain" on the brain system that "I" use to detect something important that is happening, either externally or in my stream of thought. The detection is based on sensory perception, my lifetime of experience, on my ability to assess a situation and what I might (need) to do or think about it, on my stream of thought previous to the detection. I seize upon this important something to enrich my current stream of thought and my interpretation of the external, and soon enough the process is essentially running away with itself. My habit routines become more and more suspect, and dismissed, and I procede to detect more and more of "pure reality".

As I mentioned, one of the recently detected "large-scale" networks of the brain is the *Salience Network,*[150] the research of the past ten years or so nicely meshing with my own thoughts on the matter, proposed in in the mid-1990s in the original chapter 6 of this book, and updated in my presentation at the Basel Symposium in 2006. (See the series of illustrations I used to accompany my talk at The Psychedelic Library) It has been the development of functional magnetic resonance imaging that has made possible the detection and description of the SN (salience network), as well as a great wealth of other findings about brain and cognition. I would like to quote a few lines from the recent and monumental 3-volume publication, *Brainmapping: An Encyclopedic Reference* to clarify the characteristics of the SN:

> The SN is an intrinsically connected large-scale network anchored in the anterior insula (AI) and dorsal anterior cingulate cortex (dACC). The SN also includes three key subcortical structures: the amygdala, the ventral striatum, and the substantia nigra/ventral tegmental area...The nervous system dynamically selects specific stimuli for additional processing from a constant stream of incoming sensory inputs. Saliency detection mechanisms in the brain are at the core of this process and can be conceptualized into two general mechanisms. The first is a fast, automatic, bottom-up 'primitive' mechanism for filtering stimuli based on their perceptual features... At each level, salience filters enhance responses to stimuli that are infrequent in space or time or are of learned or instinctive biological importance... The second is a higher-order system for competitive, context-specific, stimulus selection and for focusing the 'spotlight of attention' and enhancing access to resources needed for goal-directed behavior. The large-scale network described here is a core brain system that implements this latter process... Within the context of the SN,

"computations" is problematic. As John Searle pointed out, "Computation does not name a physical process in nature like photosynthesis or digestion. Any physical process is computational only relative to an interpretation. This is a deep point."

150 A brief overview at Wikipedia, mirrored at The Psychedelic Library

> events that are likely to be perceived as salient include deviants embedded in a constant stream, surprising stimuli, and stimuli that are pleasurable and rewarding, self-relevant, or emotionally engaging.[151]

Reading again the excerpt from Huxley's *The Doors of Perception,* it is not difficult to see what he is accomplishing with his psychedelically-augmented SN, that his entire psychedelic experience is dependent on a radically-increased use of his SN. But so far, I have not seen in the research any mention of how the SN is controlled, how it maintains its ordinary everyday operation where most events and thoughts are overwhelmingly deemed hum-drum, of little consequence, and how the gain of the SN might be radically increased so that one's very existence may be perceived for the miracle that it in reality is.

Perhaps my surmise that the raphe nuclei / locus coeruleus system of the brain stem is involved, as described previously. There is no mention in recent research of any participation of raphe/LC in the SN but I am hoping that might happen eventually. As I understand it, so far the SN "is most readily identified using intrinsic functional connectivity analysis of fMRI data acquired *when a subject is at rest* (i.e., not performing any specific task). This analysis overcomes a limitation of task-based brain imaging data, in which the SN has been difficult to disentangle from other neurocognitive networks..." [152]

It may therefore remain to be discovered what the SN looks like in high-gain mode, influenced by psychedelic experience for example, and what its gain-controlling brain parts might be. It seems obvious that the SN must be able to operate at various levels of intensity, efficiency, according to the activities, pursuits and intentions of its owner. It remains experimentally verified that the locus coeruleus becomes highly activated with the occurrence of novel and salient events, and that the locus coeruleus appears to be closely controlled by the raphe nuclei.[153] It would be surprising if the locus coeruleus activation and the SN were *not* associated, apparently performing the same function but independently. And considering that the psychedelic experience depends on the serotonin 5-HT2a receptors totally: blocking these receptors prevents the psychedelic experience completely. There are abundant collections of 5-HT2a receptors on the locus coeruleus, the entire neocortex, the insula, and the function of the raphe nuclei in multiple control and moderating functions throughout the body would seem to leave wide open the idea that control of the SN is also similarly implicated.

A note of caution for future interpretations of brain-scan data: the observed participation of raphe/LC nodes in salience detection may not be as expected since "LSD and other indoleamine hallucinogens...have potent, direct *inhibitory* effects upon serotonergic neurons located in the raphe nuclei of the brainstem." (italics added)[154] Perhaps we will therefore not see these small areas "lighting up" in fMRI scans looking for SN activation. We may rather see the opposite.

In summary then: The psychedelics easily and dependably release the salience detection network (SN) from normal control, a control which is in the great majority of individuals one of excessive repression of the salience of everyday events, a mode of operation related to evolutionary constraints built

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151 Menon V. (2015) Salience Network. In: Arthur W. Toga, editor. *Brain Mapping: An Encyclopedic Reference*, vol. 2, p. 597. Academic Press: Elsevier. Available in .pdf

152 *ibid.,* p.597-8

153 M. Segal: Serotonergic innervation of the locus coeruleus from the dorsal raphe and its action on responses to noxious stimuli. *The Journal of Physiology* Volume 286, Issue 1, January 1979

154 *op. cit., 50 Years of LSD,* p27.

into us.[155] When the salience detection network is thus freed, our habit routines all start to become questionable rather than uncritically, unconsciously and almost universally accepted and acted upon. Our habits of thinking and perception are suspended, no longer satisfactory for ongoing existence. I rest my case. Let the fMRI scans begin!

155 See the next chapter.

8. Early Man

The following section is an updated and expanded version of my chapter in *The Dream on the Rock,* co-authored with my friend Fulvio Gosso, a book mentioned here in the section "Introductory Remarks." In the last chapter of *Dream* I gathered together evidence that could support my contention that culturally modern humankind[156] had been awakened from a long cognitive sleep by the sudden discovery of the use of a psychoactive preparation of some sort. I also attempted to provide a possible time-line for such an event. Since writing for *The Dream*, however, further studies have come to light that need be mentioned. Most importantly, it has become even more obvious that the début of modern humans should actually be thought of as two quite different happenings: the appearance of *anatomically-modern* humans[157] and the (necessarily later) appearance of culturally or *cognitively-modern* humans, for as I shall claim, the two events are radically different, and widely spaced in time. We shall see that at least two or three professional anthropologists have also made this division, but without entirely realizing its significance.

The separateness of these two events became even more clear to me when I recently read of evidence pushing back the appearance of "modern man" from *ca.* 90,000 to between 260,000 and 350,000 years ago. The findings were reported in two recent articles from the online science magazine *Cosmos*[158] that summarize the original research published in *Science.*[159] While the date of the appearance of *anatomically-modern* humans is certainly subject to the evidence that has been gleaned from DNA analysis and fossil finds, the advent of psychedelically-awakened, *cognitively-modern* humans at a much later date would probably have left behind little obvious direct evidence, DNA nor fossil. Evidence of the existence of the beginnings of modern culture would be the most difficult to uncover and classify. Attempting to define a scenario and time-line for that happening is therefore no easy task, and any tentative hypothesis subject to serious falsification as further new research appears. My original scenario has suffered from the effect.

Since most of the characteristics that have defined early but culturally modern humans have been attributed to the past 10-70 thousand years, the further back the date for the appearance of anatomically-modern humans is pushed by new research findings, the more the question becomes important: Why the long delay? If we were physically (and neurologically) capable of doing all the things we moderns can do, why did we spend as much as 300,000 years in complete stasis? And then, what might have been the catalyst that suddenly changed us cognitively and psychologically?

The following paragraphs then, will include excerpts from *The Dream on the Rock,* some additional material that I decided not to include there since it

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156 Culturally-modern, cognitively-modern, psychologically-modern... all three terms seem to describe in slightly different ways the change from a merely anatomically-modern Early Man.

157 The term "anatomically-modern" has also recently been under careful analysis, and the divide between anatomically- and cognitively-modern man become increasingly blurred, see Stringer, Chris: "The origin and evolution of *Homo sapiens*," *Philosophical Transactions of the Royal Society B,* 13 June 2016.

158 *Cosmos*, see also *Cosmos 2*

159 Southern African ancient genomes estimate modern human divergence to 350,000 to 260,000 years ago." *Science*

referred back to earlier chapters here, and new findings that necessarily alter the possible scenario for such an awakening. My original timeline and evidence that seemed to support it will be presented in an abbreviated form, and then criticised and/or altered to reflect new possibilites. Naturally, due to the great uncertainties about the very fragmentary data available, *any* suggested time-line or scenario is highly subject to error, but the core reasons why we should continue to suspect a *psychedelic awakening* remain the same. Many of those reasons tie in closely with the theory of psychedelic experience as presented here in previous chapters.

The Most Human Universal

The search for evidence that human tribes and societies throughout global history have used psychoactive plants for religious, shamanic, philosophical and medical purposes has met with great success. Publications citing such evidence come from an entire spectrum, from drug-use oriented screeds to the most conservative of scientific journals. The ultra-respectable Scientific American Library Series counts among its handsome and lavishly illustrated volumes its *Plants, People, and Culture — The Science of Ethnobotany*, and devotes an entire chapter to plants that have been used for "Entering the Other World". A world map shows clearly just how universal psychoactive plant use has been, the historical locations of use of a dozen of the major plant species being shown across the globe.[160]

The science of anthropology has not always been at the forefront of such research however, and still today some of the reigning convictions of the discipline reveal a willful ignorance of the importance of psychoactive use in the evolution of human societies. Many specific examples could be cited, but one general, and paradigmatic situation concerns us here: the still-ongoing 'nature vs. nurture' debate that has allowed anthropologists to ignore psychoactive plant use as a mere curiosity, or worse, as a perversion or degeneration of a supposed original "drug-free" shamanism.[161]

Anthropological viewpoints of the 20th Century have vacillated between nature and nurture as the prime cause of human behaviour: whether it is culture or genetic inheritance that influences behaviour the most strongly. In some professional circles the proponents of "cultural relativism" had slowly gained ground to the point of flatly denying that anything like a universal human nature need be considered important for theories of human behaviour.

And then there arrived on the scene a revolutionary little book entitled *Human Universals*. Its author, the anthropologist Donald E. Brown, argues that not only do universals exist, but "are important to any broad conception of the task of anthropology." Brown immediately takes the offensive to explain how anthropology had taken a wrong turn:

> ...the study of universals has been effectively tabooed as an unintended consequence of assumptions that have predominated in anthropology (and other social sciences) throughout much of this century. From 1915 to 1934 American anthropologists established three fundamental principles about the nature of culture: that culture is a distinct kind of phenomenon that cannot be reduced to others (in particular, not to biology or psychology), that culture (rather than our physical nature) is the fundamental determinant of human behavior, and that culture is largely arbitrary. This combination of assumptions made universals anomalous and very likely to be rare; to admit or dwell upon their existence raised

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160 Image scanned from *Plants, People, and Culture,* Scientific American Library 1996, pp.156-157.

161 *Shamanism, Archaic Techniques of Ecstasy*, Mircea Eliade, Princeton University Press 1951, 1972 p417.

> troubling questions about anthropology's fundamental assumptions. These assumptions also led many anthropologists to conclude or argue that anthropology should be narrowed from the study of humanity to the study of culture.[162]

While the final definition of a human universal may still be in a state of flux, Brown provides us with sufficient guidelines in his book so that we may apply the concept to our present endeavor. An important point is that although a human universal may have its roots in human biology, it is above all social and cultural in nature, and not merely trivial and physiological as some had claimed. Brown's published list of universals is a thought-provoking list indeed, and includes a wide range of human behavioral characteristics. Some seem to be inherent in human nature and biology, while others are "cultural conventions that have come to have universal distribution." Of particular interest for us here is this one: "Mood- or consciousness-altering techniques and/or substances." Here, I shall claim that this is one of the most important, perhaps *the most important* and the very first of all human universals.[163]

I would like to alter the definition of the universal a bit, however, to designate what must be its fundamental: it must be that the seeking of altered states of consciousness (ASCs) is the universal, and methods to do so subsidiary to the seeking. The methods themselves may or may not be quite so universal, since they can be quite varied in time and place. Certain societies have—and others we don't know about may have—forgone or proscribed the use of psychoactive substances for various reasons, and/or enforced alternatives for substance use. Nevertheless, humans have universally sought the transcendence of ASCs and experimented with every conceivable way to attain them. The use of psychoactives must remain at least a near-universal, however, since it is such a supremely effective way to alter consciousness. And psychoactive use might well have approached complete universality in the most ancient of societies where cultural organization was still in its early stages: in such early tribes and societies well-organised and often powerful priesthoods, the most likely source of psychoactive proscription or the imposition of substitute and even bogus methods for consciousness alteration, did not yet exist. Rudimentary shamanism must have been the norm for Early Man, and given the near-universal prevalence of psychoactive use in the shamanic tradition even today, it would be difficult to maintain that this does not reflect a universal practice for Early Man.

Donald Brown's establishment of the importance of human universals for anthropology logically extends into the realm of paleo-anthropology, and supports the idea that human universals in general, and psychoactive plant use in particular, must go back to the very beginnings of human existence. The question naturally arises, then, whether—or more importantly how—the use of psychoactive plants might have played a role in the sudden appearance of cognitively-modern humans some time between 40Ka and 90Ka (thousand years ago). There really are only three hypotheses to consider: psychoactive use 1) played no role whatsoever, 2) accompanied and perhaps assisted human emergence, and 3) was *necessary* for the evolution of cognitively-modern humankind. The first hypothesis seems highly unlikely given the available evidence, and will probably only be adopted by those harboring a prejudicial anti-drug bias. It need not be considered here.

There exists an important precedent for thinking that the seeking of ASC's is

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162 Brown, Donald E., 1991, *Human Universals*, Temple University Press, p.6

163 Other researchers too have expressed similar views, see for example, Weil, Andrew: *The Natural Mind,* Houghton Mifflin Company, Boston 1972: "...the desire to alter consciousness periodically is an innate, normal drive analogous to hunger or the sexual drive."

a human universal, and that is the intentional psychoactive drug use of a wide range of animals. Georgio Samorini, in his book *Animals and Psychedelics*, presents evidence that,

> ...entirely on their own and without the influence of captivity or conditioning—wild animals, birds, and even insects do indeed drug themselves. This deliberate seeking of inebriation among all classes of animals is a perfectly natural, normative behaviour. Indeed, the pursuit of inebriation has been proposed as a kind of fourth drive—akin to hunger, thirst, and sex, so ubiquitous is its manifestation.[164]

The evidence shows that although animals intoxicating themselves is a feature prevalent, but scattered throughout all levels of the animal world, it is not a universal in any given species or group of species. Yet it is common enough to conclude that it must be indicative of a general instinctive characteristic that humankind's immediate predecessors would very probably have shared with the rest of the animal kingdom. The seeking of ASCs becomes a universal, however, only with the advent of cognitively-modern human existence, and it is my contention that the two phenomena are intimately related. To become a universal in this case it was very probably necessary that complex language had already developed as a means to make psychoactive use more than just an instinctive desire, occasionally and only haphazardly realized, but to bring it into the cultural norms of the first manifestations of shamanism. Anatomically-modern humans had already been on the scene for 200,000 years or more, plenty of time for the evolution of complex language abilities, to be discussed below.

My reasons for making the claims above, that the seeking of ASC's was the very first human universal, will become clear during the remainder of this chapter. I will argue that not only does the universal pervade the earliest of human tribes, but that it was the first human universal, since without this catalyst proto-human social groups would have remained in that pre-cognitively-modern stasis that had already existed in East Africa for 100,000 years or more, and in other areas of Africa for as much as 300,000 years. During this long gestation, our not-yet-fully-human predecessors were physically mature yet psychologically yet-to-be-born. Proto-man had the functionally equivalent physical (and therefore neurological) equipment as we have today, yet his transition to Early Man did not take place for an exceedingly long period of time. Clearly, there must have been a good reason.

What Makyth a Man?

It had long been the accepted wisdom among many scientists, as well as the common mythology of public perception, that the rise of tool-making—*technology*—was an important, if not defining characteristic of the evolutionary process connecting advanced apes to Early Man. A parallel idea was also popular: that tool-making and early technology might have been the force driving the extraordinarily rapid increase in the size of the primate brain, from the first hominids of two or three million years ago with a brain volume of about 400 cubic centimeters, to modern man with a brain volume more than three times this figure.

It now appears that the tool-making hypotheses have resulted less from a careful analysis of the data than from superficial concurrence of two tendencies. Recent work now shows it extremely likely that the ability to produce technology, it has been called object-intelligence for want of a better

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164 Samorini, G., 2002, *Animals and Psychedelics — The Natural World and the Instinct to Alter Consciousness*, Park Street Press (from the foreword by Rob Montgomery). Originally published in Italian under the title *Animali che si drogano* by Telesterion, Vicenza.

term, has been a development that has "piggy-backed" upon a much more important development in intelligence, that which is required for social transaction. A recent collection of the important papers providing the foundation for the theory of Machiavellian Intelligence has been published as a book,[165] and one quotation should suffice to illustrate that even anthropologists such as Thomas Wynn, who might be surmised to have a vested interest in the importance of tool-use and making in the development of early hominids, has whole-heartedly agreed with the new view:

> Given the evidence of brain evolution and the archaeological evidence of technological evolution, I think it fair to eliminate from consideration the simple scenario in which ability to make better and better tools selected for human intelligence. At almost no point in hominid evolution was there even a provocative correlation. The earliest known hominids, Australopithecus afarensis, had a brain larger than an ape's of equivalent size, but as far as we know, no greater reliance on tools. Early Homo at 2 Ma [million years ago] had a much more 'encephalized' brain, but the tools and even the context of use were not beyond the capacity of modern apes. Homo erectus did possess technology that was outside the range of ape behaviour, but by this time, 1.5 Ma, much of the encephalization of the Homo line had already occurred. In sum, most of the evolution of the human brain, the presumed anatomy of intelligence, had occurred prior to any evidence for technological sophistication and, as a consequence, it appears unlikely that technology itself played a central role in the evolution of this impressive human ability.[166]

As one of the contributors to the book remarked, Wynn's paper "is a bombshell to the older 'Tools makyth Man' view... Wynn throws the question of the cause of human brain size back into the realm of the invisible: either the social relationships or the lifestyle which produced technology, not the technology itself."[167]

The conclusions of the Machiavellian Intelligence hypothesis provide a key to the most probable evolutionary scenario for the influence of psychoactive plants in the emergence of modern humans. The arguments of the hypothesis show that the complexity of cognitive operations required for social interaction in large groups of individuals is far greater than that required for tool use or making, or for that matter any other activity of primate species.[168] Studies of societies of monkeys and apes in both natural and controlled environments strongly support the theoretical arguments. The brain size of various species of modern primates, for example, has been closely correlated with the size and complexity of the social groups of the various species studied.[169] The complexity of social interaction would increase geometrically with the number of possible interrelations between animals in a group consisting of three or more generations of relatively long-lived individuals. Dominance relationships, alliances, group undertakings such as efficient foraging and hunting, lengthy childhood, and relatively constant possibility of mating activity adding to the complexity. The demands of increasing social

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165 Byrne, Richard W. and Whiten, Andrew, 1988, *Machiavellian Intelligence*, Clarendon Press, Oxford University Press

166 *ibid*., chapter 20, Wynn, T., "Tools and the evolution of human intelligence," p 283

167 *ibid*., chapter 25, Jolly, A., "The Evolution of Purpose" pp373-4.

168 See for example the paper by Daniel C. Dennett, "The intentional stance in theory and practice" for an appreciation of the "levels of intentionality" necessary and implicit in social interaction, *Machiavellian Intelligence, op. cit.*, chapter 14, pp180-202.

169 See "Social Network Size Linked to Brain Size", *Scientific American,* August 7, 2012. At least one other recent study has tried to cast doubt upon the findings, but the theory seems well consolidated to me.

complexity was a development requiring far faster biological evolution of the equipment which facilitated it than any previous set of demands such as tool use and manufacture, climate change, interactions with other species, or other hypothesized evolutionary pressures. Thus it is reasonable that the rapid increase in brain size among primates requires no other explanation, despite its unprecedented speed. The social transaction conclusions of the Machiavellian Intelligence hypothesis show how an advanced ape evolved to the point of having the required physical equipment to become artists, philosophers, musicians, and scientists, but as we see, proto-man, even with all this modern equipment, remained in a pre-human stasis for an extremely long period, changing little if any during the entire time. A further influence, sudden and catalytic, was necessary.

Evolutionary Theories

There has been some debate and commentary on the internet as to whether Terence McKenna's "theory" that psychoactives had an influence on human evolution was actually a serious proposal.[170] I had discussed the idea with him in an exchange of letters before publication of his book, but it seemed to me even then that his proposed scenario was more a TM-typical gee-whiz New-Age provocation than an evidence-supported theory. Firstly, he put the critical influence of psychoactives in a far-too-distant time frame when primates must have had little or no complex language. In addition, his proposals that psychedelics were "mutation-causing" agents that "directly influenced the rapid reorganization of the brain's information-processing capacities" seemed to me conceptually flawed and totally unsupported by evidence. The Machiavellian Intelligence hypothesis had not yet been published, however, nor had the genetic research that showed the ancestry of the entire human race to be very recent, and it was these two developments which provided me with a more realistic time-frame and psychological mechanism to support my own "psychedelic awakening" scenario.

Before presenting a possible evolutionary scenario however, let me explore further the idea of social complexity and its relation to the habit routine model of normal cognitive operation I have proposed. I state that the power of the habit routine cognitive system would have increased with the increasing complexity of animal species, and would have reached its summit in proto-man. In our proto-ancestors we have a being whose potential intellectual capability extends to inventing mathematics and hypothesizing philosophy, yet for at least 300,000 years, with the functionally-equivalent equipment as we possess today, we did no such thing. Our mental powers for original, creative, analytical thinking which are a natural product of that same intelligence that evolved for social transaction, were held in check by powerful evolutionary forces—except perhaps for use in extreme emergencies after which we would immediately revert to our habit-routine governed existence. The very requirements that brought our high-powered brain into existence—those necessary for complex social interaction—needed to be radically channeled to exclusive, habit-routine governed social use in normal times so that social coherence would be maintained, so that individuals in a social group used their powers in the established interests of the group, and so that group selection would further advance the evolution of advanced hominids. According to authors Elliot Sober and David Sloan Wilson, this was the essential situation for the evolution of unselfish or altruistic behavior.[171]

The Machiavellian Intelligence hypothesis and its proposed increasing

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170 McKenna, T., 1992, *Food of the Gods*, Bantam Books, New York

171 *Unto Others: The Evolution and Psychology of Unselfish Behavior,* Elliott Sober & David Sloan Wilson, Harvard University Press, 1998.

social complexity fits perfectly with my surmise. Increased social complexity and the evolution of a large, expensive to support nervous system go hand in hand with extreme reliance on habit routine as the primary cognitive mechanism guiding behavior. One major consideration is that a large brain requires an excellent and copious diet, a requirement that would be fulfilled best in a social group able to cooperate on the highest levels to procure and share a wide variety of nutritious foods. An ability to avoid toxic plants as well would depend on complex social relationships as I will show in a moment.

It might be said that all these requirements would be an argument against the use of psychoactive agents in such social groups, an argument with which I entirely agree! The increasing social complexity and food requirements are arguments for the increasing power of ingrained and necessary habit routines that would prevent any cognitive breakthrough to using the new brain for purposes other than the maintenance of social order and group prosperity. Experimentation with new foods, such as psychoactive plants, would not in normal circumstances have been a common occurrence. Any individual who developed a taste for frequent consciousness alteration using psychoactive plants would likely be seen as disruptive and deviant, and be shunned or expelled from the social group. Such was the substance of Andrew Weil's dismissal of McKenna's "wild speculation" in *Food of the Gods*, expressed at the first Tucson conference on consciousness.[172]

Two quotations concerning the diet and food sources for primates will illustrate the point, the first quotation concerning the necessity for a rich and complex diet, the second on the ways this is fulfilled while yet preventing exposure to toxic (or presumably psychedelic) items:

> Monkeys and apes have to balance their diet, which they do by wide ranging and yet selective eating; this is nicely illustrated by a study of Sri Lankan monkeys, Macaca sinica, by Marcel Hladik. By careful observation and quantification of their feeding, and phytochemical analysis of their food plants, he was able to show that for these 'frugivorous' monkeys, fruit was always more abundant than they could ever need. However, the monkeys had large day ranges and occupied a home range too large for efficient defense as a territory. Why? Their ranging was apparently a consequence of a need to eat fungi, rotten wood, insects, bark, shoots—a whole range of items that allowed them to make up the protein, vitamin, and mineral deficiencies of the energy-rich ripe fruit (Hladik 1975). The need for a balanced diet forces many primates to eat items that are hard to find. In studying baboon ecology, I was continually amazed at the subtle cues that they must use to identify some of their plant foods; at the most harsh time of year, the main survival foods were all either underground, or tiny and inconspicuous. [173]

> Mother primates of several species pull their infants away from novel objects (two species of macaque), or remove foods from infants if the food is not part of the diet (chimpanzee). Caro and Hauser suggest that the latter might be 'accidental', but having seen it happen in gorillas, I doubt this (Anne Russon, who has noted the same in orang-utans, shares my scepticism). An infant gorilla was fiddling with and chewing at a leaf (of a species not normally eaten), facing away from the mother who was eating herself, when the mother broke off her feeding, reached over the infant's head and took the leaf, dropping it well out of the infant's reach. In the case of a chimpanzee watched by Mariko Hiraiwa-Hasegawa (1986), the mother not only did the same, but systematically picked every other leaf

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172 *Toward a Science of Consciousness,* Hameroff, Kaszniak, and Scott, editors, The M.I.T. Press, 1996, p687.

173 *The Thinking Ape,* Richard Byrne, Oxford University Press 1995, p178.

> of the same species in the infant's reach and placed her foot firmly on the pile of leaves! But in any of these cases, the function is unclear: does the behaviour serve to teach, or simply to remove infants from danger? [174]

It has been proposed that the dietary requirements of animals with complex nervous systems was itself a factor in the evolution of hominid intelligence, the increasing need for a high-quality diet selecting for advances in intelligence and larger brains, which itself would demand further dietary improvements.[175] This must certainly be the case, but I think that the methods used by advancing species to procure better and better diets are themselves aspects of social behavior, and thus fall under the hypotheses of Machiavellian Intelligence. It was only through the advancing complexity of social life that the dietary requirements could be met, either for the actual procurement and sharing of foodstuffs or for the transmission of the knowledge of how to obtain them, and how to avoid serious errors such as ingesting toxic items.

From the preceding arguments concerning social stability, we may thus surmise that the influence of psychoactive plants on our immediate ancestors must have also involved some other simultaneous and important changes or events which helped to suppress the described tendencies to greater and greater dependence on habit routine as the primary determinant of normal behaviour. Some unusual change must have occurred to allow and ensure that psychoactive use would occur on a significant scale and would rapidly and irreversibly transform the habits of the hominid group that became the first group of psychologically-modern humans.

It is necessary to point out, however, that the very brain changes which facilitated social evolution and a powerful habit routine cognitive system would be the same changes that would make an eventual psychedelic intervention most effective: A greatly expanded cortex to allow retention and access to long-lasting and complex memory data used for habit routine search and selection would also be critical to eventually implement creativity and original thinking that was far more than random trial and error, creativity that could intentionally produce wide-ranging positive results. We would not expect attempts at individual creativity by a small-brained animal to result in much more than increased risk for that animal. A greatly expanded portion of the cortex involved with ‘association processing’ allowing the assembly of habit routines of a multisensory and intentional complexity, would also facilitate highly effective creativity. And a greatly expanded frontal cortex, the seat of working memory and other advanced cognitive abilities, facilitating habit routine based upon simultaneous nested levels of intentionality, would likewise be instrumental to a being requiring the frequent use of improvisation in situations which involved simultaneous trains of logical operations. The same nervous system improvements that enable advanced habit routine generation and use also provide for psychedelically-enlightened operation that is productive and creative, and not just hazardous to an animal. Here we have an argument against the influence of psychedelic agents at an early, small-brained stage of hominid evolution: psychedelics would not have ‘worked’ on hominids with limited brain capabilities.

Necessity of Language

One further argument will suffice to eliminate from consideration an early psychedelic influence on hominid evolution. The role of language in hominid development has been another hotly-debated topic. It is my contention that

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174 *ibid.,* p142.

175 Katherine Milton, “Foraging behavior and the evolution of primate intelligence”, in *Machiavellian Intelligence, ibid.*, pp285-305.

the psychedelic state of consciousness would have been of little or no creative value for an individual, and would have provided no evolutionary breakthrough for a social group which did not already have the benefit of complex language abilities. (I mentioned this above, as a reason why consciousness-alteration only became a universal with the advent of human social existence.) Psychedelic use and its effects are most valuable as a cumulative and social phenomenon. The psychedelic experience must not only be individually integrated but socially integrated as well, if it is to provide a key to rapid cultural advance as happened, for example, in ancient Greece. There must arise a "psychedelic culture" which is transmitted and developed from one generation to the next, and through which shamanism can arise. Without symbolic language, it is difficult to see how such a process might happen. Once a fairly complex language ability had evolved, however, we may imagine that psychedelic experience would have provided an impetus for further important language development into abilities concerned with the expression of the abstract, the mythical, the artistic… language capable of elaborating and transmitting tradition, a hallmark of culture.

Whereas written language is a cultural phenomenon which must be taught, (a child who is not taught to read and write will certainly not pick up the ability spontaneously), spoken language is assimilated spontaneously. Spoken language is a biologically-inherent feature of the human brain, a realization that became apparent to the linguist Noam Chomsky several decades ago. Steven Pinker, a former student of Chomsky, has made several conclusions concerning language and its evolution which are pertinent to a hypothesis of the time period in which psychedelic influence might have played a role in human evolution.[176] On the strength of much recent research, Pinker concludes that the first anatomically modern humans already spoke the equivalent of modern human language.[177] Since language is intrinsic to the brain structures which produce and interpret it, language must have co-evolved with those structures, and have been fully realized with the advent of the brain with which it co-evolved. Spoken language was therefore not "invented" at a late stage of that evolution, (although reading and writing most certainly were). Since language is inherently a social phenomenon, this proposed co-evolution of brain and language fits nicely with the Machiavellian Intelligence hypothesis of brain advances being driven by social requirements, including the advancement of language capability.

Pinker notes therefore that "language did not first appear in the Upper Paleolithic beginning about 30,000 years ago, contrary to claims frequently seen in archaeological…and popular science treatments."[178] The idea that psychedelics would not have 'worked' on our smaller-brained forbears such as Australopithecus is supported by the proposed necessity of the existence of complex language as a precursor for the beneficial influence of psychedelics, and considerably narrows the time frame in which such influence must have played its role. Using conclusions from linguistics and brain evolution, we see that such a time frame should extend from about 150Ka to 50Ka (thousand years ago). I shall further narrow this window of opportunity for psychedelic influence in my arguments to follow. The important conclusion which has just been developed is that psychoactive plants in the environment cannot have played any significant role in either the early development of language, nor in

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176 Steven Pinker, "Facts about human language relevant to its evolution" in *Origins of the Human Brain,* Jean-Pierre Changeux and Jean Chavaillon, editors, A Fyssen Foundation Symposium, Clarendon Press, Oxford, ch17.

177 See also, "Study: Language is Learned in Ancient General-Purpose Brain Circuits that Predate Humans", *Science News* http://www.sci-news.com/ Jan 30, 2018.

178 *op. cit.,* Steven Pinker in *Origins of the Human Brain,* p271.

the parallel development and tripling in size of the hominid brain during the period from about 3Ma to the appearance of anatomically modern humans about 300Ka.

Considering the importance of language in evolution, and the importance of language for various modern arguments as to how the process of man's evolution took place, some further comments are appropriate which will tie together some ideas expressed in previous chapters with the task at hand. It is widely hypothesized, quite correctly I believe, that major enhancements to spoken language occurred during the Upper Paleolithic with the appearance of anatomically modern hominids. As Pinker has noted, certain observers thus wish to believe that language itself was practically non-existent before this period. The argument of language being inherent to the brain structures which produce it, and therefore of the necessity that language co-evolved with those brain structures is a powerful rebuttal of such ideas, but additional evidence also favors the co-evolution claim. Rudimentary language abilities have now been definitively shown to exist in our closest relative, the chimpanzee.[179] It was also noted that language abilities are not used by chimpanzees in the wild, but the fact that these primitive language capabilities exist at all must indicate that rudimentary brain circuitry for producing language nevertheless exists. If such circuitry were present, albeit in very primitive form, at the period of divergence between the Panidae and early hominids, it is unreasonable to assume that such circuitry might continue to evolve for the next several million years, only to be used suddenly at the Upper Paleolithic to produce complex language which had no precedent whatsoever. The only argument here could be that these brain areas which later permitted spoken language were all along used for another function altogether.

Although I feel that chimpanzee language ability, and certainly the arguments of Pinker and other linguists, strongly favor the continuous existence and development of language throughout hominid development, the alternative use argument just cited brings us to another consideration which is important to my theory. Referring back to figure 1 in chapter 3 and the associated text, it will be seen that according to my cognitive hypothesis, language is but one, if the most obvious and important, of the symbolizing functions of the thinking1—thinking2 conglomerate. In other words, language, the serial realization of thinking in abstract symbolic form, is not itself the material or medium of the thought process until a late stage, and is not necessarily a part of the thinking process at all. My model is, of course, in contention with the majority of recently proposed cognitive models of the function and construction of language, and I do not expect its easy acceptance: only the evidence of the many-sided picture that my theory of psychedelic experience presents might have the power to convince scientists today that the cognitive model of thinking1—thinking2 processes might have some general applicability. The neurologist Harry Jerison, for example, proposes that language itself is the medium of reflective thought and imagery:

> "The role of language in communication first evolved as a side effect in the construction of reality," proposes Harry Jerison, a neurologist at the University of California, Los Angeles, who has made a special study of brain evolution. "We can think of language as being merely an expression of another neural contribution to the construction of mental imagery." Brains throughout evolutionary history have been shaped to construct an inner world appropriate to a species' daily life. In amphibians, vision provides the principal element of that world; for reptiles, an acute sense of smell. For the earliest mammals, hearing was additionally important;

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179 See James L. & Carol Grant Gould, *The Animal Mind*, Scientific American Library 1994., pp183ff and pp186-187.

> and in primates, a melange of sensory input creates a complete mental model of external reality. Humans, says Jerison, have added a further component: language, or more precisely, reflective thought and imagery. Thus equipped, the human mind creates an internal model of the world that is uniquely capable of representing and coping with complex practical and social challenges. Inner reflection, not outer communication, was the facility upon which natural selection worked, argues Jerison. Language was its medium—and, at the same time, an efficient tool for communication. This hypothesis now has wide support.[180]

Too bad. I believe the hypothesis that language is the *medium* of the construction of mental models of reality, is mistaken. Firstly, as stated here, the model implies that without language, the construction of mental models of the world, by animals for instance, is minimal. Yet the habit routine cognitive model shows that the habit routine, constructed by thinking1 processes and analyzed by thinking2 processes, is the mental model of reality we are concerned with, and that the transformation into language or other forms of symbolization is a subsidiary, secondary, and non-essential process occurring in thinking2. As I have argued previously, the habit routine system has been the constant companion of animal life from the beginning, it is the primary function of all animal nervous systems, not just advanced ones such as our own. It is interesting how close the above quotation comes to the idea of the habit routine model as the mechanism of construction of the "mental model of external reality," ("a melange of sensory input creates a complete mental model of external reality") but then misses the necessary conclusion. Jerison's model would have the symbolization function as the primary cognitive operation, but that would require that the "raw material" of symbolization be the primary sensory information rather than the generated habit routine, and a great deal of evidence, summarized in previous chapters, argues against this model.

Language is not at all the medium of the thinking processes that precedes symbolization, and which is a resonance to the habit routine and its analysis. Language as it is realized, or other forms of symbolization such as the production of gesture or music, perhaps also the expression of emotion via facial expression and general posture, are serial processes, yet the habit routine, the internal model of the world, is iconic. It is a Gestalt, a constantly changing and updated multi-feature, yet holistic entity not requiring elaboration through a serial process of point for point representation with abstract symbols as does language. Our basic thinking process is in terms of icons or Gestalts, holoprojections, which later, and sometimes very laboriously, may find only incomplete and unsatisfactory expression through the symbolization processes. Consider this statement by Albert Einstein, describing the way he considered his creative thinking to occur:

> The words of the language, as they are written or spoken, do not seem to play any role in my mechanism of thought. The psychical entities in my case are . . . visual and some of muscular type. Conventional words and other signs have to be sought for laboriously only in a secondary stage.[181]

Thus many recent views of language and thinking miss the essential fact that the great part of what constitutes thinking, both conscious and pre-conscious

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180 Roger Lewin: *The Origin of Modern Humans,* Scientific American Library 1993, p173.

181 Einstein's view and similar ones from many other creative individuals have been collected in a paper by Robert Root-Bernstein and Michele Root-Bernstein: "Intuitive Tools for Innovative Thinking", International Handbook on Innovation, Larisa V. Shavinina, editor, 2003 Elsevier Science Ltd. This paper may be found online.

as with the construction of the habit routine, has nothing to do with the serial process of spoken language at all. The creation of the mental model of reality is not "linguistic" except in the sense that we might define a new type of "language" constituted not of words and the rules for serially connecting them, but of the very iconic Gestalts that are created by habit routine search. The evolution of the ability to produce the habit routine started probably with the very first animals, as I have discussed, but the evolution of spoken language only began much later. The two evolutionary processes are very far apart indeed, as are the brain processes which produce them.

The problem of the modern understanding of these facts probably arises from the nature of the methods of modern Western science itself. It is, above all, a descriptive undertaking, and therefore a serial process rather than an experiential, iconic one. So in attempting to "scientifically explain" many of our cognitive abilities using descriptive language, we must necessarily let serial symbolization rule our paradigm to such an extent that we ignore certain aspects of the ongoing iconic thinking process which is the seed of our explanations.

Genetics to the Rescue

The suggestion of an evolutionary scenario for human development attempts to establish an actual series of events in history, if pre-history. Considering the very fragmentary evidence in the fossil record, and the indirect nature of other modern evidence to be described below, the chance for error in proposing the story of how Early Man made his way out of Eden is humbling. As we have seen above, the first theory of psychedelic evolution, that of McKenna, has suffered terminally from a dose of counter-argument all too easily supplied by the critics.

Much of McKenna's book remains admirable however, for instance his presentation of evidence indicating the probable importance of psychedelic plants for the very early tribal societies that lived on the Tassili Plateau of southern Algeria, or Çatal Hüyük in central Anatolia. These are examples, along with ancient Greece and the Eleusinian Mysteries, that illustrate the rapid flowering of culture possible in societies that were associated with an organized social and/or religious use of psychedelic plants. The importance of psychedelics for early man certainly suggests an important evolutionary influence as well. The trick is to deduce, using a wide variety of ancient and modern evidence, when and where, and why that evolutionary influence might have taken place. Let me start by considering some modern reinterpretations of the fossil evidence which have recently received overwhelming support from one of science's most recent and fascinating developments, molecular genetics.[182]

Chris Stringer, who is today the head of the Human Origins Group of the Natural History Museum in London, recounts a most interesting tale of scientific discovery in his recent book, *African Exodus,* co-authored by the science writer Robin McKie. It is the kind of story which has epitomized the romance and excitement of scientific discovery and revolution as perceived by the lay public, stories such as the Curies' discovery of radium or Galileo's road to revolutionary views about the heavens. But not only is the story of these recent discoveries concerning human origins of interest to the general public, it represents a Kuhnian scientific revolution of important scope, perhaps

182 As I have stated above, much of the following evidence now needs re-interpretation on the basis of a rapidly-increasing rate of new findings and related viewpoints. It seems there might be several emerging candidates for a new paradigm of human origins, and that they will contend for quite some time to come. Nevertheless, I shall present below my originally hypothesized scenario, now as an *example* of what might be possible to construct using available evidence.

comparable in radical change to the revolution in physics earlier in the 20th century.

The first chapters of African Exodus are concerned with a close examination of the archaeological "bones and stones", in which Dr. Stringer shows how the Multiregional Hypothesis[183] of human evolution, the predominant model for most of the last century, has just recently been discredited in favor of an Out-of-Africa (actually an Out-of-Africa II) model.[184] A new mathematical technique, multivariate analysis, used by Dr. Stringer during his several years of work on the fossils, led him to doubt the validity of the multiregional theory early on in his career. But only a small minority of paleoanthropologists were ready to listen to new analyses of fossil characteristics which called into question the status quo of their profession, for many great scientists of the past decades had analyzed these same fossils and there was wide consensus that a multiregional scenario was the correct one. The upheavals and conflicts typical of a newly-born scientific revolution ensued. A revolutionary new idea proposed by a small group of scientists, at first rejected as absurd by the establishment, soon began to topple that establishment. Chris Stringer and Robin McKie introduce their book:

> For the past few years, a small group of scientists has been accumulating evidence that has revolutionised our awareness of ourselves, and our animal origins. They have shown that we belong to a young species, which rose like a phoenix from a crisis which threatened its very survival, and then conquered the world in a few millennia. The story is an intriguing and mysterious one, and it challenges many basic assumptions we have about ourselves... It is a remarkable, and highly controversial narrative that has generated headlines round the world and which has been the subject of a sustained programme of vilification by scientists who have spent their lives committed to the opposing view that we have an ancient, million-year-old ancestry. The debate, which reverberates in museums, universities and learned institutions across the world, is one of the most bitter in the history of science.[185]

What finally broke the dam of resistance to the new ideas was the entry upon the scene of revolutionary new techniques from a field which had previously played no role whatever in paleoanthropology, molecular genetics. Until very recently, the possibility that we might learn something about the evolution of our distant ancestors by studying the genetic makeup of living humans was hardly even suspected, and of course the techniques for doing so completely unknown. But all this changed rapidly as the science of molecular genetics grew from its infancy in the 1960's to the powerful tool it is today. The use of genetic analysis for understanding evolution, the science of molecular anthropology, also had its beginning the 1960's, with the pioneering work of Allan Wilson (later to be a key player in the confirmation of the Out-of-Africa scenario) and Vincent Sarich. It was their early work that began to topple many sacred gospels of paleoanthropology, the first to fall being the idea that apes and humans had diverged very early, between fifteen and thirty Ma. By comparing protein structures of modern apes and man, Wilson and Sarich

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183 The Multiregional Hypothesis posits that an early migration by *Homo erectus* from the African heartland to the Near East, Europe, Asia, Australia, was followed by a long period of regional and parallel development, with some intermixing between regions, to produce *Homo sapiens* quasi-independently in the various regions. Under this scenario, racial differences, long thought to be far more significant than has recently been shown to be the case by genetic analysis, were supposedly evolved during this at least million-year period.

184 The first "Out-of-Africa" migration being that of *H. erectus* 1.5 to 2 Ma.

185 *African Exodus,* Chris Stringer and Robin McKie, Jonathan Cape, London 1996, from the Preface.

concluded that the separation could have been no earlier than 5Ma. “We were variously ignored, abused and scorned,” recalls Sarich. But it was the first of many venerable precepts of paleoanthropology that was to fall to the new techniques of genetic analysis. The research of Wilson and the many others who followed came along at precisely the right time to resoundingly confirm the early work of Stringer.

Stringer and McKie mention in their introduction above that our species “rose like a phoenix from a crisis which threatened its very survival,” and propose later on in the book the occurrence of a population bottleneck sometime about 100 to 150Ka. The possibility of such a bottleneck has also drawn criticism from defenders of the orthodoxy, yet again the genetic evidence is what has come to the forefront to support the proposal.

The genetic evidence in question was not at first concerned with the DNA of the cell nuclei, found in every cell of the body and which is responsible for control of the growing embryo and inheritance of physical traits, but DNA contained the mitochondria of these same cells. These small structures within animal cells act like metabolic power-packs, enabling the biochemical reactions which provide the cell with energy. That these structures contain their own DNA, entirely different from nuclear DNA, is something of a curiosity, and has led to speculation that very early on in evolution, mitochondria might have been a separate organism which developed a symbiotic relationship with primitive single-celled life forms to enable the evolution of the first true single-celled animals.

Whatever their evolutionary story, the mitochondria and their independently organized DNA strands have provided an important key for the understanding of hominid evolution. Two specific characteristics of mtDNA (mitochondrial DNA) figure importantly: firstly, mtDNA is transmitted only through the female lineage, since the mitochondria of sperm reside in the cell’s extra-nuclear protoplasm, and do not enter the egg at fertilization. Thus mtDNA provides a powerful tool for tracing genealogies in animals, and reconstructing recent evolutionary trees. Secondly, mtDNA has a relatively high and constant rate of random mutation which is conveniently analyzed, thus constituting a ‘molecular clock’ providing genetic markers for accurately tracing migration and fissioning in human societies. A recent paper by Rebecca L. Cann, an early associate of Allan C. Wilson, explains more fully the peculiarities of mtDNA which result in its being such a powerful tool for the study of evolution. Concerning the bottleneck hypothesis resulting from mtDNA studies she recounts:

> When I began my study of mtDNA in the late 1970s with Dr. Allan C. Wilson, one of his postdoctoral fellows, Dr. Wesley Brown, was writing up his work on a study of 21 human mtDNAs. Dr. Brown had discovered that using restriction fragment length polymorphisms (RFLPs), humans as a species looked 'different' to other mammals. He found that in comparison to two chimpanzees, or two gorillas, or two orang-utans, or two gibbons, or even two pocket gophers, humans had only one-half to one-fifth of the intraspecific variability seen in our closest primate relatives and other genetically well-characterized mammals. In 1980, Brown proposed that the level of variability sampled in his study was consistent with the derivation of the human mitochondrial sequence from a single female about 200,000 years ago. This was the origin of the bottle-neck hypothesis and mitochondrial 'Eve'.[186]

The mitochondrial “Eve” hypothesis naturally made big headlines, was

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186 “Mitochondrial DNA and Human Evolution” in *Origins of the Human Brain,* Jean-Pierre Changeux and Jean Chavillon, editors, Fyssen Foundation Symposium, Clarendon Press, Oxford, 1995, p 128.

featured on the cover of such magazines as Time and Newsweek, and also quite naturally was journalistically exaggerated out of all proportion to the original claims. A concerted attack by the multiregionalist "old guard" also helped to make the new idea sound a bit absurd, both to the public, and to scientists in other fields not yet acquainted with the genetic evidence. All the criticisms have been adequately countered however, and the findings confirmed by newer and more complete studies, including studies on the nuclear DNA. Rebecca Cann was careful to explain, in the above quoted paper, the intended interpretation of the hypothesis concerning the possible number of individuals existing at the time of the proposed bottleneck. Since mtDNA is passed on only through the female lineage, the existence of a mitochondrial Eve does not imply that our nuclear DNA is also descended from a single individual, nor that at one point the human lineage was reduced to a single, or mere handful of individuals (the Biblical Eve scenario!) Recent estimates of the number of individuals existing at the time of the bottleneck, including that of Chris Stringer, puts the number at perhaps ten thousand.[187] It may be argued that a population of ten thousand individuals is not what one could call a genetic bottleneck, yet the sum of the genetic evidence indicates that "there were at least 100,000 adult archaic forebears of our Africa ancestors about 200,000 years ago."[188] Thus a decrease to 10,000 individuals is certainly a "population crash" indicative of important events in the early evolution of modern man.

As for the date of the lifetime of mitochondrial Eve, there have been various estimates between the extremes of about 60 to 400Ka based on several different methods of mtDNA analysis. Some best estimates put the life of mitochondrial Eve at about 130 to 140Ka, "the date of origin of modern humans."[189] The uncertainties in these several estimates may be narrowed by considering data from other fields of study, and from a view of the overall evolutionary scenario which emerges upon consideration of all the information at our disposal, including my own hypotheses of the influence of psychedelics on the overall process. Using all these sources, a reasonably constrained sequence of events with fairly accurate dates becomes possible.

The Trigger Event

In looking at the combined evidence from new interpretations of the "stones and bones," (Chris Stringer's findings), the genetic evidence, (now far more convincing than just a few years ago), and other pieces of the puzzle, Stringer and other workers have come to the conclusion that there must have been some kind of unusual event, some catalyst, some kind of "trigger" which set in motion the very rapid rise of human culture and civilization which began a mere few moments ago on an evolutionary scale. The strong evidence for a population bottleneck, during which time individuals existed who were our sole ancestors, and the ensuing rapid migration and rapid rise of human culture in every corner of the earth, has led these workers to ask a central and important question for which they have not yet formulated an answer. Stringer and McKie write:

> It was one of the critical events in mankind's convoluted route to evolutionary success. The nature of the trigger of this great social upheaval is still hotly debated, but remains a mystery at the heart of our 'progress' as a species. Was it a biological, mental or social event that sent our species rushing pell-mell towards world domination? Was it the

187 *African Exodus, op. cit.,* p.150

188 *Ibid.,* p 150

189 *The Origin of Modern Humans,* Roger Lewin, Scientific American Library 1993, p99.

> advent of symbolic language, the appearance of the nuclear family as the basic element of human social structure, or a fundamental change in the workings of the brain? Whatever the nature of the change, it has a lot to answer for. It transformed us from minor bit players in a zoological soap opera into evolutionary superstars, with all the attendant dangers of vanity, hubris and indifference to the fate of others that such an analogy carries with it.[190]

Reading this paragraph in African Exodus when it was first published, I realized I had been for several years working on ideas which constituted the very answer sought by this recent revolution in thinking about human evolution. It was a falling into place of pieces of a puzzle which justified so much earlier "wild speculation," a realization that practically by accident I had found a key that many others were actively searching for which would enable the opening of a door to an important future in understanding.

Subsequently, two further books on human origins have concurred with Stringer's view with slightly different interpretations of the data and slightly different resulting hypotheses. Spencer Wells, in his book *The Journey of Man* speculates that "a single fortuitous event may well have changed the course of human evolution."[191]

Richard Klein likewise has been a strong supporter of the so-called "Great Leap Forward"[192] or "Big Bang of Human Consciousness" theory, and believes that a genetic mutation might have sufficiently changed the way our brains are wired to provide the necessary catalyst.[193] [194]

As speculative as the causes and results proposed by various researchers are, there is a general agreement about the Great Leap Forward itself, based on evidence of radical shifts in technology around 50-70Ka. Whatever the cause might have been, quite suddenly, almost instantaneously in evolutionary time, archaic or proto-man became modern man, he became as a God with creative powers denied to mere animals.

Rebecca Cann asks,

> We often wonder if language played a part of the process, and that our ancestors all had some new mutations which allowed them to spread, at the expense of the other indigenous peoples. [Results of genetic research] suggest the spread of our ancestors was rapid, with little mixing.[195]

Although language certainly played a part in the process, as I have already

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190 *African Exodus, op. cit.,* pp 5-6

191 Wells, Spencer: *The Journey of Man,* Princeton University Press, 2002

192 A term coined by Jared Diamond for anthropological use, but borrowed from Mao-Tse-Tung's economic and social campaign by the Communist Party of China (CPC) from 1958 to 1962. Considering the results, the term might be considered unfortunate for use in anthropology.

193 Klein, Richard G.: *The Dawn of Human Culture,* New York, John Wiley & Sons 2002.

194 Many years before these researchers, Arthur C. Clarke and Stanley Kubrick had already suggested the idea of a trigger to sudden cognitive awakening in *2001: A Space Odyssey*. Although presented as "entertainment", films and novels, especially of the sci-fi variety, have often been the vanguard of scientifically researched findings in later years. In *2001* the beginnings of cognitively awakened humankind occurs as the result of the sudden appearance of the "Black Monolith", something mysterious and unexplainable—ineffable—that ignites a bout of extreme salience detection in a group of proto-humans and leads to their thinking creatively. For Kubrick & Clarke it was a physical object so unusual that the group of proto-humans present could not ignore it. How much more ineffable would be the experience of a psychedelic state of consciousness that made existence itself the subject of wonder and awe! And sadly, in the Kubrick/Clarke story, the first thing that creative thinking leads to is an arms race! Hardly psychedelic...

195 *Ibid.,* p134.

discussed, the identity of the trigger, the origin of the population bottleneck, the reason behind man's migration to the ends of the earth, the factor enabling the rapid rise of culture independently in all these regions, the factor behind the ability of the new hominids to out-compete all former races of archaic man, the secret of the birth of the human race, may all be intimately related to one and the same phenomenon: the advent of socially-relevant psychoactive plant use by a regionally isolated group of proto-humans somewhere in Africa.

The appearance of psychologically modern humans may even have occurred through a *single individual*, the first *shaman*, a sort of original tribal wise-man, an exceptional individual who discovered a plant that induced a psychedelic awakening, and who was already a social group leader so that his authority would not be rejected, a wise-man who then began to transmit his vision first to his close tribes-people, and then further afield as his wise-man status was reported. Such events would leave no obvious DNA nor fossil evidence, since his "progeny" would not have been biological but philosophical, although genetic traces of a bottle-neck of sorts might be discovered if they are diligently searched for. The practices originally discovered by the core group might have been significant enough to spread rapidly and widely, thus the scenario does not envisage all modern peoples as the *genetic* descendants of the original core group.

Psychoactive use could then have been at once the reason for an apparent but not necessarily absolute bottleneck, and also the trigger, the key which enabled this original group to expand and prosper by virtue of the cognitive advantages provided by the cumulative effects of psychoactive use. These advantages, I remind the reader, concern a new and powerful ability to suspend a mode of existence entirely governed by habit routine. The advanced ape that was our predecessor necessarily had, as I have stated above, the most complete, one might say irrevocable dependence on habit routine of any animal yet evolved, a dependence entirely precluding the use of the most advanced nervous system ever evolved for creative purposes except in dire circumstances. Yet through psychedelic training guided by tribal wise men, individuals and entire social groups could break through this barrier, repeatedly and at will.

Climate Change

But what of that other facilitating factor I mentioned before, the one that would allow psychedelic use to become important and not just an infrequent and disorienting event for single individuals who might then expulsed from their group? Some environmental or social situation must have resulted in the frequent use of psychedelics by a significant proportion of the core group, and psychedelic use must then have rapidly become part and parcel of the social structure of the group. There are several possibilities. Here another body of research information on climate change becomes important, for during the proposed period between 60Ka and 200Ka, drastic climatic changes were occurring on a time scale certain to disrupt all life on the planet, especially those advanced forms of life so dependent on social complexity and a diversified diet.

In view of the best estimates for the time slot for the population bottleneck and mitochondrial Eve (about 133Ka),[196] a particular period of climatic history stands out: the Eemian interglacial period. During the Eemian, warm, wet, and tropical conditions extended much further north than at present. The fossil evidence shows that hippopotamuses browsed along the banks of the Thames and the Rhine, while lions and elephants roamed the forests of southern England. Until recently, the Eemian interglacial period was thought

196 see *The Origin of Modern Humans, op. cit.,* p99.

to have been a stable climatic period lasting from about 130Ka to 114Ka, when the beginning of the last ice age commenced. Climatic information has been obtained from such methods as analysis of ocean sediment cores, pollen cores from terrestrial sources, and ice cores drilled in such locations as Antarctica and Greenland. A recent ice core analysis from Greenland however, has given us a radically new view of the Eemain climatic era, indicating that it was not a period of stability but rather one of wild climatic oscillations.[197]

> The early part of the Eemian was dominated by several oscillations between warm and cool stages. The temperature dropped by as much as 10 degrees, sometimes within as short a time as ten to thirty years. Some cold spells lasted a few decades, while others lasted several hundred years. After 8000 years of fluctuating conditions, the climate settled into a period of stable warmth lasting some 2000 years. This warm period ended abruptly...when the temperature in Greenland dropped about 14 °C within ten years.[198]

Such a period as the early Eemain seems to provide exactly the kind of opportunities for the disruption and crisis conditions for groups of human predecessors that might lead to the discovery of psychedelic use. Several times there must have been abrupt changes in habitability of various regions, with changes in flora and fauna and resulting dietary pressures, food shortages, the encroachment of and conflict with neighboring tribes, the possible occurrence of new diseases and a resulting search for medicinal remedies promoting population movements, in essence, frequent turmoil. If modern chimpanzees have the need to roam far and wide to procure their necessary diet including "fungi, rotten wood, insects, bark, shoots," we may safely assume that proto-man had similar if not even greater exigencies. If uprooted from a home ground, or if rapid climate change forced him to experiment with new foods, an opportunity for the social discovery and use of psychedelic plants becomes important.

In the case of edible fungi today for example, it is well known that many cases of poisoning result when individuals or groups, newly arrived in an area, see and consume a mushroom which they had always safely consumed in their previous home region. Many mushrooms look nearly identical, and some fungi species are known to be safe in one region, yet toxic in another. A changing climate might well alter a fungal species, changing its visible characteristics or production of metabolites. Some recent work has shown that fungi tend to proliferate at far greater rates in a tropical, CO2 rich climate, as must have existed during the Eemian.[199] In these facts we see a possible mechanism whereby a group of our ancestors might have discovered the use of a psychedelic mushroom or other plant, in which the discovery involved the use of that plant by the entire group, and for an extended period of time. The likelihood of widespread existence of unfamiliar and unusual species of alkaloid-containing plants is, of course, much higher in the tropical and humid, and fluctuating conditions of the Eemian, rather than during the dry, cold, and barren ice age conditions which preceded it. And the dates of the climatic disruptions of the early Eemian that might have led to such a discovery match nicely the mtDNA evidence of a population bottleneck.

The Eemian might well have been the period of mankind's first important exposure to psychedelic drugs, for by 90Ka we see the appearance of sophisticated bone harpoons and knives in what is now Zaire, a level of

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197 "Chill Warnings from Greenland," *New Scientist,* 28 August, 1993, pp29-33.

198 *Ibid.,* p31.

199 "Sneezing while the Earth warms," *New Scientist,* 24 August, 1996, p5.

technology that was not seen in Europe until 50 thousand years later.[200] But we should not expect that the initial psychedelic exposure would have led to rapid cultural change as we would today define it. Evidence from studies of "primitive" yet ecologically stable and wise tribal societies indicates that psychedelic use and the associated rise of shamanism does not automatically propel a society towards building automobiles and atom bombs, but rather, preferentially enables another kind of creativity involving tradition, stability and equilibrium. Some of the oldest of tribal societies, those that have been discovered in New Guinea, or in the backwaters of the Amazon basin, or the vast tundra of the Siberian wilderness, all have a long tradition of psychedelically influenced shamanism, and have remained stable for many thousands of years. If we should look at such a society and call it "primitive," their practices being seen as backward and ignorant, how much more so may such a stable and ecological society view the all-too-obvious happenings and extrapolations of Twentieth Century "Civilization"? Our view today of what constitutes progress and civilized living has practically nothing in common with the views of a great many societies that have come before, and lasted far longer than our recent experiment in progress. With a little luck, the remnants of an isolated tribe or two may well survive us.

A psychedelically-enlightened society does not at all produce rampant technological change, just for the sake of change. They do not fly to the moon just because it is there, or to impress and propagandize tribal members with their supposed superiority over a rival tribe in some cold war scenario. A psychedelically-enabled society does, however, make rapid advances of a creative nature in response to real challenges such as climate change, the necessity to emigrate to new regions, the avoidance of disease and a search for new medicines. But in periods of climatic- and resource-stability the psychedelically-enabled society also exhibits an ecological stability: it has the power and intelligence to make creative changes as it pleases, and chooses consciously to remain in equilibrium with nature. What could be more illustrative of wisdom than this? In times of stability, psychedelically-enabled tribes produce myth, art, philosophy, they use their creative powers to elaborate tradition, the hallmark of culture; they do not spend their time in petty schemes to conquer nature, or exploit reality, or develop "backward" regions.

Perhaps the long term lesson that is taught by the psychedelic experience is that the human animal, having evolved slowly over millions of years, is ill-equipped to handle sudden large advances in technology without the *continued wise guidance of psychedelic leaders and experts.* Without such guidance societies have historically and very reliably degenerated to constant warfare and the mass production of weapons, ecological destruction, genocide, waste, and collapse. Surely there is a better use for creativity than this.

The point here is to give a better view of what a psychedelically enabled tribe, at the advent of the human race, might do with its powers of creativity. If our original African ancestors began the use of psychedelic agents as the first step toward an organized shamanism, only our modern illusions of what constitutes "progress" would predict that such a society, if truly a society of man, would rapidly invent and amass technology. A broader view would predict that what would be amassed by the true *Homo sapiens* would be techniques of living exhibiting a consciously designed harmony and ecology, leading to long-lasting modes of tribal life changing only slowly with time.

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200 *African Exodus, op. cit,* p5.

Psychedelically enlightened tribes would optimally remain stable for millennia. To restate: Creativity in such a group would involve the creation and preservation of myth and ritual, the gradual perfection of a style of living, the elaboration of tradition, not a headlong rush into exploitation of "resources" and a supposed domination of nature.

Thus our originally psychedelically-enlightened ancestors, the first true humans, would have spread slowly and surely from their original home, perhaps in East Africa, and carried with them such traditions of stability and longevity. Only severe challenges to their survival and continuation would result in their use of the creative power to make radical changes in their technology and lifestyle. Before long even a slow migration would have brought descendants of the original core group into the Middle East, as evidenced by fossils of modern humans in Israel dated at 100Ka.[201] We must remember that climatic changes after the end of the Eemian, although following a general tendency toward the next ice age, continued to include occasional but abrupt reversals as is shown by the recent Greenland ice core studies. Migration was likely therefore to have been a sporadic happening, as certain habitats and food sources changed. Considering these tribes' penchant for stability, intentional migration, just for the sake of migration, was unlikely. The spread of our ancestors would therefore have been slow and occasional, initiated by the occasional climatic upheavals and other environmental challenges such as volcanic eruption, changing food supplies, occurrence and avoidance of diseases, and perhaps the search for new medicines and psychedelic plants. We know from anthropological studies how important are the recommendations of the shamans for decisions taken by tribal elders, and it is thus possible that shamans also greatly influenced decisions of our early ancestors concerning their movements. The shamans' use and search for psychedelic plants may well have initiated some early migrations.

It is necessary to understand the above described tendencies that would naturally follow our original psychedelic enlightenment to see why modern culture as we know it did not get underway for over 60 thousand years. Tradition and stability reigned for many thousands of years while a slow migration brought human ancestors to Europe, Asia, and finally the Americas. But the flowering of modern culture did not really get underway until 40 thousand years ago, when art and body ornamentation, sophisticated bone tools, built hearths and structured living spaces, open site 'religious' burials, storage pits and social storage, quarries, the long distance exchange of raw materials, long term occupation of harsh environments, and signs of complex forward planning made a wide appearance as evidenced in the archaeological record.[202] This apparently sudden appearance of the roots of the modern age, in which the beginnings of modern technology can be seen, is the phenomenon that has challenged anthropologists the most. If anatomically and cognitively modern humans began their specieshood in Africa 130Ka, why did it take so long for the modern trend to get underway? And importantly, what was the catalyst which precipitated this event so suddenly? Like all history, the answers to such questions, even if they could be known, must necessarily be very complex, a story that can be told in a multitude of ways that might seem contradictory. Consider the myriad ways that even recent history can be written.

But some scholars have proposed that the sudden flowering of the modern age beginning about 40Ka might actually have been more gradual, and sporadic. Such ideas fit in with the above observations on the likely

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201 see *African Exodus, op. cit,* various index entries under "Qafzeh, Israel."

202 see the chart in *In Search of the Neanderthals,* Christopher Stringer and Clive Gamble, Thames and Hudson, 1993, p198. http://www.psychedelic-library.org/Kosmos/chart.jpg

characteristics of psychedelically-enlightened societies. The appearance of the previously-mentioned bone harpoons in Zaire, and other scattered evidence may well indicate that local tribes made advances in technology in fits and starts, in response to novel challenges, and then returned to long periods of stability. The appearance of cave art seems today from modern discoveries to be rather abrupt, yet the quality of such art would indicate a long tradition of artistic endeavor, certainly the artists of the Lascaux and Cosquer caves were no amateurs, thousands of years of tradition no doubt led up to their remarkable artistic abilities. New discoveries of even more ancient sites are bound to indicate that the first 'artists' did not suddenly appear around 40 thousand years ago, but that artistic expression was a slowly maturing phenomenon of very long duration indeed, going back to the Eemian perhaps.

The psychedelic model of evolution of culture therefore agrees that some recent interpretations of evidence indicating a 'sudden flowering' of culture beginning about 40Ka is too drastic. Alison Brooks, an archeologist who with John Yellen made the important finds in Zaire, states:

> A closer scrutiny of the archeological record leads one to inquire, Just how abrupt was the behavioral transition in Europe? I believe that the gulf between the Middle Paleolithic and the Upper Paleolithic has been artificially widened by de-emphasizing the very real evidence of cultural complexity in the former and overstressing the achievement of early modern humans, who, in Europe, did not achieve all of the behaviors usually cited as part of the Upper Paleolithic "revolution" until the very end of the Pleistocene [near 10,000 years ago].[203]

One final surmise about the trigger events that may have continued to push Early Man along the road to modern civilization will bring this chapter to a close. If, according to my theory, there was a gradual evolution of culture during the 70 thousand years between the Eemian and the period in which the beginnings of modern culture are deemed to have begun 40 thousand years ago, then we might look for the rapid, yet sporadic and geographically independent advances in culture and technology to coincide with known instances of rapid climatic change, with instances of severe volcanic activity or other known or to-be-discovered radical environmental influences during the period. It will certainly be interesting to compare further detailed analyses of the new Greenland ice cores to known and future archeological discoveries in an attempt to correlate cultural change with environmental disruption. Perhaps there will never be enough evidence to write history about such pre-historic times, but intriguing clues and parallel developments may well appear that will at least allow the writing of a probable scenario.

The question of how geographically isolated groups of modern men all developed astounding cultural and technological advances, and how at least two dozen different regional societies of men experienced along with such changes a dramatic increase in population, has been a puzzle for many archaeologists, linguists, anthropologists, and other workers. In the words of Chris Stringer and Robin McKie,

> It is an extraordinary catalogue of achievements that seem to have come about virtually from nowhere — though obviously they did have a source. The question is: what was it? Did we bring the seeds of this mental revolution with us when we began our African Exodus, though its effects were so subtle they took another 50,000 years to accumulate before snowballing into a cultural and technological avalanche that now threatens to engulf Homo sapiens? Or did that final change occur later,

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203 Quoted in Lewin, *The Origin of Modern Humans, op. cit.,* p128

and was it therefore more profound, and much speedier in its effects?[204]

I believe the answer is neither of these, or rather a combination of the two: The seeds of the revolution were indeed carried by Homo sapiens from his birthplace in Africa, but they were seeds which needed periodic stimulation to grow vigorously. As I have argued, psychedelic wisdom does not of itself propel societies to produce a "technological avalanche" nor should we believe that "technological avalanches" are inherently good. Psychedelic wisdom rather leads to ecology, stability, and longevity. But when novel and severe challenges present themselves to psychedelically-enabled societies, they are able to react intelligently and with foresight and complex long-range planning. This is perhaps the most important difference between the true *Homo sapiens* his animal forebears.

The Long Winter

Thus the periodic and now well-established abrupt climatic upheavals of the Eemian and post-Eemian world became the catalyst which successively and cumulatively forced tribes of men living in many isolated areas of the globe to use their God-like powers of creativity to advance technology in the interests of survival and stability. An ice age was approaching, with fits and starts, and global climatic change was frequent and severe. If the cognitive seeds existed, dormant in the sense of not automatically producing technological change at a rate which we moderns believe essential to our species, and these seeds existed in all the societies of men around the globe, the fact of climatic change being a global phenomenon would explain how these seeds flowered, or were forced to grow independently in all these regions.

During the post-Eemian period, changes in the earth's orbit were responsible for the climatic disruption and slow onset of a new ice age. But such orbital changes have sometimes been hypothesized as the catalyst for increased volcanic activity as well. Whatever the cause, at least one extremely severe volcanic eruption occurred during the period leading up to that famous starting date for the beginning of modern technology, and in line with my proposals, may have been a major event pushing tribal societies around the world toward radical changes in the effort to survive. Stringer and McKie tell of the eruption:

> The Earth was gripped by continuing climatic mayhem as changes in its orbit began inexorably to push down the world's thermostat. Then to add to these woes, about 74,000 years ago, Mount Toba on the island of Sumatra exploded in the largest volcanic eruption of the past 450 million years. The blast was 4,000 times more powerful than that of Mount St Helens and would have sent more than 1,000 cubic kilometres of dust and ash into the atmosphere, plunging the earth into years-long volcanic winters. Summer temperatures could have dropped by as much as twelve degrees centigrade, while forests shrank, deserts spread, and in eastern Asia, a prolonged winter monsoon would have swept clouds of dust from inland deserts round the globe... Having evolved in warm Savannah sun we nearly perished, huddled in cold dismal misery as volcanic plumes straddled the earth.[205]

Examination of some recent charts of sea-levels and estimated prevailing temperatures reveals that this event seems to have brought on the most severe period of the last ice age. The post-Eemian climate between 115Ka to 75Ka is

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204 *African Exodus, op. cit.,* p186-187

205 *African Exodus, op. cit.,* p153. Stringer and McKie give the reference for the eruption as M. Rampino and S. Self, 1993, "Climate-volcanism feedback and the Toba eruption of ca. 74,000 years ago", *Quatenary Research,* 40: 269-80.

now known to be more changeable, the Greenland ice core data showing several abrupt reversals, yet the same data show that after a significant warming period peaking about 75Ka to 80Ka, a severe decline then led into the very coldest period of the ice age.[206] The whole of the post-Eemian climatic turmoil may well have been the partner to those original African seeds of modern culture which required such periodic stimulation to grow. The volcanic eruption might have been one of the most important instances driving societies to improvise and find technological solutions in order to survive, the aftermath of the Mount Toba event would have disrupted flora and fauna world-wide, it would have caused food shortages, driven intentional and planned migration in search of resources, brought about wide experimentation with new foods and medicinal plants, and perhaps even led to the appearance of new or altered species of psychedelic plants such as the fungi which might have proliferated in the wake of widespread forest death and an abundance of decaying vegetation. *Psilocybe cyanescens* for example, usually a fairly rare species, thrives in decaying woody debris and in colder climes. It is also one of the more powerful Psilocybe species.

Since all the previous climatic changes of the Eemian were fairly gradual, taking at a minimum several years to develop, it becomes difficult to choose a specific one as a candidate for the 'trigger' event leading to social psychoactive use. But in the Toba eruption and succeeding volcanic winter, we have an extremely abrupt event that surely caused the kinds of disruption required to change habits overnight. Thus the Toba eruption, although occurring a bit late for other parts of the argument here, might well have been the initial trigger event. This possible scenario does tie in with some further important evidence, however.

Ethiopia

If the Toba eruption is to be our catalytic event, or perhaps an additional one, looking for a geographical location where a psychedelically-enabled tribe might have suddenly appeared would lead us to the Abyssinian highlands of Ethiopia, a possible area of refuge and retreat for humans who were previously living in the Herto region, a lowland coastal region to the east. A recent BBC report[207] places the earliest yet discovered anatomically-modern humans there: a 160,000 year-old fossil find shows that modern, yet still proto-human beings existed there in a state of pre-human stasis for a very long time indeed. The Highlands to the west of the Herto[208] were a place where they might have escaped the drought and starvation the Toba eruption must have produced. It is of course impossible to say what psychedelic plants might have existed there at the time, with the radical climate disruption ongoing.

It is certainly a difficult task to sift and weigh all these factors in the attempt to propose a concise, or even an approximate scenario for psychedelic influence on early man. Two or more seemingly contradictory scenarios might well have happened simultaneously in different regions, or consecutively. The idea of psychedelic evolution is still too new, and much more work will have to take place with these new hypotheses in mind, trying to prove and disprove the many resulting implications before we can decide on a likely scenario. As I have said, this task is more than just the construction of a temporary model, it is an attempt to discover actual history and subject to real error. The evidence that I have presented showing *why* a psychedelic awakening is likely, nearly certain in my opinion, remains. The questions remaining to be answered are

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206 Ice

207 BBC

208 Herto

the *where and when* of the process.

Recent Evidence

I have been collecting studies that bear on my evolutionary scenario since writing it over 20 years ago. What is most obvious is that the entire body of evidence, pro- and con-, has become much more complicated to the extent that it becomes impossible to construct a time-line reasonably consistent with all the new facts and findings. It is even difficult now to evaluate the importance of certain events such as the Toba eruption, for example.[209]

As for human dispersal out of Africa, movements and migrations, genetic analysis, single- vs. multiple-origin theories of modern humans, et al., the findings of the past 20 years also complicate matters greatly. Three papers in the journal *Nature* by three of the original proponents of Out-of-Africa are worth reading,

Chris Stringer: "Human evolution: Out of Ethiopia", *NATURE* 423, 692 - 695 (12 June 2003)

Rebecca L. Cann: "Human evolution: Tangled genetic routes", *NATURE* 416, 32 - 33 (07 March 2002)

Alan Templeton: "Out of Africa again and again", *NATURE* 416, 45 - 51 (07 March 2002)

However, in a more recent paper entitled "Why we are not all multiregionalists now" Chris Stringer shows that the multiregionalist camp is alive and well—well maybe not all *that* well... He concludes,

> 'Modernity' was not a package that had a single African origin in one time, place, and population, but was a composite whose elements appeared, and sometimes disappeared, at different times and places and then coalesced to assume the form we see in extant humans. However, during the past 400000 years, most of that assembly took place in Africa, which is why a recent African origin still represents the predominant (but not exclusive) mode of evolution for *H. sapiens*. Rather than saying 'we are all multiregionalists trying to explain the out-of-Africa pattern', it would be more appropriate to say 'we are all out-of-Africanists who accept some multiregional contributions'.[210]

I have duplicated some these papers at http://www.psychedelic-library.org/Kosmos Additional articles are also available there, a few among many to be found online, and illustrate well the rapid and perhaps bewildering developments concerning human origins:

"Bones of Stone Age boy challenge single-origin theory of modern humans" *Cosmos* September 2017

"Humans Migrated Out of Africa to Escape Drying Climate, New Study Says"

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209 See for example "Doubt over 'volcanic winter' after Toba super-eruption", May 1, 2013, Oxford University and "Evidence suggests Toba volcanic winter was less lethal than thought" March 2018. Yet we have the much more recent eruptions of Samalas and Tambora described at Wikipedia, both in Indonesia and both of which *did* cause serious climatic disruption, even in far-away Europe and North America, with reliably documented agricultural failures, epidemics, famine... So it remains for me still entirely possible that Toba did cause crisis conditions in E. Africa, as I suggested above. I have duplicated these website articles at http://www.psychedelic-library.org/Kosmos in case they should be removed from their original locations.

210 Stringer, Chris: "Why we are not all multiregionalists now" Trends in Ecology & Evolution Volume 29, ISSUE 5, April 2014

Science News, October 2017

"Revising the story of the dispersal of modern humans across Eurasia", *Science Daily*, December 2017

"Human Dispersal Out of Africa: A Lasting Debate", *Evolutionary Bioinformatics* 2015:11

"Rethinking the origins of Homo sapiens" *Cosmos* 16 July 2018

"Did Our Species Evolve in Subdivided Populations across Africa, and Why Does It Matter?" *Trends in Ecology & Evolution* Volume 33, ISSUE 8, P582-594, August 01, 2018

Assimilating all the latest studies in the rapidly developing field is quite beyond my enthusiasm at this point, and I think it has now become impossible to devise a scenario that would show with any degree of confidence the when and where of a psychedelic awakening. It even seems that any general agreement and theory of human origins and dispersal is becoming ever more difficult to achieve. A great many viewpoints are contending.

If a "when and where" enquiry seems increasingly to lead to little that is useful for understanding human origins, what remains for positing a "psychedelic awakening" are the following considerations:

1) The extremely long period between the first anatomically modern humans and—much later—the rapid flowering of cognitively modern humans. This consideration applies even if the definition of anatomically-modern has become more diffuse. Presumably the minor anatomical differences that qualify as modern, cited by Stringer and others for the various groups back to 300,000Ka, still leave all representatives as possessing complex language and other characteristics that are required for psychedelic awakening and the genesis of a shamanic tradition.

2) The prevalence of psychedelic shamanism worldwide, both in recorded history and evidence of the same in prehistoric times. See again the map at The Psychedelic Library.

3) The little disputed claim that the seeking of altered states of consciousness is a *human universal.*

4) The general agreement that culture arose rather rapidly compared to the long period of stasis, and that there seems to have been some kind of trigger event that precipitated the trend.

Points number 1 and 2 effectively "sqeeze" the argument from both sides. Our exceedingly long gestation during which we were not-yet-cognitively-human (and a couple of thousand years is a *long* time, not to mention *200 or 300 thousand* years) indicates that HR-governed existence was a powerful evolutionary characteristic completely holding us in check. This in turn necessitates a sudden and overpowering catalytic influence to overcome the long-enduring social-scale HR-governed mode of existence. And then the near-universal prevalence of psychedelic shamanism later in the game, not very long after the proposed awakening, must demonstrate that these practices originate *from and during* the awakening period, and that they *accompanied* modern humans in their migrations to all parts of the globe. If ASCs are to be a human universal, it seems obvious they would not have sprung into existence at random, independently, yet world-wide. Surely there would have been many groups of humans who never developed the shamanic tradition were it not a *universal*. Yet in every corner of the earth, we see one or more psychoactive plants becoming of major importance. This could not have been a hit-or-miss occasional scenario, but rather it indicates that before his

migrations Early Man *already knew* about psychoactive plants and had a shamanic tradition for governing their use.

> As man emerged from his brutish past, thousands of years ago, there was a stage in the evolution of his awareness when the discovery of a mushroom (or was it a higher plant?) with miraculous properties was a revelation to him, a veritable detonator to his soul, arousing in him sentiments of awe and reverence, and gentleness and love, to the highest pitch of which mankind is capable, all those sentiments and virtues that mankind has ever since regarded as the highest attribute of his kind. It made him see what this perishing mortal eye cannot see. How right the Greeks were to hedge about this Mystery, this imbibing of the potion, with secrecy and surveillance! What today is resolved into a mere drug, a tryptamine or lysergic acid derivative, was for him a prodigious miracle, inspiring in him poetry and philosophy and religion. Perhaps with all our modern knowledge we do not need the divine mushrooms any more. Or do we need them more than ever? Some are shocked that the key even to religion might be reduced to a mere drug. On the other hand, the drug is as mysterious as it ever was: "like the wind that comes we know not whence nor why." Out of a mere drug comes the ineffable, comes ecstasy. It is not the only instance in the history of humankind where the lowly has given birth to the divine. Altering a sacred text, we would say that this paradox is a hard saying, yet one worthy of all men to be believed. [211]

211 Wasson, R. Gordon. *The Road to Eleusis* chapter 1.

9. Challenges

Our business is to wake up, we have to find ways in which to detect the whole of reality in the one illusory part which our self-centered consciousness permits us to see.

—Aldous Huxley

It doesn't require a hyperactive SN (Salience Network, the salience detection system) to *perceive and understand* that we are facing multiple, unprecedented challenges today.[212] We are surely—and much sooner than has so far been predicted—destined to experience an uncharted zone of catastrophe as the repercussions of anthropogenic climate change affect essentially all aspects of life on earth.

For *perception and understanding* to reliably lead to a radical shift in one's attitudes, intentions, motivations and occupations, however, some renewed activation of the relevant salience at a higher, more urgent level may well be required. It may require viewing our present ecological and political crises as if for the first time, for example, as if we had been suddenly transported from our more comfortable, secure life as it was in the early 1960s, when the future looked brighter and brighter (for most of us in the West, at least), when the future for our children promised them even a better life than we enjoyed, when there wasn't the least suspicion we were rapidly *destroying* our own future and the future of the planet itself and doing it through the very same collective style of life that was so satisfying and prosperous in that earlier age.[213] Waking up to today having known nothing of its stark horror in advance would surely be a monstrous shock and SN activator in the extreme.

Psychedelically-assisted SN amplification may well provide such an as-if-for-the-first-time experience. Perceptions and situations we have grown used to, become bored with, even very threatening ones and especially ones we feel powerless to do anything about, may once again seem critical enough to incite us to some action. And psychedelic training for an individual over a period of

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212 I find it stultifying to write about today's eco-politico horrors, so I won't attempt it here. In any case, those already in the know need no further convincing and those who have not been paying attention usually don't want to hear about it, least of all from someone trying to convince them of impending catastrophe. I therefore let others do such writing, and there are many who do it well, and forward to my newsletter subscribers the most salient articles I come across, always titled [THS] The Harder Stuff. From there, they can take it or leave it, but at least I have given a try at spreading the Real News. For any readers here who would like to sample some of these sendings, I've made several of my recent ones available. An example of the kind of information and analysis you can read there, and this is a good one as it bears upon *both* our ecological and political situation: From an article entitled, *Is Climate the Worst Casualty of War?* "The money misspent on the Iraq War—a war for oil, let's not forget—could have purchased the planetary conversion to renewable energy. Just sit with that a moment..." If that doesn't activate your SN to meltdown conditions, you should get an fMRI immediately as there must be something wrong with it.

213 For my purposes here I am, of course, exaggerating the *pros* of that earlier age and ignoring the *cons* that so many citizens of the world were experiencing. For my middle-class generation, in the USA, things mostly did seem on the up-and-up. College was very affordable, well-paying jobs awaited graduates, McCarthyism had been slain, we had "better living through chemistry" and cigarettes didn't really cause cancer, music and the arts were blossoming after the rather drab post-war 1950s scene... and we seemed to have a few politicians and statesmen who actually merited their positions.

time may well sharpen his everyday abilities for self-catalyzed critical evaluation, creative thinking and action, inspired by a more vivid perception of salience in his everyday consciousness. By contrast, for many the SN may be calmed, stifled and rendered quite *hypo*active by repeated or continuous exposure to what might otherwise be seen as critical and requiring immediate action. If a ship-full of extra-terrestrials suddenly landed, appeared to everyone everywhere on all the TV channels and their chief announced, "We are taking over for your own good", salience detection systems would universally be operating at full blast—especially for those high-ranking types in the Pentagon. But over the next days and weeks, as little seemed to be changing, most of us would get used to the idea (excepting those in the Pentagton I'd reckon), and the frenetic activity of our SNs would subside. It would take a new twist on the situation to re-activate the perceived salience of the original event, perhaps a new proclamation: "For starters, first thing tomorrow we will hold court to see who is most responible for the sinful degradation of your once-beautiful planet". (Pentagon higher-ups begin soiling themselves, especially upon hearing the Biblical term).

The primary neurocognitive importance of the salience detection system; how the SN is controlled and used by individual consciousness; how and why due to evolutionary necessity it ordinarily maintains an everyday, default-mode operation where most events and thoughts are overwhelmingly deemed hum-drum, of little consequence; and how the gain of the SN might be radically increased by various age-old methods mentioned previously or with psychedelic assistance so that one's very existence may suddenly be perceived for the miracle and mystery that it in reality is; all this has been explored here in previous chapters. The role that psychedelically-assisted SN increase might have played in the sudden appearance of cognitively-modern humans was the subject of the previous chapter, and here I would like to take a look at what role the effect might have played in ancient Greece, the 1960s social upheavals, and for the future of our home planet.

Eleusis

In the year 395 A.D. Alaric the Goth and his merry band of Onward Christian Soldiers overran and destroyed the Temple at Eleusis, the holy place where the famous and two-thousand-year-old celebration of the Eleusinian Mysteries had been practised. The central feature of that yearly celebration, initiation, and revelation was the partaking of a powerful and mysterious psychedelic potion, the *kykeon.* Far from being a minor and obscure sect, the Mysteries had been for centuries a central and important religious experience and inspirational revelation whose initiates included essentially all the great names of Greek antiquity. Its importance, along with the secret of the divine and psychoactive sacrament used in the yearly celebration, has only in the past few decades been adequately revealed despite earlier, mostly unproductive speculation by scholars.

The first, and still today seminal publication that set the stage for a meaningful clarification of the Eleusinian Mysteries is *The Road to Eleusis,* first published in 1978.[214] It was the reading of this book, shortly thereafter, that ignited my own musings about the larger implications of psychedelic use by the *entire family of man,* back to our first prehistoric roots in Africa. The significance of Eleusis strongly suggested that the use of such plant drugs had been a global phenomenon of long development and of utmost importance to tribal man—a human universal—so that "drug use" must extend back into the most remote periods of human prehistory.

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214 R. Gordon Wasson, Albert Hofmann, Carl A.P. Ruck: *The Road to Eleusis: Unveiling the Secret of the Mysteries.* Harcourt Brace Jovanovich in 1978

In ancient Greece, the yearly celebration at Eleusis was a major religious and intellectual event that had profound effects on Greek society. A few lines from Wasson's chapter in *The Road* should convey the special salience of the Celebrations:

> We are dealing with a central theme of Greek civilization in antiquity. Early Man in Greece, in the second millennium before Christ, founded the Mysteries of Eleusis and they held spellbound the initiates who each year attended the rite... Aristides the Rhetor...in the 2nd century A. D. pulled aside the curtain for an instant when he said that what the initiate experienced was "new, astonishing, inaccessible to rational cognition", and he went on: "Eleusis is a shrine common to the whole earth, and of all the divine things that exist among men, it is both the most awesome and the most luminous."
>
> Plato tells us that beyond this ephemeral and imperfect existence here below, there is another Ideal world of Archetypes, where the original, the true, the beautiful Pattern of things exists for evermore. Poets and philosophers for millennia have pondered and discussed his conception. It is clear to me where Plato found his "Ideas"; it was clear to those who were initiated into the Mysteries among his contemporaries too. Plato had drunk of the potion in the Temple of Eleusis and had spent the night seeing the great Vision.
>
> The ancient testimony about Eleusis is unanimous and unambiguous. Eleusis was the supreme experience in an initiate's life. It was both physical and mystical: trembling, vertigo, cold sweat, and then a sight that made all previous seeing seem like blindness, a sense of awe and wonder at a brilliance that caused a profound silence since what had just been seen and felt could never be communicated: words are unequal to the task. Those symptoms are unmistakably the experience induced by a [psychedelic]... [215]

> For among the many excellent and indeed divine institutions which your Athens has brought forth and contributed to human life, none, in my opinion, is better than those mysteries. For by their means we have been brought out of our barbarous and savage mode of life and educated and refined to a state of civilization; and as the rites are called "initiations," so in very truth we have learned from them the beginnings of life, and have gained the power not only to live happily, but also to die with a better hope.[216]

The Eleusinian Mysteries were in the exclusive hands of the Eumolpus and Kerykes families, and for close to two thousand years, these hierophants governed with autocratic authority the rites at Eleusis. The rites were open to all, women and men, young and old, slave and free. There were only two requirements: that initiates be able to understand the Greek language used for the ceremonies; and, more importantly, that they have no unatoned blood guilt on their hands.

I never gave much thought to the second of these requirements, I guess I just assumed that a murderer should, as punishment perhaps, not be permitted the redemption that a psychedelic experience might provide. More recently however, I'm wondering what the logic of this prohibition might have been. In modern times it may be probable that a murderer, especially a first degree, cold blooded one, having become used to the idea that he has murdered and not very repentant, might well have a psychedelic experience that turned into a very bad trip indeed. Suddenly understanding the deep significance of his act... Perhaps over the centuries the Eleusis priests had seen

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215 *ibid.*

216 Cicero, *Laws II*, xiv, 36

such people become a danger to themselves and especially to others during the long night of awakening.

In an operative and very real sense Eleusis was a 2000-year ongoing Psychedelic Revolution, a revolution of *collective awakening*. Each and every generation was awakened at Eleusis, and Greece progressed from a quite primitive culture to heights of civilization not re-achieved for many centuries. It might be objected that the ancient Greeks fought plenty of wars of both defense and conquest, practised slavery and capital punishment, and that such practices are not illustrative of an "enlightened society". Yet our Enlightenment ancestors of the Renaissance were equally, if not more so guilty. And what the Catholic Curch and its Inquisition did to the New World could hardly be called a product of an "advanced civilization". And... what we are doing to the planet today certainly reeks of barbarism and collective stupidity. Ancient Greece may therefore still stand in many respects as the best-achieved example of an advanced civilization.

In microcosm, the isolated hypothetical society described in Aldous Huxley's novel *Island* exemplifies the idea of a continuing psychedelic revolution as was the case in ancient Greece. The story is of a society on a Pacific island, founded by a Scottish doctor and an enlightened Buddhist king, that for over a hundred years was an ongoing and unique experiment in civilization. *Moksha,* a psychedelic fungus, like Eleusis' *kykeon,* was a central agent of influence that guided the initiation of the young into adulthood, and also provided a refresher awakening for citizens in later life: it was an activator of salience perception taken ceremonially for mystical, intellectual and cosmological insight.

Every generation must undergo the initiation/awakening experience, whether as youngsters as in *Island,* or in adulthood too, as it is not something literal that can be taught from a book or lecture and preserved in a society by rote educational means. The revolutionary aspect of both societies, is just that psychedelic awakening plays a continuing and necessary role in bringing the human issuing from evolutionary necessity out of his barbarous and savage mode of life and educating him toward a refined state of civilization. (paraphrased from Cicero.) Without the continued application of the psychedelic awakening, under the guidance of a society's wise elders/priests/initiates, succeeding generations will more or less quickly fall back into the "barbarous and savage mode of life."

A great many philosophers and scientists have tried to identify the source of humankind's destructive nature, our default-mode "barbarous and savage mode of life," our rampant "malignant aggression" as Erich Fromm has called it. The multitude of high-octane minds that have attempted a theory might discourage most from entering the fray, but since I have already gone way out on a great number of limbs in previous chapters, I will yet again ignore the possible consequences of a serious fall. I never did finish a paper on the subject as I promised, but the main elements of my idea were presented to ENCOD's *Drug Peace Conference: a counter-event to the annual meeting of the UN Commission on Narcotic Drugs,* Vienna, 7-9 March 2008. The lecture dealt with several topics, so I have excerpted the relevant part relating to malignant aggression.

A 60s Revolution?

The very first psychedelic revolution was of course the one that awakened proto-man from his 200,000 year cognitive slumber. And we can view ancient Greece and the Rite of Eleusis, and perhaps one or two additional ancient societies[217] as ongoing psychedelic revolutions. But does anyone yet fully

217 For instance the very early tribal societies which lived on the Tassili Plateau of southern

understand what happened in the 1960s, especially during the last years of the decade? I have a rather large collection of books about the 60s and 70s, and although they are filled with an amazingly detailed collection of facts, stories, theories and opinions, I don't think so. And I am loathe to call a merely momentary societal upheaval whose stated goals remain woefully unfulfilled a "revolution". A rebellion that fizzled might be the more appropriate term. A true social revolution, a revolution of collective awakening, is not something that happens overnight with the seizure of power by a group whose collective behavior is usually as reprehensible as of those whom they overthrow.[218] Gilad Atzmon recently wrote:

> While [...] so-called revolution is occasionally fueled by ideological or social 'insight,' the 'revolutionaries' are more often anti-insightful by nature. They spend their energy reducing an 'insight' into a fixed regime: a doctrine, a dogma, a strategy, a pile of commandments, a kosher jargon or a list of 'deplorables.' While Marx, for instance, offered an insightful materialist vision of our past as well as our human future, Marxists are generally an anti-insightful bunch. Their doctrine reduces Marx's insights into Torah and Mizvoth, restricting and suppressing creative thinking. So-called 'revolutionaries' are too often a collective of 'counter-revolutionaries;' people who do little but kill insightfulness. They identify symbolically with the 'revolution,' while they sustain a reality of stagnation.[219]

Most people today, I would venture, identify the concept of revolution with the political and/or military overthrow scenario, a regrettably common and widely-reported phenomenon in the modern world, the very thing we would need to remedy and outgrow as a goal of a revolution of awakening. It seems few are even aware of the possibility of a collective awakening kind of revolution that leads to a radically changed-for-the-better society as exemplified by Eleusis. Something important *did* happen in the 1960s, but revolution it was not, although there certainly were several *revolutionaries* who played important roles, individuals whose ideas *might* have incited true revolution. Those with a penchant for denigrating the 60s—a common agenda for some of the books I have purchased—may well call it revolution in their quest to show that the 60s "failed" and led to no valuable result, just like so many other violent and confused seizures or attempted seizures of power.

Although the events of the 60s therefore do not qualify as the kind of revolution promoting lasting insightful changes in our modern world as did Eleusis for the Greeks, the fault lies perhaps more with the difficulties of igniting true revolution today than with the revolutionaries behind the 60s changes. The revolutionaries for the most part *were* insightful and might have succeeded in another epoch that was not subject to the anti-enlightment tsunami of the modern age, a suffocating wave of conspicuous consumption and commercialism, advertising, multimedia saturation, false propaganda and

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Algeria, and Çatal Hüyük in central Anatolia, discussed by Terence McKenna in his *Food of the Gods*.

218 I suppose I am at odds with the political science definition of revolution as it appears at Wikipedia, but if "Scholarly debates about what does and does not constitute a revolution center on several issues," for my purposes here I will consider a "revolution" not merely as "a seizure of power by a group whose collective behavior is usually as reprehensible as of those whom they overthrow," but rather as a series of events which leads to a new, enduring, more enlightened version of a society, one that has solved and outgrown its previous collective contradictions that required the revolution as a remedy. One that parallels our original awakening ca. 70KYA, or the awakening of Greek society from its "barbarous and savage mode of life."

219 From the website writings of Gilad Atzmon, "Insightfulness and Palestine", October 14, 2018.

MainStreamMedia rabble-rousing, and Fake News, Social Media ersatz discussions, comfortable living, entertainments, hobbies and vacations and a multitude of trivial distractions,

> When life is a struggle, experience is vivid, simple joys are profoundly felt, intelligent choices are critical to survival and acts of heroism are both necessary and valued. When life is comfortable, people become satiated and hard to satisfy, tastes become decadent and effete, questions of safety are pushed off on specialists and spontaneous acts of individual heroism and bravery come to be treated as symptoms of social maladaptation.[220]

The Inside Dope

So what did happen in the 1960s? As I recently remarked to a friend, jokingly at first, but then the phrase revealed something important: “The 1960s could only have happened after the 1950s.” At first glance, the statement would easily qualify as a Yogi Berra-ism. But more importantly, it implies a prediction: such changes as those that happened then are unlikely to happen again. The 1950s ushered in a unique combination of events and political situations in the West, and spreading further afield; a post-war and post-50s attitude of optimism and enthusiasm, above all centered in the“baby-boom” generation; a rapidly expanding standard of living for Western populations; a prosperity never before seen for the middle class; but then the abrupt appearance of rebellion and protest by the very group having benefitted so handsomely from the new affluence: university-age students. Parents, grandparents, the older generations and establishment society didn't catch on right away, wondering why the baby-boomers were not appreciative of their never-seen-before freedoms and wealth. Established power was of course doing what it always had done, exploiting, warring, capitalizing, accumulating, scheming, investing, acquiring, but that was so normal and on-going throughout history as to seem a minor blot on the landscape of “modern prosperity.” Salience networks were inured to the business-as-usual specter. And then...

It was the sudden introduction of that notorious salience-detection activator, LSD, which awakened a core group of the young—mostly university students—they became the revolutionaries of the 60s for whom the reality of the centuries old staus-quo antics of the Power Elite became *intolerable.* The shameful barbarity of America's destructions in Southeast Asia was the principal focus that then magnified perception of what had been done to Japan with the A-Bomb, what had been done to North Korea, what was being perpetrated on planet Earth through business-as-usual practices. All became issues as intense and salience-awakening as if they had suddenly appeared in a true age of peace.

Nearly all chroniclers of the 60s have been loathe to credit psychedelics as the principal catalyst of the 60s revolutionary spirit, the unrest and protest movements, but without understanding the core function of psychedelics as salience-awakeners, and how that would be the very thing that could produce an outbreak of revolutionary motivation. Adopting that ignorance, the importance of psychedelic awakening was—and still is—easily ignored, or even denied outright. Many of the books I have that tell the story of the 60s do not even have an index entry for LSD. And when they do, it typically leads to a paragraph about Timothy Leary and surely not Huxley, Watts, Osmond, *et al.*

Now a great many youngsters took LSD in the 1960s, but only a few of them became the true revolutionaries. No matter, since the 80% who are neither the

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220 Dmitri Orlov: "Barbarians Rampage through Europe's Cemetery"

biophiles or necrophiles common to all societies[221] will reliably blow with the wind, following those who have the most exciting agenda, or who shout the loudest... Normally it is the necrophilic types who shout the loudest and lead entire nations off to perpetrate ridiculous crusades and crimes against humanity, but this time it was different. The revolutionaries had an agenda that was itself an awakening for a great many. The Age of Aquarius beckoned, and with it a vision of a New Age that might overcome the evils of the time. Naïve perhaps, but we were young and very few had even an inkling of just how entrenched was that evil. Today it is all too obvious.

In the 60s we used to insist that merely being in the presence of someone undergoing a psychedelic experience could induce a "contact high," and perhaps it was so and rallied a great many youngsters around the ideas and motivations of the revolutionaries. And for those youngsters who *did* take LSD but needed direction and guidance, the revolutionary message of the insiders could not be ignored. Later in the decade and into the early 1970s, the perceptions of urgency concerning Vietnam and other issues began rubbing off on a great many who obviously had not taken any psychedelic salience-activators: parents and grandparents, religious leaders, labor union members, even a few Congressmen began to see the light. A collective contact high?

And who were these true revolutionaries? Probably not many of the usual suspects I fear, but out of respect I will not name them, many of them brought to prominence by the same wave of commercialism, advertising, and multimedia saturation that puts the trivial on a pedestal and pretends the profound is too difficult for the public to grasp. But I will go ahead and mention a few who *were* 60s revolutionaries:

Certainly the early SDS (Students for a Democratic Society) members who published the *Port Huron Statement*, written in 1962 by Tom Hayden, a University of Michigan student and then the Field Secretary of SDS, with help from 58 other SDS members.[222] The document was ahead of its time and remains a most revolutionary statement, largely because we can easily see that little has changed for the better, the *Statement's* criticisms are more valid than ever on issue after issue:

> Not only did tarnish appear on our image of American virtue, not only did disillusion occur when the hypocrisy of American ideals was discovered, but we began to sense that what we had originally seen as the American Golden Age was actually the decline of an era...
>
> The American political system is not the democratic model of which its glorifiers speak. In actuality it frustrates democracy by confusing the individual citizen, paralyzing policy discussion, and consolidating the irresponsible power of military and business interests.
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> [T]he localized nature of the party system does not encourage discussion of national and international issues: thus problems are not raised by and for people, and political representatives usually are unfettered from any responsibilities to the general public except those regarding parochial matters. Second, whole constituencies are divested of the full political power they might have: many Negroes in the South are prevented from voting, migrant workers are disenfranchised by various residence requirements, some urban and suburban dwellers are victimized by gerrymandering, and poor people are too often without the power to obtain political representation. Third, the focus of political attention is

221 From the research and writing of Erich Fromm, see *The Anatomy of Human Destructiveness,* online.

222 see Wikipedia and Port Huron Statement Original Draft and Still Radical at 50 and a slightly corrected (spelling and typos) version I have taken the liberty to prepare, at The Psychedelic Library

> significantly distorted by the enormous lobby force, composed predominantly of business interests, spending hundreds of millions each year in an attempt to conform facts about productivity, agriculture, defense, and social services, to the wants of private economic groupings.
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> What emerges from the party contradictions and insulation of privately held power is the organized political stalemate: calcification dominates flexibility as the principle of parliamentary organization, frustration is the expectancy of legislators intending liberal reform, and Congress becomes less and less central to national decision-making, especially in the area of foreign policy. In this context, confusion and blurring is built into the formulation of issues, long-range priorities are not discussed in the rational manner needed for policymaking, the politics of personality and "image" become a more important mechanism than the construction of issues in a way that affords each voter a challenging and real option. The American voter is buffeted from all directions by pseudo-problems, by the structurally-initiated sense that nothing political is subject to human mastery. Worried by his mundane problems which never get solved, but constrained by the common belief that politics is an agonizingly slow accommodation of views, he quits all pretense of bothering. ...
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> Past senselessness permits present brutality; present brutality is prelude to future deeds of still greater inhumanity; that is the moral history of the twentieth century, from the First World War to the present. A half-century of accelerating destruction has flattened out the individual's ability to make moral distinction, it has made people understandably give up, it has forced private worry and public silence.

It may be astonishing to some unfamiliar with 60s happenings that such a document was penned in 1962 and that it was such a penetrating critique of those times, the entire post-war era in fact, and that the document might as well be analyzing today's world. Exactly the same situation persists today, but in spades: today's version of such problems is greatly magnified. Nothing important criticized by the *Statement* has been improved, and much has gotten far, far more threatening.

The manifesto that in another age might have been a blueprint for collective awakening was ignored by mainstream “intellectuals” not to mention the mainstream media and the Power Elite. Instead the promoted images and stories showed that we indeed had a “revolution,” but of the trivial, one of styles but not substance, of hair-styles but not styles of use of that powerful 1.3kg organ just beneath... and thus was the momentum of the university protest scene siphoned off into largely irrelevant side-issues. Oh yes, we got a little womens' lib, a reinforced civil liberty or two, some gay rights, a little ecological consciousness (we banned DDT, wowee!), but the only *real enemy of mankind* remains as omnipresent as ever: WARFARE.

Some 60s revolutionaries may well, like the president who didn't inhale, deny that LSD played a role in their personal awakening. As I have made clear in previous chapters, a few individuals in every age seem to have an inherent ability to discern salience to its full degree while the great majority may need some assistance. So although a claim to self-inflicted revolutionary motivation may be true for a few, I will nevertheless maintain my claim above that the 60s may well have been as unproductive of revolutionary spirit as the 50s except for LSD. Perhaps as the truth about what a psychedelic experience is—presented in the several chapters here—becomes more widely known, some who have been loathe to admit their own involvement might come clean. I consider it very lucky indeed, and *an honor* and certainly not a personal stain or error to have been awakened by psychedelic experience.

I will mention but one other of the 60s revolutionaries, and in this case I am not even sure of his actual identity, but have only a pamphlet that was written

by him, *What is the Psychedelic Revolution?* What I find exceptionally interesting in this document is that the author anticipated to some extent that the core effect of psychedelics is salience enhancement. He calls it an increase in *noticement*, *i.e.,* a psychedelic drug increases one's *noticing.* He seems not to be aware of Huxley's or Watts' similar conclusions discussed earlier here:

> When we talk about psychedelics "expanding awareness", we are really talking about one of two kinds of awareness—man's awareness of what he experiences, as opposed to his awareness of what he feels or does in response. The flow of our lives is rooted in the dialectic of the two—in the tension between objective experiencing, and subjective responding. Substances like LSD and mescaline are unique, as stimulants that accelerate the perceptual, experiential awareness with far less acceleration of behavioral response. Most stimulants accelerate behavior, or speed everything up in lockstep; psychedelics speed up the rate at which you notice. Now normally, as we interpret reality, we pick and choose stimuli, so that as we construct an ideology, we create a reality, which is tested and defined through further behavioral response, emerging as "material reality". Psychedelics speed up "noticement", the concrete perceptual awareness which elicits response from the organism: you have far more stimuli, for which you develop stronger, (more compact, inclusive interpretations... In effect, a consciousness-expanding drug is a deconditioning agent. It speeds up "noticement" [salience detection] so much that, cinemagraphically, noticing becomes continuous.[223]

What is the Psychedelic Revolution? also anticipates my model of psychedelic experience as involving a *suspension of habit routines.* It is, of course, an entirely different type of document than *The Port Huron Statement* in many respects. I hope the present reader will spend a little time with these two essays since—despite their age—they are critical for understanding our present precarious situation and what might be done about it. They both cover much of the same territory, but from radically different perspectives, the *PHS* from an almost mainstream, university-intellectual position, the *Revolution* paper from an underground, and radical insider viewpoint. The two documents are separated by merely six years, but a great deal had changed during this period.

What is the Psychedelic Revolution? begins with an observation similar to mine, that the original revolutionary spirit of the early 60s had been largely siphoned off into irrelevancies, and then straight away insists that meaningful revolution would necessarily involve widespread use of psychedelics as catalysts and teachers. *The Port Huron Statement* of course makes no reference whatever to drugs of any sort, nor should it have since it is above all an analysis and citique of the faults of the American system of government, a dissection of its glaring deficiencies at home and deplorable actions on the international stage. The latter part of the document makes a great many recommendations of what needed to be done to remedy the problems, and these recommendations act also as penetrating criticism, for in reading each one I can well imagine a hypothetical member of the Power Elite reading them and at each one snorting, "fat chance of *that*, kid". Nevertheless, if you should read them you will conclude as I do that they are the most level-headed and obviously necessary measures that *still* need to be taken to ensure not only world peace, but now the very survival of life on earth.

The Power Elite—along with the rest of humanity—will of course finally loose the game in the not too distant future, and it is curious that no significant reformist alliance has formed among them because *it is they who*

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223 From *What is the Psychedelic Revolution?* (signed) - a provo - early 1968. Provisionally attributed by an expert of the literature of the times to Chester Anderson.

have the most to lose. There will be no escape to alternate mansions, or on yachts beating a path to southern Pacific Isles, or to far-northern bunkers and hideaways, or on spaceships to destinations that don't even exist. At least we, middle-class commoners, will lose at most a small house, and (joy!) perhaps an abusive mortgage and other debt, and (I hope it is over rapidly) our lives...

> The main thing we have to lose under the current system is a livable earth. As Marx (a great devotee of science) would certainly recognize if he were granted a posthumous research trip into the 21st century, capitalism has not produced its own working-class "gravediggers" (the "revolutionary" industrial proletariat he thought he saw coming into being in his time). *The profits system is not the "dialectical" midwife of socialism. It is an environmental as well as social, political and spiritual cancer—an exterminist endgame wired to take us beyond mere precarity to full-on extinction.* If all of us—from the bottom up and top down—don't figure out how to become the undertakers of this commons-plundering rentier regime, the insight of onetime leading neoconservative philosopher Francis Fukuyama will be borne out, though not in the sense he meant: Capitalism will indeed mark "the end of history and the last man," through literal extinction.[224] (italics mine)

Rich dudes! Wealthy Ladies! Listen up!! Are you hip to what we are saying here? You are going to lose the whole shebang! And it won't be 50 years down the road, make no mistake about it. Maybe you are just an old fossil for whom an admission of accessory to ecocide matters not *a wit* since you think you will be long dead when the hard rain begins to fall. You would be embarrassed to admit you were wrong? Oh! the shame and disrespect! OK, I accept your reticence, but actually you are of little importance and no one would even remember whether you atoned, unless... unless, use your gluttonous fortune to do something truly redemptory? Why bother?

We are addressing instead the youngsters among you, the new money, those who will not only themselves lose the lot, but your even younger youngsters, sons and daughters, who will not even inherit a wind that is not radioactive[225] or so charged with poisons that life after 30 will be just waiting around to see what flavor of cancer will be your fate. So, rich youngsters, you *have the most to lose, and oddly, just perhaps, the most to gain as well. What's that I said?*

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224 Paul Street, "Our 'Rentier Capitalism' Is One More Nail in Earth's Coffin" Truthdig.com

225 Readers who think the danger of intentional or accidental nuclear war is the least of our worries should pay close attention to Daniel Ellsberg's just published book, *The Doomsday Machine: Confessions of a Nuclear War Planner.* Ellsberg was the insider's insider, held every known and unknown-to-many security clearances that ever existed, and he *knows his stuff in spades.* He reveals, for example, that there are and have always been a great many fingers (not just the president's) poised over—and authorized to push—the Big Red Button, many of them very itchy indeed. And he documents that the world came much, much closer to nuclear holocaust during the Cuban Missile Crisis than has heretofore been revealed. The problem, as he shows, is that during such crises, even though the presidents and prime ministers may show great restraint and willingness to compromise, the top levels of military command begin to escape from their control and tend to be quite gung-ho on going to war *on their own volition* no matter what the consequences. Again and again, Ellsberg documents *Dr. Strangelovian* scenes that have actually happened and that might well have had the same consequences as in the film. During the Cuban Crisis, unbeknownst to the U.S., there were four Soviet submarines in the Caribbean, *each carrying a nuclear-tipped torpedo*. Only due to a rather miraculous chain of events, two days after everyone thought the crisis already resolved, were the nuclear torpedos not fired. The book is a testament to the monumental insanity of infatuation with and belief in the effectiveness of "nuclear deterrence" and the quite obviously deranged coterie of "war planners" inhabiting that accursed pentagonal insane-asylum just outside of Washington D.C.

What is Needed?

A psychedelic revolution, obviously. (More snorts from the old-money Power Elite.) Yes, yes, I agree, a bottom up revolution today has little chance of even beginning, granted.[226] Today's university students are too burdened with debt and fear, and LSD is not on their menu. And a middle-class revolt is even more unlikely. They too are over-burdened with debt and fear. And whatever distant outposts of revolutionary spirit that may exist amongst either group is rapidly dispersed into trivial issues. The Power Elite have seen to that. But hold on a minute. The title of this chapter is "Challenges".

I have been reading *Giants: The Global Power Elite* by Peter Phillips. An excellent review of the book by Robert J. Burrowes was recently published by the ICH website[227] and merits a careful reading by both we commoners and members of the Elite. Here is a short excerpt from Burrowes' review:

> So what are the implications of this state of affairs? Phillips responds unequivocally: 'This concentration of protected wealth leads to a crisis of humanity, whereby poverty, war, starvation, mass alienation, media propaganda, and environmental devastation are reaching a species-level threat. We realize that humankind is in danger of possible extinction'.
>
> He goes on to state that the Global Power Elite is probably the only entity 'capable of correcting this condition without major civil unrest, war, and chaos' and elaborates an important aim of his book: to raise awareness of the importance of systemic change and the redistribution of wealth among both the book's general readers but also the elite, 'in the hope that they can begin the process of saving humanity.' The book's postscript is 'A Letter to the Global Power Elite', co-signed by Phillips and 90 others, beseeching the elite to act accordingly.
>
> 'It is no longer acceptable for you to believe that you can manage capitalism to grow its way out of the gross inequalities we all now face. The environment cannot accept more pollution and waste, and civil unrest is everywhere inevitable at some point. Humanity needs you to step up and insure that trickle-down becomes a river of resources that reaches every child, every family, and all human beings. We urge you to use your power and make the needed changes for humanity's survival.'

I would wholeheartedly agree with Burroughs, however, when he doubts that such an appeal will have any measurable effect:

> As I read Phillips' insightful and candid account of elite behavior in this regard, I am reminded, yet again, that the global Power Elite is extraordinarily violent and utterly insane: content to kill people in vast numbers (whether through starvation or military violence) and destroy the biosphere for profit, with zero sense of humanity's now limited future... For this reason I do not share his faith in moral appeals to the elite, as articulated in the letter in his postscript. It is fine to make the appeal but history offers no evidence to suggest that there will be any significant response. The death and destruction inflicted by elites is highly

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226 As I finish writing these lines for first publication, December 7, 2018, a significant wave of protest is arising in my home country, France, and has been powerful enough to cause the government to reverse course on a few of its recent abusive edicts. A new May 1968 is occurring in the streets of Paris, including the violence that always seems necessary to arouse the rich rulers from their torpor. How far will this protest go? Hard to say, but one negative point is that there is little or no mention of ending warfare—this is not an anti-war movement—it seems the protests, like so many before including most of our 1960s demonstrations, are merely asking the Power Elite for a few more crumbs from its table. A bottom-up revolution can do little else unless it goes to such extremes as did one other French protest that had the power of the Guillotine to back up its demands. And today's Power Elite has enough hired thugs to squelch that possibility, so far at least.

227 Available at Information Clearing House and mirrored at The Psychedelic Library .

> profitable, centuries-old and ongoing. It will take powerful, strategically-focused nonviolent campaigns (or societal collapse) to compel the necessary changes in elite behavior.

And I also have doubts that any group, or any campaign *outside* of the Elite itself will be allowed to materialize. If there is to be revolution, a revolution of awakening, it will necessarily have to sprout from insiders, maybe just a few as with the revolutionaries of the 60s, who then will convince—one by one, if necessary—his cohort of insiders to wake up and "find ways in which to detect the whole of reality in the one illusory part which our self-centered consciousness permits us to see."

Insiders, Elites, remember my warning! *You own the most, and therefore have the most to lose by continuing on your present course! You WILL lose EVERYTHING.* Go ahead and ignore my warning, but don't pissandmoan when you can't find any cooks or butlers to wait on you in your far-north hideaway, or, for that matter, find any food. We commoners will all be long gone so your laments will fall on dead ears.

"Increased nature relatedness and decreased authoritarian political views after psilocybin for treatment-resistant depression"[228] And there are quite a number of other recent studies using psychedelics to "treat" various psychological problems, or simply to study how psychedelic experience can allow and encourage a person to re-orient his priorities to find a more satisfying mode of living. Much of this research is being conducted in Europe, using the search engines will help to locate it.

Want to give it a try? Think it might show you the nature of your current course and possibilities for another? Get together with a couple of your trusted friends and offer to make a substantial donation to one of the research groups to undertake a study like this: whether members of the Global Power Elite can be brought to their senses and form a core group within, using their wealth and influence to awaken their fellows to what must be done, and soon.

But let us be clear about "treatment" of conditions. Psychedelics do not "treat" depression or any other listed psychological problem in the way that an antibiotic treats an infection—this should be evident from an understanding of this Theory of Psychedelic Experience. At most we can say that psychedelics "treat" a flat, repressed, hypoactive SN, a chronic and self-reinforcing slide into the hell of seeing little "meaning or purpose in life," experiencing little if any of that "nature-relatedness" that the above mentioned study motivated in patients or test subjects. All (or almost all normal) people *know* the importance and desirability of nature relatedness, and recognize the sorry state of current society that is libertarian-authoritarian oriented, but life in that kind of society essentially forces obedience to it, which then enforces false beliefs in the person that despite drawbacks, it is the most rational, perhaps only choice. Only with psychedelically-assisted SN amplification can such a person break the illusions. Depression in this sense is a person deeply *knowing* the unsatisfactory nature of his life and *sensing* that there is a better way to live, but finding day-to-day no escape. A psychedelic "treats" this condition only indirectly.

The psychedelic experience encourages the person to re-order priorities, to make changes in life he already knows are the "cure" to his condition, but by force of habit is incapable of making unassisted. The person "cures himself". But only because the catalyst enables him to judge the relative importance of different pathways, and the necessity of following a better, more satisfying one.

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228 *Journal of Psychopharmacology* Published January 17, 2018, Taylor Lyons and Robin L Carhart-Harris.

> Psychedelics actually break habits and patterns of thought. They actually cause individuals to inspect the structures of their lives and make judgments about them. — Terence McKenna

Similarly to being clear about what a psychedelic experience "treats," we should not allow our psychedelic experience to convince us of the independent reality of the "spiritual" be it contemporary religion, shamanic events, alien beings, or whatever. All these manifestations, realizations, visions, or existences are figments of our own personal outlook, explicit and implicit, accessible and unconscious, derived not from the drug but from past experience, learning and prejudice, much of it totally hidden from our everyday consciousness and some of it owing its existence to important but forgotten events from early life. As with the saying, The only Zen you will find on a mountaintop is the Zen you bring there: If a psychedelic experience should convince me suddenly of the existence of Jesus Christ whereas before I was a non-believer, we may not say that a psychedelic drug thus proves the existence of JC! If I should take a dose of LSD and at the peak of the experience I experience an earthquake, this does not demonstrate the drug can cause earthquakes! This is not to deny the reality or actual existence of any such creed or person (or earthquakes for that matter)! It is only to insist once again that the psychedelic experience reveals nothing independent of the experiencer. The psychedelic experience merely provides a pathway, through the radical increase in salience detection, to our own interior being.

Salience Amplification and Habit Routine Suspension. Try it, you'll like it. Then tell your friends. Organize and finance a research project in... perhaps Switzerland or the U.K.. Keep it all very quiet at first, let the awakening spread from person to person as an insider's secret. But hasten, we've no time to waste. I tempted you with the thought: The most to gain? Obviously.

Targets

Considering that WAR is the *#1 guilty party* in climate degradation,

> The money misspent on the Iraq War—a war for oil let's not forget—could have purchased the planetary conversion to renewable energy... The Pentagon uses more petroleum per day than the aggregate consumption of 175 countries (out of 210 in the world), and generates more than 70 percent of this nation's total greenhouse gas emissions, based on rankings in the CIA World Factbook.[229]

And considering that the *#1 perpetrator of war* on the planet is the USA, we may quite logically conclude that to avoid total climate meltdown and probable extinction of most life forms, the ability of the USA to continue its Masters of War strategy must be rapidly and radically reduced, i.e., *eliminated.* Warfare must be our first target, for all other measures to ensure continued survival, *even taken together,* if warfare continues, *will not meet with overall success.*

And considering that those who now wield military power in the USA have not the least intention of reducing war at all, much less radically and rapidly, it is therefore imperative that a newly invigorated, *well-financed, anti-war movement be a primary project for all biophiles, those who love life.* So where is the anti-war, peace movement today? Submerged in protests for a dozen comparatively unimportant issues, I fear.[230]

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229 Climate the Worst Casualty of War or mirror at The Psychedelic Library

230 See Philip Giraldi, America Has No Peace Movement – Blame the 'White Supremacists'

Environmentalism, many philanthropic initiatives, which include general conservation, preserving/restoring ocean health, transportation electrification and fighting climate change, planting trees, saving rain forests, protecting animals, cleaning up the oceans, reducing coal use and CO2 emissions, wind farms, solar electric, electric cars,

> NONE OF THESE, EVEN TAKEN TOGETHER, WILL ACHIEVE THE NECESSARY GOAL UNLESS THE NUMBER ONE THREAT IS FIRST STOPPED: WAR.

You may say, "Oh, but I feel that it's important to promote recycling, veganism etc. etc., surely that will help." OK, granted, but only like bailing out a sinking Titanic with a thimble. The Global Power Elite and their Masters of War at the Pentagon are not content with the devastation so far produced in this new century. They have bigger plans: *Bipartisan panel: US must prepare for "horrendous," "devastating" war with Russia and China*[231] The article concludes,

> The American ruling class is entirely committed to a course of action that threatens the obliteration of not only much of the world's people, but of the American population itself... This is not the madness of individuals, but the insanity of a social class that represents an outlived and bankrupt social order, capitalism, and an equally outlived political framework, the nation-state system. And it can only be opposed by another social force: the world working class, whose social interests are international and progressive, and whose very existence depends on opposing the megalomaniacal war aims of American capitalism.

Yet again, the appeal for a bottom-up revolution that is impossible.

If there is to be a planet-saving revolution,
it will have to be an inside job this time.

The odds of this are only marginally better than zero, but as far as I can see, there is no other possibility other than the ship-full of extra-terrestrials mentioned above.

Make War on War

OK, but how to do it? A frontal attack on the Pentagon, even by all the New Money Power Elite, is not worth planning. We all know that only Arab hijackers can defeat the Pentagon's air defense system. The Pentagon does have one weakness, however, and it was well-exploited during the Vietnam War. Soldiers turned on their commanders, caused significant SNAFUs in their equipment and organization, and when they got home became anti-war campaigners who convinced many to burn dreaft cards, flee to Canada, or as I did, to Mexico. A shortage of willing and reliable soldiers did have a significant impact on winding down the war, and might again. A problem now, however, is that soldiers actually volunteer to participate in war madness. They do this in most cases since they are unemployed, probably still living at home, with no realistic hope of a future livelihood or profession, family,... and the military makes big promises to them. Once they are inducted, indoctrinated, and sent out to murder in foreign lands, they are beyond reach. They fear losing even the slender rewards the military has promised them, even though they can see

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231 Mirrored at The Psychedelic Library

that the most important thing they will likely receive is a case of Post Traumatic Stress Disorder.

Causing a shortage of soldiers must start with preventing youngsters from enlisting. This might be accomplished, but it could be very expensive, and here is where the New Money Elite's main asset could be decisive. As many war veterans as possible should be hired outright to contact those youngsters about to enlist, and these youngsters too could be hired to form a sort of *army of peace* numerous enough to haunt the nation's enlistment centers, letting prospective recruits know the truth about the abominations they are about to take part in.

You have the cash. You could hire an army of... at least many thousands.

You own the means of spreading (true) propaganda that can convince youngsters to just say no to murder, and to let the world know what you are doing and why.

Inspiration for resistance: the Catonsville Nine[232]

If there are enough of you, the Pentagon's resulting counterattack will not work. They will have to offer compromise. But their offer should not be accepted, for it will be like a three-pack-a-day smoker's promise that he will "cut down". If there are enough of you and your names are simply too big and important to ridicule, the fate of the the Catonsville Nine will not be yours. You will, quite to the contrary, be in a position to indict the Masters of War and bring their ecocidal game to a halt.

So what if you need to spend most of your fortune? As must be obvious, you were soon to lose it in any case. But you may not lose everything, you may not lose the one home we all have. IF you are successful, however.

The second part of *The Port Huron Statement* remains a template for what needs to be done next: Under the heading "What is Needed?" are exceptionally well thought out and highly detailed recommendations on such issues as: Universal controlled disarmament; The task of world industrialization; America must abolish its political party stalemate; Institutions and practices which stifle dissent should be abolished, and the promotion of peaceful dissent should be actively promoted; Corporations must be made publicly responsible; It is not possible to believe that true democracy can exist where a minority utterly controls enormous wealth and power; The influence of corporate elites on foreign policy is neither reliable nor democratic; The allocation of resources must be based on social needs; How should public vs. private domain be determined?; How should technological advances be introduced into a society?

Many recommendations are given also concerning mental health institutions and prisons, education, agricultural policies, the civil rights struggle...

> The United States' principal goal should be creating a world where hunger, poverty, disease, ignorance, violence, and exploitation are replaced as central features by abundance, reason, love, and international cooperation. To many this will seem the product of juvenile hallucination: but we insist it is a more realistic goal than is a world of nuclear stalemate. Some will say this is a hope beyond all bounds: but it is far better to us to have positive vision than a "hard headed" resignation. Some will sympathize, but claim it is impossible: if so, then, we, not Fate,

232 "Resistance Is the Supreme Act of Faith" mirrored at http://www.psychedelic-library.org/THS/Resistance.pdf

> are the responsible ones, for we have the means at our disposal. We should not give up the attempt for fear of failure.

About the only thing that has changed significantly is that *The Port Huron Statement's* recommendations and goals are today much more than just the right thing to do: they are necessary for survival. The Global Power Elite that in the 1960s ridiculed the *Statment's* goals as "the product of juvenile hallucination" is today the same clique but with new faces, *but there is a new development:*

> They too are threatened with the results of their own policies. Has there ever been a more spectacular case of fabulous castles built on...sand?

Rats on a ship destined to sink are said to divine the future, and abandon their habitat *en masse* in port. But I wonder if they stand around nervously as the ship prepares to sail, waiting to see who will make the first move before collectively rushing for the exits?

We must learn to live together as brothers
or perish together as fools.
Martin Luther King Jr.

10. Chemistry

The following sections describe what I have found to be the best method for preparing the simple amides of lysergic acid such as LSD, using ergotamine tartrate as the starting material. Over the years I have met a few other "underground chemists" and read books and articles by and about them, and all seem to claim they had found or invented the "best" method for making LSD, while never specifying exactly what it might be! There are also a few "recipe books" available from various sources, and they also do not accurately present the procedures described below nor any alternative ones that work as well. And none even mention the "best" procedure for combining lysergic acid with simple amines (the second part of the preparation). So here I have decided to reveal all, with the conviction that if someone should decide to try to manufacture LSD or similar amides, he might as well have the best information available. The following is not to be taken as an encouragement to do so, and in fact should *dis*courage "amateurs" from even trying. Although I have described the specifics of the procedure in great detail, only those with previous laboratory experience, excellent technique, and university training will be capable of understanding and performing the following with any measure of success, especially with regard to the quality of the product.

Nevertheless, to rebut any objections to my description of these methods, there are really no secrets in the following—all the tricks and specifics of my method can be found in the scientific literature, available in any good university library. The only minor difficulty being to know, from experimentation, which particular tricks work best at each stage of the procedure. Experienced chemists would have little trouble understanding and applying the details described here—many would judge my detailed descriptions as obvious in many cases. Yet amateur untrained persons would not get past many stages in the process. Nevertheless some of the tricks are quite tricky (!) to find in the literature, such as the use of sodium dithionite to protect the ergotamine from decomposition during hydrolysis. I found just a single brief mention of this technique, and was happily surprised at how effective it was.

My requirements for a "good" or "best" method are that it is suitable for use in a small clandestine laboratory, using a minimum of equipment and chemical reagents, especially ones that are difficult to obtain, highly toxic, polluting or dangerous to use or dispose of. Another requirement is that the solvents used should be for the most part reclaimable for further use. Thus, for example, Hofmann's original method for activating lysergic acid by producing lysergic acid chloride hydrochloride using phosphorous trichloride and phosphorous pentachloride, although it works reasonably well, requires bulky equipment (a glove box with a side chamber that can be pumped out to vacuum), excellent ventilation and personal protection, the performance of a tedious sublimation of the PCl5, and leaves one with a nasty mixture of phosphorous compounds in a highly flammable solvent, not easily disposed of and impossible to reclaim for further use. Additionally, due to their possible use for nefarious activities such as the manufacture of explosives, most phosphorous compounds may be difficult to obtain. Several other methods for activating lysergic acid so that it will react with an amine can be found widely in both scientific and amateur literature, but they all suffer from significant drawbacks and do not produce a product that is as easily purified as do the procedures below.

Hydrolysis

The hydrolysis of ergot alkaloids to lysergic acid was first performed by Jacobs and Craig in 1934[233] and is easily accomplished in methanolic solutions of potassium hydroxide (KOH), but the size and purity of the yield of resulting lysergic acid depends critically on the proportions of reagents used, the technique of the separation, the protection of the alkaloids from oxidation and other decomposition, and the reclaiming and conversion of isomeric iso-lysergic acid from by-products of the process.

Procedure[234]

A solution is prepared containing 155 grams KOH, 6 grams of sodium dithionite ($Na_2S_2O_4$), 550 ml H_2O, and 100 ml methanol (MeOH),[235] and added to a 2-litre round bottom standard-taper flask containing 100 grams of ergotamine tartrate. No pretreatment of the alkaloid is necessary. A two-necked distilling head is fitted to the flask with a vertical condenser for refluxing, and permitting the immersion of a sealed tube for the bubbling of nitrogen (N_2) below the surface of the hydrolysis mixture. A glass tube drawn out or fire polished to a small diameter at its tip is best.

The boiling flask is placed in an oil bath maintained at 125 degrees C, and N_2 is bubbled through the mixture, at first vigorously to assist the dispersion and solution of the alkaloid. As the mixture heats and the alkaloid dissolves, the N_2 stream is slowed to 2 or 3 small bubbles per second as measured from a tube leading from the top of the reflux condenser into an open flask of water. Too rapid a stream of nitrogen will bring over too much of the reaction solvent. Ammonia from the decomposition of ergotamine is trapped in this flask, and standardized acid may be used with a suitable indicator to signal the progress of the reaction.

When the mixture begins to reflux, its temperature should be about 92 °C, and refluxing is continued for a further 1 hour. At this point about 95% of the ergotamine has been hydrolyzed, and the reaction is stopped by removing the flask, stoppering it, and cooling it under running water. Continued refluxing does not improve the yield and in fact results in some decomposition, to be avoided. 450 ml of cold MeOH is added to the mixture and the flask and contents are placed in a freezer for several hours or overnight to attain a temperature of minus 15°C or lower.

It is convenient at several points in this and other processes to have a large reserve of thermal ballast at this temperature, and to that end, a 25 to 50 litre open-topped drum of alcohol-water mixture (or antifreeze mixture) should also be kept in the freezer, a large chest type freezer is quite suitable. This drum of cold liquid is convenient for the final cooling of the acidified hydrolysis solution, and as a source of refrigerant for the condenser of a rotary evaporator. This is an essential piece of equipment for later procedures.

Alternatively, one can use a refrigeration compressor and home-built heat

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233 Jacobs, W. A.; Craig, L. C., "The Ergot Alkaloids: II. The Degradation of Ergotinine with Alkali. Lysergic Acid," *J. Biol. Chem*., 104 (1934), 547-551. and Jacobs, W. A.; Craig, L. C., "The Ergot Alkaloids: III. On Lysergic Acid," *J. Biol. Chem*., 106 (1934), 393-399.

234 All flasks, condensers, the rotary evaporator et al. are 24/40 standard taper Pyrex laboratory glassware.

235 Readers familiar with the chemical literature will notice that these proportions differ from those in the various classical hydrolysis recipes. This is due to my finding that the hydrolysis is highly temperature-dependent but only slightly dependent on the concentration of KOH. My proportions thus use less methanol, achieving a higher pot temperature, and the total amount of solvent to KOH ratio is more geared toward the next phase of the process, the sulfating of the hydrolysis mixture.

exchanger to provide cooling at -15°C. Insulated tubing, a small circulating pump, valves, etc. make up the rest of the apparatus, which in total should be smaller and more portable than a chest freezer.

The hydrolysis mixture, now cooled to minus 15°C, is poured into a 2-litre beaker, preferably of thin stainless steel to facilitate rapid heat transfer, and the beaker placed in an ice/salt bath to maintain as low a temperature as possible during the acidification process. If dry ice is available, a dry ice/alcohol bath is even better for maintaining a low temperature. A 50% solution of sulfuric acid in water is very slowly added to the dark clear hydrolysis solution, and a thick grey precipitate of mixed potassium and lysergic acid sulfates appears. A robust motorized stirrer with a cage-type impeller is handy for keeping the thick mixture well stirred. The temperature of the mixture is monitored, and not allowed to rise above zero degrees C. The rate of addition of H2SO4 must be adjusted accordingly.

When the mixture attains a pH of 3.0 to 3.5 as measured with pH paper, the addition of H2SO4 is stopped, and the stirring continued until the temperature once again falls to minus 15°C. The mixture must not be acidified below pH3. Congo red indicator paper may be used, it changes to a blue colour at the desired pH range. Just before the acidification is complete, a dramatic thickening of the precipitate will be noticed as the bulk of the lysergic sulfate precipitates out. The beaker and its mixture may be more quickly cooled at this stage by immersion in the drum of coolant in the freezer.

The proper filtering of the precipitates is somewhat slow and tedious but important for a high primary yield of product. The mixture is filtered through a large Büchner funnel by vacuum, a plastic or insulated funnel is best to avoid warming the mixture as it slowly filters. When most of the liquid has run into the flask, the filter cake will be seen to contract and cracks will form allowing air to pass. The filter cake must be continuously and rigorously pressed down with a spatula to avoid this happening, so as to finally produce a hard, practically dry cake of mixed sulfates. This cake, still in the funnel, is then washed with several small batches of pure methanol pre-cooled to minus 15°C, a total of about 200ml may be used. A polyethylene squirt bottle, or a trigger-operated spray bottle is handy for continuously washing the cake using a minimum of solvent. The yellow filtrate in the vacuum flask may precipitate a further small quantity of mixed sulfate, if it is significant it may likewise be filtered off and added to the next step. This is not necessary if only a small amount appears, as the acid filtrate will now be stored in a refrigerator for later recycling.

The washed filter cake is now placed in a large high speed blender/mixer, a spoonful of activated decolorising charcoal is added, and the mixture stirred for several minutes with a solvent prepared from 6% of concentrated ammonia solution in methanol. Enough solvent is added to produce a fairly thin suspension and after further stirring, the mixture is again filtered. The resulting filter cake is washed with a few aliquots of the same solvent and then removed from the funnel, and finally once again treated with 6% ammonia in methanol in the blender, and the combined filtrates are then evaporated in a rotary evaporator. The rotary flask should be a 2-liter round bottom pyrex flask that has been pre-tested at high vacuum, for it is important to evaporate the ammonium lysergate solution until it is a thick paste, and until all traces of ammonia smell have been evaporated off. This requires pumping out the apparatus to quite a low pressure, and one would not want to see the evaporating flask implode! The rotary evaporator (and accompanying vacuum pump as well) must be of top quality, with no leaks and an efficient condenser cooled to well below 0 degrees C by a pump recirculating the coolant stored in the freezer already mentioned (or the compressor/heat exchanger apparatus). A water bath and thermostat adjusted to about 30°C is used to warm the 2l

evaporating flask.

A continuous-feed tube into the rotary flask for mixtures to be evaporated is a further refinement, and a bleed needle-valve connected to the nitrogen cylinder/regulator to evaporator vacuum line allows easy control of the vacuum in the apparatus. The admission of nitrogen should also be used to re-pressurize the apparatus after an evaporation is complete. The more one prevents oxygen from mixing with the products being produced, the better will be the quality of the final yield.

The thick paste of crystallized lysergic acid hydrate remaining in the evaporating flask is washed out into a small beaker with portions of cold distilled water containing just a trace of carbonated water. The resulting slurry is then stirred and cooled in a coolant bath until it just starts to freeze, vacuum filtered, and the cake washed with additional aliquots of ice cold distilled water. The resulting dark clear filtrate is added to the acid filtrate stored in the refrigerator. The nearly white lysergic acid hydrate is then removed to a plate to dry overnight at 30 degrees C. The yield is normally about 30 to 32 grams of d-lysergic acid hydrate containing about 12% water of crystallization.

Treatment of Leftover Filtrates

The leftover solution consisting of the two filtrates from the above process can be stored in the refrigerator for some time, undergoing only slow darkening and decomposition. It contains some of the original sodium dithionite as well as its decomposition product, sulfur dioxide, both of which as antioxidants slow the decomposition of the remaining lysergic and isolysergic acid still in the acid filtrate. There is also a little unreacted ergotamine remaining in this solution. The following process first quantitatively extracts all the remaining alkaloid (mostly iso-lysergic acid) and then converts it to a further acidified solution of d-lysergic acid sulfate using the same process as for the hydrolysis described above. Since the remaining alkaloid in the acid filtrate amounts to about 20% of the total theoretical yield, it is advantageous to save the leftover acid filtrate solutions from 2 to 4 hydrolysis runs before extracting using the following process.

A one-pound bottle of a strong-acid ion exchange resin is converted to its acid form. A resin such as Amberlite IRA-120 in bead form, or an equivalent Dowex resin is suitable. Finely powdered resins have too slow a flow-rate, so the bead form is preferable. It is normally supplied in its sodium form and must be treated with several batches of 2N reagent-grade hydrochloric acid to convert it to acid form. This can be accomplished by first stirring the resin with the 2N HCl in a large beaker, filtering it, washing it with well distilled and de-ionized water to remove sodium ions, and then re-treating the resin with another batch of HCl. The process is repeated four times.

A slurry of the prepared resin in distilled water is poured into a chromatography tube of 60mm in diameter, and filled to about 60cm in length. Distilled water is drained through the column and the top of the resin layer may be protected from disturbance with a filter paper held in place by a heavy stainless steel or porcelain perforated plate. The previously stored acid filtrate solution is adjusted to pH3 to 3.5 if necessary and then slowly siphoned into the chromatography tube, being careful not to disturb the top surface of the ion-exchange resin, or let it run dry and thus admit air to the resin. The flow rate is controlled with a stopcock at the bottom of the tube. If the chromatography tube is poorly loaded or settles unevenly, or the top surface of the resin disturbed by introduction of solvent, the flow is likely to become uneven and maximum absorption and separation not achieved. The flow rate of the acid filtrate is adjusted to about 2 drops per second. Faster flow rates will not allow the alkaloids to be absorbed completely by the resin, and they will leak out the bottom well before saturation of the resin has

occurred. Several hours are required to absorb the acid filtrate. A chromatography tube of this size will normally absorb the alkaloids contained in the leftover solutions from 3 hydrolysis runs, i.e., from the hydrolysis of 300gms of ergotamine tartrate.

The progress of the absorption may be followed using a long-wave blacklight, the fluorescing lysergic acid alkaloids being discerned moving slowly down the column as the resin is progressively saturated. The resin itself fluoresces a dull green, whereas lysergic acid alkaloids fluoresce blue-white. The long-wave blacklight is an essential tool in all procedures with lysergic acid alkaloids, even small traces fluoresce intensely, especially if they are in salt form and dissolved in water or alcohol. In the darkened laboratory, the blacklight assists in finding and cleaning up all traces and spills of these pharmacologically very active products. Absorption of toxic ergotamine or lysergic acid itself through skin abrasions or by accidental transfer to the mouth is to be rigorously avoided.

When the blue-white fluorescing zone has advanced to within a few centimeters of the tube outlet, application of acid filtrate to the top of the tube is stopped, and distilled water is washed through the tube. This washing may be done at increased flow rates. The washing is continued exhaustively for several hours until the eluent has only traces of sulfur dioxide odor. The eluate passing through as the acid filtrate is being absorbed will contain copious amounts of SO2 and the process is best carried out in a fume hood with efficient exhaust fan. A liter of methanol is then passed slowly through the column, after which the alkaloids are then stripped from the column by elution with 7 percent concentrated ammonia in methanol. The methanolic eluate is concentrated to a small volume under reduced pressure in a rotary evaporator, and the resulting solution re-treated with methanolic KOH by the same method as the original alkaloid was hydrolyzed, and in the same proportions. This treatment with KOH hydrolyzes any remaining ergotamine but more importantly converts the iso-lysergic acid produced in the hydrolysis back into its d- (active) form. In solution, all lysergic acid compounds naturally equilibrate to a mixture of the d- and iso forms. In the case of lysergic acid itself, the equilibrium concentration is about 85/15 d-/iso. The re-equilibration of isolysergic acid and re-claiming of leftover products from hydrolysis can result in an overall yield of well over 90% of theoretical. The protective action of sodium dithionate is essential to this overall result.

Since the ion-exchange column method for recuperation of side-products is so effective, one might propose to use it to isolate the original yield, but the acid sulfate method, if a little tedious, works quite well with the quantities described: an ion-exchange column for separating the entire yield of a 100-gram hydrolysis would be much larger and more difficult to control. Also, resins are not nearly as cheap as sulfuric acid, and I haven't had much luck trying to reclaim them after use.

LSD

The first reference I found for the “best” method for LSD preparation was in a book[236] still available occasionally in used condition. In the section by Staab and Rohr we find: (Section 3.2, p72), “Reaction of *N,N'*-Carbonyldiimidazole with Carboxylic Acids to Form Imidazolides.” In a later section, 4.2, we are referred to the original paper[237] that describes the process for the preparation of lysergic acid amides. Those interested to read the originals should be able to find them easily in any good university library, but it is not necessary, since

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236 *Newer Methods of Preparative Organic Chemistry, Volume 5,* edited by W. Foerst, Academic Press 1968.

237 A. Cerny and M. Semonsky, *Coll. Czechoslov. Chem. Commun.* 27, 1585 (1962)

the reaction of lysergic acid with *N,N'*-Carbonyldiimidazole (henceforth CDI) is straightforward and easily accomplished, with just a few caveats.

Firstly, and of utmost importance, is the adherence to strict anhydrous conditions. CDI reacts vigorously with water, liberating CO2. If there is any significant amount of water in the reaction solvent, dimethylformamide (henceforth DMF), then the equivalent quantity of CDI will react with it before converting any lysergic acid. So, one must be able to purify DMF to a highly water-free state, and be able to accurately measure trace water concentration in order to know how much water remains. Chemists will know that it is in practice impossible to remove *every trace* of water from a solvent, and DMF is more difficult to dry than other solvents. So one must dry it to the best of the lab's capability, then measure the concentration of the trace of water that remains, and use just enough excess CDI to eliminate it. In this way, one can convert the lysergic acid totally to its imidazolide. To this end, the determination of water by the Karl Fischer method, using electrometric endpoint, is most effective. The chemist must master this analytic procedure before any attempt is made to react lysergic acid with CDI. The determination of trace water in DMF is a little more complicated than for other solvents, since the end-point will drift considerably over a few minutes. A series of determinations using DMF intentionally contaminated with small but precise quantities of water must be performed, to standardize one's technique.

As for the drying of DMF, this too is not as straightforward as one might hope. DMF is very much like water in certain respects, and even at its boiling point, 153°C, far above the boiling point of water, the DMF remains quite reluctant to give up its content of water. Since one will be reclaiming DMF after the reaction to be described below, there will always be some water in it, and drying agents will not do the trick. The reclaimed DMF will also have some benzene in it, for reasons to be described below, and this turns out to be very convenient, for distilling DMF containing 10-15 percent of benzene turns out to be the best drying method! As the DMF distillation pot is heated above the boiling point of benzene, 80°C, one will notice that the distillate in the condenser has droplets of water suspended in the immiscible benzene. Benzene and water form an *azeotrope,* and even without knowing the least thing about this thermodynamic magic, one may use it to advantage!

Even after the benzene has pushed over all apparent water, however, traces still remain in the distillation pot. The DMF may be dried further by continuing the distillation up to DMF's boiling point, changing the condenser that would now still have water adhering to it from the passage of the condensed azeotrope, and continuing the distillation until one has distilled about half the contents of the pot. DMF coming over after that will be about as dry as one can achieve. Again, the use of nitrogen is a good idea: as it is supplied in cylinders, it is essentially totally dry and can be used to fill or flush one's setup, such as the distillation apparatus. Use nitrogen at every opportunity to achieve and maintain anhydrous conditions!

As for CDI, its use has become more and more common since the first descriptions were published, it is an excellent reagent for preparing peptides, proteins, and otherwise difficult to synthesize chemical and biological molecules. It is quite expensive however, another reason to dry one's DMF to the maximum. One of its great advantages is that its only reaction byproducts are CO2 and imidazole, both innocuous for the product one has just synthesized. Compare that to the nasty byproducts resulting from other LSD synthesis methods. CDI is available from various chemical supply houses, but of course it is no secret what it can be used for - so, caution. CDI can, however by synthesized quite easily from imidazole and phosgene[238].

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238 See https://en.wikipedia.org/wiki/Carbonyldiimidazole and H.A. Staab and K. Wendel

But *phosgene!* you exclaim, where am I to obtain a notorious war-gas and how to handle it? Fortunately, phosgene (carbonyl chloride) is such a useful laboratory reagent that it is widely used and obtainable in small cylinders, or even better, as a 10-15% solution in benzene or toluene, perfect for the CDI synthesis.[239] In the process, it is reacted completely, so no nasty side products remain such as with other LSD preparation methods. Naturally, extremely anhydrous conditions must prevail in this synthesis too: dry the solvents meticulously, heat and pump out the glassware,[240] use nitrogen, etc. And again, use the Karl Fischer determination of water everywhere. The method also provides a very good way for determining the percentage purity of CDI. Since CDI reacts so swiftly with water in the air, just opening the bottle will produce a little decomposition. And the synthesis method will produce CDI of indeterminate purity according to how well one can perform it. So, one can add precisely weighed amounts of CDI to a solvent that has a pre-determined amount of water it it, then back-titrate the remaining water with Karl Fischer reagent, and calculate the percentage purity of the CDI. 80-95% is a common result, even for "pure" CDI purchased from a supplier.

Lysergic acid as produced by the above method contains approximately 12% by weight of water of crystallization, and, you guessed it, this water must be removed before reacting it with CDI. 50 grams of lysergic acid hydrate is thus dried under high vacuum in a vacuum-tested 2-liter round-bottom flask immersed in a stirred oil bath at 143°C. 140-141°C is not enough, and 145°C or greater will char the lysergic acid somewhat. Precise automated temperature control is therefore essential. It takes 2-3 hours to dry the lysergic acid, and it is beneficial to remove the flask from the bath every 15-30 minutes and shake the contents a bit, so as to mix the powder and avoid that the same part is always against the flask wall. Use nitrogen to raise the pressure inside the apparatus before this shaking. Caution is required at the beginning of the drying, since at vacuum, water vapor emerging from the powder can "blow" some if it out the flask! So, pump out the flask slowly and watch for the bumping/blowing effect. Slow and/or stop reducing the pressure until the lysergic acid powder "settles down". Use the needle valve bleed mentioned above to control the vacuum, and use nitrogen to refill the apparatus. At the end of the drying period one can add another flask to the setup containing a little P2O5 (phosphorous pentoxide, a very powerful drying agent.) Only a very small layer of P2O5 should be used. The P2O5 flask will be outside, not in the oil bath, of course. It is best if the tube connecting the two flasks is wide bore, the same as a 24/40 standard-taper joint. At this stage of the drying, the apparatus is pumped out to maximum vacuum of the pump. The last traces of water can thus be trapped by the P2O5, the surface of which becomes gummy in the process. Be careful disposing of the remaining P2O5 - it reacts rather violently with water.

The reaction to form lysergic imidazolide is straightforward: A suspension of 50gm dry lysergic acid in 1 liter of anhydrous DMF is stirred with a magnetic stirring bar, at room temperature, and an equimolar amount of CDI[241] is introduced all at once. If the flask is stoppered, the stopper might pop

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(1973). "1,1'-Carbonyldiimidazole". *Org. Synth.; Coll. Vol.*, 5, p. 201

239 Note that the analogous reagent prepared from imidazole and thionyl chloride is *not* suitable for preparing lysergic acid amides.

240 An apparently dry flask, for example, still has oodles of water adhering to its surface, and the only way to remove (most of) it is by pumping out the flask to high vacuum, heating it moderately, and then refilling the flask with dry nitrogen. Even 3-liter round-bottom standard-taper Pyrex flasks may be so evacuated, but not Erlenmeyer-style flasks which have the annoying habit of imploding!

241 The CDI must be calibrated for purity with the Karl Fischer procedure mentioned above.

out since the reaction yields CO2 whose pressure will slowly build up in the reaction flask. Remove the stopper from time to time. The escape of CO2 from the solvent is gradual, and indicates the success of the reaction. The suspension of lysergic acid should be fine and homogeneous so that the reaction can proceed rapidly. If there are lumps in the mixture, these will be slow to disperse and react. I have noticed that long reaction times allow considerable isomerization.[242] It appears that lysergic imidazolide has an equilibrium concentration much higher in the inactive iso- form than lysergic acid itself or the simple lysergic acid amides such as LSD (88/12 d-/iso-). The equilibrium of lysergic imidazolide is thankfully not very rapid, so if the lysergic acid is finely dispersed, it will all dissolve in a few minutes, and the amine, such as diethylamine, can be added after 10 minutes, 15 minutes maximum. Once reacted with the amine, no further isomerization occurs.

Introducing dry, finely sieved lysergic acid directly into DMF, however, results in the formation of gummy, difficult to disperse lumps. In order to achieve a fine suspension, the lysergic acid (well-sieved so that it is a fine powder) is first introduced into the reaction flask containing only 150ml of anhydrous benzene. A little more benzene may be added, the desired result being a not-too-thick slurry. The magnetic stirrer can usually achieve this without problems after several minutes. One may stop the stirring for a moment and observe the mixture to check for small lumps not yet broken up. Once the lysergic acid is in fine suspension, the anhydrous DMF may be slowly added, with continued stirring.

A small excess of CDI may be used, perhaps 3%, to ensure that all the lysergic acid will be quickly converted to its imidazolide. Small errors in the determination of CDI purity, trace water in the solvent, etc, can thus be taken into account. Any excess CDI present will react with the amine, however, and produce unwanted side products, so one must not use more than a small excess of CDI. Immediately before the addition of the amine, therefore, a small amount of water is added to the mixture, just enough to react with the theoretical excess of CDI. Lysergic imidazolide reacts only slowly with water, so as long as one adds the amine immediately after the water, no imidazolide should be affected. The reaction of imidazolide and amine is very rapid, but one may continue stirring the reaction mixture for 30-60 minutes.

Purification

The object of the following procedures is to obtain a slightly beige, nearly white crystalline yield of lysergic acid diethylamide tartrate. There are several phases to the purification, all fairly standard methods, and most professional chemists would probably modify my recommendations according to their previous experience with purifying such compounds.

The final reaction mixture from the above process is a DMF solution of LSD in its free-base form, an equivalent of imidazole by-product, some dissolved CO2, and minor amounts of various impurities and decomposition products. These latter compounds cause the mixture to be dark brown, or even a little reddish. The 4 principal steps to purification are, 1) evaporation to a thick syrup, 2) liquid-liquid extractions, 3) chromatography, and 4) crystallization.

1) The reaction mixture is evaporated to a thick syrupy consistency in the rotary evaporator. Dissolved CO2 from the reaction can cause sudden boiling-

A calculated excess of CDI must also be added to eliminate water traces from the DMF/benzene solvent, the concentration of which has also been determined with the Karl Fischer titration.

242 The formation of isolysergic imidazolide might be considered a drawback of the method, but it occurs only to a minor degree if the reaction is performed rapidly, and, similar to the conversion of isolysergic acid back to the d-form described in the hydrolysis section, I will describe below an effective process for converting iso-LSD back to its active form.

over at first, so lower the pressure slowly and cautiously using the bleed needle-valve, all the while observing the rate of condensation of solvent so as not to cause boiling. The benzene will of course evaporate over first, after which the pressure will need to be lowered significantly to get the DMF evaporating. The water bath can be regulated to 35°C.

2) When little or no further evaporation of DMF is possible, the flask is removed and the syrupy residue dissolved in 500ml dichloromethane[243] and introduced into a 2l separatory funnel. The organic (dichloromethane) layer is then washed with a few batches of water containing a trace of ammonia. The raw lysergic acid amide is then extracted into an aqueous solution of tartaric acid, and this layer then washed with several portions of dichloromethane. The extractions can be repeated if it is judged that further purification can be achieved.[244] If a significant amount of difficult-to-break emulsion appears between the extraction layers this might indicate that the reactions have produced excessive decomposition products.

The final aqueous/tartaric acid extract is neutralized with ammonia and the raw amide extracted back into dichloromethane. The solution is totally evaporated, whereupon the raw amide will puff up into a dry foam inside the evaporation flask. Be careful not to suck up any of the product into the evaporator body and condenser.

3) Chromatography. The raw amides are chromatographed over silica gel in a solvent mixture of 3:1 acetone:dichloromethane. The process is not so much a chromatography designed for complete separation of the components, but rather a batch purification that first removes the highly colored impurities which remain stuck at the top portion of the column, and then achieves an enrichment of the d-LSD isomer, which flows down the column a little more rapidly than the iso-LSD. As I mentioned previously, the equilibrium between the two isomers is about 88:12, but the small amount of isomerization that accompanies the formation of lysergic imidazolide might produce a raw amide mixture a little richer in iso-LSD.

The silica gel to be used should be intended for chromatography and be quite fine and light in consistency, indicating a very high surface-area to volume ratio. It might be necessary to try a few different “brands” to find the best for this particular use.

The chemist needs to develop a satisfactory and repeatable technique to load a chromatography column so that it will flow correctly. A poorly-loaded column will “leak” the mixture in spikes down the side or center, and not achieve a good result. For ~50gm raw amides a tube of 40-50mm diameter and 40-60cm length should suffice. (Larger diameter tubes are increasingly difficult to load to achieve a uniform flow.) The tube itself should be somewhat longer, so that the silica gel/solvent slurry can be poured into it in one go, and

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243 Chlorinated solvents such as dichloromethane are more closely regulated than in my day, since they contribute strongly to depletion of the ozone layer. I assume they are still available to laboratories since alternatives may not perform equally. Every effort to reclaim dichloromethane must be made to minimize the amounts needed. Dichloromethane is extremely volatile, so large amounts will pass through the rotary evaporator condenser and continue on through the vacuum pump. A cold trap at the exhaust end of the pump should be installed.

244 A convenient and extremely sensitive test to determine whether there are traces of lysergic acid compounds along with the impurities in the extracts (or anywhere else, for that matter) is as follows. A 5% solution of para-dimethylaminobenzaldehyde in methanol is prepared, and stored in a dropper bottle for use. A 2-3ml sample of whatever is needing a test is introduced into a small test tube, and a few drops of the DMAB solution is added. A few drops of concentrated sulfuric acid is then slowly added by dribbling it down the side of the inclined test tube with a small pipette or dropper from a dropper bottle. The H2SO4 will flow down underneath the sample/DMAB layer, and with a little jiggling of the test tube, a dark purple ring will form at the intersection of the two layers, its intensity proportional to the amount of lysergic acid compound present.

then allowed to slowly settle with only a very slow solvent flow allowed out the bottom stopcock. When the silica gel has apparently settled, the tube should be gently tapped so as to settle the gel to its final length. A filter paper and porcelain or stainless steel circular perforated plate should be carefully placed on the top to prevent the silica gel layer from being disturbed. The column is not allowed to run dry!

The raw amides are dissolved in ~50-100ml of the 3:1 solvent mixture. The resulting solution should not be too viscous or it will not flow onto the column evenly, but not so voluminous so as to prolong the time necessary to absorb it on the column. The solution can be siphoned in gradually, taking care not to disturb the top of the silica gel packing. When all the amide solution has been absorbed on the silioca gel, the elution is continued with the 3:1 solvent. Use a slow flow rate, especially at first, until it can be seen that no spiking is occurring as the amides flow down the tube. Dark colored impurities should be easily absorbed and trapped in the top quarter or third of the column, and a blacklight will assist in showing the progress of the amides. As they emerge at the bottom and are collected, each 100ml is removed and evaporated on the rotary evaporator to monitor the progress of the elution. When 70-80% of the original weight of raw amide has been collected, this d-form-enriched portion is thoroughly evaporated, the flask filled with nitrogen and stored in a refrigerator until one is ready to crystallize this main portion. The column is exhaustively eluted with further 3:1 solvent until very little weight is being removed. This portion will contain mostly the iso-LSD that was produced in the reaction and will be converted as described below.

Crystallization

150ml warm methanol is added to the main portion of the crude amide, in its evaporation flask, and the flask turned on the evaporator. No evaporation is effected, this is simply a convenient method to dissolve the crude amide in the rotating flask, immersed in the evaporator's water-bath at 30-35C. When the amide has dissolved, and equimolar amount of d-tartaric acid is added and the flask rotated again in the water-bath. The tartaric acid dissolves and then crystallization of LSD tartrate normally commences promptly, whereupon the contents of the flask is washed into a beaker with small portions of methanol. The beaker is then placed in the freezer to complete the crystallizing. The beaker may simply be covered with a plastic sheet held in place with a rubber band - no special protective measures are needed.

If crystallization does not begin spontaneously, even after the mixture has been placed in the freezer, a small amount of cold acetone may be carefully and slowly introduced via a pipette, as a layer on top of the methanol solution. *Do not use diethyl ether* as described in other recipes. There is no need whatever to have ether in the laboratory. Crystallization should then commence between the two layers. The acetone layer may be necessary sometimes, as when crystallizing secondary yields from filtrates, or if the amide solution is not of best purity. It appears that some impurities produced along the way can impede crystallization. A mixture of amides overly-rich in the iso-form may also not easily crystallize.

The crop of crystals may be cold filtered after a few hours residence in the freezer, and washed with a minimum amount of cold methanol. This primary yield can be simply dried in the open air at room temperature, since pure LSD tartrate is quite stable and unaffected by oxygen, except in the very-long term. Crystals of LSD tartrate, stored over several years with no special precaution, will slowly turn dark grey, but the decomposition is nearly all at the surface of the crystals, and quite minor: such darkened crystals, observed while dissolving in a little methanol or ethanol/water, will be seen to readily dissolve, and the resulting solution under the blacklight will show the typical

and strong bright blue fluorescence. I have not done any quantitative test, but I would estimate that even very old (10+ years), very dark samples are still 80-95% pure, contrary to what one may have heard about the sensitivity of LSD. In solution, or especially when exposed on blotter paper, gelatin squares, or in poorly made tablets however, decomposition is certainly an important factor. More on this subject presently.

Re-equilibration of iso-LSD

The secondary portion of raw amide eluted from the chromatography tube, presumably stored in a flask in the freezer, and all the various filtrates, washings, clean-up of small spills and whatever, may be combined and re-claimed/re-equilibrated using the following process. All tartrate must first be removed however, so the methanolic filtrate from crystallization and various washings must first be neutralized with ammonia and then extracted back into dichloromethane. The methanol will first be evaporated, then some water with a few % ammonia and dichloromethane added and the layers separated in a separatory funnel. The ammonia/water layer may be extracted with another portion of dichloromethane. The combined dichloromethane extracts can then be added to the flask containing the secondary yield obtained from the chromatography tube.

The dichloromethane having been evaporated, leaving again a syrupy residue that will puff-up under vacuum to achieve removal of all solvent, is then dissolved in methanol, and a spoonful or two of strong-base ion exchange resin is added. The resin must be in the OH^- form, and either the bead or powdered varieties of Dowex or Amberlite are satisfactory. Amberlite IRA-400 is suitable, but must be converted from the as-supplied chloride form to the OH^- form before use. Washing with a few portions of 2N reagent grade carbonate-free sodium hydroxide, in a procedure analogous to the conversion of the strong-acid resin used to re-equilibrate lysergic acid, is the method to use.

Under the influence of base, lysergic acid and its amides attain their equilibrium concentration between d- and iso- forms. Free hydroxyl, such as KOH solution (as in the hydrolysis process), might in this case cause some hydrolysis of the iso-LSD, and would also be more complicated to remove after the re-equilibration. The use of the OH^- form ion exchange resin neatly bypasses these drawbacks. The OH^-, although freely available for causing isomerization, is permanently locked to the ion-exchange resin and can simply be filtered off after the process is complete.

Not only does each lysergic acid compound exhibit a specific equilibrium concentration, 85/15 d-/iso- for lysergic acid and 88/12 for LSD, but the re-equilibration process is also specific to each compound for the time required. Lysergic acid in concentrated KOH re-equilibrates almost instantly. But lysergic acid amides, particularly LSD, require much more time to arrive at equilibrium.

The flask containing the free amides in methanol and the ion-exchange resin is consequently stirred with a magnetic stirring bar for one week. The resin can then be filtered off, washed with portions of methanol, and the solution evaporated to a thick syrup. One might then proceed directly to crystallization, but it will be observed that some decomposition has taken place since the product has not the light-yellow color of the original portion taken from the chromatography column. To achieve best purity, the chromatography is repeated for this second yield. ...And so on. Depending on the amount of starting material in both the hydrolysis and the imidazolide reaction, one will always have “leftovers” that can be re-treated to obtain further crops of crystals. The repetitive process is limited mostly by one's enthusiasm to produce the most from the least!

Dosing method

The final problem of how to distribute one's product has been solved in a few different ways. Dissolving the final crystal tartrate in (for example) vodka and dropping or absorbing the solution onto “blotter paper” has been popular since it can be done anywhere with a minimum of equipment.[245] But the method is certainly the least desirable for preservation of product purity. As the solution dries on the paper, LSD tartrate does not recrystallize, but forms an oil or gum on the paper fibers and thus loses the protective effect of being in the crystalline form. Blotter paper LSD has a limited shelf life, and can decompose significantly over a period of a few weeks, the rate depending on whether it is exposed to light, heat, humidity and perhaps even city air contaminated with acidic products emanating from factories, power generation, etc. On paper, the product is completely exposed to every whim of the environment. So exposed, significant darkening of the paper dose can be observed over weeks, even days. Coating the paper with an impermeable layer might help, but I haven't heard of it being tried.

The advantages of blotter paper do include, however, inspiring confidence in the product since there are very few drugs - even poisons - that are pharmacologically active at the dose range possible to absorb on a small square of paper. Way back when, there were often rumors that certain LSD products had been “cut” with speed or other products, but a tiny square of paper cannot contain an active dose of most of the proposed contaminants. Whether most consumers were aware of this is another matter. Blotter paper has another advantage: one can easily judge the condition of a blotter paper dose—and even verify that it is indeed LSD—by putting it in a small test tube and adding a few ml water. In a darkened room using a blacklight, the bright blue-white fluorescence[246] (mentioned in other sections of this book) can be observed dissolving off the paper. If the fluorescence is weak, or more yellow than blue, the dose is correspondingly weak and/or decomposed.

Occasionally, gelatin squares (windowpane) or sheets of 100+ doses appeared on the market, but this dosing method also suffers from the fact that the LSD is not crystalline therein, but still in a dissolved state. Much of the dose may, however, be protected from the air since it is inside the gelatin layer.

Well-made tablets certainly are the most desirable dosing method for preserving purity, since the LSD is still in its crystalline form, and most of it locked away from light and air inside the tablet.[247] In Mexico, I had brought along with me some Sandoz ergonovine tablets to use as standards, or comparisons with whatever I might extract or synthesize. As an experiment, I took a couple of tabs up on the roof and exposed them to the direct high-altitude high-UV sunlight for a couple of hours. Naturally, the surface of the tabs became much darkened, but breaking one in half showed that just under the surface, the bright-blue fluorescence was “as-new”. A tablet-making machine is, of course, not the easiest piece of equipment to come by, and not very portable either. Even the best pharmaceutical-grade tablet-making excipients might be hard to purchase safely.

For convenient and purity-preserving distribution of pure LSD to a few

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245 One enterprising chemist even invented a machine to automatically put 100 dose-calculated drops of LSD onto strips of filter paper - see *High Times* magazine, No. 42, February 1979.

246 The fluorescence is the same as that seen in quinine-containing “tonic water” for mixed drinks.

247 This assumes, of course, that the tablet-making mixture is prepared from crystalline LSD plus the excipient and mixed well, i.e., that the LSD is not first dissolved and “dropped” on a tablet.

friends or professionals for private “therapeutic” or heuristic use, a 1mg/ml solution in ethanol/water is quite stable over long periods of time, especially if kept in dark-colored dropper bottles in the refrigerator. Naturally, one must calculate the dose contained in one drop, etc.

Chemical Mysteries

Two further chemical enquiries of mine still need some resolution. The first deals with *ergine,* (lysergic acid amide, or lysergamide), and the second with an analogue of LSD that I prepared quite by accident but which I could never identify.

The problem of the psychoactive potency of ergine—or lack of it—has crept into the debate about the *kykeon* of Eleusis as well as the use of the same psychedelic molecule by the Central American shamans (*ololiuqui,* discussed in chapter 3 above). The problem was well covered by Dan Perrine in our paper “Mixing the Kykeon”, mentioned previously. Some researchers, including Albert Hofmann too, were never able to attain a significant psychedelic effect from either ergine or its isomer, isoergine.[248] Some have even proposed that the *ololiuqui* of Central America was probably little more than a placebo. Such a criticism would then have to include the *kykeon* if indeed my theory about its preparation is close to the truth.

But as Jonathan Ott remarked to us when we were writing "Mixing the Kykeon", and wondering how we might support our theory against the placebo crowd, in Central America the Catholic Church's Inquisitors much more frequently wrote about, and were apparently far more concerned about the use of *ololiuqui* than of *Psilocybe* mushrooms,[249] so it is hard to believe that the former had little psychedelic effect. And as my own experiments with *ololiuqui* extracts demonstrated, somehow the active principle of this shamanic drug could indeed be very powerful. And then there are a great many amateur psychonauts who have used and appreciated morning glory seeds over the years, few claiming they had little or no psychedelic effect.[250]

In a presentation at Basel in 2006, and later as the final chapter “Kykeon Chemistry” in an edition of *The Road to Eleusis*[251] I ventured the hypothesis that either ergine or isoergine alone, arriving in the brain, had a far less potent psychedelic effect than *the equilibrium mixture of the two.* Remember the comments above about how all lysergic acid compounds gravitate toward a mixture of their two isomeric forms, differing only in the direction which the

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248 What is not at all clear from the reports of Hofmann *et al.,* is whether the tested compounds were in their free-base or salt forms, and how the doses were administered, whether by directly-swallowed capsule, injection, etc. At first glance this may seem a trivial matter, but in fact may be the key to clarifying this mystery. See the rest of the argument below.

249 “*Ololiuhqui* was far more prominent as an entheogen here in Mesoamerica than those mushrooms — the mushrooms are mentioned only here and there by a few competent chroniclers; yet almost an entire book was devoted to denouncing mainly the *ololiuhqui* idolatry. The annals of the Inquisition contain many times more *autos de fe* for *ololiuhqui* than for mushrooms.” (Jonathan Ott: personal communication)

250 As for psychonauts using morning glory seeds, I remember one friend insisting he got excellent results by chewing the seeds thoroughly, and this may well be a much better way to ingest them since the re-equilibration of ergine might well occur in saliva, and the equilibrium proportions preserved before swallowing. Most who have tried using seeds find the taste is very bitter and disagreable, so may well have swallowed the seeds before they were adequately chewed. To avoid the taste others have taken powdered seed in capsules or wrapped up in a bit of tissue. In these cases there would be little or no conversion of ergine to equilibrium concentrations.

251 Wasson, Hofmann and Ruck, *The Road to Eleusis – Unveiling the Secret of the Mysteries,* Thirteenth Anniversary Edition, 2008, North Atlantic Books, Berkeley California.

amide side chain extends out from the main part of the molecule; And also the comments about the approximate equilibrium concentrations and time constants to establish the equilibrium under different conditions, different for each lysergic acid compound.

It was only recently that I discovered a paper that documented some facts about the ergine/isoergine transformation[252] that bear upon my suggestions. The lysergic acid compounds I had dealt with over the years were usually re-equilibrated in basic solution (see the above sections) but Martinkova et al. had found that ergine isomerizes to ergine quite rapidly, *in neutral, pH7 solution.* This finding provided a further clue that may help resolve this question of psychedelic potency.

For the moment let me continue my claim that the equilibrium mixture eregine/isoergine is the active principle at the brain's neuroreceptors when the shaman's *ololiuqui* or the *kykeon* is ingested. The point that the paper resolved was how the mixture in each case was produced. The shaman's recipe, as stated in an early chapter here, was to mix the powdered *ololiuqui* seeds with (presumably neutral, pH7) water, wait for a short time, and filter off the liquid portion which was then used in the curing or ceremony. During the short waiting time, the equilibrium mixture would therefore automatically be produced, even though the seeds themselves originally contain almost entirely the ergine isomer. At Eleusis, the preparation method I suggested would also have allowed ergine to remain for a time in neutral or basic conditions, and thus equilibrate. So in both cases the equilibrium mixture is automatically produced by the method of preparation.

What happens next is that the psychedelic preparation is ingested, and immediately finds itself in a highly acid medium in the stomach. Once these alkaloids are in acid solution, the ring nitrogen at the 6-position takes on a proton to form the salt form of the alkaloid. The molecule therefore carries a positive charge and the re-equilibration reaction that proceeds via enol formation at the 8-position is radically impeded or entirely prevented. Thus whatever mixture, or either isomer alone, arrrives in the stomach, it will become protonated and maintain its ergine-isoergine distribution until absorption, moving through the blood, and arriving at the brain's neuroreceptors. If you ingest ergine alone, (or isoergine), only that isomer alone will arrive in the brain. If you ingest the equilibrium mixture, then both isomers will be bathing your various neuroreceptors simultaneously. It should also be pointed out that it will always be the salt form arriving in the brain, the alkaloids having passed through the highly acid, protonating conditions of the stomach, and also being much more soluble than the free base, non-ionized form.

This scenario is the simplest, most parsimonious hypothesis and so most likely closest to the actual events involved in taking these preparations. We may also conclude that since both *ololiuqui* and the *kykeon* were sufficiently active psychedelic agents, and that the only common element of the two preparations was ergine/isoergine, then suggestions that the psychoactivity of one or the other might be due to additional psychoactive chemicals may be ruled out. It remains only to show *why* the equilibrium mixture should be so much more effective at producing a psychedelic experience. Dr. Dave Nichols has criticised the mixture idea on the basis that his research seems to reveal that isoergine must be completely, or very nearly inactive at the 5HT-2 receptor, and I will take him at his word on this. But what might be happening when *both* ergine and isoergine in equilibrium concentration are intimately hovering around adjoining 5HT-2 receptors? I will have to go out on yet

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252 Martinkova et al., "Hydrolysis of lysergamide to lysergic acid by Rhodococcus equi A4", *Journal of Biotechnology* 84 (2000) 63–66.

another chancey limb to suggest an answer.

In fact I don't have an answer that I would make a large wager on, but only a hint gleaned from some recent receptor research. To me, what this research strongly suggests is that our knowlege of how drugs, especially mixtures of drugs, interact with receptors is still quite subject to not only new developments but possibly even radical overhaul. This is even more the case when we consider that so much receptor research is now necessarily being done *in vitro,* since studying actual receptors in a living organism has all sorts of impossibilites, doubly so if the organism is a human! Whether *in vitro* findings of a very complex nature can be directly transposed to the actual operation of a human brain is therefore not to be automatically assumed.

Two recent papers suggest to me that the affinity of a receptor, or group of receptors, is not as specific for given ligands as has sometimes been assumed.[253] [254] These articles are very specialist-oriented, and I certainly don't have the expertise to extrapolate the findings to my present task. But I do think they question the position that the equilibrium mixture hypothesis has no basis, that the co-presence of isoergine at or near neuroreceptors in the very restricted volume of a synapse can have no effect since isoergine alone seems completely inactive.

And what if we could actually watch a single ergine molecule, and detect when it "decided" to convert itself to isoergine and *vice versa*? There is only probability that can predict when it will actually do so, the action of a single molecule cannot be predicted with certainty, it might well "decide" to remain in its currect form forever! So what about a collection of ergine and isoergine molecules in the very restricted volume of a synapse? Do they somehow influence each other's probability of conformation change? Is there some kind of mysterious field effect going on so ergine or isoergine molecules "know" the state of brother and sister molecules nearby, and thus "know" whether they should transform themselves to establish or re-establish equibirium conditions? Might a molecule in the midst of equilibrium therefore "see no need" to transform itself and thus bring the mixture *away* from equilibrium? It has been suggested that the limited psychoactivity of an ergine molecule in a 5HT-2 receptor might be due to its sudden "decision" to convert itself to isoergine, whereupon it no longer fits in the receptor and pops out. But what if it remains in its active state much longer due to this field effect? All of the above is of course silly speculation, unless... On a somehat smaller scale than molecules, physics has noted all sorts of silly behaviors at quantum dimensions. Perhaps in the synapses too.

Second Center of Asymmetry

The 4-ring lysergic acid structure has a center of asymmetry at the 8-position, where the amide side-chain is attached, and which accounts for the d- and -iso frms of lysergic acid compounds. But another center exists that is not much discussed, since there are no drugs that take the form of L-lysergic acid derivatives. The second center of asymmetry is at position 5, where the attached hydrogen normally projects toward the viewpoint usually depicted in diagrams such as in part 2 of "Mixing the Kykeon."

I believe that, quite by accident, I prepared the d-diethylamide of L-lysergic acid. Here's how it happened: Remember that d-lysergic acid resulting from the hydrolysis procedure contains about 12% water in its crystalline structure, and that before reacting it, the lysergic acid hydrate must be dried at high

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253 Martí-Solano, Maria et al.: "A Dynamic View of Molecular Switch Behavior at Serotonin Receptors: Implications for Functional Selectivity," October 14, 2014 https://doi.org/10.1371/journal.pone.0109312

254 Kenakin, Terry: "Biased Agonism", *F1000 Biol Rep*. 2009; 1: 87.

vacuum and 143°C. The drying process always results in some minor charring and discoloration, indicating a little decomposition is taking place. I decided to try drying the lysergic acid hydrate directly from a refluxing DMF solution, using the benzene-water azeotrope effect described previously.

Finely powdered LA hydrate was thus slurried in benzene, then DMF added, similarly to the method for reaction with CDI. A nitrogen bubbler-tube was inserted in the flask, a condenser fitted, and provision made for slowly reducing the pressure in the apparatus. The flask was heated slowly in an oil bath at normal pressure, with nitrogen bubbling in so as to keep the LA hydrate well dispersed and therefore easily subject to dissolving. As the temperature increased, it could be seen that the LA hydrate was indeed dissolving, thus releasing its water of hydration into solution. As the temperature arrived at the point where the benzene-water azeotrope would distil, drops of water and benzene appeared in the condenser, in a quantity indicating that the water of hydration was indeed distilling over. By this time, all of the LA hydrate had dissolved, so it seemed that it was indeed possible to dry LA hydrate by this method.

The heating and distilling of the benzene-water azeotrope was contiued until no more water was seen condensing, the totality of the benzene now having distilled as well. The pressure in the apparatus was slowly reduced while continuing to heat the flask, the temperature in the flask rising to perhaps a little over 100°C. I assumed that traces of water would remain in the DMF solution, so contined distilling for a short while. I also assumed that little or no decomposition of the LA, now *anhydrous* in the DMF, would occur as long as I kept the temperature well below the 143°C used for drying *in vacuo*.

The flask was cooled to room temperature, keeping a nitrogen atmosphere above the solution, which was now quite clear with nothing precipitated, and only slightly amber-colored. A reaction with CDI was performed as usually done, and proceeded normally, with CO_2 evolution. The DMF was evaporated and the 3:1 acetone/dichloromethane added in preparation for the chromatograpy step. The crude syrupy LA amide dissolved *but quickly formed a crystalline precipitate, totally out-of-character with the usual result!*

The crystalline precipitate was filtered off, and it quickly became obvious that the product was definitly not the normal d-lyseregic acid diethylamide previously produced by this procedure. Its solubility was radically different, almost insoluble in acetone or dichloromethane, thus it could not be chromatographed as usually done. It also seemed impervious to hydrolysis with KOH!

My dissapointment was acute, but almost as an afterthought, I dissolved a little in methanol, added an equivalent of tartaric acid, and lo and behold, the solution fluoresced bright blue-white as normal LSD should. I concluded that the lysergic acid ring structure had not been altered, and prepared myself a 30 microgram dose. A normal-for-the-dose psychedelic experience ensued...

In later years I cornered 2 or 3 heavyweight psychedelic chemists at conferences to see if they could enlighten me, but no. I am quite confident due to the tests I made that the compound was *not* the usually-produced lysergic acid diethylamide, but due to its psychedelic activity at the 30 microgram level, and its normal fluorescence, it could not have been anything drastically different. An analogue with different configuration at poisition-5 of the lysergic acid ring structure seems the most probable conclusion.

Concluding Remarks

What has been the net result of our illegal efforts? There have been quite a few LSD chemists working in hideaway labs over the decades, all of whom firmly believed (and still believe)[255] in the overall benefits of a general availability of psychedelics. We all have continuously heard back from friends, and friends of friends, that our product provided positive, astonishing and sometimes life-changing experiences for a great many. Considering the number of doses collectively produced, there should be millions of us who credit one or more psychedelic experiences with having shown us some of the secrets about life and the universe. The secrets, of course, are things hidden in plain view, the reality that only augmented salience detection has a possibility of revealing.[256] The *Kosmos*.

But what of the negative aspects of psychedelic use? Freak-outs, flashbacks, psychotic episodes, chromosome damage, cancer, Charles Manson events... Careful evaluation by those capable of such have shown that most of the negative reporting has been the propaganda so enthusiastically issued by moral entrepreneurs, and magnified by media outlets interested in selling infotainment and garnering high-paying advertising. And where we *can* see disturbing events or personal difficulties with psychedelic experience it should now be obvious that the total non-specificity of what a psychedelic drug "causes" shows the innate and true source of the difficulties, and that the negative propaganda *itself* has often been the cause of the negative event or experience. To be a little flippant, the more the media insists that people tend to jump out of tenth-floor windows under LSD, the more likely that it might actually happen once in a while. There seems to be only one confirmed case of LSD-induced window-jumping before the propaganda mill got into full operation, and that was of Frank Olsen,[257] and it seems now from what has been revealed in the book that he did not jump but was pushed. Before the period of mindless propaganda starting in the mid-1960s, all serious observers had noted the remarkable *safety* of psychedelics, even when used outside of the research programs.

So has all this psychedelic voyaging produced a better world? Aside from the personal enlightenment of the millions of individuals what do we have as a long term benefit? True, for a time we grew in strength, pressured for social advances, sometimes with success, even through the thick and thin of the assassinations, student shootings and imprisonments, the dirty tricks and spying by Hoover's FBI... Then the Vietnam War ended, we were naïve to think it due to our resistance. Nevertheless we youngsters wanted to follow our bliss and largely dispersed, thinking some sort of victory had been achieved. Hardly. It was during this period that the seeds of the neoliberal, neoconservative movement began their morbid germination. It seemed as if the old moneyed interests, the war profiteers, the old guard Power Elite, had declared the end of "peace and love" and began agitating for the return of normality, "war and hate." And, just look around, they have succeeded

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255 See for example the recent documentary film *The Sunshine Makers.*

256 If I am not being too "religious" for some readers: (113) His disciples said to him, "When will the kingdom come?" <Jesus said,> "It will not come by waiting for it. It will not be a matter of saying 'here it is' or 'there it is.' Rather, the kingdom of the father is spread out upon the earth, and men do not see it." - The Gospel of Thomas

257 *op. cit., A Terrible Mistake*

mightily. A dark suspicion indeed, but perhaps the Sixties actually stimulated the rise of neoconservatism. And now our main hope is that the tool that helped us to awaken might come in handy in awakening *them* from their moral coma. Well, stranger things *have* happened.

Peter Webster
December 2018