WAKING THE TRANCE FIXED

BY

PATRICIA A. HELVENSTON AND PAUL G. BAHN

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PREFACE

In 2002 we published a booklet entitled, *Desperately Seeking Trance Plants: Testing the "Three Stages of Trance" Model.* Our thesis was that there were a number of empirical facts that seriously challenged, indeed refuted, the Shamanic or Neuropsychological model of Paleolithic Art first proposed by David Lewis-Williams & Thomas Dowson (LW & D) which we refer to as the "Three Stages of Trance" model (TST model) because of its emphasis upon a highly specific pattern of so-called "hallucinatory" images occurring in three stages (1988:201-217). We reprint that booklet here as Chapter 1, along with the Introduction explaining how we respectively became convinced we needed to publish that document, as well as our credentials for doing so. As we explained at the time, the booklet had initially been intended as a paper for the *Cambridge Archaeological Journal*, (*CAJ*), but for various reasons, one of which was what we perceived as that journal's blatant bias in favor of the proponents of the TST model, we decided to publish the piece ourselves, reserving the right to express ourselves as we saw fit. Our perceptions of bias against a challenge to the TST model have been roundly confirmed in a number of ways as will be described in Chapter 6.

After we published *Desperately Seeking Trance Plants*, the *CAJ* indicated it was interested in publishing an abstract of it entitled, *Testing the 'Three Stages of Trance' Model* which would include comments from a neuropsychologist, John L. Bradshaw, and an archaeologist, Christopher Chippindale. That paper appeared in Volume 13(2), October, 2003, along with our response to Bradshaw and Chippindale (pp. 213-24). In Chapter 2 we will summarize our replies to both critiques because in them we address other assertions of "fact" by proponents of the TST model that we wanted to gather together, along with the original booklet, in order to demonstrate the many fallacies perpetrated by Lewis-Williams and followers, and to document the difficulties we have had in attempting to publish our challenges. In this regard, we urge the reader to watch for our upcoming paper entitled "Archaeology or Mythology: The 'Three Stages of Trance' Model and South African Rock Art," to be published in a special issue of *Afrique & Histoire* in 2005. Finally, we have had numerous requests for the original booklet from individuals, groups, and libraries, long after all the copies were distributed and/or sold and we want to respond to those wishes.

In February 2004 we were contacted by the *CAJ,* which sent us three papers criticizing our *CAJ* synopsis and asked us to reply to them for the April, 2004, issue. The critiques had already been typeset, and thus had clearly been with the journal for some time, and yet we were asked to provide a response within two weeks, which we indicated was impossible because we had not only to investigate obscure references cited in these comments but also to analyze and reply to them. The *CAJ* agreed, and we were given a few weeks to research and organize our rejoinder. During these negotiations we were told that Lewis-Williams had submitted a critique of our original booklet, not of our synopsis, but that we would not

be allowed to see or comment upon it before publication in the April issue (it would, of course, have been logical and far more sensible to allow us to answer all such critiques in a single response).. The journal indicated it might consider publishing a short retort from us to Lewis-Williams critique in the October 2004 issue. When CAJ appeared in April 2004, Volume 14(1), it contained a section entitled "Reaction" which included critical assessments of our synopsis by Jean Clottes, David Pearce, and David Wilson (pp. 81-100), which seem to have been clearly coordinated, along with our reaction, entitled "Waking the Trance-Fixed" (pp. 90-100). We reprint our reaction here in Chapter 3 because we mounted several new challenges to the TST model at that time. When we received our *CAJ* 14(1) we noted with interest the paper by Lewis-Williams (pp. 107-111) entitled "Neuropsychology and Upper Paleolithic Art: Observations on the Progress of Altered States of Consciousness," in which he purported to offer a critique of our original booklet. There are numerous misattributions and distortions in that paper to which we respond in Chapter 4. We implored the *CAJ* to publish our response to Lewis-Williams because readers who had only read a synopsis of *Desperately Seeking* would not be in a position to know that he had utterly misrepresented and traduced our original booklet. The *CAJ* refused on the grounds that its readers had now read all they wanted on the subject!

A few proponents of the TST model have claimed that oxygen deprivation (hypoxia), either as a result of inhaling the fumes of burning hallucinogens from a cave campfire, or as a result of breathing the accumulation of CO^2 in deep recesses of caves, could produce hallucinations. We addressed the first hypothesis in our original booklet (pp. 43-4) and demonstrated empirically that any participants inhaling the vapors of burning hallucinogens were likely sickened or killed. In Chapter 5 we present a detailed refutation of the notion that CO^2 is in any way a hallucinogen.

In Chapter 6, we present further challenges to the TST model, specifically, some of the methodology utilized and the theoretical assumptions upon which the model is based. David Whitley has been one of the most active proponents of the TST, shamanic model in the United States, arguing that much, if not all, of the Native American rock art in the western United States can be interpreted according to it, and in Chapter 7 we refute specific instances of what we regard as his misuse of ethnological records from the early 20^{th} century.

Chapter 8 concludes this book with a brief description of the various biases and episodes of censorship we have encountered in attempting to bring all of this critical information before the scientific community. For example, the comments by one of us (PGB) about Lewis-Williams' *The Mind in the Cave* which appeared briefly on the web in an interview by Oxbow books, but which were rapidly removed, are reproduced here. We also take the opportunity to print a somewhat longer and more formal review of this same book's French edition, by PGB, which appeared in translated and much shortened form in the journal *La Recherche* (October 2004:104).

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Authors' Note Introducing Chapter 1: Chapter 1 was originally published as a booklet of the same title by RJ Communications, LLC., New York, 2002. We reprint it here with an added discussion of the psilocybin-containing mushroom, *Psilocybin semilanceata*, alleged by some to be native to Europe, p. 32.

Chapter 1
Part A
Desperately Seeking Trance Plants: Testing the "Three Stages of Trance" Model

INTRODUCTION

The authors of this paper – the one a professional neuropsychologist, the other a rock art specialist – have both felt a number of growing concerns about the "three stages of trance" model for some years now, and have decided to address some of them in the present paper.

Paul Bahn has been interested in this model for many years, and indeed recently (2001) set out in some detail his initial attitude of cautious welcome in 1988, which largely reflected his lack of detailed knowledge of shamanism, and of southern African rock art, let alone of neuropsychology (see page 59 for more information). As the years passed, and his knowledge improved of the first two of these domains, his disillusion with the "shamanic" approach to rock art rapidly increased as he realized how tenuous or even baseless were many of the claims being presented as self-evident or factual, especially with regard to Ice Age art in Europe. But inevitably, as an archaeologist, he remained unaware of the major developments in the field of neuropsychology during the past decades.

Patricia Helvenston first learned of the model several years ago, when E. Malotki contacted her, and described the "three stages of trance" model, asking if she thought all types of trance proceeded through the specific pattern beginning with geometric figures and proceeding to geometric figures coupled with more complex "iconic" images, and so on. She replied that the only trance that she thought would conform somewhat to such a sequence would be a mescaline-induced trance, such as described by Heinrich Klüver many years previously. She did not pursue the issue any further, except to suggest some references to Professor Malotki. A few years later, on October 26, 2001, she attended a colloquium at Northern Arizona University, Flagstaff, Arizona, at which D. Whitley presented a talk entitled "Chauvet Cave and the Origins of Art." In it, he discussed the "three stages of trance" model, and described the contention by J. D. Lewis-Williams and T. A. Dowson that Paleolithic artists painted the great cave images to record hallucinations experienced during a state of shamanic trance. When Helvenston indicated that, as a neuropsychologist who had used hypnosis and other trance states in the treatment of patients for over fifteen years, she had never had a patient who had ever described anything remotely similar to the "three stages," he replied that this was what psychologists were telling the proponents of this model, but that they chose to ignore them.

The many errors regarding trance phenomena, and the outdated neuropsychology presented in support of this "neuropsychological theory," as well as Dr. Whitley's comment about ignoring contradictory evidence, caused her considerable consternation. She began extensive and intensive searches of all of the sources cited by LW & D and by Whitley, and uncovered many errors, as well as sources

which were cited as if they agreed with the claims being made, when in fact they did not. She contacted Dr. Bahn and the result was a joining of forces to write this paper.

The paper was originally submitted to the *Cambridge Archaeological Journal* – which has printed a huge amount of material by adherents of the model over the years – in the hope of a rapid publication by October 2002. Unfortunately, although the journal indicated some interest in publishing our paper, there was considerable delay in obtaining comments– some of which were acceptable, and some of which were not – from referees with the result that it became impossible to meet the deadline for the October issue. Rather than wait six months for the next issue, we felt very strongly that our paper should appear as rapidly as possible so that the rock art community, and the archaeological world at large, could be made aware of the fallacies underlying the shamanic model. In particular, yet another book is due to appear in autumn 2002 which attributes much of European cave art to shamanic trance phenomena, and which is based, inevitably, on the usual "three stages of trance" model. Since the length and format of the paper preclude rapid publication in any other journal, we have therefore resorted to the methods of some earlier scholars in deciding to publish the paper ourselves, in order to disseminate the facts as swiftly as possible.

ABOUT THE AUTHORS

Patricia Helvenston was a practicing clinical neuropsychologist in Denver and Chicago for twenty-five years. She earned her Ph.D. at the University of Chicago in Biopsychology and completed a post-doctoral fellowship in Neuroanatomy and Neuropharmacology. She was the recipient of the Gellhorn Prize in Neurophysiology while still a graduate student. She was a lecturer in Comparative Vertebrate Neuroanatomy at the University of Chicago, and assistant professor of Psychology at Indiana University. She completed a postdoctoral clinical internship at Chicago Read Mental Health Center, Chicago, Illinois, and a postdoctoral clinical internship in Psychoanalytic Psychotherapy at the Denver Mental Health Center in Denver, Colorado, where she subsequently became Chief Psychologist. Dr. Helvenston was a Regional Medical Consultant to the Disability Determination Services, United States Social Security Administration, a forensic neuropsychologist, and earned a Diplomate from the American Board of Professional Neuropsychology. She was an assistant professor in the Departments of Psychiatry and Rehabilitation Medicine, University of Colorado School of Medicine, and Director, Psychological Services, Spalding Rehabilitation Hospital, Denver. Dr. Helvenston was President of the Colorado Psychological Association, Chairperson of the Ethics Committee, and President of the Colorado Women Psychologists. She was the Director of the Center for Neurorehabilitation and ReEntry, the Rehabilitation Institute of Chicago and Northwestern University, a popular speaker in Denver and Chicago about various neuropsychological topics, author of various professional papers and co-author of a book entitled "Epilepsy and You." She retired from clinical practice a few years ago and now engages in full-time research and writing.

Paul Bahn is an archaeologist and author. He obtained his Ph.D. in 1979 from the University of Cambridge, with a thesis devoted to the economic prehistory of the French Pyrenees. This was followed by a series of post-doctoral fellowships, including three years at Liverpool University, and a J-Paul Getty Postdoctoral Fellowship in the History of Art and the Humanities. His major specialty is the art of the Ice

Age, on which he has published extensively (including *Images of the Ice Age*, 1988, and *Journey Through the Ice Age,* 1997, both with Jean Vertut), but he has also devoted a great deal of research to prehistoric rock art in many other parts of the world (*The Cambridge Illustrated History of Prehistoric Art*, 1998); he is also a specialist in the archaeology of Easter Island. Since the mid-1980s he has been freelance, and has written and edited numerous books on archaeology, including *Archaeology: Theories, Methods and Practice"* with Colin Renfrew, 4th edition, 2004. P.G. Bahn recently published a major critique of shamanism as it is defined by proponents of the TST model. See Bahn, P. G. 2001: Save the Last Trance for Me: An Assessment of the Misuse of Shamanism in Rock Art Studies. In *The Concept of Shamanism. Uses and Abuses*, eds., Francfort, H-P. & Hamayon, R. N. in collaboration with P. Bahn, Bibliotheca Shamanistica, Volume 10, Akademiai Kiado: Budapest. pp. 51-93. It was his reluctance over many years to believe that Britain was necessarily bereft of Ice Age cave art which led him to put together the Anglo-Spanish team which, in 2003 and 2004, discovered the country's first cave art at Creswell Crags, Nottinghamshire, a discovery which has revealed Church Hole to be one of the most important and interesting decorated caves in Europe.

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FRONT COVER

This is an artistic representation by Patricia Helvenston of the hallucinatory shapes and colors that were originally depicted in a yarn painting made by a member of the Huichol Indian group in Mexico. The intent of the representation is to convey a sense of the color, texture, and throbbing movement of images as reported by individuals who have experienced mescaline-induced hallucinations. The yarn painting was originally made to show visions of the kind experienced by the Huichol people in hallucinations brought on by taking peyote. The Indian at the left is carrying a basket of freshly harvested peyote and viewing a vision that is exploding with color and streaks and flashes of light. The Peyote cactus is represented at the right. The authors wish to express particular appreciation to Dr. Ronald K. Siegel for his kind permission to reprint this illustration.

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Chapter 1
Part B
Desperately Seeking Trance Plants: Testing the "Three Stages of Trance" Model

In 1988, J. D. Lewis-Williams and T. A. Dowson (LW & D) presented the "three-stage model" of trance phenomena that they proposed would account for mental imagery as perceived by people in "certain altered states of consciousness." [1] This model, extrapolated from two local studies that discussed the rock art of the San (Bushmen) and the Shoshonean Coso, was then used in an attempt to explain what the authors referred to as "entopic signs" (i.e.,

[1] J. D. Lewis-Williams and T. A. Dowson, "The Signs of All Times: Entopic Phenomena in Upper Palaeolithic Art*." Current Anthropology*, Volume 29.2, 1988, pp. 201-217.

geometric drawings), present in the cave art of the Upper Paleolithic.[2] The present paper suggests one set of factors that would seriously weaken, if not completely refute the model by providing a detailed discussion of various types of trance states, their characteristic means of induction and the subjective reports of drug users regarding each type of trance experience. This systematic consideration of the most common trance states will demonstrate that the only trance states that bear any resemblance whatsoever to that described in the "three stage" model are drug-induced trances caused by plants containing mescaline, LSD, or psilocybin. The "three stage" model does not describe naturally induced trance states nor trance states induced by other hallucinogen-containing plant materials. If the trance states described by the "three stage" model must be induced by plants containing at least one of these three psychoactive substances, then those plants must be demonstrated to have been present in the general locale of the rock art site during the appropriate time period. Moreover, evidence of these plant remains should be available in the sediments of the site where the proponents of the model claim the art has been inspired by LSD, mescaline or psilocybin induced trance.[3] By examining the "three stage" model from this perspective, the authors present the first direct method for empirically testing its validity.

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Introduction

As is now well known to archaeologists, and more specifically the rock art community, LW & D proposed a model in 1988 that they believed could classify and explain Upper Paleolithic geometric signs on cave walls. Their approach would avoid "simplistic ethnographic analogy and the impasse of induction from internal analysis."[4] The model proposed was based upon two studies of local populations, the San (Bushman) rock art in southern Africa, and the rock art of the Shoshonean Coso of the California Great Basin, and was based on the supposed "three stages" involved in the perception of trance imagery. Subsequently, this model has been widely accepted in a long series of works that have all too often been rather uncritical,[5] primarily because the vast majority of archaeologists and rock art specialists were ill-equipped to assess the theory's claims about shamanism and neuropsychology. The shamanistic aspects of the theory – i.e. the belief that most rock art was produced by, and reflected the trance imagery of what they called "shamans" – was not rebutted by true specialists in shamanism until some years later, either because these specialists had little or no contact with the field of prehistoric rock art and therefore had no idea that this theory was being applied in such a way, or because they could not believe that such an idiosyncratic version of "shamanism" could be taken seriously by archaeologists.[6]

In exactly the same way, it has taken a long time for neuropsychologists to react to the misappropriation of data from their discipline, either because they usually have no knowledge of events in rock art studies, or because they found it hard to imagine that anyone could take seriously such a simplistic application of outmoded neuroscientific research. In this paper a professional neuropsychologist and a rock art specialist jointly expose the fallacies in the model, and for the first time propose a method for

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[2] For a current critique of the model, see Bahn, "Save the Last Trance For Me: An Assessment of the Misuse of Shamanism in Rock Art Studies," In *The Concept of Shamanism, Uses and Abuses*, H. P. Francfort and R. N. Hamayon (Eds.) in collaboration with P. G. Bahn, Bibliotheca Shamanistica, Volume 10, Budapest: Akademiai Kiado, 2001, pp. 51-94.

[3] For an example of this approach, see Carolyn E. Boyd and J. Philip Dering, "Medicinal and hallucinogenic plants identified in the sediments and pictographs of the Lower Pecos, Texas Archaic." *Antiquity*, Volume 70, 1996, pp. 256-75.

[4] LW & D, p. 201.

[5] Among the many individuals who have recently been "entranced" by the model and repeated it virtually verbatim, one can cite B. Fagan*, From Black Land to Fifth Sun: The Science of Sacred Sites*. Reading, Mass., Helix Books, 1998, pp. 72-3; J. E. Francis and L. L. Loendorf, *Ancient Visions, Petroglyphs and Pictographs of the Wind River and Bighorn Country, Wyoming and Montana,* Salt Lake City, University of Utah Press, 2001, pp. 21-23; E. Malotki, "The Serpent: A shamanistic motif in the Archaic/Basketmaker Rock Art Imagery of the Palavayu Anthropomorphic Style (PASTYLE), Arizona," In *American Indian Rock Art*, Volume 27, S. M. Freers & A. Woody (Eds.), Tucson, Arizona, 2001, pp. 237-52; and D. Whitley, *The Art of the Shaman, Rock Art of California*, Salt Lake City, Utah, University of Utah Press, 2001, p. 106.

[6] R. N. Hamayon, "La transe d'un préhistorién: à propos du livre de Jean Clottes et David Lewis-Williams." *Les Nouvelles de l'Archéologie*, Volume 67, 1997, pp. 65-67.

empirically testing its validity. Bahn has drawn attention to the fact that the authors of the model have never suggested what factors would disprove the theory "in the Popperian sense of progress through invalidation of hypotheses."[7] The present paper, therefore, suggests one set of factors that would seriously weaken, if not completely refute the model.

Misuses of Neuropsychology

LW & D devoted a great deal of effort to discussing what they referred to as "entoptic"[8] phenomena as perceived during "certain altered states of consciousness" in their 1988 paper.[9] Their ideas regarding such phenomena, derived from a few primary sources such as R. K. Siegel, led them to refer to their views as a neuropsychological model because as they put it, "entoptic" hallucinations (i.e., form constants and phosphenes according to LW & D), or geometric figures (the term we prefer), unlike culturally informed hallucinations ("iconic" hallucinations) during trance states were "completely controlled by the nervous system."[10] This statement was followed by a long and detailed explanation of neuropsychological theories and experimental results that, while representing relatively mainstream thinking between about 1920 and 1970, had become very passé by the time their 1988 paper was published.

For example, as early as 1887 it was suggested that the physical eye itself could furnish the material on which visual hallucinations are based.[11] By 1964 Mardi J. Horowitz, a source frequently cited by LW & D, *speculated* that geometric forms "may be entoptic – either from the anatomic characteristics of the eye or arising in the bioelectrical circuits for pattern receptivity in the retinal ganglionic network."[12] This speculation had already been outdated a few years earlier in 1958, when Wilder Penfield had experimentally demonstrated that electrical stimulation of primary visual cortex (Brodmann's Area 17) caused the patient to see "vivid lights, colored or black forms, moving or stationary."[13] Given that LW & D cite respectable scientists from the 1920s to the 1970s regarding "entoptic" phenomena it appears to the non-specialist as if they are presenting contemporary thinking in neuropsychology. Nothing could be further from the truth.

It is extremely difficult to address the many ways in which neuropsychological data are misused by LW & D, particularly with respect to "entoptic" phenomena, because the entire discussion in that paper, and even a recent paper by LW in 2001,[14] emphasizes obsolete theories, models, procedures and findings. [15]

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[7] Bahn, 2001, p. 53, p. 84.
[8] We do not employ the term "entoptic" ourselves, when it appears in this text it simply refers to the definition of "entoptic" employed by LW & D unless otherwise clearly specified.
[9] LW & D, 1988, pp. 201-217.
[10] Ibid., p. 201.
[11] I. Hoppe, "Der entoptische Inhalt des Auges und das entoptische Sehfeld beim hallucinatorischen, Sehen," *Allg. Z. Psychiatry*, 1887, Volume 2, pp. 438-52, cited by H. Klüver, "Mechanisms of Hallucinations" In *Studies in Personality*, Chapter 10, Q. McNemar and M. A. Merrill, (Eds.), New York: McGraw-Hill Book Company, 1942.
[12] Mardi J. Horowitz, "The Imagery of Visual Hallucinations," *Journal of Nervous and Mental Disease*, Volume 138, 1964, p. 520. It is noteworthy here that Horowitz defines "entoptic" to mean within the eye. A popular Medical Dictionary of the time defined "entoptic" as "Noting visual phenomena which have their seat within the eye." Leslie Brainerd Arey, et al (Eds.), *Dorland's Illustrated Medical Dictionar*y, Philadelphia, W. B. Saunders Company, 1957, rpt. 1961, p. 456.
[13] Wilder Penfield, "The Excitable Cortex in Conscious Man," *The Sherrington Lectures*, Liverpool, Liverpool University Press, 1958, p. 11.
[14] Lewis-Williams reaffirmed his belief in the relevance of this research that has been superceded for decades. See J. David Lewis-Williams, "Brainstorming Images: Neuropsychology and Rock Art Research," In *Handbook of Rock Art Research*, David Whitley (Ed.), Walnut Creek, AltaMira Press, 2001, pp. 332-357.

(Authors' note: In October, 2004, Dowson (CA 2004:516) acknowledged that the neuropsychological model he and LW had proposed was "now slightly outdated.") In order to do justice to a comprehensive critique one would need to present all of the experimental findings within a historical context, providing the history of "entoptic"[16] phenomena, how they were produced, described, defined in medicine and neuropsychology, and what such phenomena were thought to reveal about the nervous system at that time, as opposed to what significance such things might have today. Moreover, one would need to discuss how LW & D used an idiosyncratic definition of "entoptic"[17] and how "entoptic" phenomena were defined and thought about by the sources LW & D cite *in support of their own views,* even though a careful analysis of those sources finds that *they do not support* LW & D.[18] While theories about "entoptic" phenomena might have been completely respectable 30 years ago, they simply are not today. To resort repeatedly to such material is like trying to study the biological basis of manic-depressive illness using the ancient humoural theory. Or to cite other analogies that suggest themselves from additional fields, it is like trying to use pretectonics geology to explain what we see in the fossil record today, or the Ptolemaic theory to explain the universe, or the Bible to explain human evolution. In their time these were popular approaches, but not now. A point by point rebuttal of each obsolete detail would literally take a book, so it is quite obviously beyond the scope of this paper, and frankly, not worth the effort. Today, few, if any, neuropsychologists would consider phenomena produced within the eyeball to have any significant relevance to typical visual hallucinations, either simple hallucinations (which would include geometric signs or entoptics and phosphenes as referred to by LW & D) or complex hallucinations. The most parsimonious way to engage the issue is to simply present the current thinking of neuropsychologists regarding trance states and hallucinogenic drugs and the neuropsychological findings pertinent to each, as contrasted with some of the more obvious neuropsychological fallacies put forth by LW & D.

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[15] For example, LW & D cite H. Klüver, whose research was completed in 1928 and 1942. His observations of mescaline intoxication are still considered classic, but his interpretations about what such findings indicated about the nervous system are generally obsolete; for example, Knoll et al's research was done in 1963; Horowitz's research was completed in 1964; Siegel's research was completed in 1975, 77, and 78. The technological sophistication of neuropsychological research has exploded within the past several years and some of the research prior to about 1990 is completely outdated today, except in providing a historical perspective regarding ideas about the mind/brain. There are some areas of such research, like the effects of hallucinogens on human subjects in experimental studies conducted from the 1920s -1970s that cannot be replicated and thus the observations but not necessarily the interpretations from those studies are in a sense, still current, because we cannot accomplish such research today. Also, there are those older studies that remain current and classics in the field. The trick for the professional expert is to know the difference.

[16] Neuropsychologists, neurologists, and ophthalmologists have consistently used this term to apply only to those visual phenomena that are based upon physiological processes within the eyeball itself.

[17] LW & D use an eccentric definition of "entoptic" to refer to any visual sensation derived from the structure of the optic system between the eyeball and the cortex. Unfortunately this unusual use of the term leads to a good deal of confusion. In 2001, Lewis-Williams, p. 339, says that "Notwithstanding reasonable debate about the exact meaning of *entoptic* (within the eye, or within the optic system), I retain *entoptic* phenomena to denote the geometric imagery of Stage One." The authors of this paper suggest that the use of entoptic should be abandoned if LW and his followers wish to persist in their "three stage model." Their use of the term is quite perplexing to neuropsychologists, and inaccurate. It would be far more parsimonious and scientific to simply refer to "geometric" figures occasionally seen under the influence of LSD, mescaline or psilocybin, as occurring predominantly in the first stage of such a drug-induced trance. At least this type of statement would be consistent with contemporary neuropsychological research findings.

[18] In 2001, Lewis-Williams acknowledged his debt to Ronald K. Siegel, p. 337. Indeed, most of the "three stage" model is based upon his research and interpretations of experimental outcomes. However, Siegel, after a fairly extensive and detailed review of "entoptic" phenomena (using the standard definition of the term, i.e., "entoptic" phenomena are restricted to the eyeball), concluded that form constants were very unlikely to result from entoptic images. See Ronald K. Siegel and M. E. Jarvik, "Drug-Induced Hallucinations in Animals and Man," *In Hallucinations: Behavior, Experience, and Theory*, R. K. Siegel and L. J. West (Eds.), New York: John Wiley & sons, 1975, pp. 142-144. Horowitz, *The Imagery,* cited previously, used the standard definition for "entoptic," not the definition used by LW & D. For a very sophisticated discussion of "entoptic" phenomena and hallucinogens, see Theodore X. Barber, "Imagery and 'Hallucinations': Effects of LSD contrasted with the Effects of 'Hypnotic' Suggestions," In *Imagery, Current Cognitive Approaches*, (Ed.), Sydney J. Segal, New York, Academic Press, 1971, pp. 102-136.

Incorrect Neuropsychological "Facts"

"Entoptic" Phenomena (entoptic figures & phosphenes per LW & D); or Simple Hallucinations (per neuropsychologists).

Any intelligent scholar can do some selective reading and research in scholarly areas quite remote from his/her own, selecting various theories and findings to support his/her particular views. But what characterizes the expert in a given field is knowing how to place those individual findings within the entire scope of the domain, assessing which older findings are still considered relevant and which have been abandoned by that particular discipline, and knowing how to weigh evidence from one source or another, which includes recognizing and being capable of evaluating the acknowledged authorities versus the self-appointed experts. Due to their lack of a comprehensive understanding of the broad field of neuropsychology, LW & D claim that "entoptic" phenomena occur within the visual system and hallucinations "have no foundation in the actual structure of the optic system"[19] (See Chapter 4, pp. 67-69 for more detail). This is an inaccurate assertion because visual hallucinations can be produced experimentally by electrical and/or chemical stimulation of both Brodmann's area 17 (primary visual cortex, definitely a "structure" of the optic system), and area 19 (the most complex of the visual association areas, another structure of the optic system).[20]

Also, LW & D refer to "entoptic" phenomena as including two classes of geometric percept (phosphenes and geometric figures or form constants), that "appear to derive from different parts of the visual system,"[21] but this assertion is also inconsistent with neuropsychological research which demonstrates both phosphenes and geometric figures are mediated by the cortex. Although phosphenes and vague, gray, geometric forms may allegedly be produced by physical stimulation such as pressure on the eyeball, much sharper, more colorful images are commonly induced by electrical stimulation of Brodmann's area 17. Through cortical feedback loops, stimulation of some subcortical visual structures such as the lateral geniculate bodies or the optic nerves[22] may also produce such images, but the elaboration of the figures appears to be mediated by the cortex, and thus these cortical areas are believed to be responsible for the perception of phosphenes and geometric figures under non-electrical stimuls conditions. Both phosphenes and "entoptic" phenomena (as defined by LW & D) are labeled "elementary hallucinations" or simple hallucinations by neuropsychologists[23] who have described these hallucinations as

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[19] LW & D, p. 202. These authors are attempting to demonstrate that geometric figures are not influenced by cultural and individual factors, whereas complex hallucinations are. While it is true that complex hallucinations are almost certainly affected by such experiences, there is still a remarkable similarity in the types of complex images stimulated by hallucinogens such as Mescaline, LSD, and psilocybin indicating that some neural substrates within the human visual cortices may be "wired in," even though different cultural experiences may *also* affect the elaboration of such hallucinations. This is particularly true for mescaline, wherein high concentrations of the drug are found in the cerebral gray matter following ingestion. See fn # 35.

[20] Foerster, 1928, cited by Henri Hecaen, and Martin L. Albert, *Human Neuropsychology*, Malabar: Florida: Robert E. Krieger Publishing Company, 1986, p. 154.

[21] LW & D, pp. 202-203., say that "entoptic" phenomena are comprised of form constants (i.e., geometric figures), and phosphenes. In this discussion they also say that "phosphenes" result from within the eyeball, while "entoptic" or form constants (geometric figures) result from structures beyond the eyeball. As we will see, this is also inaccurate. In 2001, pp. 332-333, LW continues to refer to phosphenes produced by pressing on the eyeball, and phosphenes produced by EEG (electroencephalogram) electrical stimulation of the brain by means of gross temporal scalp leads, as if they represented the same phenomena.

[22] Chapanis et al, 1972, cited by Hecaen, and Albert, p. 153.

[23] LW & D cite the work of M. Knoll and J. Kugler, pioneers in the early studies of electrical stimulation of the human cerebral cortex, who, using very gross temporal electrodes, observed about 15 forms as reported by their subjects. They referred to these forms as

simple visions, such as ephemeral lights, flashes of light, sudden brightenings, appearance of colors, etc., barely patterned. Patients describe the simplest forms as luminous points, lights, stars, sparkling visions, floating objects e.g., little butterflies. The patient may at one time be struck by the intensity of the light, at another time by the multiplicity of light sources. Often, color is an important feature, especially reds, then green, blue, and violet. Perhaps only one color may be involved, but often the colors are multiple and simultaneous. Elementary hallucinations are characterized by the absence of pattern. Nonetheless, *occasionally* [our italics] a geometric form is described, such as horizontal lines, circles, half-hexagons, and so forth. These hallucinations are often animated by movements that vary the forms, especially zigzag rotary movements. In some cases a vibratory movement may appear to be animating the real objects. The hallucinatory images may move in space, usually in a horizontal direction, more rarely in a vertical direction.[24]

The reader will note that this description of simple hallucinations is virtually identical to the descriptions presented by LW & D for "entoptic" phenomena. However, it is important to note that the geometric figures described by neuropsychologists from experimental results are only *occasionally* seen in the laboratory. The main point here is that the actual neurophysiological data indicate that phosphenes and form constants are both simple hallucinatory phenomena that are produced by electrical stimulation of the same area in the visual system, Brodmann's area 17 in the occipital lobe.[25] In this connection, Wilder Penfield found that patients saw "sparks, tongues of flames, colors, and flashes of light" when area 17 was stimulated.[26] The fact that elementary hallucinations (or LW & D's "entoptic" phenomena) occur in *Homo sapiens* tells us very little about the nervous system of Upper Paleolithic artists. This is because area V1, progenitor of area 17 (human primary visual cortex and the area involved in the processing of simple forms), was quite well developed in ancient primates some 55 million years ago.[27] Thus, area 17 is a fundamental structure of the primate visual system. Moreover, area 17 is actually larger in pongids than in hominids, the latter having sacrificed some of area 17 in the evolutionary development of visual association areas 18 and 19 about three to four million years ago.[28] Thus, LW & D's emphasis on form constants, rather than complex hallucinations, says far more about the visual cortex of the great apes than it does about the human nervous system.

"Iconic" Hallucinations (LW & D) or Complex, *Esthesic* Hallucinations (Neuropsychologists)

LW & D refer to more complex hallucinations as "iconic." Neuropsychologists refer to this same

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characteristic phosphenes, but contemporary neuropsychologists would refer to them as elementary hallucinations, produced by stimulation of area 17. "Form–similarity between phosphenes of adults and pre-school children's scribblings," *Nature*, Volume 206, Dec. 11, 1965, pp. 1129-30, and Kellog, R., Knoll, and Kugler, "Subjective light pattern spectroscopy in the encephalographic frequency range," *Nature*, Volume 184, 1959, pp. 1823-4.

[24] Hecaen and Albert, pp. 152-153.

[25] See Derek Hodgson, "Shamanism, Phosphenes and Early Art: An Alternative Synthesis," *Current Anthropology*, Volume 41:5, December 2000, pp. 866-873, for a discussion of the importance of the entire visual system in producing phosphenes.

[26] Wilder Penfield, "The permanent records of the stream of consciousness." *Acta Psychologica*, Volume 11, 1954, pp. 47-69.

[27] J. Allman, "The Visual System in Early Primates," In *Progress in Psychology and Physiological Psychology*, Volume VII, New York: Academic Press, 1977, pp. 1-53.

[28] Ralph L. Holloway, "Toward a synthetic theory of human brain evolution," In *Origins of the Human Brain*, (Eds.), Jean-Pierre Changeux and Jean Chavaillon, Oxford: Clarendon Press, 1995, pp. 42-57.

type of hallucination as a complex hallucination of an *esthesic* type.[29] This form of hallucination is defined by the fact that the vision contains elements that appear *nearly* real. Such complex hallucinations occur as a result of electrical stimulation of Brodmann's area 19. Reduction of the level of consciousness is minimal and lucidity is preserved. Generally, the patients describe the hallucinated image as possessing the size, shape, detail, and color of real objects. The visions are easily recalled after the electrical stimulation ceases and may consist of humans, animals, various objects, and geometric figures.[30] The affective state of the subject at the moment of the hallucination, corresponds, generally, to the content of the hallucinated scene. Certain phenomena are especially common with *esthesic* hallucinations. These include Lilliputian-type hallucinations, micropsias (decrease in an object's size), macropsias (increases in an object's size), and metamorphopsias (visual illusions) associated with the hallucinated image. Sometimes objects may appear to be very far away and "telescoped," whereas at other times when objects are approaching they may seem to become very large and looming.[31] As we will see shortly, these neuropsychological descriptions of elementary and complex visual hallucinations resulting from electrical stimulation of the cortex are very similar to those induced by mescaline, LSD, or psilocybin. As such, they are also akin to the descriptions of "entoptic" and "iconic" hallucinations as per LW & D. We would like to suggest that if these authors and their followers are going to refer to their model as a neuropsychological one, it should be incumbent on them to make it a practice to use neuropsychological terminology consistent with the standard nomenclature in that field.

Hallucinatory Images That Should Be Common In Paleolithic Art Per LW & D, But Aren't

It is now well known that many different trance states (including both natural and drug-induced trances) involve the increased activity of structures in the "limbic system."[32] This knowledge derives from a variety of sources. For example, irritative epileptic lesions in the temporal lobes produce a host of sexual, religious and spiritual experiences, dreamy states, and complex auditory and visual hallucinations similar to those produced by LSD.[33] These same experiences can be produced by electrical and/or chemical stimulation of the deep limbic structures within the temporal lobes, such as the amygdala and hippocampus. Following the ingestion of LSD, not only are vivid and complex auditory and visual hallucinations experienced, but there are electrophysiological abnormalities noted in the amygdala and hippocampus, as recorded by subcortically implanted electrodes.[34] From these findings it was speculated that LSD must have a direct effect on limbic structures. This theory was confirmed by neuropsychological research examining

[29] Esthesia refers to hallucinations based upon sense perceptions that seem absolutely real. For example, Hacaen and Albert report that one subject called out to a hallucinated dog repeatedly because he believed it was "there." This type of hallucination should be distinguished from that image referred to by M. J. Horowitz as a "pseudohallucination," which the subject responds to emotionally "as if" it were real, but cognitively he knows it is not. Drug-induced hallucinations may consist of both esthesic and pseudohallucinations. See "Hallucinations: An Information-Processing Approach," In *Hallucinations: Behavior, Experience, and Theory*, R. K. Siegel and L. J. West (Eds.), New York: John Wiley & Sons, 1975 pp. 81-161.

[30] S. Tarachow, "The Clinical value of hallucinations in localizing brain tumors." *American Journal of Psychiatry*, Volume 99, 1941, pp. 1432-1442.

[31] Rhawn Joseph, *Neuropsychiatry, Neuropsychology, and Clinical Neuroscience: Emotion, Evolution, Cognition, Language, Memory, Brain Damage, and Abnormal Behavior*. 2nd edition, Baltimore, Maryland: Williams and Wilkins, 1996, p. 478.

[32] The limbic system is a phylogenetically ancient neural system concerned with the elaboration of emotional reactions that includes such structures as the septal region, the fornix, entorhinal cortex, the hippocampus, and the amygdala, the latter two of which are deep structures within the temporal lobe.

[33] D. M. Bear, "Temporal lobe epilepsy: A Syndrome of sensory-limbic hyperconnection," *Cortex*, Volume 15, 1979, pp. 357-384.

[34] Chapman, et al, cited by R. Joseph, p. 510.

the localization of LSD in the brain of the squirrel monkey. For example, there were high concentrations within the visual subcortical structures, nuclei of the limbic system, the pituitary, and pineal glands, but low levels were found in the visual cortex.[35] Similar results were found following ingestion of mescaline, except that there were also high levels of mescaline in the cerebrocortical grey matter as well.[36] This line of research has convinced neuropsychologists that limbic structures are highly active during both drug-induced trance and trance induced by natural processes.

This increased activity in the limbic system is accompanied by hallucinations of form constants such as hands, triangles, and crosses, as seen following electrical stimulation of the inferior temporal lobe.[37] Since such figures are also produced during "trance," it would seem that they should appear among the geometric illustrations provided by LW & D. However, none of these forms is shown in their diagrams. It would also seem that such figures should appear rather commonly in Paleolithic rock art. Faces – usually called "phantoms" – are very rare in Ice Age cave art, occurring in only a handful of sites such as Marsoulas or Les Trois Frères. Crosses and triangles are even rarer – one can cite a triangle in Kapova, or a single cross in Chauvet. Triangles in the center of Spain, e.g. at Ojo Guareña, have been interpreted as vulvas, and indeed most triangular or subtriangular forms are normally seen as such, even when they are not very detailed.

Hands are far more common in Ice Age cave art, with positive prints occurring rarely (Chauvet, Altamira, Fuente del Salín, etc.), and stencils far more commonly, often in large numbers (Gargas, Cosquer, El Castillo, La Garma, Fuente del Salín, etc.); but hand prints and stencils are common in the rock art of many parts of the world – especially Patagonia, South Africa, Borneo – and in Australia. Many motivations for their production are known, none of which involves Altered States of Consciousness. Why then, should one assume *a priori* that their production in Ice Age caves must necessarily be linked to trance experiences?

Are Trances Invariably Shamanistic ?

LW & D and their followers have repeatedly asserted that Paleolithic cave art was inspired by shamanistic trance. For example, in the 1988 paper, they state that the "most important and overriding feature of shamanism, and the one with which this paper is principally concerned [is] altered states of consciousness."[38] Such an assertion implies that "shamanism and altered states," i.e., trance, are synonymous with one another or universally linked in some fixed association, a position that Bahn and many others have criticized.[39]

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[35] Solomon H. Snyder and Martin Reivich, "Regional Localization of Lysergic Acid Diethylamide in Monkey Brain," *Nature*, Volume 209, March 12, 1966, pp. 1093-1095.
[36] N. Neff et al, cited by Snyder, p. 1095. The high concentrations of mescaline in the visual cortex raise a question as to whether or not the hallucinations experienced by ingestion of LSD are really that similar to those of mescaline – a point that researchers who studied both hallucinogens have stressed.
[37] Joseph, p. 49.
[38] LW & D, 1988, p. 204.
[39] Bahn, 2001, pp. 51-94. In the same collection as Bahn's paper appears see also Angus R. Quinlan, "Smoke and Mirrors: Rock Art and Shamanism in California and the Great Basin," pp. 189-206; Cecelia F. Klein, et al, "Shamanitis: A Pre-Columbian Art Historical Disease," pp. 207-242; Jean-Loic Le Quellec, "Shamans and Martians: The Same Struggle!" pp. 135-161; Jack Steinbring, "The Northern Ojibwa Indians: Testing the Universality of the Shamanic/Entoptic Theory", pp. 179-188.

Indeed, as I. M. Lewis has shown, religious ecstasy and religious mysticism, both of which are most commonly experienced during an altered state of consciousness, are nearly universal phenomena, but shamanism is not.[40] Thus, some type of "religious experience" is considerably more likely to be associated with altered states of consciousness than is shamanism, which represents but one form of religious experience. Rituals enacting myths important to a given culture would certainly be included in the general category of "religious experience." As A. Solomon demonstrated regarding the San, mythology needs to be given particularly serious consideration where therianthropes are depicted in their art, because 19th-century San commentators explicitly linked paintings of such figures to the mythological past.[41] This is a point that LW & D have ignored, as far as we are aware, and one that would appear to be significant in any interpretation of Paleolithic cave art. LW & D cite Reichel-Dolmatoff's work with the Tukano of the Colombian northwestern Amazon, but they neglect to mention that the hallucinations of the Tukano are drug-induced and totally interpreted within the context of a very complex system of origin myths. The *yajé* ceremonies are conducted by the men of the group, not by a shaman.[42]

Finally, although LW & D have said that not everyone will experience the three stages of trance, they continue to discuss a "three stage" model and all of their writings propound three stages as the typical experience in "certain altered states." As we will demonstrate shortly, there are literally dozens of different trance states, and the "three stage" model is one that is applicable only to a highly specific trance induced by mescaline, LSD and psilocybin.

Altered States of Consciousness

Anthropologists have been very interested in trance and altered states of consciousness for decades. For example, Erika Bourguignon demonstrated that altered states of consciousness, i.e., trance states, exist in a variety of forms among the peoples of the world.[43] Trance states are often institutionalized and culturally patterned and utilized in specific ways. As Bourguignon says,

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[40] I. M. Lewis, *Ecstatic Religion: A Study of Shamanism and Spirit Possession*, lst edition, 1971, Penguin Books, and 2nd edition, New York: Routledge, 1989.

[41] A. Solomon "Thoughts on Therianthropes, Myth and Method." *Pictogram* Volume 10:2, 1999a, pp. 10-16.

[42] See Gerardo Reichel-Dolmatoff, "The Cultural context of an Aboriginal Hallucinogen: *Banisteriopsis caapi*," In *Flesh of the Gods: The Ritual Use of Hallucinogens*, Peter T. Furst (Ed.), Prospect Heights, Illinois, Waveland Press, Inc., 1972, pp. 84-113. LW & D assume the three-stage progression of their model is justified by the fact that the Tukano refer to three stages in their *yajé*-induced hallucinations (1988 paper, p. 104). However, in Reichel-Dolmatoff's paper, the three stages the Tukano describe are very different from LW & D's own descriptions, and they are dictated by the mythology which the Tukano believe the hallucinations reveal. Moreover, the Tukano state that not everything is seen in one hallucination, or at all times. Western participants in the *yajé* ceremonies describe varying stages, for example, some refer to 2, some to 4, some to many stages. The active ingredients in *yajé,* generally consist of the plant *Banisteriopsis caapi*, which contains harmine, harmaline, and d-tetrahydroharmine. However, the Indians commonly mix a variety of other plant hallucinogens in the *yajé* mixture, most commonly those that contain tryptamine compounds. These tryptamine compounds potentiate the effects of the *yajé* because it is an MAO (monoamine oxidase) inhibitor, thus it achieves its effects by interfering with the metabolism of tryptamines. The combination of tryptamine-containing plants with a plant that is an MAO inhibitor potentiates the effects of the tryptamines. Thus, there are dozens, if not more, hallucinogenic mixtures used by the Tukano and other Amazonian Indians. These plants are not found outside the Western Hemisphere, although there is a Syrian shrub, known as rue (*Peganum harmala*), that also contains harmine and has been known since antiquity to have hallucinogenic properties. For a discussion of the intricate complexities of *Banisteriopsis*, see Richard Evans Schultes and Albert Hofmann, "Hallucinogens in the Western Hemisphere," In *Plants of the Gods: Their Sacred, Healing and Hallucinogenic Powers*. Rochester, Vermont: Healing Arts Press, 1992, pp. 3-54.

[43] Erika Bourguignon, (Ed.), *Religion, Altered States of Consciousness and Social Change*, Ohio State University Press, Columbus, 1973, pp. 3-35. In a prior paper she referred to these states as trance. See Erika Bourguignon, "World Distribution and Patterns of Possession States, In *Trance and Possession States*, Raymond Prince, (Ed.), Proceedings Second Annual Conference, Montreal: R. M. Bucke Memorial Society, March, 1966, 1968, p. 4.

> The cultural meaning supplied for these states and the institutional framework within which they operate vary from society to society, and thus the specific functions they fulfill vary also. Yet, there are some common trends. In traditional societies – and to a considerable extent in modern societies as well – the context in which such patterned states are viewed most often by the people concerned is one that we may broadly call "religious." I mean here that altered states tend to be spoken of in connection with supernatural entities such as "spirits" or "souls."[44]

Lewis also emphasizes the universality of mystical experience and the remarkable uniformity of mystical language and symbolism, and advocates using the term "trance" to denote the mental state of the subject in such altered states of awareness.[45]

Neuropsychologists have also been interested in altered states of consciousness throughout the twentieth century and there has been an enormous amount of research related to both consciousness and altered states of consciousness. Moreover, there is a large body of investigation that has examined the subjective experience of individuals entering trance by a variety of induction techniques. In this regard it is noteworthy that LW, in speaking of trance states, has asserted "insufficient research has been done on the type of state that the various means of induction produce."[46] While he may not be familiar with this huge body of research, it exists, nevertheless.

In order to discuss the characteristics of altered states of consciousness, it is necessary to briefly consider a practical definition of "normal" consciousness. E. Klinger argues that consciousness is a general term that allows us to refer to many different forms of experience or awareness that can shift or alter gradually (or dramatically) in response to internal as well as external conditions of stimulation. The events of consciousness are not only complex and varied, but they "incorporate images in a variety of different sensory modalities and in every degree of believability, vividness, and realism, including hallucinations, reveries, inner dialogue, and dreamlike sequences."[47] Thus, many of the phenomena that we experience in our usual state of consciousness are *unusual,* but because they are so familiar to us, we don't attend to them a great deal.[48] As neuropsychologists Peter W. Sheehan and Kevin M. McConkey emphasize, "It is important to recognize that altered states of consciousness should not be defined in terms of the *content of consciousness* [our italics] rather, appeal should be made to structure."[49] By structure of consciousness Sheehan and McConkey refer to the varying combination of cerebral structures or systems that may be activated and/or inhibited in a specific pattern during a given state of consciousness. In the case of drug-induced altered states, the key factor of consciousness would be the manner in which the content of consciousness was experienced – realistic (esthesic) versus bizarre illusions and hallucinations, for example.

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[44] Ibid, p. 3. Furthermore, this definition can readily accommodate ancestor worship, myths, ritual, and healing ceremonies.
[45] Lewis, p. 33. He prefers the medical definition of trance as found in the *Penguin Dictionary of Psychology*, which defines trance as "a condition of dissociation, characterized by the lack of voluntary movement, and frequently by automatisms in act and thought, illustrated by hypnotic and mediumistic conditions." However, recourse to the disassociation theory of altered states has become outmoded in neuropsychological circles during the last decade. The authors propose a more current and easily understood argument based upon a discussion of the phenomenon of consciousness itself.
[46] Lewis-Williams, 2001, p. 337.
[47] Lewis, p. 33.
[48] C. T. Tart, "A systems approach to altered states of consciousness." In J. M. Davidson and R. J. Davidson (Eds.), *The psychobiology of consciousness.* New York: Plenum Press, 1980.
[49] Peter W. Sheehan and Kevin M. McConkey, *Hypnosis and Experience: The Exploration of Phenomena and Process.* New York: Brunner, Mazel, Publishers, 1996.

On the other hand, LW & D argue that it *is* the content of consciousness, including a progression from geometric images to complex, iconic hallucinations in "certain altered states," that suggests a model to interpret Upper Paleolithic cave art. In fact, they assert that the frequent appearance of geometric signs associated with iconic images is best explained by the hypothesized shamanistic trance they describe in their papers. But hallucinations do not simply occur in trance or altered states of consciousness; they can and do occur during simple waking states. Thus, one does not need recourse to shamanistic trance or any other trance experience to explain what LW & D imply is rock art inspired by drug-induced hallucinations.[50] Simple imagination is an entirely sufficient condition of everyday consciousness to evoke the same content of image as a hallucination.[51] Bahn has already discussed diverse other conditions sufficient to account for the various images depicted in rock art.[52] As noted, in contrast to LW & D, neuropsychologists believe that the structure of consciousness is the key factor in evaluating "normal" versus "altered" states of consciousness. A comparable rationale was proposed by neuroscientists K. H. Pribram,[53] D. Rappaport,[54] and C. T. Tart,[55] all of whom believe the most distinctive feature of states of consciousness is the overall structure or organization of consciousness. For example, the same elements or contents of consciousness may exist in both hypnosis and a dream, or *even* in routine awareness. However, as Tart emphasizes, different states of consciousness result from the interaction of different subsystems of consciousness. For example, when both the sympathetic and parasympathetic nervous systems are highly aroused, a state of altered consciousness is likely to be experienced.[56]

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[50] LW, 2001, asserts that "neuropsychology can be invoked. . .to identify arts derived from the imagery of altered states of consciousness," p. 341. However, geometric percepts are far more commonly experienced during normal consciousness. Thus the presence of such figures in Palaeolithic cave art cannot be associated with altered states of consciousness without some compelling evidence of hallucinogenic substances within sediments of the cave, at least according to the "three stage" model as it has been presented.

[51] Sheehan and McConkey, p. 4.

[52] P. G. Bahn and J. Vertut, *Journey Through the Ice Age*, p. x; University of California Press, Berkeley, 1997, pp. 181-83, and P. G. Bahn, *The Cambridge Illustrated History of Prehistoric Art*, Cambridge University Press, 1998,pp. 240-42.

[53] K. H. Pribram, "Problems concerning the structure of consciousness." In G. G. Globus, G. Maxwell and I Savodnik (Eds.), *Consciousness and the Brain*. New York: Plenum Press, 1976a and "Self-consciousness and intentionality: A model based on an experimental analysis of the brain mechanisms involved in the Jamesian theory of motivation and emotion." In G. E. Schwartz and D. Shapiro (Eds.), *Consciousness and self-regulation: Advances in research* (Volume 1). New York: Plenum Press, 1976b.

[54] D. Rappaport, "Cognitive structures." In *Contemporary approaches to cognition:* University of Colorado Symposium. Cambridge, Massachusetts: Harvard University Press, 1957.

[55] C. T. Tart*, States of consciousness*. New York: Dutton, 1975, p. 59. See also, Tart, "States of consciousness and state-specific sciences." *Science*, Volume 176, 1972, pp. 1203-1210, as well as, "A systems approach to altered states of consciousness." In *The psychobiology of consciousness*, cited previously. Recently, Pierre Rainville, et al., have utilized PET (positron emission tomography) scans to measure neuronal activity during deep relaxation and hypnosis and have found that different systems within the cerebrum are activated or suppressed in each condition. "Cerebral Mechanisms of Hypnotic Induction and Suggestion," *Journal of Cognitive Neuroscience*, Volume 11:1, 1999, pp. 110-125. Their "results provide a new description of the neurobiological basis of hypnosis, demonstrating specific patterns of cerebral activation associated with the hypnotic state and with the processing of hypnotic suggestions," p. 110.

[56] The autonomic nervous system is composed of two mutually inhibiting subsystems, the sympathetic nervous system, and the parasympathetic nervous system. The sympathetic system executes the so-called fight-or-flight response and generally causes a state of arousal that produces increases in blood pressure, pulse rate and muscle efficiency, dilates the pupil, produces erection of body hair, ejaculation, decreased salivation, and increased respiration. This subsystem is usually referred to as an arousal system, whereas the parasympathetic system is referred to as a quiescent system, because it maintains the bodily homeostasis and regulates activities such as digestion, relaxation, and sleep. Under normal circumstances, when the sympathetic system is active, it serves to inhibit the functions of the parasympathetic system and vice versa. However, there are conditions in which either system can become so active that the other system ceases to be inhibited and "spills" over into a high level of activity itself. The high levels of arousal in both systems are unusual and appear to be accompanied by altered states of consciousness. This appears to be the mechanism that accounts for the unusual subjective experiences of many trance states. Ritual dance begins by producing a high level of activity in the sympathetic system, which as it increases, spills over into the parasympathetic system driving it to become highly aroused. When both systems are in a hyperarousal status, altered consciousness occurs. Meditation appears to achieve a similar result from the opposite direction, in that the parasympathetic system is highly active, spills over into the sympathetic system which becomes activated, and the

Arnold M. Ludwig proposed the following definition for altered states of consciousness (ASCs):

> Altered states of consciousness are those mental states, induced by various physiological, psychological, or pharmacological maneuvers or agents, which can be recognized subjectively by the individual himself (or by an objective observer of the individual) as representing a sufficient deviation, in terms of subjective experience or psychological functioning, from certain general norms as determined by the subjective experience and psychological functioning of that individual during alert, waking consciousness. This sufficient deviation may be represented by a greater preoccupation with internal sensations or mental processes than is usual, by changes in the formal characteristics of thought, and by impairment of reality testing to various degrees.[57]

When we consider states of consciousness that are alternate to our usual waking state, there are certain forms of altered consciousness that are readily recognized and so much a part of our everyday experience that they are generally accepted and defined as alternate states, i.e., drug intoxication and sleep states. The features of demarcation signaling an altered state of consciousness become more complex to differentiate when one considers daydreaming, certain states of reflection, and trance. The situation is even more complicated when one realizes that meditation, relaxation techniques, and hypnosis are all forms of altered consciousness, i.e., trance states. Most studies prior to the 1980s relied upon EEG (electroencephalogram) recordings to assess patterns of cortical activity and inhibition during trance. The basic EEG is an extremely gross means of studying cortical activation, and those studies were of little use in establishing which central nervous system structures were differentially activated in various trance states.[58] However, recent neuro-imaging techniques are beginning to provide a means of studying specifically which cortical regions and systems are activated or suppressed during various forms of trance.[59] LW & D have stated that "we do not know if the trajectory of mental imagery is identical for all drugs and for non-drug-induced states, but we believe that a broad similarity can be accepted."[60] It is certainly true that they do not know this literature, but it exists and it is vast, nonetheless. Furthermore, they have consistently propagated the fallacy that all trance states are essentially similar in a "broad" way. We will demonstrate the error of this assertion shortly. For now, suffice to say that Peter H. Van Der Walde, one of the leading neuropsychiatric authorities of trance states, wrote: "The differences among trance states are far more numerous than are their similarities and so it has been difficult to generalize meaningfully about any basic similarities among trance states."[61] Furthermore, Van Der Walde emphasized that attempts by past workers to describe various kinds of trance as closely related phenomena were never able to fully reconcile different trance-state manifestations within *a unifying theoretical framework* [our emphasis].[62] It seems to us that this position, expressed by a leading authority on the subject, undermines the attempts of LW & D to propose some "broadly similar" universal form of "three-stage trance."

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individual experiences union with God, etc. See E. Gellhorn and W. F. Kiely. "Autonomic Nervous System in Psychiatric Disorder," *Biological Psychiatry,* J. Mendels, (Ed.), New York: Wiley, 1973 and "Mystical States of Consciousness: Neurophysiological and Clinical Aspects." *Journal of Nervous and Mental Disease*, Volume 154, 1972, pp. 399-405.

[57] Arnold M. Ludwig, "Altered States of Consciousness," In *Trance and Possession States*, Raymond Prince, (Ed.), Proceedings Second Annual Conference R. M. Bucke Memorial Society, March 1966, Montreal: R. M. Bucke Memorial Society, 1968, p. 69.

[58] These are the types of studies that LW & D's sources cite.

[59] For two excellent examples see Raineville, et al., cited previously, and Stephen M. Kosslyn, et al., "Hypnotic Visual Illusion Alters Color Processing in the Brain," *American Journal of Psychiatry*, Volume 157:8, 2000, pp. 1279-1284.

[60] LW & D, 1988, p. 204.

[61] Peter H. Van Der Walde, "Trance States and Ego Psychology," In *Trance and Possession States*, cited previously, p. 57.

[62] Ibid.

Additionally, there are so many different forms of trance (ASC) that any attempt to ascribe similar characteristics to them all is a doomed enterprise because it is so completely refuted by the evidence from an extensive body of knowledge. For example, Ludwig demonstrates that ASCs may be produced in any setting by any agents or techniques which interfere with the "normal inflow of sensory or proprioceptive stimuli, the normal outflow of motor impulses, the normal 'emotional tone,' or the normal flow and organization of recognitive processes."[63] In short, there is an optimal range of exteroceptive stimulation necessary for the maintenance of normal, waking consciousness, and levels of stimulation either above or below this range appear to be conducive to the production of ASCs.[64] In this regard, Ludwig classifies the various methods employed to produce ACS into five major categories.

Categories of Altered States of Consciousness

The **first category** includes "mental states resulting primarily from an absolute reduction of sensory input, from a change in patterning of sensory data, or from constant exposure to repetitive, monotonous stimulation. A drastic reduction of motor activity also may prove an important contributing factor."[65] Included in this category are the following examples of ASCs:

1. Highway or road hypnosis.
2. "Breakoff" phenomena in high altitude jet pilots.
3. Mental aberrations while at sea, in the Arctic, or on the desert.
4. Experimental sensory deprivation states.
5. Alterations in consciousness associated with solitary confinement, or prolonged social isolation, commonly practiced by ascetics and mystics.
6. Post-cataract operation psychoses.
7. Nocturnal hallucinations, especially in elderly persons.
8. Mental aberrations in elderly cataract patients.
9. Extreme boredom.
10. Alterations in consciousness in poliomyelitis patients placed in a tank-type respirator.
11. Mental aberrations in polyneuritis patients with sensory anesthesia and motor paralysis.
12. Mental phenomena experienced during profound immobilization in a body cast or traction.
13. Hypnagogic and hypnopompic states.
14. Sleep and associated phenomena, such as dreaming, somnambulism.
15. Healing and revelatory states during 'incubation' or 'temple sleep,' as practiced by the early Egyptians, Greeks and Romans.
16. 'Kayak disease' found in Greenlanders spending several days in a kayak while hunting seals.
17. Hypnotic trance[66] (Helvenston believes that hypnotic trance should also be included in both Ludwig's second and third categories, based upon more recent experimental data regarding various induction techniques).

The **second category** of maneuvers that can produce ASCs includes excitatory mental states resulting primarily from sensory overload or bombardment, which may or may not be accompanied by strenuous physical activity or exertion. Profound emotional arousal and mental fatigue may also be major contributing factors. Such ASCs of excitation include:

1. Suggestible mental states produced by 'third degree' tactics, such as grilling and verbal badgering
2. Brainwashing states.
3. Experimental 'hyperalert' or 'hyperkinetic' trance states secondary to tension-induction maneuvers.
4. Dance- and music-trance in response to jazz, rock-n-roll, rhythmic drumming.

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[63] Ludwig, p. 70.
[64] D. B. Lindsey, "Common Factors in Sensory Deprivation, Sensory Distortion and Sensory Overload," In *Sensory Deprivation*, (Ed.), P. Solomon, Cambridge: Harvard University Press, 1961. Also, see fn 56 for a discussion of the autonomic nervous system that addresses this issue.
[65] Ludwig, p. 71.
[66] Ibid, pp. 71-72.

5. Hyperkinetic trance states associated with emotional contagion, often encountered in a group or mob setting, such as manifested by mass hysteria or the St. Vitus and tarantism dancing epidemics of the Middle Ages.
6. Religious conversion and healing trance experiences during revivalistic meetings.
7. Mental aberrations associated with certain rites of passage (e.g., puberty and initiation rites), such as found in initiates to manhood status in some primitive tribes or the Greater Eleusinian Mysteries.[67]
8. 'Spirit possession' states, either by the Holy Spirit or tribal spirits, during revivalistic or tribal religious ceremonies.
9. Shamanistic divination and prophetic trance states during tribal ceremonies.
10. Ecstatic trance, such as experienced by the 'howling' or 'whirling' dervishes during their famous devr dance.
11. Trance-like states experienced during prolonged masturbation.
12. Orgiastic trance, such as experienced by the Bacchanalians or Satanists during certain religious rites.
13. Firewalker's trance.
14. Alterations in consciousness arising primarily from inner emotional turbulence or conflict, or secondary to external conditions conducive to heightened emotional arousal which could include the following:
    a. Fugue states, amnesias, traumatic neuroses.
    b. Battle fatigue.
    c. Panic states, rage reactions.
    d. Increased suggestibility, illusions, etc., resulting from prolonged fear.
    e. Depersonalization.
    f. Hysterical conversion reactions, dreamy and dissociative states.
    g. Berserk,[68] Latah, [69] and Wihitico[70] psychoses.
    h. Bewitchment and demoniacal possession states.
    i. Acute psychotic states[71] such as schizophrenic reactions.[72]

The **third category** of factors producing ASCs is "mental states that appear to result primarily from focused or selective hyperalertness with resultant peripheral hypoalertness over a sustained period of time."[73] These factors include:

1. Trance phenomena resulting from prolonged vigilance, such as during sentry duty, Crow's nest watch, etc.
2. Trance states reported among radar screen operators.
3. Alterations in consciousness resulting from intense mental absorption in a task, such as reading, writing, problem solving.
4. Fervent praying.
5. Total mental involvement in listening to a dynamic or charismatic speaker.
6. Trance states resulting from attending to one's own amplified breath sounds or the prolonged watching of a revolving drum, a metronome, stroboscope, etc.[74]

The **fourth category** includes "mental states which appear to occur mainly as a result of what might best be described as a 'passive state of mind,' in which active, goal-directed thinking is minimal."[75] This category includes:

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[67] In the case of the Eleusinian Mysteries, R. Gordon Wasson, A. Hofmann and C. A. P. Ruck have made a convincing argument that *Claviceps purpurea* (ergot) growing on wheat and barley may have been used in a water solution during the mysteries or a water solution of the powdered ergot of *Paspalum distichum,* a grass growing around the Mediterranean, might have produced an entheogenic (experience of God) state during the mysteries. See *The Road to Eleusis: Unveiling the Secrets of the Mysteries*. New York: Harcourt, Brace, Jovanovich, 1978. If this theory is correct, the Greeks would have been the only culture that has used ergot as a hallucinogen deliberately. See Richard Evans Schultes and Albert Hofmann, *Plants of the Gods: Their Sacred, Healing and Hallucinogenic Powers*. Rochester, Vermont: Healing Arts Press, 1992, pp. 102-103. Ergot is an extremely poisonous compound as shown by the epidemics of St. Anthony's Fire during the Middle Ages, and as described in detail by John G. Fuller in an epidemic of ergot poisoning as recently as 1951. See *The Day of St. Anthony's Fire.* New York: The Macmillan Company, 1968.

[68] Berserk refers to an ancient Scandinavian warrior frenzied in battle and held to be invulnerable.

[69] Latah is an extreme startle reaction wherein a sudden stimulus provokes the suspension of all normal activity and triggers a set of unusual and inappropriate motor and verbal manifestations, over which the affected person has no voluntary control. The disorder is found in women of all Malaysian races, especially the Javanese, but it is also observed in a smaller proportion of men.

[70] Wihtigo is a psychiatric illness confined to the Cree, Ojibway, and Salteaux Indians of North America. They believe that they may be transformed into a Wihtigo, a giant monster that eats human flesh.

[71] Ludwig, pp. 72-3.

[72] The authors would add that acute psychotic states associated with manic depressive illness also belong in this category.

[73] Ibid, pp. 73-4

[74] Ibid, p. 74.

1. Mystical, transcendental or revelatory states (e.g., satori, samadhi, nirvana, cosmic consciousness).[76]
2. Daydreaming.
3. Drowsiness.
4. Brown Study, or reverie.
5. Free-associative state during psychoanalytic therapy.
6. Mediumistic trance.
7. Deliberately induced autohypnotic trance (e.g., among Indian fakirs, mystics, Pythian priestesses, etc.).
8. Creative, illuminatory, and insightful states.
9. Profound aesthetic experiences.
10. Music-trance, especially common while absorbed in relaxing, soothing lullabies.
11. Reading-trance, especially with poetry.
12. Alterations in consciousness associated with profound cognitive and muscular relaxation, such as during floating on the water, sunbathing.
13. Nostalgia.[77]

The **fifth category** of factors inducing ASCs includes "mental states resulting primarily from alterations in body chemistry or neurophysiology. These alterations may be deliberately induced or may result from conditions over which the individual has little or no control." These ASCs include:

1. Hypoglycemia, either spontaneous or secondary to fasting; ascetics or priests may fast as an aid in inducing mystical or spirit-possession states.
2. Drowsiness secondary to hyperglycemia (e.g., postprandial lethargy).
3. Dehydration (often partially responsible for the mental aberrations encountered in the desert or at sea).
4. Narcolepsy.
5. Auras preceding migraine or epileptic seizures.
6. Hyperventilation states.
7. Alterations in consciousness subsequent to sleep deprivation.
8. Toxic delirious states secondary to the abrupt withdrawal from addictive drugs, such as barbiturates, alcohol, etc.
9. Toxic deleria caused by fever or the ingestion of toxic agents.
10. Dreamy states and déjà vu phenomena caused by temporal lobe seizures.
11. The administration of pharmacological agents which may include:
    a. Anesthetics, e.g., carbon dioxide, nitrous oxide, ether.
    b. LSD and related compounds.
    c. Narcotics, marijuana.
    d. Sedatives: e.g., barbiturates, alcohol.
    e. Stimulants: e.g., amphetamine, cocaine.[78]

Given this huge variety of some seventy-five different trance states,[79] only one of which refers to shamanistic trance, how could anyone who is informed about the complexities of neuropsychological research suggest that all trance states have the same characteristic "three stages"?[80]

To emphasize some of the different characteristics of various trance states, we will discuss two major classes of trance induction. The first class of induction is by natural trance techniques that do not

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[75] Ibid.
[76] The authors would add Abraham Maslow's "peak experience" such as at-oneness with nature attained through passive meditation or occurring spontaneously during the relaxation of one's critical faculties. See Abraham H. Maslow*, Religions, Values, and Peak-Experiences*. New York: The Viking Press, 1964.
[77] Ludwig, p. 74.
[78] Ludwig, p. 75.
[79] This list is not exhaustive, for example it doesn't include the hallucinations experienced by speleologists cited by Bahn, 2001, pp. 58-59.
[80] In their 1988 paper, LW & D state that "the three stages we propose should therefore be seen as cumulative rather than sequential." In other words, they are trying to bring their model into conformity with some of their sources who do not describe three stages of trance. For example R. K. Siegel only noted two stages of trance in his work on marijuana and cocaine while Mardi Horowitz noted several stages of trance. Strikingly, Horowitz's subjects experienced complex hallucinations in the initial stage of intoxication and geometric figures in the last stage! Nevertheless, LW & D continue to refer to their model as the "three stages of trance." In his 2001 paper, LW discusses identifying "art derived from the imagery of altered states of consciousness." He says that "it should be noted that a confident identification depends on the presence of elements referable to all three stages," p. 341.

include the ingestion of alcohol, drugs, or hallucinogens. The second class of trance induction refers to trance states that are substance-induced. Within these two general classes of induction, we will consider several types of trance that were referred to in Ludwig's categories.

Natural Trance States

Hypnosis, Psychoanalysis, Peak Experiences

Numerous studies have demonstrated that hypnosis, transcendental meditation, autogenic hypnosis, Zen, and yoga all lead to a similar if not identical state of altered consciousness, with similar reports of mystical, and affective experiences.[81] No reports based upon the subjective experiences during these trance states contain any descriptions that are even remotely compatible with the "three stage model." We will consider hypnosis as an example of the typical subjective experience representative of this group of trances. Hypnosis is an example of a mental state traditionally believed to result primarily from an absolute reduction of sensory input, accompanied by hyperalert and focused attention to certain internal stimuli. In other words, hypnosis is an altered state of consciousness wherein selective stimuli are emphasized while others fade into the background, usually in response to suggestions made by the hypnotist.[82] The scientific study of this special state was first appreciated by Franz Anton Mesmer (1734-1815) and his follower the Marquis de Puységur, (fl. 1885-2903).[83] Basically, what these individuals discovered was that during a trance state which can be induced by a wide variety of techniques, guided suggestions caused the subject to "feel-remember-think-imagine-experience ideas or events that they were rarely ever asked to experience."[84]

Over the past thirty years a huge body of research has been published relating to hypnotic phenomena.[85] Additionally, the practical utilization of the hypnotic trance for a vast array of therapeutic treatments derived from empirical clinical practice has expanded our knowledge of hypnosis as a therapeutic modality.[86] Hypnosis is a natural, although altered state of consciousness, that may be induced by a hypnotist or the individual subject (the latter is known as autogenic hypnosis). It is the addition of guided suggestion to the basic state of relaxation that characterizes the special event known as hypnosis. During the trance, the individual is in a relaxed, hyper-suggestible state wherein s/he is concentrating, focusing, and maximizing involvement with one idea or sensory stimulus at a time, and excluding others from the foreground of awareness.[87]

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[81] F. H. Frankel, "Hypnosis as a treatment method in psychosomatic medicine*," International J. of Psychiatry in Medicine,* Volume 6: 1-2, 1975 pp. 75-85.

[82] Don J. Feeney, Jr. *Enhancing Relationships: Exploring the Hypnotic Framework of Addictive Relationships,* Westport, Ct.: Praeger publishing, 1999, pp. 2-16.

[83] Henri F. Ellenberger, *The Discovery of the Unconscious: The History and Evolution of Dynamic Psychiatry*, New York: Basic Books, Inc., Publishers, 1970, pp. 55-84.

[84] Theodore X. Barber, "Changing 'Unchangeable' Bodily processes by (Hypnotic) Suggestions: A New Look at Hypnosis, Cognitions, Imagining, and the Mind-Body Problem," In *Imagination and Healing: Imagery and Human Development Series.* Anees A. Sheikh (Ed.), New York: Baywood Publishing Company, Inc., 1984, p. 69.

[85] See Sheehan and McConkey, *Hypnosis and Experience*, previously cited, and *Theories of Hypnosis: Current Models and Perspectives,* (Eds.), Steven Jay Lynn and Judith W. Rhue, New York: The Guilford Press, 1991, for two contemporary surveys regarding hypnosis.

[86] Michael D. Yapko*, Essentials of Hypnosis*. New York: Brunner/Mazel, Publishers, New York, 1995.

[87] H. Spiegel and D. Spiegel. *Trance and Treatment: Clinical Uses of Hypnosis*. Washington, D. C.: American Psychiatric Press, 1987. Thus, the induction of hypnosis usually involves centering upon a specific sensory stimulus to the exclusion of all others until trance is induced. Many contemporary techniques used to induce hypnotic trance include a suggested and focused awareness upon bodily

The more frequently one induces relaxation or hypnosis, the more quickly one is able to enter the trance state and experience progressively deeper levels of trance. Finally, hypnosis is guided imagination. The hypnotist (heterohypnosis) or the subject (autogenic hypnosis) induces a trance and then proceeds to act as a guide for the experience by providing suggestions for various images, feelings, thoughts, sensations, or perceptions. It is important to remember that the altered state of hypnosis is largely defined in terms of an individual's subjective experience and altered psychological functions, although imaging studies now allow us to view those patterns of brain activity involved during hypnosis. During hypnotic states there are changes in sensory and motor experiences (i.e., perceptions; images; sensations including odors, sounds, tastes; affective states; somatosensory awareness; and the inability to move the limbs).[88] Hypnotic states may also include illusions, very rarely some hallucinations, and hyperawareness of one area of the body with an absence of awareness of the remainder of the body. It is very important to emphasize that the hallucinations perceived during hypnosis differ from those experienced following ingestion of LSD, mescaline, or psilocybin.[89]

In all of the vast literature relating to hypnotic trance over the past thirty years, there is no hallucinatory experience reported that in any way corresponds to the "three stage" model. There are reports of extremely varied hallucinatory experiences in all of the senses, including many examples of synaesthesias (sometimes believed to be characteristic of LSD-related trances exclusively). But there is no description of an evolving hallucinatory process beginning with geometric figures followed by increasingly complex "iconic" forms, including anthropomorphous, theriomorphic or therianthropic forms. Helvenston has no doubt that given the appropriate guided suggestion provided by a hypnotist, some subjects could experience such a progression of hallucinatory images during hypnosis; however, these images have never been spontaneously reported in the hypnotic literature.

Moreover, Helvenston (as a minor part of her overall professional work) utilized hypnotic trance in the treatment of about a thousand subjects over the course of fifteen years of clinical practice, and induced autogenic hypnotic states over a longer period of time. She has never experienced anything remotely resembling the "three stage" model during autogenic hypnosis, nor have any of her patients reported such an experience to her. Bahn cites the case of a psychoanalyst at the Centre Alfred Binet in Paris on 28 February 1996, who stated that in "twenty years of work at the Centre, involving almost 2000 patients, he had never encountered anything that resembled the "three stages of trance" model.[90]

Ludwig referred to a type of ASC experienced during the free-associative process in psychoanalysis. Based upon her own experiences in psychoanalysis, Helvenston would add that much of the psychoanalytic experience, because of the methodology used, can be powerful because it induces a trance state during which the hyper-suggestibility of the analysand is a predominant feature. Many other

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sensations such as feelings of numbness, warmth, or heaviness of a limb or the eyelids, and these sensations are made, through suggestion, to appear as pleasant accompaniments of relaxation. However, classical techniques that direct the subject to focus upon the light of a candle, a swinging watch, or any other external object are also utilized to induce trance.

[88] John F. Kihlstrom, "Hypnosis," *Annual Review of Psychology*, Volume 36, 1985, p. 385.

[89] Theodore X. Barber, "Imagery and Hallucinations" cited previously, pp. 101-129.

[90] Bahn, 2001, p. 52.

colleagues and associates have discussed their own experiences of analysis with her personally and neither her own experiences nor these reports, nor any cited in the psychoanalytic literature, correspond to the "three stage" model of trance.

Another common trance that many people in our secularized world have experienced without imparting to it a specific name is what Abraham H. Maslow referred to as a "Peak Experience."[91] Maslow was deeply influenced by William James' study, *The Varieties of Religious Experience*,[92] in which James reflects upon a wide range of experiences traditionally referred to as religious in the broadest sense. Like James, Maslow was especially interested in the trance-like states of insight into "truth" which mystics in most of the world's great religions have reported. Such trance states are characterized by

> feelings of limitless horizons opening up to the mystic vision; the feeling of being simultaneously more powerful and also more helpless than one ever was before; the feeling of great ecstasy and wonder and awe; the loss of place in time and space; and finally the conviction that something extremely important and valuable had happened, or that the mystic is to some extent transformed and strengthened even in his daily life by such experiences.[93]

Over the course of more than 30 years, Maslow was convinced that although these "mystic" trances had for thousands of years been associated with the supernatural, they were a natural, human experience, well within the jurisdiction of science. He conducted many studies on the secularized peak experience (i.e., an experience similar to the mystic trance, but viewed from a non-supernatural perspective). He concluded that the acute mystic or peak experience is a tremendous intensification of any of the experiences in which there is a loss of self or transcendence of it. Intense concentration, intense sensuous experience, self-forgetful and intense enjoyment of music, art, nature, or sexual orgasm are all examples of what thousands of subjects have described as a peak experience.

In all of the research conducted on peak experiences, there were no descriptions of mystic trances that even remotely resembled the "three stage" model of shamanistic trance. This is curious, because of all the trance states cited by Ludwig, Maslow's peak experience, lasting only a brief period of time, is a very common form of trance as experienced by contemporary peoples,[94] and thus would likely have been a common form of trance experience for people of the Upper Paleolithic. Indeed, it is easy to imagine a *Homo sapiens sapiens* of 30,000 years ago, staring at a broad green valley dotted with wild flowers and crossed by a meandering river, where a herd of favored prey animals grazed, having a peak experience wherein s/he feels at one with nature and the great beasts. Drawing the animal could be seen as a natural expression of the profundity of that experience. There is no need here to summon up shamans, hallucinogens, rituals, myths or anything else, just the joy of a nature lover mingling with the great outdoors.[95] As Bahn has stressed repeatedly, we can speculate that such experiences might have inspired some cave art; but there is no current methodology that would enable us to distinguish between art based

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[91] Maslow cited previously.
[92] William James, *The Varieties of Religious Experience*. Cambridge, Massachusetts: Harvard University Press, 1985.
[93] Abraham H. Maslow, *Motivation and Personality*, 2nd edition, New York: Harper & Row, Publishers, 1970, p. 164.
[94] Maslow estimated that nearly everyone experienced mild Peak Experiences, but fewer individuals were likely to have the acute mystic experience, although this still included a large percentage of the population, Ibid, pp. 164-165.
[95] Indeed, Edward O. Wilson has proposed the "Biophilia Hypothesis," which states that humanity's innate affinity for the natural world is a biological need, integral to our development as individuals and a species. See *Biophilia,* Cambridge, Massachusetts: Harvard U. Press, 1984.

upon shamanism, ordinary consciousness, a peak experience, autogenic hypnosis, meditation, or any other trance state.

Ritual Trance

Ludwig and others[96] have emphasized that trance states may be induced by dance and music in response to rhythmic drumming, light-dark patterns (such as those observed around a flickering fire in the darkness of night) and synchronized body movements. They have also noted mental aberrations associated with certain rituals (such as rites of passage), shamanistic divination, and prophetic trance states during certain tribal ceremonies. Barbara W. Lex presents a fascinating discussion of "ritual trance" and elaborates the way in which such trances arise out of the "manipulation of universal neurophysiological structures of the human body" by means of dance and ceremonial performances.[97] Such trance states are within the potential behaviour of all normal human beings, and function as a mechanism for re-establishing intense and similar emotional states in participants, restoring individual and group equilibria during periods of social transition, environmental crisis, and other stress-producing situations. The ritual behaviour, including dance and music, involves repetitive, evocative sequences of action and produces some rather specific patterns of activation in the autonomic nervous system, that appear to generate certain fairly specific subjective experiences in the participants.[98]

Unfortunately, Lex does not go into detailed descriptions of the subjective phenomena reported during such "ritual trances," other than to refer to the similarities between the subjective experiences reported in these states and those experienced by practitioners of various forms of meditation. The subjective affects she cites include feelings of temporal distortion, timelessness, "unusual sensations," strong emotions, "feelings of memory disturbance, ineffability, pseudoperceptions" (she appears to be referring to visual illusions), "mystical experiences and images."[99] Additionally, she reports that subjects demonstrate myoclonic jerks. Eugene G. d'Aquili and Charles D. Laughlin, Jr. also discuss the "ecstatic state and sense of union" produced by ritual trance. They note that this ecstatic state is very brief, often lasting only a few seconds, but that it may be repeated at numerous focal points during the ritual.[100]

Lex cites the section of Ludwig's paper wherein he discusses some "general characteristics of ASCs."[101] Hence, we assume that she was familiar with the list of various subjective experiences he reported as occurring during trance. We emphasize that *there is no mention of hallucinations* of any kind, neither geometric forms nor realistic-appearing images in Lex's presentation. She emphasizes affective states, mystical experiences, including feelings of union with the community and cosmos, feelings of ecstasy, and timelessness during ritual trance. In fact, Lex's data suggest that the subjective experience

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[96] Barbara W. Lex, "Neurobiology of Ritual Trance," In *The Spectrum of Ritual: A Biogenetic Structural Analysis*, by Eugene G. d'Aquili, Charles D. Laughlin, Jr., and John McManus. New York: Columbia University Press, 1979.
[97] Lex, pp. 117-152.
[98] See fn #56.
[99] Lex, pp. 123-126.
[100] Eugene G. d'Aquili and Charles D. Laughlin, Jr., "Neurobiology of Myth and Ritual," cited previously, pp. 177-178.
[101] Lex, p. 126. Ludwig, in attempting to cite all the different types of subjective experience reported by subjects during various types of trance, includes a mention of geometric figures. In examining the experiments he cites, it is clear that geometric figures are reported only during LSD, mescaline, or psylocybin ingestion.

during ritual trance is similar to that of meditative and hypnotic trance, neither of which is consistent with the "three stage" model. In short, none of the most common forms of trance induced by natural processes generates a progression of hallucinatory experiences consistent with the "three stage" model.

Substance-Induced Trance

The "three stage" model is most consistent with hallucinations produced by the ingestion of mescaline, LSD, and psilocybin, as we will now demonstrate.[102] According to the sources cited by LW & D, their model was directly based upon subjective reports of those subjects who ingested mescaline, although they cited references in support of their theory that included trances induced by LSD, tetrahydrocannabinol (THC), the active ingredient in marijuana and hashish, and cocaine. Except for LSD and mescaline, all of the other substances referred to in LW & D's citations pose major challenges to their model.

Mescaline

In the 1988 paper LW & D cited Heinrich Klüver as one of their primary sources. Klüver, a highly respected neuroscientist at the University of Chicago, had studied the visual hallucinations produced by mescaline[103] and noted that such phenomena consisted of both simple visual percepts (form constants or geometric figures) and complex hallucinations. Klüver cited the findings of Rouhier, who suggested that there were three stages of mescal-induced hallucination, beginning with form constants, progressing to a combination of form constants and complex hallucinations, and ending with complex hallucinations. LW & D chose to follow Rouhier, not Klüver in this regard. In fact, Klüver was very skeptical of Rouhier's three stages, and in 1928 he wrote,

> It seems to us that any scheme, which in a detailed manner, assigns different kinds of visions to successive stages of the mescal state must be viewed as extremely arbitrary. The only thing that is typical with regard to sequence is that very elementary visions are followed by visions of a more complex character.[104]

Moreover, Klüver, rather than commenting on the uniformity of hallucinations experienced during the mescal trance, as LW & D have, wrote: "One is struck by the great variability in the changes produced. These perceptual changes may differ from case to case, from one intoxication to another, and in different stages of the same intoxication."[105] Klüver was struck by the huge variety of color tones, the most overpowering aspect of the experience. Indeed, he observed that the colors of the hallucinations often

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[102] LW & D, 1988, "This three-stage progression was established by research using mescaline and LSD," p. 204.

[103] Mescaline is the active principle of the Mexican cactus *Lophophora williamsii* or the other species of *Lophophora* known as *L. diffusa*. These cacti, referred to as the Mescal Button or Peyote Button, are widespread throughout the southwestern U.S. and northern Mexico. They are extremely important sources of hallucinogenic substances and appear to have been widely used by the aboriginal inhabitants for centuries and are still widely used today. The Mescal Button is not to be confused with the Mescal Bean, which is a red bean or seed of the shrub *Sophora secundiflora*. These seeds contain the highly toxic alkaloid cytosine, pharmacologically related to nicotine. It causes nausea, convulsions, and death through respiratory failure. Truly hallucinogenic activity is unknown for cytosine, but it may produce powerful intoxication through a kind of delirium, a condition that may induce a "visionary trance." Richard Evans Schultes and Albert Hofmann, *Plants of the Gods*, pp. 26-27, 28-29, 48, 57. For more discussion about the indigenous use of Mescal Button in North and South America, see Peter Furst, "To Find Our Life: Peyote among the Huichol Indians of Mexico," In *Flesh of the Gods: The ritual use of hallucinogens,* cited previously, pp. 136-185.

[104] Heinrich Klüver, *Mescal and Mechanisms of Hallucinations,* Chicago: The University of Chicago Press, 1966, p. 20. Klüver's work on mescaline was initially published in 1928, under the title *Mescal "The Divine Plant and Its Psychological Effects,"* London: Kegan, Paul, Trench, Trubner & Co., pp. 1-111. Klüver's speculations on hallucinations, which LW & D utilize, were published in 1942 as "Mechanisms of Hallucinations," In *Studies in Personality*, Q. McNemar and M. Merrill (Eds.), New York: McGraw-Hill Book Co., 1942, pp. 175-207

[105] Ibid, p. 33.

obscured the geometric form constants. He indicated there was no general rule concerning hues and their sequence in mescal visions. The brightness and color saturation of the figures also impressed him greatly.[106] Nevertheless, Klüver did cite three types of form constant that appeared to recur fairly frequently. (1) He referred to the first form constant he discussed by terms such as grating, lattice, fretwork, filigree, honeycomb, or chessboard design. Closely related to these was the cobweb design. (2) The second form constant he discussed was designated by terms such as tunnel, funnel, alley, cone or vessel. (3) The third form constant he presented was the spiral.[107] However, unlike the descriptions of simple geometric forms presented by LW & D and shown in Figure 1 of their 1988 paper,[108] the forms described by Klüver were not simple geometric figures. For example, consider Klüver's descriptions of spiral figures,

> Upon rhythmic whistling there appears a brown spiral, a wide band, revolving madly around its vertical axis. The band spiral opens and closes as a concertina according to the rhythm of the whistling whereby bright light falls through the intermediate spaces. . "a procession, coming from the lower right, moved slowly in spiral turns to the upper left"…. "wire-like thin black lines in curves and spirals drawn out."[109]

The incredible complexity of the geometric figures, which are embedded within a highly complex image, is conveyed in the following two subjective reports as cited by Klüver.[110] The first example is that of Serko who described his "haptic hallucinations" by mentioning he had the sensation that one of his legs felt as if it were spiral in shape. Serko wrote

> In the diffusely illuminated visual field a luminous spiral forms itself through the active movement of a stripe. This quickly rotating spiral is moving back and forth in the field. At the same time. . .one of my legs assumes spiral form. . .The luminous spiral and the haptic spiral blend psychologically, that is to say, the same spiral which is optically hallucinated is also haptically experienced. In an hallucinatory way the leg blends haptically with the luminous spiral. . .A physician, a subject of Beringer, reports: Before me I see the lower part of my body from the hips down as a large green varnished object which has about the shape of a truncated cone with spiral windings. This same subject experiences the sounds of a concertina coagulating in the spiral windings of the body.[111]

Obviously, the spiral form is only one factor of the entire hallucination. Based upon these descriptions, it seems that rock art inspired by mescaline-induced hallucinations should include some spiral forms, or other geometric figures, emanating from a human figure. It is very noteworthy that LW & D ignore the spiral figure which is so prominent in Klüver's descriptions and in R. K. Siegel's illustrations referred to in a subsequent section of this paper.

Moreover, Klüver's descriptions of color tones, intensity and color saturation and the complexity of geometric figures embedded within a much more expansive image do suggest a possible methodology for interpreting whether rock art *may be* hallucinogen based. That is, the geometric figures would need to be portrayed in intensely vivid color, embedded within more complex images, and shown alongside more realistic, intensely colored complex (iconic) images, both created at the same painting session. Indeed, this

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[106] Ibid, pp. 24-25.
[107] Ibid, pp. 22-24.
[108] LW & D, p. 206.
[109] Klüver, p. 24.
[110] Although LW & D ignored the haptic hallucinations reported by Klüver in their 1988 paper, LW in 2001, p. 341-342, does cite a few examples, which he refers to as "somatic hallucinations." A haptic hallucination is based upon the complex senses of touch and proprioception. LW's examples are very simple, e.g., he refers to sensations of "prickly skin," or bee stings and he still largely ignores the incredible complexity of the hallucinatory phenomena associated with mescaline trance.
[111] Klüver, p. 25.

is how modern artists depict their drug-induced hallucinations.[112] For example, the front cover of this paper shows a drawing made by a Huichol Indian of Mexico, inspired by the use of peyote buttons containing mescaline. Highly noteworthy is the fact that the dual portrayal of geometric forms with iconic figures is required by the "three stage" model, as LW stresses when he says that arts derived from trance "must contain the elements referable to all three stages."[113] The drawing on the Front Cover of this book might be said to fulfill this requirement and it shows the manner in which "geometric forms," such as zigzag lines and circles are grounded within artistic depictions of more complex scenes. While this approach to the study of rock art in the Americas might prove fruitful, but only when coupled with evidence of hallucinogens at the rock art sites, it is unlikely to be beneficial for Upper Paleolithic art, as far as mescaline is concerned, because this substance is found *only in plants of the New World*.[114] This inescapable fact certainly discredits the "three stage" model with respect to Paleolithic cave art being inspired by mescaline-induced trance. [115]

LSD

Lysergic Acid Diethylamide (LSD) allegedly produces hallucinations identical to those reported during mescaline trance, as noted by M. J. Horowitz, another source cited by LW & D.[116] However, in contrast with Klüver or the "three stage" model of LW & D, Horowitz described a much more complex progression of images evolving through several stages.[117] Furthermore, according to Horowitz, rather than beginning with images predominantly consisting of geometric figures as required by the "three stage" model, the form constants were produced much later in the hallucinatory sequence *after* more complex imagery had been developed.[118] It is believed that drugs of the "so-called LSD group" which includes mescaline, LSD and psilocybin, are reportedly identical in their clinical effects, but the data presented by Horowitz challenge that view, since the presence or absence of geometric forms occurs in different time sequences in mescaline trance than it does in LSD trance,[119] although it appears that much of the content *may be* similar in both.[120] In order to establish that the subjective hallucinations produced by these three

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[112] See R. K. Siegel's illustrations in "Hallucinations," *Scientific American*, Volume 237, 1977, pp. 132-140.
[113] LW, 2001, p. 341.
[114] Schultes and Hofmann, *Plants of the Gods,* pp. 28-29, p. 48, p. 63.
[115] As LW & D stressed, that model was specifically formulated to account for the "co-occurrence of signs and representational art" in Palaeolithic rock art, p. 204.
[116] Mardi J. Horowitz, "Hallucinations: An Information-Processing Approach," In *Hallucinations: Behavior, Experience and Theory***,** pp. 163-195
[117] Horowitz, p. 175. Horowitz noted that the first experience of hallucination was the emergence of surprising memory or fantasy images. The perception of which images were internal (thought) versus those that were external (perception) was maintained. Gradually the fantasy or memory images seemed to be increasingly intrusive and became quasi-real to the subject. In the next stage, the experienced intensity of thought images resembled that of perceptual images, but the person was still able to label the experience as non-perceptual. Next, the subject experienced a progressive loss of differentiation between external and internal sources of information, beginning with an alteration of perceptual images. A second type of progressive loss of differentiation between external and internal sources of information began with an alteration of perceptual images characterized by blurring, graying, bending, halo-effects, shimmering, reduplicating of forms or other perceptual distortion. This phase might then be followed by a phase of vivid "entoptic" images such as spots, flashes, and geometric patterns. Finally, pseudohallucinations or hallucinations may be elaborated by adding internal information to these basic forms. The reader will note that Horowitz lists several stages characterized by differing images and the "entoptic" or geometric images, rather than occurring in the initial phases of intoxication, occur toward the end of the trance state, while the complex hallucinations occur first.
[118] Ibid.
[119] Also, mescaline is found localized in the visual cortex whereas LSD is not.
[120] Leo E. Hollister, "Effects of Hallucinogens in Humans," In *Hallucinogens: Neurochemical, Behavioral, and Clinical Perspectives*, Barry L. Jacobs (Ed.), New York: Raven Press, 1984, pp. 19-33. Hollister also notes that when a subject develops a tolerance to LSD,

substances are more than grossly similar, a much more extensive comparison of the art produced under the influence of each substance, along a time continuum from ingestion, would need to be undertaken – a study that has never been done to our knowledge. As Jerome Levine et al point out, "one difficulty frequently encountered in the use of LSD has been the great response variability among individuals. No reliable method has been found to predict the particular response of a given individual following administration of the drug."[121]

In the "three stage" model one of the major assumptions that LW & D make is that similar drug-induced hallucinations are experienced by all shamans, across all time. Nothing could be further from the truth. In fact, many subjects who have taken LSD, psilocybin, and mescaline have reported very disappointing results in that they experienced absolutely no hallucinations whatsoever.[122] They did experience a variety of extremely unpleasant physiological reactions that we cite here to demonstrate that no culture takes these substances lightly, because in high doses they are known to produce madness and/or death. The common vegetative symptoms experienced after ingesting these three substances include dizziness, light-headedness, weakness, muscle aching and twitching, shivering, nausea, vomiting, abdominal discomfort, anxiety, tension, restlessness, numbness of the tongue, lips or mouth, other paraesthesias, and blurred vision.[123] Experiencing these unpleasant symptoms is a high price to pay for only the possibility of a hallucinogenic experience.

Psilocybin and psilocine

Psilocybin and psilocine are the last of the "LSD group" of hallucinogens, and they are the active ingredients in about 24 species of hallucinogenic mushrooms found in Mexico, Central America and South America. These sacred plants, known generally in the United States as "Magic Mushrooms," were of major religious importance in early Mexico[124] where the Aztecs referred to them as Teonanacatl (Divine Flesh).[125] The most important varieties belong to the genus *Psilocybe*, and the diversity of subjective experiences reported following ingestion of these mushrooms suggests that different varieties produce rather different clinical effects. For example, in the 17th century, Dr. Francisco Hernandez, personal physician to the King of Spain, described some species of mushrooms that produced death, while others caused madness, and still others produced visions of demons, devils, wars, and sadistic cruelty.[126] The cultic use of these psilocybin-

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s/he also develops a tolerance to mescaline, or vice versa, p. 55. This is referred to as developing a cross tolerance. A Balestrieri, "Some Aspects of the Sensitivity to Hallucinogenic Drugs," In E. Rothlin (Ed*.), Neuropsychopharmacology*, Volume 2, Amsterdam, Elsevier, 1969, p. 44, discusses the cross tolerance between LSD and Psilocybin as does H. Isbell, A. B. Walbach, W. Wikler and E. J. Miner, "Cross Tolerance Between LSD and Psilocybin," *Psychopharmacologia,* 2, 1961, p. 147.

[121] Jerome Levine, Arnold Ludwig, & William H. Lyle, "The Controlled Psychedelic State." *The American Journal of Clinical Hypnosis*, Volume 6:2, 1963, pp. 163-164.

[122] See S. Szara, "The Comparison of the Psychotic Effect of Tryptamine Derivatives with the Effects of Mescaline and LSD-15 in Self-Experiments." *Psychotropic Drugs*, S. Garattini and V. Ghetti (Eds.), Amsterdam: Elsevier Publishing Company, 1957, pp. 460-479. Szara experienced vegetative symptoms prior to any other symptoms when taking LSD and mescaline. He did experience illusions but no hallucinations. He experienced disturbances of spatial perception, time perception, bodily sensations, and depersonalization. He experienced euphoria during mescaline and anxiety during LSD. He also experienced language changes during LSD.

[123] Leo E. Hollister, "Clinical syndromes of the Chemical Psychoses," In *Chemical Psychoses: LSD and Related Drugs* by Leo E. Hollister, Springfield, Illinois: Charles C. Thomas, 1968, pp. 32-59.

[124] The Aztec religion employed one species that was referred to as "Teonanacatl." See Jonathan Ott and Jeremy Bigwood (Eds.), *Teonanacatl: Hallucinogenic Mushrooms of North America,* Seattle: Madrona Publishers, Inc., 1978.

[125] Schultes and Hofmann, p. 148.

[126] Ibid, pp. 144-147.

containing mushrooms still survives in religious rituals today in Mexico, Central, and South America. R. G. Wasson, the first non-Indian reporter to fully participate in the Mazatec mushroom ceremonies described his experience as beginning with the sensation that his soul had been removed from his body where it floated in space. He saw

> geometric patterns, angular, in richest colors, which grew into architectural structures, the stonework in brilliant colors, gold and onyx and ebony, extending beyond the reach of sight, in vistas measureless to man. The architectural visions seemed to be oriented, seemed to belong to the…architecture described by the visionaries of the Bible.[127]

Unfortunately for the "three stage" model, until recently the only psilocybin-containing mushrooms that have ever been used for hallucinatory purposes are New World species, so they have to be ruled out as inspiring Upper Paleolithic cave art in Europe. There may have been a species of psilocybin-containing mushroom, *Stropharia cubensis* which was found in both the New World[128] and North Vietnam.[129] There is no evidence that this species was ever used outside the New World for hallucinogenic purposes. Additionally, Schultes and Hofmann report that a famous Mazatec shaman, Maria Sabina, who used many varieties of mushrooms in her divinatory and religious rituals, would not use *Stropharia cubensis* because of its adverse results.[130]

In the 1998 (English Translation 2001) edition of Schultes, Hofmann, and Rätsch's *Plants of the Gods*, a European species of Psilocybe (*Psilocybe semilanceata*) is mentioned for the first time, no reference to it having been included in the 1992 edition edited by Schultes and Hofmann. Although there is no evidence that this mushroom was present in Europe earlier than 1799 (Gartz 1996: 15), the 1998 edition speculates that *P. semilanceata may* have been used in Europe for some 12,000 years. The four sources cited for this conjecture are Gartz, (he was not cited in the earlier edition), but those were not his findings. In fact, Gartz speculated that a poisoning reported in a medical report in 1799 resulted from the consumption of *P. semilanceata*, but the author of that report believed the mushrooms in question were one of the very common species of agaric. It should be noted that *P. semilanceata* belongs to a completely different family of mushroom (*Strophariaceae*) than the agarics (*Agaricaceae*). The latter contain many species of edible mushrooms, along with the poisonous hallucinogenic mushroom *Amanita muscaria*.

The group that was poisoned consisted of a father and his four children who harvested some "little brown mushrooms" from a park, no more than a tea saucer full, and consumed them. They had often eaten "the same mushroom" with no ill effects whatsoever. On this occasion, however, one of the children began to laugh uncontrollably, to experience vertigo and to become stuperous. His eyes were dilated and he held his abdomen as if he were ill, but when he was awakened to ask if he was in pain, he said yes sometimes and no at other times. His breathing was quick, his pulse irregular and too fast, and his feet were cold to the touch. His stuperous condition is more suggestive of intoxication from an agaric mushroom than of a

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[127] R. G. Wasson cited by Schultes and Hofmann, p. 148.
[128] Schultes and Hofmann, p. 144. A closely related species, *Psilocybe semilanceata*, was reported to be found in Europe by Pollock, but nothing was cited as to whether it had ever actually been used as a hallucinogen. See also, Steven Hayden Pollock, "The Psilocybin Mushroom Pandemic," *Journal of Psychedelic Drugs*, Volume 7:1, 1975, p. 75.
[129] Pollock, p. 74.
[130] Schultes and Hofmann, p. 148.

psilocybin-containing one. It is certainly possible that a poisonous agaric species was mixed among the edible species and avoided detection. The father also suffered from vertigo and said "everything went black" (Ibid). We are more inclined to believe the author of the report who appears to have been familiar with the mushroom species available in London at that time than Gartz, so we doubt that this report concerned *P. semilanceata.*

However, even if the mushroom in question was *P. semilanceata* it must have been very sparse. Even more significant is the fact that this is a very late identification of this species if it had actually existed in Europe for 12,000 years. Had it been widespread as it is today, we believe there would have been many more references to it in the botanical literature and more reports of poisoning. In our view, Gartz, an advocate of hallucinogen use as is Rätsch, would gladly report the existence of this shroom[131] if he had any evidence that it had been in Europe for thousands of years. Gartz also acknowledged that there was very little evidence from the Middle Ages in Europe to indicate widespread knowledge of the effects of mushrooms on human consciousness. *Amanita musc*aria had been known in Europe since at least the time of the Roman Empire, and references to "fools" mushrooms (producing mental effects) are linked to that species. Gartz believes such linkages occur because that was the only known psychotropic mushroom in Europe at that time, and we are inclined to agree. It seems quite likely, based upon the empirical evidence available at this time, that if *P. semilanceata* did grow in Europe from 1799, it may have been imported to the Old World after the conquest of the Americas, where it grows profusely from South America to the Pacific Northwest of North America, reaching Spain and Portugal around 1496 at the earliest.

There were three other poisonings that Gartz attributed to *P. semilanceata* about 1900 but it was only with its rapid spread across Europe during the 1960s and 1970s that this mushroom was definitively identified as the responsible agent of numerous poisonings reported during the latter years of the 20th century. Gartz cites a report in German from 1927 that describes *P. semilanceata* as being an essentially "worthless" species (Ibid: 17), and there is no evidence that it was deliberately ingested until the last 30-40 years when numerous reports of poisoning abound. A. Hofmann was the first to identify psilocybin as the active ingredient in *P. semilanceata* in 1963, and yet he did not include this species as native to Europe in the 1992 edition of *Plants of the Gods* co-edited with Schultes. We believe that this indicates these researchers did not view *P. semilanceata* as native to Europe and we have been unable to find evidence of spoors for this species in data bases of ancient fauna in Europe.

LSD in Europe?

If one were to accept the "three stage" model as currently presented, the only hallucinogen among the three types discussed above that could have even *potentially* affected Paleolithic cave art, would be LSD. It is now well known that a fungus, one of the *Claviceps* species that grow on various Loliums and other cereal grasses native to Greece and parts of Europe, contained Ergot, a fungal growth on some domesticated grains. As far back as 600 BC, the Assyrians called Ergot a "noxious pustule in the ear of the

[131] Contemporary term used to designate a hallucinogenic mushroom, most commonly used by psychedelic advocates.

grain."[132] The major active hallucinatory ingredients of Ergot are various indole alkaloids, all derived from lysergic acid. It is believed that *Claviceps paspali*, native to Greece, was one of the hallucinogenic substances used in the Eleusinian Mysteries.[133] *Claviceps purpura*, the Ergot infecting rye, was the active ingredient causing the disease known as St. Anthony's Fire that caused thousands of people to die a hideous death from Ergot poisoning in Europe during the Middle Ages. There were two forms of Ergotism; the first included symptoms of delirium, bizarre visual hallucinations, gangrene, and spontaneous abortion. The second form of Ergotism caused convulsions and other epileptic symptoms.[134]

There is no evidence that any culture ever used *Claviceps purpura* deliberately to cause hallucinations. Considering the grotesque symptoms of ergot poisoning it is highly unlikely that anyone in the Upper Paleolithic actually utilized this fungus. Moreover, that species is believed to appear only on cultivated grains, making its use even more unlikely in the Upper Paleolithic. It seems that Paleolithic peoples made abundant use of whatever wild grasses were available to them.[135] However, Ergot from wild grasses contains the simple lysergic acid amides, ergine, and lysergic acid-hydroxyethylamide (found only in traces in Ergot of rye). These alkaloids are believed to have caused the convulsive form of Ergotism during the Middle Ages, and are unlikely candidates for hallucinogen use at any time.[136]

In the very unlikely event that some form of *Claviceps purpura* was found on a wild grain within an Upper Paleolithic cave site, it would not follow that the individuals who might have consumed it even survived, let alone created any cave art. But just to bend over backwards in deference to the "three stage" model, let's assume, for the sake of argument, that someone consumed *Claviceps purpura*, survived, and created some form of art work. As we have seen LSD is said to produce grossly similar hallucinations to those of mescaline. Reflecting back upon the vivid multi-sensory descriptions of the hallucinations produced by mescaline, and described by a variety of subjects,[137] it would follow that, Paleolithic rock art should contain some complex, colorful imagery wherein geometric figures occur as part of a larger complex drawing of humans, therianthropes, etc., and geometric figures are seen emanating or piercing human forms or combined in some way with them. Even accounting for vast cultural differences in interpretation and presentation, some variation of these elements should occur. Moreover, all elements of geometric figures and "iconic" images would need to occur simultaneously i.e., they must be produced at the same time according to the "three stage" model.[138] What evidence for this sort of image exists for Upper Paleolithic cave art? In fact, no such depictions exist. The only marks touching a few of the very rare human or humanoid depictions in Ice Age cave art are straight lines, usually interpreted as spears or arrows, but of course their true significance is unknown (See p. 94 for more detail). The juxtaposition or combination of geometric and iconic images is very rare in this art corpus, and in many cases is likely to be

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[132] Ibid, p. 133.
[133] See fn # 67.
[134] Schultes and Hofmann, p. 103.
[135] Joyce A. Tyldesley and Paul G. Bahn, "Use of Plants in the European Palaeolithic: A Review of the Evidence," *Quaternary Science Reviews*, Volume 1, 1983, p. 58.
[136] Schultes and Hofman pp. 102-105.
[137] Klüver, Mescal, pp. 3-55, Barber, LSD, Mescaline, Psilocybin, pp. 5-78, Furst, *Hallucinogens and Culture*, pp.57-73.
[138] LW, 2001, p. 341.

a straightforward depiction of nature, as stressed by Marshack.[139] The next hurdle one would need to overcome would be to ensure that the motifs were produced at the same time, so issues of dating must be addressed and dating, of course, in Ice Age art is extremely difficult. In engravings, it might sometimes be possible to argue, from micro-traces in the grooves, that the same tool was responsible, and that the entoptic and iconic forms, to use LW & D's terminology, were drawn at the same time; and in painted or drawn images, pigment analysis could be used. But so far not a single example has yet been investigated in these terms, so we do not know the relative chronology of any such pairing.

In conclusion, mescaline, LSD, and psilocybin are the only substances that produce a form of trance with which the "three stage" model bears some correspondence. Yet, plants containing two of these substances, mescaline and psilocybin, were unavailable in Europe and the third, LSD, is highly unlikely to have ever been deliberately ingested, if indeed, it was even available on wild grasses in species that we know nothing about at this time.

Marijuana as Hallucinogen?

Continuing with their assumption that all trances are broadly similar, LW & D cite the work of Ronald K. Siegel, who studied hallucinations produced by marijuana or tetrahydracannabinol (THC, the active ingredient in marijuana and hashish). A great interest in hallucinogenic substances flourished between the 1950s and the 1970s when the deleterious effects of such substances upon human subjects came to be increasingly recognized. Since that time there have been severe proscriptions against such research with human subjects, and so the vast literature regarding hallucinogen experiences in human subjects cannot be repeated or clarified. While this research was fairly standard at the time, by today's standards it is often characterized by flawed, overly generalized, and simplistic methodology, but since it cannot be repeated, we must learn what we can from it.

One of the problems with much of the hallucinogenic research as viewed from a contemporary perspective was that, like LW & D, many experimenters appeared to expect to find similarities in the subjective experiences induced by a variety of substances. Some experimenters, among whom R. K. Siegel is an example, appear to have anticipated that most hallucinogens would produce the same form constants as Klüver had obtained from subjects describing their mescaline-induced hallucinations. Thus, the studies Siegel conducted on marijuana and THC, synthesized in the laboratory in a purified and potent form unknown outside the laboratory, as well as cocaine, refer to many, if not most of the same geometric forms described by Klüver following mescaline ingestion and Horowitz following ingestion of LSD. In one of the Siegel studies cited by LW & D, it is sometimes difficult to determine which substances inspired which artistic depictions and under what experimental conditions because the article was a summary of experiments published in scientific journals and was written for popular consumption, being published in *Scientific American*.[140] In this paper Siegel combines the results of his studies on THC and marijuana, interviews with Huichol Indians in Mexico, and studies he conducted with chronic cocaine abusers. Unless

[139] A. Marshack. "Methodology in the Analysis and Interpretation of Upper Palaeolithic Image: Theory versus Contextual Analysis." *Rock Art Research* Volume 6:1, 1989, pp. 17-38.
[140] Ronald K. Siegel, "Hallucinations," *Scientific American*, cited previously, pp. 132-140.

the reader was familiar with the original studies from which the article was derived, it would be difficult to determine the experimental method used in each. In this survey article, Siegel cites drawings produced under the influence of LSD, mescaline and cocaine, as well as art inspired by "intoxication from hallucinogen,"[141] which could refer to any of the previous substances (Siegel apparently considers cocaine to be a hallucinogen, but most categorize it as a stimulant or euphoriant). While hallucinations produced by LSD and mescaline appear similar, those produced by marijuana, or THC, and cocaine appear to be less so. Nevertheless, Siegel utilized essentially the same drawings of form constants for studies of cocaine, marijuana, THC, mescaline, and LSD,[142] as if the geometric forms were identical and the frequency of their appearance was similar in all of these states of intoxication.

In trance induced by marijuana and hashish some subjects occasionally report "visions" and hallucinations under very high doses.[143] This is an important point, because the use of *Cannabis* by humans, documented since the Neolithic,[144] and probably used by the Scythians about 1,000 years prior to Herodotus, [145] has been oriented toward the medical treatment of a wide variety of conditions. It was also used as an intoxicant and inebriant, but seldom as a hallucinogen. Its hallucinatory properties were known to occur in extremely high doses which some cultures referred to as poisoning.[146] The more common experiences following ingestion of marijuana are euphoria, feelings of detachment and relaxation. Other responses that are less pleasant include feelings of depersonalization, derealisation, a feeling of loss of control, fear of dying, irrational panic and paranoid ideas. In some studies about 15% of *Cannabis* users reported hearing voices or having unwarranted feelings of persecution or risk of harm from others.[147] *Cannabis* has typical effects upon perceptual processes, in that colors seem brighter, music more vivid, emotions more poignant and meaningful. Spatial perception is distorted and time perception is impaired.[148]

Siegel's experiments on the hallucinatory properties of marijuana were conducted using varying doses of THC on 400-milligram marijuana cigarettes. Using this procedure, the dosage of the active ingredients is difficult to assess. A rough estimate would suggest that the highest dose each subject was administered was 400mg of marijuana and 44 μg of THC/kg body weight, but exactly what quantities of each substance were active in stimulating the central nervous system cannot be stated. Under these conditions at least some of the subjects (he does not say how many) reportedly experienced hallucinatory phenomena. According to other studies in which THC was accurately quantified to the ingestion of 300-

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[141] Ibid.
[142] See R. K. Siegel, "The Experimental Analysis of Drug-Induced Imagery," In *Hallucinations, Behavior and Theory*, cited previously, pp. 104-161; and "Cocaine Hallucinations," *American Journal of Psychiatry*, Volume 135:3, 1978, pp. 309-314.
[143] R. N. Kumar, W. A. Chambers, and R. G. Pertwee, "Pharmacological actions and therapeutic uses of cannabis and cannabinoids," *Anaesthesia*, 2001, Volume 56, pp. 1059-1068. For other discussions of *Cannabis* see William A. Emboden, Jr., "Ritual Use of Cannabis Sativa L.: A Historical-Ethnographic Survey, in *Flesh of the Gods: The Ritual Use of Hallucinogens*, by Peter T. Furst, Prospect Heights, Illinois: Waveland Press, 1990, pp. 214-237; and "Cannabis (spp.) and Nutmeg Derivatives" In *Hallucinogens and Culture,* by Peter T. Furst, San Francisco: Chandler and Sharp Publishers, Inc., 1976, pp. 33-39.
[144] Schultes & Hofmann, pp. 92-93.
[145] Sula Benet, "Early Diffusion and Folk Uses of Hemp," In *Cannabis and Culture*, Vera Rubin (Ed.), Chicago, Aldine, 1975, p. 40.
[146] For example, a 10th-century document from China states of cannabis "if taken in excess it produces hallucinations and a staggering gait." See Hui-Lin Li, "The Origin and Use of Cannabis in Eastern Asia: The Linguistic-cultural Implications," In *Cannabis and Culture*, p. 56.
[147] Andrew Johns, "Psychiatric effects of cannabis," *British Journal of Psychiatry*, Volume 178, 2001, pp. 116-122.
[148] C. Heather Ashton, "Pharmacology and effects of cannabis: a brief review." *British Journal of Psychiatry,* Volume 178, 2001, pp. 101-106.

480 µg/kg of body weight, or 200-250 µg/kg of body weight by smoking, considered a very high dosage, subjects reported "changes in body image, visual illusions, feelings of unreality and hallucinations."[149] It appears that the combination of THC and marijuana cigarettes that Siegel used contained high doses of the active ingredients and thus was unlikely to be encountered with any regularity outside the laboratory. Siegel presents a description that suggests his subjects saw all the various forms following ingestion of marijuana and THC that were previously reported by Klüver for mescaline. However, he also wrote that "many subjects could not label simple forms, but, they frequently acknowledged 'geometric forms of all kinds' to be present,"[150] so it cannot be stated with certainty what forms these individuals actually "saw."

Thus, one is left with the distinct impression that Siegel's accounts of the highly typological geometric figures his subjects reported may have been, in part at least, the result of significant experimenter expectation, where a more neutral investigator may have failed to duplicate these findings. This impression is further supported by the next series of experiments in which he decided that his subjects experienced too much difficulty verbalizing form shapes during the experimental trials. He followed the example of Ogden Lindsley and Timothy Leary and taught his subjects how they should code the various geometric images they would see during the experiments. Not surprisingly, he found that subjects who had been trained in this manner reported some 20 responses per minute, whereas untrained subjects reported about 5 responses per minute following ingestion of THC, psilocybin, LSD, or mescaline. By contemporary standards the methodology of this experiment is seriously flawed because of the strong influence of suggestion conveyed to the experimental subjects concerning what they were expected to see. Thus, one must reject the findings of this series of experiments as being so confounded that they are difficult, if not impossible, to interpret.[151]

In spite of the difficulties in interpreting the experimental results as published in one of his studies, Siegel did make a number of statements regarding neuropsychological findings that LW & D should have included in their "neuropsychological" model of "three stages of trance." The most obvious point that has been ignored by the proponents of that model is that Siegel only reported two stages of trance,[152] a point that Bahn has already made.[153] Siegel discussed the fact that "entoptic" images could not have accounted for the geometric figures reported in his experiments.[154] He also indicated that Penfield's research demonstrated electrical stimulation of the visual cortex and the temporal lobes produced "moving colored lights, geometric forms, and lines,"[155] and suggested that as early as 1845 Moreau was maintaining that hallucinations resulted from the excitation of the central nervous system (this does not include the eyeball).[156] Finally, Siegel discussed the fact that in reviewing some 500 hallucinations induced by LSD, "79% of the subjects reported quite similar complex images which included religious images and symbols,

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[149] H. Isbell. *Studies on tetrahydrocannabinol I. Method of assay in human subjects and results with crude extracts, purified tetrahydrocannabinols and synthetic compounds*. Lexington, Kentucky, University of Kentucky Medical Center, 1967, and H. Isbell, et al, "Effects of 9-tans-tetrahydrocannabinol in man." *Psychopharmacologica,* Volume 11, 1967, pp. 184-188.
[150] R. K. Siegel and M. E. Jarvik, "Drug-Induced Hallucinations in Animals and Man," cited previously, p. 309.
[151] Ibid, pp. 119-130.
[152] Siegel, *Scientific American*, p. 132.
[153] Bahn, 2001, p. 52.
[154] Siegel, *Scientific American*, p. 139.
[155] Ibid.
[156] Ibid, p. 132, p. 139.

images of small animals, and humans."[157] This finding strongly suggests that some of the complex imagery ("iconic" hallucinations per LW & D), seen upon electrical or chemical stimulation of the visual associational cortices and temporal lobes is hard wired. It is most certainly affected by ontological experience as indicated by the fact that many hallucinations included cartoon figures;[158] however, caricatures were also reported, and such abstracting abilities appear to be an innate property of the human brain.

Marijuana is unlikely to have been present in Europe 30,000 years ago. It is believed to have originated in Central Asia and to have been brought to Europe by the Scythians in about 600 BCE.[159] The late importation to Europe rules this plant out as a possible candidate in inducing the hallucinations which LW & D say inspired Paleolithic art. Herodotus, the Greek historian, reported that the "Scythians. . .take some of this hemp-seed [*Cannabis*] and creeping under the felt coverings, throw it upon the red-hot stones; immediately it smokes, and gives out such a vapor as no Grecian vapor-bath can exceed; the Scyths, delighted, shout for joy."[160] In this example, the psychoactive ingredients in the hemp would have been both inhaled and absorbed through the skin.

Recently, some have suggested that Upper Paleolithic cave art might have been inspired by oxygen deprivation. This could have occurred in at least two ways – the first of which would include inhaling carbon dioxide build-up in the deeper recesses of the cave (See Chapter 5 for more detail). But, as speleologists who are familiar with "foul air" know, hallucinations are not likely.[161] The second process of oxygen deprivation could occur by inhaling smoke directly from a nearby fire. However, hypoxia from smoke inhalation would not have produced hallucinations because it actually results in "dizziness, confusion, seizures, and/or a temporary cessation of brain activity and coma – even if the deprivation is transient."[162] Moreover, serious damage from smoke inhalation caused by fires would produce carbon monoxide poisoning, the symptoms of which include headache, nausea, vomiting, confusion, fainting, seizures, coma, and death.[163] Schultes has noted that the most important hallucinogens are all alkaloids or related substances that contain significant amounts of nitrogen, biogenetically derived from the indolic amino acid, tryptophan.[164] *Cannabis* is a non-nitrogenous substance.[165] If ancient peoples had inhaled the vapors of nitrogenous psychoactive substances thrown upon fires, they were very likely sickened or killed

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[157] Siegel, *Scientific American*, pp. 132-133.
[158] Ibid.
[159] See Benet, p. 40, cited previously, and Schultes and Hofmann, *Plants of the Gods*, pp. 92-102.
[160] Herodotus, *The Persian Wars*, Book IV, Paragraph 75, George Rawlinson, (Trans.), The Modern Library: New York, 1942, pp. 319-320.
[161] In the summary of a paper presented at the 21st biennial Australian Speleological Federation conference, 1997, speleologist Garry K. Smith notes that a cave atmosphere containing greater than 1% carbon dioxide is considered "Foul Air," and is a hazardous and frightening experience, because there is typically no smell or visual sign associated with foul air and the first signs are increased pulse and breathing rates. Higher concentrations of carbon dioxide lead to severe headaches, dizziness, clumsiness, and even death. See "Carbon Dioxide, Caves and You," *World Wide Web*, 8/13/2002, pp. 1-2.
[162] See Joseph, p. 589 and "Smoke Inhalation," by Christopher P. Holstege, *eMedicine Consumer Journal*, Volume 2, Number 5, 2001, pp. 1-6.
[163] Ibid.
[164] Schultes, "An Overview of Hallucinogens in the Western Hemisphere," In *Flesh of the Gods*, p. 6.
[165] Schultes and Hofmann p. 99.

by cyanide poisoning, since large amounts of hydrogen cyanide are produced during combustion of nitrogen-containing natural products.[166]

Finally, if Paleolithic peoples had attempted to inhale hallucinogenic vapors, evidence of the plant remains should be found within the sediments of the cave. Unless we find evidence that some species of unknown marijuana plant existed in Europe during the Upper Paleolithic that subsequently became extinct, this plant must be ruled out as the source of "hallucinogen-induced shamanic trance" allegedly providing the inspiration for Paleolithic rock art.

Cocaine-Inspired Cave Art In Europe?

R. K. Siegel also conducted a study purporting to show that cocaine produced hallucinations similar to those reported for THC and marijuana.[167] In this study, he recruited a total of eighty-five "recreational cocaine users," and reported on their phenomenological experiences. One of the severe limitations of this study is that most of these individuals more than likely had a history of polysubstance abuse – data that are not included in the published report. Therefore, the subjective reports provided by these recruits cannot be taken at face value, since they may include the effects of hallucinogens other than cocaine.[168]

Siegel considers cocaine a hallucinogen, which in his broad definition includes psychoactive compounds that cause the mind or the attention to wander.[169] However, using somewhat stricter criteria cocaine is not usually considered a hallucinogen. For example, Schultes and Hofmann refer to it as a euphoric.[170] Siegel states that "hallucinatory phenomena," following acute administration of cocaine, are rare and usually associated with large doses. Moreover the hallucinations reported were mainly paresthesias such as the sensation of bugs crawling over or under the skin. It is only with chronic abuse (six months or more of use) that visual, olfactory, and auditory hallucinations are reported.[171] Only about 15% (13 of 85) of the subjects reported visual hallucinations, and then only in the periphery of the visual field – the reports included such statements as "something just flew by," and "I feel like something or someone just moved over there in the corner of the room."[172] Subjects initially identified these images as hallucinations, but quickly stated that they knew the images were "not really there," (i.e., the subjects recognized the images were non-veridical.)[173] Many of these same subjects reported seeing "snow lights," described as similar to but less intense than the twinkling of sunlight. Only after prolonged use did subjects report having seen some geometric patterns, again, out of the corner of the eye. Most noteworthy for our purposes is the fact

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[166] D. J. Barillo, R. Goode, and V. Esch, "Cyanide poisoning in victims of fire: analysis of 364 cases and review of the literature," *J. Burn Care Rehabilitation*, Volume 15, 1994, pp. 46-57.
[167] Compare Figure 1 on p. 311 of "Cocaine Hallucinations," *American Journal of Psychiatry*, Volume 135:3, 1978, pp. 309-314, with descriptions of geometric figures reported by subjects under the influence of THC and marijuana in "Drug-Induced Hallucinations in Animals and Man," p. 113.
[168] Leo Hollister, cited previously, stated that "mislabeling of street drugs is more common than accurate labeling. The only bases that drug users have for correcting or mislabeling are their past experience with similar drugs, the opinions of fellow drug users, or the reputation of their source of drugs. None of these factors is likely to resolve ambiguity about what was actually taken. Thus, epidemiological studies that lack any chemical verification of drugs (and these are virtually impossible to design) will only be crude indices of what drugs are being used," p. 21.
[169] Siegel, *Scientific American*, p. 132.
[170] Schultes and Hofmann, *Plants of the Gods*, cited previously, p. 13.
[171] Siegel, "Cocaine Hallucinations," p. 309.
[172] Ibid, p. 310-311.
[173] Ibid, p. 310.

that *subjects did not report complex hallucinations of any sort.* In this paper Siegel does consider "entoptic" phenomena (phosphenes) as being a possible source of cocaine hallucinations because subjects reported they saw images with their eyes open, [174] and because cocaine was known to produce increases in ocular pressure.[175] However, he also notes that phosphenes are "characterized by neuronal discharge activities in the retina, lateral geniculate and visual cortex."[176] The reader may recall that LW & D maintained that phosphenes originated within the eye.[177] In short, Siegel's research with cocaine abusers reveals that visual hallucinations only occur in about 15% of users after chronic and extended abuse. Moreover, the pattern of hallucination is quite unlike that reported for the "three stage" model, in spite of the fact that Siegel includes a diagram purporting to show hallucinations typical of cocaine ingestion[178] that is similar to those geometric figures described by Klüver. Last, but not least, cocaine was a New World substance and was not transferred to the Old World until after the conquest of Mexico, so it would have to be ruled out as a hallucinogenic plant that could have inspired Paleolithic rock art in Europe.[179]

Why did LW & D cite Siegel as a primary source for the "three stage" model? One possibility is that they were attempting to demonstrate that LSD, mescaline, THC, marijuana, and cocaine all produced three stages of trance, an idea we have refuted in this paper by considering the actual research findings of Siegel. They then went on to suggest that migraine aura, various neuro-and psychopathological conditions, social and sensory deprivation, pain, etc., could all produce similar geometric figures, echoing the 1928 observations of Klüver. LW & D emphasized that the perception of geometric forms was "a feature of altered states completely controlled by the nervous system." But by what structure, other than the brain, could visual geometric figures be controlled – the liver? Presumably they assumed that this rather transparent observation demonstrated something profound about the human nervous system as it was constituted in the Upper Paleolithic. In 2001, LW asserted that

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[174] Ibid, p. 311.
[175] Ibid, p. 312.
[176]Ibid,p.311. Today we know that the primary psychoactive mechanism of cocaine is blocking reuptake of the monoamine neurotransmitters dopamine, norepinephrine, and serotonin, leading to increased available synaptic transmitters. For a discussion of the research, see C. P., "Drug addiction and abuse." In: *Goodman and Gilman's The Pharmacological Basis of Therapeutics*, 10th ed. J. G. Hardman et al, (Eds.) New York: McGraw Hill, 1996, pp. 621-43. Chronic use is associated with changes in monoamine metabolites, receptors, and uptake transporters. See T. Belej, et al, "Changes in serotonin and norepinephrine uptake sites after chronic cocaine: pre- vs. post-withdrawal effects." *Brain Research*, Volume 736: 1-2, 1996, pp. 541-542; M. H. Baumann and R. B. Rothman, "Alterations in serotonergic responsiveness during cocaine withdrawal in rats: similarities to major depression in humans, *Biological Psychiatry*, Volume 44:7, 1998, pp. 578-579; G. Perret, et al, "Downregulation of 5HT1A receptors in rat hypothalamus and dentate gyrus after 'binge' pattern cocaine administration." *Synapse,* Volume 30:2, 1998, pp. 166-171. As Marcello Spinella concludes, "the available neuropsychological and neuroimaging data convergently support executive deficits resulting from altered frontostriatal function. It remains to be shown how long it takes for these deficits to develop (and at what doses), how long they persist, and to what degree they recover." *The Psychopharmacology of Herbal Medicine: Plant Drugs That Alter Mind, Brain, and Behavior*, Cambridge, Mass.: The MIT Press, 2001, pp. 122-123. These studies indicate that chronic cocaine abuse results in deficits in executive functions, the ability to self-regulate emotion and behavior, to initiate behavior, to maintain motivation, to focus and attend to tasks, and generally "engage in independent, purposive, self-serving behavior successfully," Muriel D. Lezak, *Neuropsychological Assessment*, 2nd Edition, New York: Oxford University Press, 1983, pp. 38-39.
[177] LW & D, 1988, p. 202, "*Phosphenes* can be induced by physical stimulation, such as pressure on the eyeball and are thus entophthalmic (within the eye)". LW & D cite J. Walker, "The Amateur Scientist: About Phosphenes," *Scientific American,* Volume 144:5, 1981 pp. 142-152.
[178] Ibid, p. 311.
[179] There are some reports that cocaine has been found in some ancient Egyptian mummies, suggesting that there were ancient trade routes between the Old World and the New World, see "Drugs in Ancient Populations," by Franz Parsche, Svetlana Balabanova and Wolfgang Pirsig, The *Lancet*, Volume 341, 2/20/93, p. 503. Recently, however, severe doubts have been cast on the validity of these findings; see Heather Pringle*, The Mummy Congress*, New York, Theia, 2001, pp. 102-104.

> the most important point about the neuropsychological model is that it is posited on universal human behavior and experience. . . it provides the basis for one of the few. . . persuasive, non-trivial laws of human behavior that can be used effectively by archaeologists. This "law" may be stated thus: certain altered states of consciousness produce specific and definable visual percepts and other effects because they are wired into the universal human nervous system.[180]

This is like saying we can see because we have eyes, we can perceive visual forms because we have a mammalian brain. As we have discussed, the precursor to the primary visual cortex (Brodmann's area 17) evolved some 55 million years ago, along with the ability to perceive geometric forms. Any special importance regarding human evolution derived from the fact that geometric figures were drawn some 30,000 years ago would result from the fact of the praxis (artistic expression) of the percept, not the ability to perceive it.[181] The perception of geometric forms in the Upper Paleolithic tells us nothing important about the evolution of the human nervous system, contrary to what LW & D assert, because that story was already written millions of years previously.[182]

On the other hand, since LW & D emphasized the fact that so many different conditions seem to produce the same form constants, why don't they write about migraine-induced rock art, or fatigue-induced rock art or sensory-deprivation-induced rock art? According to the sources they cite and their interpretation of those sources, such phenomena as these are just as likely to have inspired the Paleolithic cave art as were hallucinogen-induced, shamanistic trances.

Potential Hallucinogens in Europe

Now that we have ruled out all the most logical naturally-occurring trance states and several drug-induced trance states, what, if any, hallucinogen-containing plant substances might have been found in Europe across the long time-span of Paleolithic rock art production that would be even remotely likely to have produced inspiration for cave art? There are five psychomimetic plant types that could have been present in Eurasia that might, *theoretically at least,* have inspired Paleolithic rock art. Unfortunately, descriptions of hallucinatory activity ascribed to these substances are too general to form an absolutely definitive opinion. The five plant categories include Fly Agaric (*Amanita muscaria*, a mushroom); Henbane (*Hyoscyamus niger*); Belladonna (*Atropa belladonna*); Mandrake (*Mandragora officinarum*); and *Datura* (*D. metel*).[183] We can immediately rule out *Atropa belladonna* and *Mandragora officinarum*, both of which contain hyoscyamine, and some scopolamine, because neither plant has been used for hallucinogenic properties.[184] By this process of elimination, three possible plant types could have induced hallucinogenic activity, but any visions they may have produced would be inconsistent with the "three stage model."

Fly agaric, *Amanita muscaria*

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[180] LW, 2001, p. 336.
[181] The praxis of geometric figures 30,000 years ago may not be especially important either, if the dating of finely worked bone tools with engravings of symbolic marks upon them at Blombos Cave is generally agreed to be 70,000 years. See "An early bone tool industry from the Middle Stone Age at Blombos Cave, South Africa: implications for the origins of modern human behavior, symbolism and language," by Christopher S. Henshilwood, et al, *Journal of Human Evolution*, Volume 41:6, 2001, pp. 631-678.
[182] See Hodgson, cited previously, for a hypothesis regarding the evolution of drawing form constants and realistic figures, p. 871.
[183] Schultes and Hofmann, p. 42, pp. 32-85, p. 86.
[184] Ibid, pp. 88-90. *Atropa* was used to produce a "dreamy stare" through its action of papillary dilation, prized as an example of beauty by the Greeks, and it was allegedly mixed in witches brews. *Mandragora*, which contained mandragorine, was used as a narcotic.

Fly agaric, *Amanita muscaria*, originated in Siberia and reportedly has been known there for thousands of years as a potent hallucinogen. Its active ingredients are ibotenic acid, muscimole, and muscazone.[185] It has been identified as *Soma*, the God-narcotic of ancient India,[186] and it had an exalted place in the magico-religious ceremonies of the Aryans, who are believed to have swept down from the great plains of Eurasia into the Indus Valley some 3500 years ago.[187] *Amanita muscaria* is believed to have been transported to the New World from Siberia, where aboriginals of the North American continent have used it in religious or shamanistic rituals.[188] It also spread to China and was known in ancient Greece and Rome. It appears to have arrived in Western Europe by the early Middle Ages. *Amanita muscaria* produces a state of euphoria, colored visions, macropsia, religious fervor and deep sleep.[189] Religious priests or shamans are said to consume the mushroom in order to experience a trance state. Vladimir Jochelson, a Russian ethnologist and traveler to Siberia, visited the Koryak people and offered a description of intoxication following ingestion of the mushroom:

> Fly Agaric produces intoxication, hallucinations, and delirium. A certain degree of animation and some spontaneity of movements accompany light forms of intoxication. Many shamans, previous to their séances, eat Fly Agaric to get into ecstatic states. . .Under strong intoxication, the senses become deranged, surrounding objects appear either very large or very small, hallucinations set in, spontaneous movements and convulsions. So far as I could observe, attacks of great animation alternate with moments of deep depression. The person intoxicated by Fly Agaric sits quietly rocking from side to side, even taking part in conversations with his family. Suddenly, his eyes dilate, he begins to gesticulate convulsively, converses with persons whom he imagines he sees, sings, and dances. Then an interval of rest sets in again.[190]

R. Gordon Wasson experimented with the Fly-Agaric on himself and summarized some of the findings. He indicated that it was a strong soporific and one could not be roused from sleep for about two hours, but at times would be aware of the sounds round about. In this realm of half-sleep, colored visions occurred *sometimes*, and they responded, to some extent, to the desires of the subject. For about three to four hours after waking from the sleep one experienced a sense of elation, far more powerful than that experienced during alcohol intoxication. During this state one was capable of performing amazing feats of physical effort and the act of performance was enjoyable.[191] Even though we lack detailed descriptions of the hallucinations experienced, the trance described is not similar to that reported for the "three stage" model. It is unlikely that this plant was known to Western Europe, including the areas where cave art is known, prior to late antiquity and thus, it is improbable that it served as a source of hallucinogen-inspired Paleolithic cave art.

Datura (D. metel*) and Henbane *(Hyoscyamus niger)

The two remaining flora, *Datura* and Henbane, that may have been used in Europe to produce hallucinations are considered solanaceous plants in that they contain high concentrations of tropane alkaloids, primarily atropine, hyoscyamine, and scopolamine, and because of this, they each have slightly

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[185] Ibid, pp. 70-71.
[186] R. G. Wasson, *Soma, Divine Mushroom of Immortality*. New York: Harcourt, Brace and World, 1968.
[187] Furst, "The Fly Agaric: Mushroom of Immortality," pp. 89-95, and "R. Gordon Wasson and the Identification of the Divine *Soma*" pp. 96-108. In *Hallucinogens and Culture*.
[188] Ibid, p. 96.
[189] Schultes, p. 71.
[190] Vladimir Jochelson, I. The Koryak. *Memoirs of the American Museum of Natural History*, Volume 10, 1908, p. 583.
[191] R. Gordon Wasson, "Fly Agaric and Man," 1967, pp. 405-414, cited by Furst, *Hallucinogens and Culture*, pp. 92-93.

different effects. They are deadly poisons and dangerous compounds to ingest because of difficulties in controlling dosage levels. *Datura*, *D. metel*, contains scopolamine, the substance that is believed to produce the hallucinogenic effects of the solanaceous plants. According to Schultes, scopolamine, the major alkaloid in *Datura*, induces an "intoxication followed by narcosis, in which hallucinations occur during the transition state between consciousness and sleep."[192] The effects of scopolamine, in contrast to other hallucinogens, are extremely toxic, and the user "remembers nothing experienced during the intoxication, losing all sense of reality and falling into a deep sleep-like alcoholic delirium,"[193] or dying.[194] Several species of *Datura* are found in the New World and *D. inoxia, D. stramonium* (Jimsonweed), and *D. brugmansia* have been used as hallucinogens by natives of North America, Mexico and South America (we will return to this topic in Chapter 7). It appears that the intoxication results in "beautiful dreams" that are not recalled upon awakening. *Datura* was known to Avicenna in the eleventh century and *D. metel* was mentioned as a hallucinogenic plant in early Sanskrit and Chinese writings. It is employed today in India, Pakistan, and Afghanistan where the powdered seeds are added to wine, *Cannabis* cigarettes, or tobacco to produce mild intoxication.[195] It is used as a narcotic in Mesoamerica,[196] and as an aphrodisiac in the East Indies.[197] The few descriptions available regarding *Datura* trance are inconsistent with the sort of trance reported for the "three stage model." It seems extremely unlikely that this plant would have actually been used as a hallucinogen in Paleolithic Europe because they are not recollected (except under unusual conditions as described in Chapter 7) -- only the fact of "dreams" survives the narcosis.

Henbane *(Hyoscyamus niger*) contains some hyoscyamine with a larger concentration of scopolamine, and it has been known and feared since ancient times. The Egyptians described it in the Ebers Papyrus, written in 1500 BC.[198] In ancient Greece it served as a poison to mimic insanity and as an aid to inspire prophetic visions.[199] During the Middle Ages, Henbane was supposedly one of the main ingredients in witches brew. When ingested it leads to a state of intoxication, including a feeling of pressure in the head, a sensation that the eyelids are being closed forcibly, blurred vision, perceptual distortions, and "unusual" visual hallucinations. Frequently, subjects experience gustatory and olfactory hallucinations.[200] They also appear to experience sensations and perceptions suggestive of flying. Schultes cites Porta, a colleague of Galileo, who wrote that under the effects of "these solanaceous plants, a man would sometimes be changed into a fish, and would swim on the ground."[201] Such a description suggests a complete loss of a sense of self, coupled with the perception of a metamorphosis wherein the subject was transformed into a fish-form. This portrayal of Henbane trance, although referring to "unusual

[192] Schultes, p. 86, p. 110.
[193] Ibid.
[194] Peter T. Furst, "History of Datura," In *Hallucinogens and Culture*, pp. 139-145.
[195] Schultes, pp. 68-69.
[196] Furst, pp. 139-145.
[197] Schultes, pp. 68-69.
[198] Schultes and Hofmann p. 86.
[199] Ibid.
[200] Ibid, p. 87.
[201] Ibid, p. 88.

hallucinations," does not provide a general description that is at all similar to the mescaline-induced state from which the "three stage" model is derived.

Conclusion: Testing the Model

This survey of natural and drug-induced trance states reveals that no naturally induced altered states of consciousness are consistent with LW & D's "neuropsychological model." Our systematic investigation of natural and drug-induced trance states demonstrates conclusively that their model cannot account for any of the rock art produced in caves during the Upper Paleolithic. The only drug-induced trance states that are consistent with the model are those produced by LSD, mescaline and psilocybin, and mescaline was never found in Europe, while psilocybin is now widespread since the 1960s and 1970s when it can first be definitively identified. The odds are minuscule that LSD might have been used in the Upper Paleolithic. The only other hallucinogenic plants that might possibly have induced trance states capable of inspiring Paleolithic cave art are *Amanita muscaria*,[202] *Datura metel* and *Hyoscyamus niger*,[203] but none of these plants produces a trance that is consistent with the "three stage model." Moreover, the trance induced by *Datura metel*[204] is apparently not remembered, a fact that would seem to rule it out as inspiring cave art.

In order to provide even minimal plausibility for their model, the proponents of hallucination and the "three stages of trance" for Paleolithic art would have to show that (a) these plants were readily available in Western Europe in the late Ice Age, and (b) that they were used in the vicinity of the decorated sites. In recent years, much has been made of a possible use of Henbane in the Neolithic of Scotland. But it has been shown that this may be largely wishful thinking and we have no archaeological evidence for this, since Long et al have questioned the validity of the much-touted Henbane evidence from the Scottish site of Balfarg, and stress that such theories require substantial reliable evidence from multiple sites. For example, they state, "the use of hallucinogenic drugs in prehistory cannot yet be conclusively demonstrated, using palaeobotanical evidence. . .The debate must continue but not under the impression that scientifically reliable evidence is already there." [205]

Tyldesley and Bahn speculated that *Datura* and Fly Agaric could have been used in the Paleolithic,[206] but Bahn reports they have absolutely no evidence for this as yet. The onus of proof rests squarely on the proponents of the model, and this, therefore, constitutes a crucial test of their hypothesis. If they can establish that these hallucinogens were potentially available and – far more important – if they can detect macro- or micro-botanical remains of the relevant plants in the undisturbed sediments of intact, newly-discovered caves like Chauvet, La Garma or Cussac, then they will have demonstrated the feasibility, though not necessarily the plausibility, of their theory. Of course, as in the reported detection of *Datura* in some Texan rock-shelters,[207] this would indicate that their speculations had some possible merit. Without this palaeobotanical evidence, their theory with its "three stages of trance" model remains pure

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[202] *Amanita muscaria* is an ibotenic acid, muscimole and muscazone-containing mushroom.
[203] *Hyoscyamus niger* is a hyoscyamine and scopolamine-containing plant.
[204] *Datura metel* is a scopolamine-containing plant.
[205] D. J. Long, et al. "The use of henbane (*Hyoscyamus niger L.*) as a hallucinogen at Neolithic 'ritual' sites: a re-evaluation," *Antiquity*, Volume 74, 2000, pp. 49-53
[206] Tyldesley and Bahn, pp. 53-8.
[207] Boyd and Dering, "Medicinal and hallucinogenic plants", pp. 256-275.

fiction, without the slightest justification for its application to Ice Age art, or indeed, to most other bodies of rock art around the world.

In summary, we have demonstrated how the "three stage model," so widely and uncritically promulgated and accepted in recent years by certain archaeologists and rock art specialists, is unsupported by the critical evidence. Moreover, much of the data cited in support of the model is outdated, unreliable, and distorted. However, we have also shown, for the first time as far as we are aware, how any possible validity of this model could be tested. Without such tests, the model must be relegated to the realms of dreamy speculation and ignored by serious scholars interested in establishing, in so far as possible, what really happened in the past, rather than in a popular, media-friendly, version of prehistory.

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Authors' Note Introducing Chapter 2: This chapter was originally published as a reply to commentators John L. Bradshaw and Christopher Chippindale who responded to our summary of *Desperately Seeking Transplants* (i.e., Chapter 1), published under the title *Testing the 'Three Stages of Trance' Model* in the *Cambridge Archaeological Journal* 13(2), October 2003, pp. 213-24. Our response to Chippindale here includes material cut by the editor of *CAJ* because "he was running out of space" even though we were substantially under the word limit he had originally set for the piece. Notably, in that same issue he published a review of *The Mind in the Cave* by proponents of the TST model, which totaled 16 pages (pp. 263-79) to our 11 pages. The reader may wish to access that document since we only include our response to the observations of Bradshaw and Chippindale in the current chapter.

Chapter 2
(A) Response to Bradshaw

We would like to thank Bradshaw for his response and to clarify minor criticisms that appear to result from a hasty reading of our paper. We do not use "entoptic" as a term ourselves, we simply quote LW & D's use of it, point out how their definition differs from standard neuropsychological nomenclature, and suggest they omit it (Helvenston & Bahn, 2002), and we use the term visual system according to standard neuroanatomical nomenclature. Finally, we clearly define our use of the term hallucination with respect to subjective reality.

Of much more importance, Bradshaw notes that H&B demonstrated that none of the hallucinogens, such as mescaline, LSD or psilocybin, upon which the TST model was based, is likely to have been used during the Paleolithic, because neither mescaline nor psilocybin containing plants were found in Europe, and LSD derived from ergot on domesticated grasses has never been used deliberately by humans due to its poisonous effects. Furthermore, cocaine was not present in Europe at that time, nor was marijuana.

It is worth emphasizing that Ludwig listed over 70 types of altered states of consciousness that were not induced by drugs and H&B discussed several of the more common forms in great detail, demonstrating that there are no naturally-induced trance states that are consistent with the TST model either, contrary to statements made by Lewis-Williams & Dowson, and the other proponents of the model. For example, as recently as February 6, 2003, Thomas Dowson stated "There do appear to be fundamental similarities in the ways in which people perceive visual hallucinations as well as certain types of visual

hallucinations (i.e. the geometric patterns) no matter what sort of altered state of consciousness people enter." This is patently false, as H&B have demonstrated. Dowson goes on to state "There is quite a body of neuropsychological research available on this." That is an understatement. There is a huge body of neuropsychological research regarding drug-induced and natural trance states, but it does not support the TST model.

Proponents of the TST model agree with Bradshaw and us that other conditions such as those found in the early sensory deprivation experiments, migraine headache, and traumatic brain injury can also result in subjects "seeing" geometric images, but the individuals are well aware these images are nonveridical. It is our impression that in his most recent book, *The Mind in the Cave (2002)*, Lewis-Williams emphasizes sensory deprivation as a means of inducing shamanic hallucinations to a greater extent than in his earlier work. So, we welcome this opportunity to clarify some misunderstandings about sensory deprivation that have crept into the theorizing about such phenomena by proponents of the TST model.

The very earliest sensory deprivation experiments were introduced by Donald Hebb, and the first accounts were published by his students in the 1950s (Heron, Bexton and Hebb, 1953; Bexton, Heron and Scott, 1954). In these experiments, a student could be isolated for two or three days in a soundproof compartment box with a bed in it. Patterned visual stimulation was reduced through the wearing of translucent goggles as the student lay quietly in bed, and special stimulation from self-induced movements was reduced by wearing cardboard sleeves over arms and hands. Communications between subject and experimenter were made through a headset. Subjects were supposed to stay in the experimental situation for 48-72 hours. The *occasional* (our italics) hallucinations that were induced served to attract interest to the method. Later experimenters have demonstrated that the hallucinatory effects were more a result of confounding factors than of sensory deprivation *per se.*

Sensory deprivation procedures have been refined over the years and the effects found in earlier studies such as overall cognitive impairment, hallucinations and a strong aversion to sensory deprivation are no longer prevalent. Most sensory deprivation experimenters now use flotation tanks in which subjects float in water at temperatures of 93.5 degrees F. Moreover, Epsom salts are added to the water so that the body floats in the emersion and is submerged except for the head and neck (Wallace and Fisher, 1999). Since 1983 experimenters have referred to this type of experiment as Restricted Environmental Stimulation Technique (REST). Indeed, Restricted Environmental Stimulation Therapy has been used for a wide variety of pathological conditions and produces an altered state of consciousness which appears to be virtually identical to that seen in hypnosis and deep relaxation states. As in hypnosis, subjects are in a highly suggestible state following flotation. Subjects are limited to sessions of 24 hours or less and hallucinatory experiences are essentially absent (Suedfeld, 1980, and 1984).

The early NASA experiments were based upon the Hebb paradigm and subjects did occasionally report hallucinatory experiences. Indeed, one of the predictions regarding the effects of prolonged space travel was that the astronauts would be disabled by hallucinations. Such has not been the case.

Psychological symptoms such as irritability, depression, withdrawal, and interpersonal conflict have been reported but not hallucinations (Starkey, 1959; Solomon, Phillip, et al, 1957). From their first publication in 1988, Lewis-Williams & Dowson have suggested that entering dark caves would produce hallucinations similar to those experienced in the harshest of experimental sensory deprivation experiments of the 1950's. However, walking or crawling into a dark cave, perhaps wet and chilly, while carrying a torch is not analogous to the conditions of experimental sensory deprivation.

In surveying over 1000 references to the experiences of speleologists, we have been unable to find any true (as opposed to fictional) account of visual hallucinatory experiences as reported by them. Indeed, the only such accounts were reported by people who had taken LSD and then attempted to explore a cave! The biography of Robert de Joly, a famous French speleologist who spent his life exploring caves revealed an experience in which he stumbled into some cave areas high in CO^2 and developed a severe headache lasting 24 hours. As H&B (pp. 43-44) demonstrated, the symptoms of carbon dioxide poisoning include severe headache, dizziness, clumsiness, coma, and death. Joly never reported having experienced hallucinations. Another speleologist reported that some cavers "hear voices of other cavers they are certain are nearby," but upon reflection, they realize the voices are not "real." It seems highly unlikely that Paleolithic artists ever experienced visual hallucinations as a result of simply being in the cave.

In an interview with the French magazine *Notre Histoire* (No. 179, July/August 2000, p. 37), Clottes cited a book (*Pathologie de la Spéléologie*, although the correct title is *Spéléologie et Médecine*; see Féniès 1965), which, according to him, states that caves are known as a "hallucinogenic milieu" and which devotes a chapter to the auditory and/or visual "hallucinations" of speleologists. When one examines the book, however, one finds that this thesis of 158 pages devotes not a chapter but less than two pages (pp. 41-2) to brief anecdotal accounts of assorted visual phenomena which can occur during prolonged darkness. Some of these anecdotes are reported by people who have been sleep-deprived for over 50 hours, so the effects of sleep-deprivation are a definite confounding factor. Moreover, there are only two reports of "visual hallucinations" one of which consisted of "luminous dots," the other of a light which became brighter and brighter until it was almost blinding and then disappeared. Clearly, these descriptions are of no importance or frequency in this domain, as has been confirmed to Bahn by speleologist friends.

In the recent interview with Dowson mentioned above, he notes that Paleolithic artists sometimes used manganese oxides to produce the black images and implies that manganese poisoning might have induced hallucinations. Chronic manganese intoxication is an extremely rare condition and produces neuropathologic changes in the medial segment of the pallidum; caudate nucleus, putamen, and rarely the substantia nigra, thus producing a Parkinson-like syndrome. Hallucinations and visual illusions, delusions and other neuropsychiatric symptoms occasionally occur, but only after a minimum of six months of exposure by inhalation and swallowing of dust (Huang, 1989, 257-61). The first symptoms are often asthenia, rigidity, tremor, hypokinesia and dystonias (Lee, 2000, 597-599). These symptoms would render any drawing nearly impossible to make, and clearly recognizable as being pathological. In short, the artist would have had to have been chronically exposed to the manganese day in and day out, at least 5 days a

week, for six months prior to experiencing hallucinations, and the extrapyramidal symptoms he would have experienced prior to that would have rendered drawing nearly impossible! In one reported case of accidental poisoning over a period of 4 weeks by manganese ingestion, a German patient never experienced hallucinations or delusions (Bleich, 2000, 14-20).

(B) Response to Chippindale

Unfortunately for the proponents of the "Three Stages of Trance" (TST) 'Neuro-psychological' Model," Chippindale presents absolutely no evidence whatsoever to contest or contradict the empirical evidence we presented. Instead, and not unexpectedly, he chooses to "discount [our] arguments entirely," simply because one of us (Bahn) has been a long-term critic of the model! Naturally, if one cannot argue the merits of a theory based upon empirical evidence, one can only attack the character of the critics under the guise of examining what is euphemistically referred to as the "social context" (i.e. interviews, books, book reviews, and journal articles) in which they voiced their dissent!

Reference has been made elsewhere (Bahn 2001, pp. 75, 82) to the disproportionate aggression which always greets any criticism of the shamanic approach to rock art, and shooting the messenger through *ad hominem* attacks appears to be a characteristic and predictable substitute for rational and factual debate by those who resort to this level of criticism. Another perpetual feature is an obsession with having the last word (see Bahn ibid. p. 86), and Chippindale seems very disturbed that we should have it – despite this being normal practice after comments on papers in this journal and others.

Chippindale seems to agree with us in implicitly accepting the fact that we have refuted the TST "neuropsychological model," but he then attempts to argue that the model is *not so important after all*, and that trance can still account for much rock art. Yet the TST model has long been absolutely central to this approach, so if he admits that it has been refuted, where does that leave its proponents? One cannot escape the impression that Chippindale is desperately clutching at straws by proposing that, despite our refutation of the model, trance must still lie behind much rock or cave art – indeed, this *idée fixe* seems to merit being placed in its own "social context."

Chippindale also criticizes our paper because we did not devote ourselves to a discussion of how "cultural customs also direct human experience," but this is irrelevant to the matter at hand, because our paper was a deliberate refutation of the TST "neuropsychological model" as proposed by Lewis Williams & Dowson (1988). As Pearson (2002, p. 155) has also pointed out "it is not the ethnography that led to the construction of the neuropsychological model, but the universality of entoptic phenomena." Pearson (2002, p. 89) reminds us that "LW & D realized that 'cultural expectations' affect the imagery to a considerable extent. For this reason they stressed the fact that *their model was derived entirely from neuropsychological research and concentrated on entoptic phenomena as a feature of altered states that was completely controlled by the human nervous system*" (our italics). Chippindale cites Pearson as an authority who is "persuaded that visionary experience is characteristic of rock art in general," although in a recent review of Pearson's book he indicates that he thinks Pearson is "wrong to think rock art in a ubiquitous generality is a visionary affair" (Chippindale, 2003, p. 130). The crucial point for us, however, is the fact that Pearson

relies upon LW & D's TST model, as well as the sources they have cited in support of it. We demonstrated that only hallucinogenic trances induced by psilocybin, mescaline, or LSD, contain both geometric figures (entoptic figures) and more complex images. Neither psilocybin nor mescaline is found in the Old World, and LSD, in the form of ergot, has never been deliberately ingested. Furthermore, ergot is a deadly toxin as evidenced by sufferers of *St. Anthony's Fire*, a form of ergot poisoning (Fuller, 1968).

We surveyed all known European hallucinogens and demonstrated there was no evidence that any produced a trance similar to the TST model. Any other trance would be significantly different, as we proved by describing the subjective experiences produced by a variety of European psychoactive substances. Certainly, these substances would have to be found in areas near to the rock art sites or known campsites as shown by paleobotanical evidence. Indeed, Lewis-Williams found that most of the San rock art sites at Giant's Castle and Barkley East, South Africa, could have been living sites and the presence of the artifacts in many tended to confirm that conclusion (1981, p. 17.)

We never stated that because the TST model could not account for Paleolithic cave art, such art could not relate to altered states of consciousness. We demonstrated that no known naturally induced trance states, of over 70 known varieties, were consistent with the TST model (Ludwig, 1968). Whether or not aspects of rock art traditions are consistent with their being related in "some way to visionary experience" (as Chippindale refers to trance in his comments), is an open question, not a settled fact. If proponents of the TST model are going to maintain that rock art is produced by visionary experience they need to state very clearly what evidence they have for this rather startling assumption.

Lewis-Williams and Dowson (1988) indicated their evidence for trance-induced Paleolithic rock art was that geometric figures and complex animal or therianthropic images were depicted in such art. They argued that such a combination of images only occurred in trance states. But since only mescaline, psilocybin, and LSD-induced trances produce that particular pattern of images and those substances weren't used in Europe, let alone found in cave art sites or at camp sites, then that entire rationale for trance-inspired Paleolithic cave art in Europe collapses!

LW & D's second argument for trance-inspired Paleolithic cave art was based upon a hypothesized analogy between San rock art and Paleolithic cave art. Their primary emphasis was upon the "fact" that San "shamans" were alleged to have hallucinated geometric (entoptic) figures in their healing trance dances (LW & D, 1988, p. 205), as well as more complex images, although they also considered ethnographic data in order to assert that most rock images were inspired by trance. Chippindale, following LW & D, appears to assume that the latter's rather unique interpretation of San rock art is an established fact. However, a closer look into San rock art reveals there are many problems with their interpretation. In researching for a paper in preparation entitled, *Myth or Trance: San Rock Art Revisited*, Helvenston is developing a long critique of a neuropsychological nature that is too lengthy to cite in this short response.

Chippindale et al, as supporters of the TST model, presented no evidence that visionary experience, or altered states of consciousness, as they referred to these experiences in that particular paper, have anything to do with Paleolithic cave art (Chippindale, Smith and Taçon, 2000). Instead, they

indicated that it would be logical to assume that Paleolithic cave art is related to trance because as "Clottes & Lewis-Williams have shown a visionary explanation is a compelling *notion* (our italics) in that it provides a single coherent rationale for a variety of aspects of Paleolithic art." However, the entire rationale rests upon descriptions of trance based upon the TST model which is only applicable to LSD, psilocybin, or mescaline-induced trance. Moreover, in that paper Chippindale et al, allege that altered states of consciousness are characterized by hallucinatory images, but that is only true, for the most part, if one has ingested LSD, psilocybin, mescaline, or other hallucinogens.

Chippindale, et al, cite Eliade (1964) who defined the shaman, practitioner of altered states of consciousness, as the "Great Master of Ecstasy," and yet in his entire study of shamanism, Eliade never referred to "ecstasy" as including hallucinatory visual images. Rather, he indicated that true "visionaries" often received their visions in dreams, or learned to ingest mushrooms such as *Amanita muscaria* (Eliade, 1974, pp. *227-28)*, which does not produce hallucinations similar to the TST model (H&B, pp. 48-49). One of the /Xam bushmen studied by Bleek, //Kábbo, stated that he spoke to the rain in a dream, asking it to fall. He also stated he had an out-of-body experience in his dream where he spoke with his wife and son (Lewis-Williams, 1981, p. 27).

Eliade emphasized that real shamanic trances were "comparatively rare," and the "majority of ecstatic journeys involved only a journey undertaken by the spirits or the fabulous account of adventures whose mythological prototypes are already known." Note how similar this last remark is to the case of the Kalahari San who learn to recite their myths from early childhood, and watch trance dances from infancy. They are certainly highly enculturated to have certain mythically significant experiences while in trance, a point which has already been made by Solomon (1997, 1999).

In conclusion, what Chippindale sees as an "imaginative, original and persuasive" idea, has in fact done a great deal of pernicious damage to rock art studies because it was not grounded in accurate facts regarding naturally occurring trance states or hallucinogens, their effects on subjective experience, or their geographical distribution. To give just one among countless examples: in a recent paper, Wallis (2002) applies the neuropsychological model to the rock art of NW Malakula, Melanesia, seeking to make ethnography and neuropsychology complementary in his interpretation. But, in fact, he merely combs the art in search of motifs which he can fit to the different stages of the TST model. This kind of misguided and simplistic exercise is (almost literally) "connect-the-dots" prehistory. Since Bradshaw agrees fully that the model is groundless (see also Bullen 2003), and since even Chippindale appears to concede that it has now been refuted, one can only conclude that anyone who continues henceforth to cite or apply the TST model is either ignorant of the facts or has little respect for truth in scholarship.

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Authors' Note Introducing Chapter 3: Following the publication of Chapter 2 (i.e., Testing the 'Three Stages of Trance' Model in October 2003, the *CAJ* contacted us in late February of 2004 and wanted us to reply to three criticisms of that piece for *CAJ* 14(1). These comments were already typeset and so had been in *CAJ*'s possession for some time. *CAJ* asked us to respond within 2 weeks, which we said was impossible because the critiques contained references to obscure theses and journal articles that would be difficult and time consuming to access. We rapidly provided *CAJ* with a response that we entitled "Waking the Trance-Fixed," and which appeared in *CAJ* 14(1), 2004. Chapter 3 contains our response to these criticisms from Jean Clottes, "Hallucinations in Caves," *CAJ* 14(1), 2004; David Pearce, "'Testing' and Altered States of Consciousness in Upper Paleolithic Art Research;" and David Wilson "'People Talk About Heaven…' ." Once again, we refer the reader to the journal for the texts of these comments, since we present only our response here. We also add a section where we respond to a letter published in *Current Archaeology* XVI (11) #191, in which David Wilson (2004) disputes Paul Pettitt's observations regarding *The Mind in the Cave* (2004).

Chapter 3
Waking the Trance-Fixed
Response

We must start by pointing out that David Wilson is not a disinterested commentator, but a strong proponent of the TST model. Indeed, the TV program to which he refers was the most outrageously one-sided treatment we have ever seen of the subject, in which not even a whisper of skepticism about the ill informed claims being promulgated was permitted to appear. Nevertheless, Wilson has raised some important points, many of which are somewhat tangential to our papers so let us stipulate that we have focused our attention and criticism upon the TST model specifically. We have not discussed the broader question of whether or not naturally induced trance might have been an important feature in the lived experience of upper Paleolithic peoples, nor to the general issue of whether or not "religious" experiences (William James 1902), as we understand that term today, which have often included some forms of what are contemporarily referred to as "altered states of consciousness", might have been motivating factors in Paleolithic cave art. We have concentrated specifically on the type of trance predicted by the TST model. Indeed, we don't dispute Wilson's discussion of religion or the idea that "religious" thought and experience have been dominant in human affairs for eons, nor do we dispute the deep affiliation between aesthetic sensibilities and religious phenomena, a relationship whose biological depth has been beautifully explored by Dissanayake (1995).

We would remind Wilson that of all the 70 altered states of consciousness cited by Ludwig (1968) shamanism was only one. And it is the specific emphasis on shamanism that we have criticized (Bahn, 2001) with respect to the TST model, not "religion" or spirituality in the broadest sense of signifying belief in supernatural spirits or forces, nor the possible role of altered states of consciousness in the context of spiritual rituals. One of many reasons we have criticized the shamanic aspect of the TST model is because the South African data base upon which it was formulated has been misrepresented by Lewis-Williams. For example, neither of the two investigators who studied contemporary !Kung the most intensively believed that shamanism was an aspect of their healing dances (Lee, 1968; Katz, 1982).

In recent years a new interdisciplinary field that terms itself "neurotheology" has focused upon the role that brain structures and functions play in spiritual experiences, and numerous studies have confirmed (Glore, 1960, 1986; Gross et al., 1972; Rolls, 1984; Persinger 2003) and elaborated upon the investigations of Penfield (1958) who found that electrical stimulation of the temporal lobes (which include deep limbic

structures such as the septum, amygdala and hippocampus) resulted in illusions, hallucinations, and experiences of ecstasy or odd sensations that are characteristic of altered states of consciousness, or temporal lobe seizure disorders involving the same neural substrates (Blumer, 1975; Glore, 1990). Winkelman (2004) goes so far as to argue that shamanism is the foundation of human cognitive evolution and spiritual experience. This assumes that studies of shamanism for which we have historical records only dating back 2 ½ millennia (Eliade 1964, but see Bahn 2001) have something to say about spiritual expression 30,000 years ago, but Whitley, a strong proponent of the TST model stated that in "central Asia and Siberia". . . "shamanism does not seem to first appear until the middle Holocene" (CAJ 2003:271), a position much closer to ours than LW's. Moreover, LW completely fails to consider the possibility that spiritual expression has evolved, adapted, and codified into a huge variety of "religious practices," including many varieties of shamanism (Lorblanchet 2001). By analogy, what informed person would suggest that Christianity is the same now as it was 2000 years ago following the death of Christ? Although numerous authors have assumed that the "sorcerer" figure found in the cave of Les Trois Frères in the French Pyrenees represents a "shaman," some have criticized this approach (Bahn, 1998) and it seems much more likely that the figure is a "horned god," as Breuil called it, or that he was wearing animal accoutrements with which he was either hunting or re-enacting some myth (Thackeray, 1993).

Moreover, the structures mediating emotional and spiritual experiences (the limbic system), are phylogenetically extremely ancient and well developed in the great apes. Evolutionarily the neocortex of the temporal lobes predated the expansion of the frontal lobes and inferior parietal lobules of modern *Homo sapiens* (Joseph 1996). Based upon this information, it seems certain that the evolution of these limbic structures predated "shamanism" by hundreds of thousands of years. For example, Donald (1991) suggested that the evolution of "mythic culture" began some 500,000 years ago. Donald hypothesizes that this phase in the evolution of the human mind was characterized by narrative thought as opposed to paradigmatic thought which involves the logical-scientific skills that emerge only in literate cultures after years of systematic education. According to Donald's theories of mind, mythic culture was fully developed, at least in its pattern of daily use, by the Upper Paleolithic.

Mythic culture would have been characterized by the telling of stories and creation myths, re-enactments of myth through ritual, and singing, dancing and shaking rattles and/or beating drums around the communal hearth. All of these activities are known to facilitate a hypnotic trance. The "spiritual" experiential dimensions of all of these activities are mediated, in large part, by the limbic system and temporal lobes, thus, trance phenomena of the hypnotic type may have been common from ½ million years ago, or earlier, to the present. Over time, complexity of ritual practices and specialization of socio-religious functions may have gradually evolved until an individual was selected to fulfill a role such as that of the shaman, and this person apparently became the primary possessor of techniques of trance induction. More than likely such a role only became fully developed during the past few thousand years. A mythic culture might have used plant substances to induce and/or enhance trance (Siberian shamanism is clearly associated with the hallucinogenic mushroom, *Amanita muscaria*) although in Europe, especially where

caves containing Upper Paleolithic cave art are located, the evidence for hallucinogenic substances is very sparse. Mythic culture was an oral culture and we gain a glimpse of it through the Homeric epics, whose origins developed prior to Greek cultural Paideia (Jaeger, 1945).

Ong (1982) describes the profound differences in the psychology and cognition of individuals living in a completely oral culture, and those living in a literate culture. In the former, the stories, dancing, and ritual all tend to produce trance states in some individuals during the activity, as mentioned above. We emphasize that "the effects of oral states of consciousness are bizarre to the literate mind," an observation that is consistent with the common experience of trance episodes in such cultures (p.30). Indeed, Ong emphasizes that without studying the differences between oral and literate cultures in depth, it is virtually impossible for the literate mind to comprehend the mind of the non-literate individual (and by this we mean the individual who has never been exposed to any form of writing). Such a mind as this was that of Paleolithic individuals. Literate cultures significantly alter the cognitive capacities of their members and this can be seen even in chimpanzees. For example, Bonobos, who when raised in an artificial culture especially designed to facilitate their production, modification, and purposeful use of tools; their understanding of sentences of naturally-spoken English; and their acquisition of a large lexicon of visual symbols (Savage-Rumbaugh et al, 1993) "do not act, think or communicate like the same species" (Donald, 1998), thus revealing latent cognitive potential that is not apparent when observing them in their natural surroundings.

Donald believes the same is true of humans and concludes that humans would not have the same fundamental characteristics of mind that are manifested in contemporary, highly literate Western culture, without our very specific cultural context, including extensive training in literate cognitive skills. It is our almost complete immersion in such enculturation processes that renders "altered states of consciousness" so different from "ordinary" consciousness for us, and distances us from the more affective aspects of experience so richly dominant in oral cultures such as the Middle Ages (Huizinga, 1996). And, let us hasten to emphasize, we are not stressing these differences between oral and literate cultures because we are Eurocentric, but because it is the highly literate scientist who is proposing the theories under discussion in the first place. Given this situation, the nature of her/his mind is of definite importance in trying to fully understand these matters because of the innumerable assumptions, mostly unrealized and unexamined, that the literate mind projects upon the non-literate mind.

Finally, literate cultures rely upon and enhance scientific cognitive abilities primarily mediated by the left cerebral hemisphere, thus, it is probable that 30,000 years ago, the right hemisphere may have been more dominant than it is today and visual artistic tasks may have had a critical significance which is difficult for us to appreciate (Jaynes, 1977) because of the powerful affective component associated with the perception and production of the art (Hodgson 2003a). Some of the major functions associated with the right cerebral hemisphere include social and emotional intelligence; nonlinguistic environmental awareness; visual-spatial perceptual functioning, including analysis of depth, figure-ground, and stereopsis; perceptual-manipulative functions; holistic apprehension; intuitive thinking; musical abilities; creativity;

visual imagery; visual language as the basis of visual symbolism and metaphoric thought, and the mediation, elaboration and expression of affective states (Springer & Deutsch, 1993; Hodgson 2003b). Mythic culture would have been not only dependent upon these abilities but would have contributed to the enhanced evolutionary development of them. Certainly, there would have been no need for specialized "shamans" as the activities in which the entire community was involved were sufficient to produce spiritual experiences consistently in many participants without requiring any special mediator. But, having said all this, and even if all of the above speculations are correct, we still have no way of knowing *how* any form of trance was tied into the art (Bahn, 1998, 237), nor *how* we could determine from the artistic images whether or not trance had been more involved in its inspiration than any other form of consciousness (Bahn, 2001).

Unfortunately, Wilson conflates visual images and other "unusual" experiences characteristic of naturally-induced trance states, such as hypnosis, meditation and relaxation, with the highly specific pattern of images that characterizes the TST model (which is based upon the ingestion of mescaline). We have previously pointed out the tendency of proponents of the model to make this error (Helvenston & Bahn, 2002). The experiences reported by subjects of Etzel Cardeña (1996) are typical of hypnosis, meditation and deep states of relaxation (Holroyd, 2003; Otani, 2003) and include such events as imaging colors or a bright light, experiencing a sense of profound and unexplainable transcendental knowledge, feelings of floating, out of body experiences, perceptions of music, descending down a spiral staircase, entering a dark cave, etc. It is also important to note that Cardeña did not refer to these images as "hallucinations," an important distinction that proponents of the TST model ignore, which is a topic beyond the scope of our response. Let us simply declare that not all vivid imagery experiences are hallucinations!

In the 1996 paper Cardeña did not report that his subjects described a few geometric figures. The experiences related by his subjects, while having some of the characteristics compatible with the TST model, were essentially different in pattern. For example, the TST model emphasizes the experience of imaging geometric figures, followed by images of more complex animal, human and therianthropic figures but none of Cardeña's subjects reported images of animals – whereas the TST model emphasizes such figures. The emphasis in the TST model is on vivid imagery experiences and while very rarely some hypnotic subjects do report vivid images, more commonly bodily sensations, floating sensations, fear, joy, ecstasy, dissociation from the physical body and transcendental experiences predominate.

In *Desperately Seeking Trance Plants* (Helvenston & Bahn, 2002) Helvenston reported that she had never had any reports of hypnotic subjects describing geometric figures, nor did she know of any other reports in the literature to that effect. Wilson suggested that perhaps her use of hypnosis in a clinical setting may have been a determining factor. This is quite possible, as the general setting of the hypnotic induction forms an implicit suggestion, in often unidentifiable ways, as to what the hypnotic experience might entail, an idea that Cardeña had suggested in 1996. Most reports in the literature have typically described hypnosis within clinical settings where patients may be so preoccupied with physical and psychological health problems that these issues dominate the hypnotic experience. Such preoccupations could be one reason why geometric figures are not described in the clinical hypnotic literature.

Wilson's quotations from his 1999 interview with Cardeña indicated some subjects had reported imaging geometric figures, thus, Cardeña was contacted for further details of his methods and findings. He indicated that his comments in 1996 had only represented a very brief version of some of the data (an abstract of the results was published in 1988, and a paper reporting all the relevant details is in press) but that some of his subjects described "geometric shapes, like a grid thing," "a spiral staircase," "a tunnel." While Helvenston's subjects have reported the latter two (which, by the way, we don't consider to be geometric figures, rather Klüver's term *form constant* is more applicable), no one ever described a grid or any geometric perceptions. Cardeña pointed out that there were a few other reports of images of geometric figures (Feldman, 1976), including circles of light, a crescent, and stars spinning out from a vortex "like spokes going out from a wheel," and we are very much indebted to him for acquainting us with this source. Also, geometric images have been reported in hypnagogic and hypnopompic states (Mavromatis, 1987).

Cardeña specified that his subjects were students in college courses, he never mentioned shamanism to them, and the data were gathered in 1987, prior to the burgeoning popularity of shamanic themes, although one of his participants, who had been disturbed by her strange experiences, reported the day after her hypnosis that she had begun to read a book on shamanism. One has to wonder what factors were involved in her choice of that subject at that particular time and whether these factors had influenced her hypnotic experience. The only suggestions supplied to Cardeña's subjects were that they were to experience as deep a hypnotic trance as possible and that he had no specific expectations as to what they might experience. He asked them prior to the induction as to what, if any, expectations they had of hypnosis and no one mentioned geometric figures.

None of Cardeña's subjects reported any current use of psychedelic drugs but one subject reported previous experience with LSD. This may be an important factor because ingestion of LSD, mescaline, or psilocybin, and the smoking of high doses of marijuana do produce geometric images. If subjects had previously had such experiences, the association between drug-induced trance and geometric figures could well influence the nature of a subsequent, naturally-induced trance. Seven of ten subjects in Feldman's experiment reported current use of LSD or marijuana and 8 subjects reported seeing some geometric designs, i.e., circles or a crescent moon. Since this study was carried out at Univ. of California, Berkeley, Feldman notes that most of the students on campus were interested in psychology, hypnosis, altered states of consciousness, and psychedelic drugs. These interests certainly form part of the "mind set" which each subject brought to the hypnotic experiment. Apparently Feldman did not inquire about previous use of drugs, so it is possible that most of his subjects had had some experience with them at one time or another. Moreover, since geometric figures are reported in hypnagogic states, individuals who are prone to such experiences may be primed to image geometric figures in trance.

We still question why college students, in a non-clinical setting, would experience geometric images in hypnosis whereas clinical subjects do not. Cardeña believes the reports of geometric figures during hypnosis are rare because many investigators are not working with "hypnotic virtuosos" (i.e., subjects with very high scores on standard hypnotic questionnaires) and they provide more specific

instructions to subjects and limit the time of the hypnotic experience. He also suggests that most investigators do not attempt a micro-analysis of the experience as he and a few others do. While this may be the case with many investigators, Helvenston did conduct micro-analyses, with no instances of geometric figures reported by highly hypnotizable subjects who were also suggestion-free in all of their initial hypnotic evaluations. We do not know the content of Cardeña's subjects' course of studies, of their exposure to a variety of subjects in assorted media, or of their particular "mind-set" in approaching the hypnotic task.

We wonder if those who volunteer for such experiments might not have a deep interest in shamanism, altered states of consciousness or paranormal experiences, and have actively sought out information about such phenomena that they did not report prior to hypnosis. Such knowledge would certainly form a stored experiential base that could be drawn upon during hypnosis, and as we pointed out (2002), subjects would undoubtedly experience geometric figures if they had any suggestion, either sometime prior to the experiment or during the hypnosis, inspiring them to do so. At any rate, there is some evidence of geometric imaging in naturally-induced trance states, but we think the factors facilitating the perception of such images require further investigation. Our main point is that Cardeña's subjects, while reporting some images and experiences consistent with the TST model, did not experience the over-all pattern of imagery that is predicted by it. Rather, their dominant experiences are consistent with well-known hypnotic phenomena.

Since the publication of the above in *CAJ*, Wilson has responded aggressively to a letter from Paul Pettitt (2004) in which the latter offered some commentary regarding Lewis-Williams' *The Mind in the Cave* and we offer our reply to Wilson here. David Wilson, whose self-proclaimed expertise regarding the TST model consists of the fact that he is a "television producer and writer", disparaged Paul Pettitt because he had the temerity to criticize a review of Lewis-Williams' *The Mind in the Cave* by Jeffrey May (2003). Pettitt (Ibid) had raised some reasonable questions about the TST model as discussed in LW's book along the lines we have debated in this Chapter. For example, he wondered if the idea of a shaman, with a clearly-defined role as a visionary and cosmic traveler was a universal figure. As we have seen, Eliade, the TST model's favorite expert, restricted ideas of shamanism to Siberia and North America. Wilson does not address that specific question, but rather chooses to focus upon one facet of shamanic belief, the idea of the three-tiered universe, which he correctly states was found in many widely differing societies, just as Eliade had shown in his studies of shamanism and the history of religion, but it was never only restricted to shamanism. Indeed, a three-tiered universe appears to be an extremely ancient idea, but rather than being derived from the way in which "individuals respond to ASC" (altered *state* of consciousness) as Wilson suggests, it is far more likely derived from the universal fact of human existence – wherein spirits of heaven and earth (chthonic spirits of the underworld) are conceived of as surrounding and interacting with the human experience of life in the here and now. In fact, Wilson writes of ASC, as if all trance is exactly the same, across time, geography, culture, etc., a common mistake of the TST proponents which we have addressed *ad nauseum*.

Pettitt also raised the question as to whether or not entoptic phenomena are universally experienced by humans *and stimulate art*. As we have discussed in Chapter 1, many lines of evidence confirm that the perception of geometric figures (entoptic images and phosphenes according to LW & D) is hard-wired into the human nervous system, but referring to them as entoptic figures and phosphenes is not only an abuse of neuropsychological terms, it is also highly misleading and confusing. Moreover, when LW and Dowson use those terms they specifically assert that geometric figures are seen in trance and that most, if not all, rock art that depicts these figures is therefore an indication that a shaman preserved his trance experience through an artistic representation. As we have shown, the only instances wherein such figures are seen *in trance* is when the individual is under the influence of specific hallucinogenic substances, some of which induce visual images of geometric designs (or if they have previously used such substances and expect to have a similar experience during naturally-induced trance such as hypnosis or deep relaxation, an occasional geometric figure might be reported).

Wilson claims that Pettitt "seems to think the 'altered state' itself must. . . always lead to art" but no where in his letter does Pettitt say any such thing. As a matter of fact his question was "whether altered states lead to rock art (as a whole they don't) and whether this is the main explanation for the art". As we discuss in Chapter 7, the evidence suggests that many native tribes of Siberia and North America once had practicing shamans or residual shamanic elements in some of their rituals, but there were enormous variations in whether or not the shamans induced trance, either inspired with hallucinogens, tobacco, or other psychoactive substances; or by natural procedures such as auto-hypnosis, meditation, sleep deprivation, starvation, wounds, etc.; whether or not there was any tradition of shamans recording any experience, trance or otherwise, in artistic depictions; and whether or not all "visions" were in fact dreams, not hallucinations.

Wilson appears unaware of the vast diversity of altered states of consciousness, how they are inspired, and the profound effects of specific mythological beliefs located in a particular time, culture and place, upon each and every trance experience. Pettitt raises the issue of how beliefs influence art but Wilson ignores that question and suggests that Paleolithic Europeans were not all that different from 19th century South African San, implying that whatever trance the San experienced was similar for people living 20-30,000 years ago, irrespective of their belief systems. What breathtaking arrogance and ignorance, dismissing in a sentence extremely complex issues, some of which we have just discussed above.

Pearce criticizes our paper because we fail to "argue the heuristic and methodological merits of the TST model." Time and again when data fail to support the TST model, its proponents argue methodology. Although we have a great deal to say about comments Lewis-Williams has made in emphasizing the superiority of his methods, space limitations prevent us from elaborating on those issues here, except to say that Lewis-Williams devoted considerable effort to defending his use of analogical methodologies based upon ethnological research and documentation (See Chapter 6). We recognize the importance of ethnological research when it is interpreted accurately, as we believe that San historical documents are treated by Solomon (1997, 1999, 2001, & 2004). She clearly demonstrates that Lewis-Williams has

projected his shamanistic TST theory into that body of data, as had Pager (1994) and Hromnik (1991) before her. Recently, Le Quellec has written a devastating critique of LW & D's failure to utilize San ethnological records appropriately (2004). Also, we believe that arguments from analogy are an acceptable method, as long as they are supported by some historical and/or ethnographic sources. In the absence of those sources, such a method becomes essentially an informed speculation and should be identified as such, particularly when attempting to posit mental and sociocultural attributes to *Homo sapiens sapiens* some 15,000 – 30,000 years before the present.

We are tempted to reject the remaining criticisms because Pearce has either failed to read our relevant papers or he has deliberately misquoted from them. We will simply comment briefly upon the most egregious of Pearce's misattributions. In claiming that we have ignored a "morass of unspecified assumptions," Pearce says that we presuppose the three stages of trance "were experienced as an ineluctable progression." We do not assume such, have never said we did and have been aware of Lewis-Williams' disclaimer as quoted by Pearce and discussed previously by us (Helvenston and Bahn, 2002, 17). Nevertheless, all proponents of the TST model have stressed the importance of geometric figures early in the drug-induced trance state, followed subsequently by more complex visual imagery experiences. All of the papers written by proponents of the TST model continue to cite three stages of trance as the *typical* trance experience for all altered states of consciousness, across all time and geographical locations. They have emphasized all three stages as a *sine qua non* of trance experience *per se.* Therefore, whether or not there is an experience of all three levels of trance for the majority of individuals is clearly **not** irrelevant to LW & D's central argument, as Pearce would wish us to believe and as Chippindale attempted to argue previously (2003).

As we demonstrated in our 2002 booklet, the TST model was derived *in toto* from the work of Henrich Klüver (1928) and was based entirely upon his subjects' descriptions of geometric and highly complex visual imagery experiences following ingestion of mescaline. That pattern of drug-induced vivid imagery experiences is only produced by three substances: mescaline, psilocybin and LSD – this is an empirical fact. We explored in some detail the evidence of many other substances popularly believed to induce hallucinations and six naturally-induced trance states in our previous publications and found that none produced a pattern of vivid imagery experience similar to that of mescaline, etc. We discussed the fact that Ludwig had listed some 70 different forms of altered states of consciousness, and that none of these produced a pattern of images consistent with the TST model (except mescaline, psilocybin and LSD) as far as we had been able to ascertain. If the proponents of the TST model have evidence to the contrary, it is their obligation to publish it, and not spin spider-webs of irrelevant digressions that clearly waste the readers' time. Neither mescaline nor psilocybin (until recently) has ever been found in Europe and there has never been a culture that deliberately ingested LSD until modern times. Incidentally, none of these plants have ever been shown to grow in South Africa (until recently), and therefore they could never have been used by the San. This fact constitutes another major factual error of the TST model.

Whether or not plants containing these substances ever grew in Europe is another empirical question. Since palaeobotany has little difficulty identifying pollens, seeds, spores, plant forms, etc. from thousands of years ago, (Mercuri, 1999) it is only a matter of time before evidence of plants containing mescaline and psilocybin will be found in Europe *if they ever grew there*. In fact, there are numerous world-wide data bases containing evidence of assorted plant remains from the remote past, and there is a center for the study of palaeobotany, palynology and paleoecology in France that provides lists of plants known to have grown in that region during previous millennia.

We have no personal investment in whether or not plants containing mescaline and psilocybin are found in Europe. Although plants containing these substances are frequently found in South America particularly, and North America also, there is no evidence that any such plants ever grew in Europe and we have simply pointed this out as a serious problem for the empirical data base of the TST model. In our view, this fact refutes the model. Lewis-Williams (2001) pointed out that "normal" science, as discussed by Kuhn (1970, 5). . . "often suppresses fundamental novelties" as if critics of the TST model would attempt to conceal evidence for it. Such a position would imply that confirmation of European mescaline and psilocybin containing plants would be ignored by critics of the TST model or simply "not perceived." This is quite preposterous, and we are willing to bet that if such plants ever grew in Europe, the odds are they will be discovered and widely reported.

Pearce asserts that we *assume* plants alleged to have produced images consistent with the TST model should be found in the area of the rock art cite. However, we base our discussion upon the empirical findings of Lewis-Williams who found that most of the San rock art sites at Giant's Castle and Barkley East, South Africa, could have been living sites and the presence of the artifacts in many tended to confirm that conclusion (1981). We state very explicitly that there would be material residues of the plants in the general region in which the cave art is found and the findings by Boyd and Dering (1996) support this contention.

Pearce states that we dismiss the use of "neuropsychology" in Upper Paleolithic research in its entirety. This is absurd. One of us is a neuropsychologist who has been interested in the evolution of the human brain and mind since adolescence. Indeed, we take neuropsychology so seriously, that we have been forced to criticize a simplistic, unsophisticated and trivial resort to neuropsychology by the proponents of the TST model. These individuals assume that the human brain and mind of Upper Paleolithic peoples who produced the rock art images were identical to the modern brain and mind. They also assume that alleged rituals of shamanism occurring between 15-30,000 years ago were similar to the sociocultural patterns in societies who have practiced shamanism over the past few thousand years. We have addressed these topics already and can "neurologize" (speculate about mind/brain functions endlessly) as well as others, but in the final analysis there is simply no way of knowing with a high degree of certainty what the mind of people living 30,000 years ago was like. At best, our attempts are more or less well informed speculations.

To assume that the artists required a trance experience in order to produce the rock art, as proponents of the TST model do, is startling to us because, again, it depends upon the assumption of

identical minds for Paleolithic peoples and contemporary Western peoples. Such an assumption ignores some 5,000 years of literate cultural and cognitive development that incorporates Sumero-Egyptian, Greco-Roman, Judeo-Christian, medieval-Renaissance, Indo-Arabic, Western-European and American technology and science. To imply, as Pearce does, that we do not value "less rational aspects of consciousness" is quite preposterous since Helvenston is a neuropsychologist whose professional education and practice involved explorations of the unconscious motivations of behavior and the study of altered states of consciousness. In this regard, Pearce assumes that we are ignorant of and/or have some prejudice against the fact that drug-induced trance has been and is a critical aspect of the mythic, ritual, and religious practices of various traditional cultures around the world. Again, this assumption is not only fallacious it is unconscionably arrogant. Helvenston has studied such cultures and the psychoactive substances they utilize for thirty years. It is the actual familiarity with this vast body of work that led her to criticize the lack of such a data-base as far as the application of the TST model to Paleolithic cave art was concerned.

Pearce says that it is time for research to move forward -- we agree; and likewise Wilson claims that we have put forward no alternative, and merely argue for a negative, without offering our own suggestions. Such comments merely expose a profound ignorance of the literature concerning Ice Age art; we have indeed put forward convincing evidence (e.g. Bahn 2003) for some Paleolithic cave art being strongly religious in motivation, based entirely on solid data such as its location, rather than on spurious speculations, outdated or erroneous neuropsychology and distorted ethnography. Pearce wonders why a model that is 15 years old is still being debated, and why "papers that criticize misrepresentations of early research continue to be published" -- the answer is simple. As explained elsewhere (Helvenston & Bahn 2002: 8), it took years for true specialists in shamanism, and subsequently neuropsychologists, to become aware of the distortions of their data that had been perpetrated in a completely different domain; and at the same time, the simplistic but erroneous picture of the past presented by the model's adherents has inevitably appealed greatly to the media and to uncritical minds, with programs such as Wilson's merely exacerbating the damage. That is why it is still regrettably necessary to expose the fundamental errors in this approach.

Finally, we turn to Clottes, whose comment is simply disappointing. We agree that he did eventually correct his earlier error regarding the title of the Féniès book, but not, alas, his misunderstanding of that book's contents. And far from taking a "cheap shot," we were in fact being charitable to him by focusing on the Féniès reference, by far the most serious source on which he has drawn. But since he has now seen fit to draw attention to his other, weaker sources, we shall examine them in full. For a start, we recommend that he go back and review Féniès (1965) so that he can accurately describe what he has been citing as evidence for caves as a "hallucinogenic milieu." Again, we would caution proponents of the TST model that not all *vivid imagery experiences* are considered to be "hallucinations," and part of Clottes' critique of our paper may lie in semantic misunderstandings which we will attempt to clarify here. The "Chapter" in question is titled "Wanderings of the Senses," and describes a number of unusual visual phenomena, occurring in response to prolonged near-darkness, only *two* of which are referred to by Féniès

as *visual hallucinations*, as we noted in our CAJ paper (Helvenston & Bahn 2003, 221). The visual images reported in this section were described by a subject as consisting of luminous dots, moving like comets, slowly. Two other people described a light that became brighter and brighter and then disappeared. The phenomena described would be referred to by most neuropsychologists as phosphenes, or very simple visual hallucinations of a non-veridical nature and Féniès stresses that the perception of these visual images is strictly a cortical function as has been demonstrated by numerous empirical studies. Lewis-Williams & Dowson (1988, 202) made a clear distinction between "entoptics" (form constants and phosphenes) and hallucinations, but their concepts and terminology are not consistent with accepted neuropsychological practice. Their "entoptics" are actually both non-veridical, simple hallucinations mediated by the primary visual cortex, not the eyeball or other sub-cortical optic structures.

The other unusual visual sensations that Clottes refers to as "hallucinations" are actually discussed by Féniès as representing the well-known disappearance of morphoscopic (sense of shapes and contrasts) and chromatic (color) perception in a very low light environment where vision is mediated primarily by mesopic vision. (Photopic vision is commonly referred to as day vision, mediated by cones. Scotopic vision is night vision, mediated by the rods. Mesopic vision is mediated by both rods and cones in an environment that provides low levels of light). In this section, Féniès describes an individual who was 50-hours sleep deprived, who kept bending down to pick up satchels of fossils that were actually rubble. Clearly his morphoscopic and chromatic perceptual abilities had disappeared. This particular example is not, however, a simple demonstration of the loss of these perceptual abilities in a darkened setting, because he had also been sleep-deprived for 50 hours, a factor that can produce dream-like, hallucinatory phenomena (Tyler 1965). Whether or not the remaining examples in this section also referred to individuals who were sleep deprived in addition to having lost morphoscopic and chromatic perceptual abilities is unclear, although the nature of their visions suggests that sleep deprivation was involved. They certainly did report some bizarre visual experiences. For example one individual reported seeing a souk filled with carpet vendors, dunes and skulls, but Féniès maintains that these phenomena are not hallucinations. He says that similar perceptions occur when an individual emerges from a cave after a long stay, where the sky may appear to be pink. Such images appear to be the result of the fact that prolonged darkness produces certain specific alterations in the excitability of receptors at the retinal level, and in neurons in the visual cortex to subsequent light stimulation (Boroojerdi, et al 2000, Yang, et al 1988).

In this regard, Féniès discusses what he refers to as after-images, and he provides some anecdotal examples whereby visual imagery is reported after emerging from a cave. In one instance a man reported seeing some colored concretions between his eyes and the wall of his room some 7 or 8 hours after exiting the cave. In another example, a man saw black patches of geometric forms that were moving beginning about 1 hour after he emerged from the cave. Again, these after-images are not considered to be hallucinations by Féniès. Moreover, since they occur upon emerging from a cave they would not appear to provide support for the TST model, because according to that hypothesis, the paintings would have been inspired by the darkness of the cave and been in progress or completed prior to emerging into daylight.

Let us now examine the Paleolithic cave art for examples of "spots" of light. There are numerous "dots" in Paleolithic cave art, but they are rarely nicely circular (many of those in Chauvet were made by slapping the painted palm of the hand against the wall). Others in Chauvet are laid out to form animal shapes. The other good examples of dots in cave art are at El Castillo (Spain), where they are strung out in a single or double line along one wall of a corridor; and in Pech Merle where there are some inside and around two horse figures. In the Combel gallery in Pech Merle, there are lots of red dots on the ceiling, in clusters. At the recently discovered cave of Frayssinet, there are many dots (primarily black) in the upper cave, in groups or rows; in the lower cave, there is a little "cloud" of small black dots, made with a fingertip (Lorblanchet, pers. comm.). While some of these dots ("of light"?) could possibly represent a depiction of the experience of phosphenes or simple hallucinations, it is difficult to see how one would distinguish the recording of that experience from numerous other possible explanations of such dots. Moreover, these are only a few examples of the possible depiction of phosphenes out of hundreds of caves where no such depictions exist at all. The above-mentioned dots are more difficult to explain from the TST perspective, in that the phosphenes in the literature cited by Clottes are white in color, not red or black.

The only examples we can think of, in the entire body of Paleolithic rock art, that could possibly depict the experience of a gradually increasing source of light as reported by one of Féniès subjects, would have to be three caves, Altexrri, Covaciella and Chauvet. In those caves a few walls have been scraped to provide a lighter background for new figures to stand out against. We do not consider this an example of back lighting but others may. However, this example only refers to three caves out of hundreds. If the cave environment is viewed as stimulating the experience of phosphenes, it would seem that there should be hundreds of depictions of such figures, rather than only a tiny handful.

We mentioned in our CAJ paper that other speleological sources reported auditory hallucinations which upon reflection, they realized were non-veridical and we have never disputed the fact that some speleologists have experienced auditory illusions and hallucinations. Still, we wonder how proponents of the TST model believe that auditory hallucinations affected the depictions of visual hallucinations in the cave art.

Turning now to Clottes' other sources, they constitute a few weak straws at which he has grasped desperately. Let us note that after images, loss of morphoscopic and chromatic perception, sleep deprivation, and severe exhaustion play a major role in the production of unusual visual experiences in these sources just as they did in Féniès reports. Simonnet (1996: 343) does NOT, contrary to Clottes' claim, mention "repeated visual hallucinations." What he says is that long stays underground could have had, among other consequences, the effects of a hallucinatory kind. For example, when he was young, during excavations in 1947-50, he underwent sessions in Labastide cave of 15 hours, sometimes staying awake for 36 hours. In the feeble light, there was attenuation of color vision, and he began to see landscape lines evoking the outside world in the sinuosities of a white calcite thread on the ceiling. This may only have been one incident rather than many -- we are not told -- but in any case it is clear that prolonged darkness and sleep deprivation were to blame.

The article by Renault (1995/6), which appeared in a magazine of the paranormal, contains a number of anecdotal accounts of "speleological hallucinations," all clearly tied to "limits of resistance" and exhaustion. For example, two boys trapped in a cave for two days and two nights, often saw a light that grew bright and then disappeared; a man saw lights everywhere, especially small brightly-lit houses, when he was exhausted after several days, again these perceptions seem to be a result of sleep deprivation. The great pioneer of speleology, Norbert Casteret, reported seeing varied "lights" and very bright colors after several days underground. Renault himself saw his first "underground hallucination" after 48 hours of exploration.

Clottes also cites the thesis by Saumande (1973), as quoted by Renault, but has apparently not read it himself. We, on the other hand, have taken the trouble to do so. In his thesis of more than 200 pages, devoted to "human behaviour in an exceptional milieu, the underground milieu," the late Pierre Saumande devoted three pages to hallucinations -- an even tinier percentage than in the Féniès thesis, thus further underlining the lack of importance of this phenomenon. He begins by stressing that when one analyizes tales of underground hallucinations, they always coincide with a lowering of vigilance, a disturbance of the circadian rhythm, or a very advanced state of exhaustion, and often a combination of these (Saumande 1973: 94). He also emphasizes that there are not many such reports. After repeating some examples from the Féniès book, he mentions someone who -- above a deafening waterfall -- had auditory hallucinations while exhausted after 16 hours of difficult progress. He also quotes a tale by C. Queffelec, who saw a giant bug, several metres across, on a cave wall; once again, Queffelec adds that "I was very cold, I was also very tired, and I attribute it to this exhaustion and the fact that I was completely frozen."

Saumande's principal example (1973: 95) is an experience of Renault himself, as reported by R. Algiboust (Renault's article also gives this same account, and identifies Angiboust [spelled differently] as a colonel and a medic). In the course of a particularly difficult speleological expedition, a luminous zone was seen above a waterfall, and eventually turned into a cafe terrace with the upper rocks as hanging vegetation, and the lower rocks as tables and chairs. Renault (through the narrator) emphasizes that "I was close to exhaustion with at least two to three days of rest needed to recuperate," and he says that the best comparison he can think of is becoming extremely sleepy during a long drive at night (Saumande 1973: 96), when the eyes start to close and one's attention wanders. Renault himself (1995/6) continues the tale by revealing that, having left the cave the extreme fatigue continued, and, while motoring slowly on his Vespa, he underwent frequent visual illusions, (after images per Féniès terminology) and began making strange interpretations of the shadows -- and he only just missed a dog, which he perceived as a patch of oil on the road. One would expect that, for Clottes' logic to be in any way consistent, he must therefore consider a vehicle at night to be a hallucinogenic milieu, and thus, presumably, night-time drivers who see things must be shamans?

We should also point out that a number of prehistorians have spent very long hours in dark deep caves, concentrating furiously on tracing images that are often very hard to see, and thus obviously putting their tired eyes under great strain. Breuil, as is well known, reckoned that he had spent more than 700 days

of his life making underground tracings (Bahn & Vertut 1997: 49) but, as far as we are aware, he never mentioned any kind of hallucinations. Glory, during his campaigns of tracing engravings in Lascaux, often worked from dusk till the early hours of the morning (Delluc & Delluc 2003: 22) -- and from 1952 to 1963 this work demanded thousands of hours of effort -- 5000 by some estimates (ibid.: 25). And Lemozi (1929: 41) reports spending 12 or 13 consecutive hours tracing the art of Pech Merle, only interrupting the work for a few minutes of food; when one includes the arduous process of getting to and from the decorated galleries at that time, and setting up the work, this must indicate sessions lasting the best part of a full day. Yet none of these pioneers mentions any kind of hallucination.

Amazingly, Clottes accuses us of "sleight of hand"! We believe that such an accusation might more accurately be applied to those who cite carefully selected and highly obscure references, some of which they have not even read, and which in any case do not support their claims! This is by no means the first time that this tactic has been adopted by the proponents of the TST model; indeed it has almost become a hallmark of their approach.

As a conclusion, we feel it necessary to spell out some indisputable facts in the simplest terms so that nobody can misunderstand them in the future: (1) The evidence cited from Clottes' sources reveals that caves are NOT a hallucinogenic milieu, with only very rare instances of actual hallucinations occurring, although other visual abnormalities such as achromatica and after images do occur. (2) Virtually all the experiences of visual hallucinations in caves are directly linked to extreme exhaustion, and not to the caves *per se*. (3) Even under conditions of extreme fatigue, such experiences in caves are extremely rare.

In a recent review of yet another utterly uncritical book about the shamanic obsession in archaeology, Lewis-Williams (2003a: 95) declared that "with a bit of luck, [the book] may be a prelude to some more cries of "mea culpa." We fervently share the hope that some of those who have been promulgating serious errors of fact and interpretation will indeed now acknowledge that they have been mistaken on some points, and issue some "mea culpas" -- for example, about caves being a hallucinogenic milieu -- but in view of their long record of shifting goalposts and ducking and weaving, we sadly doubt that they will ever do the honourable thing, preferring instead to remain stubbornly and ineluctably "trance-fixed."

. . . . . .

Authors' Note Introducing Chapter 4: At the time when *CAJ* was requesting our response to the three hostile comments, it also informed us that Lewis-Williams had submitted a paper purporting to criticize our original booklet, *Desperately Seeking Trance Plants*, but that we would not be allowed to see or comment upon it prior to publication. *CAJ's* editor indicated that after it was published, he would consider publishing a short reply from us in the October 2004 issue. After we read Lewis-Williams' paper entitled "Neuropsychology and Upper Paleolithic Art: Observations on the Progress of Altered States of Consciousness" (CAJ 14:1) published in April 2004, we therefore asked *CAJ* to publish a reply from us. In fact, we implored the journal, because as we argued, Lewis-Williams had misquoted us and distorted so many of our ideas that readers who had not read *Desperately Seeking Trance Plants* would have a completely false impression of our work. *CAJ* refused. Chapter 4 contains the response to Lewis-Williams that *CAJ* declined to even consider. *CAJ*'s supposed rationale was that its readers had had enough of this topic! We want to emphasize to readers that Lewis-Williams claimed he was critiquing our original booklet, not the short summary of it that we had published in *CAJ* 13(2).

Chapter 4
Response to Lewis-Williams' critique of *Desperately Seeking Trance Plants: Testing the 'Three Stages of Trance' Model*

Lewis-Williams purports to be criticizing our booklet, and yet his entire paper, "Neuropsychology and Upper Paleolithic Art: Observations on the Progress of Altered States of Consciousness" (CAJ 14(1):107-11), clearly demonstrates that (1) he did not read it, and/or (2) he did not comprehend it, and/or (3) he cannot recall what he read, and/or (4) he deliberately traduced it. Whatever the case his "critique" certainly does not demonstrate a considered analysis and refutation of the evidence that we actually presented. Thus, let us again reiterate a few key points that we spent over 50 pages documenting in our booklet.

The three stages of trance discussed by LW & D (1988) were derived from Heinrich Klüver's research in the 1920s with mescaline-induced hallucinations, and in subsequent years it was found that LSD and psilocybin both produced a similar pattern of trance. We pointed out in great detail in our booklet that there are over 75 different trance states known, three of which are induced by the three hallucinogenic substances mentioned above. Only these three substances produce the highly-specific and unique trance experience that forms the foundation for the TST model.

In our booklet, we did not discuss our views as to whether we thought naturally induced trances may have affected Paleolithic art, although we addressed this issue specifically in our *CAJ* paper "Waking the Trance Fixed." Our goal initially was to provide an in depth analysis of the TST model and the empirical data base upon which it was founded and thus, our focus was quite narrow. Lewis-Williams asserts that we ignore the possibility that a natural trance state, such as that produced by hypnosis, might have had some influence on Paleolithic cave art, but our consideration of natural trance states in our booklet demonstrated that there were none that were similar to the TST model. Far from being unaware of the pattern produced by natural trances, we devoted 35 pages of our booklet to a detailed analysis of mescaline-induced trance, naturally induced trances, and trances induced by substances other than mescaline, LSD and psilocybin. Not only is no naturally-induced trance state similar in overall pattern and content to the trance discussed by proponents of the TST model, neither are trances produced by other hallucinogenic substances. We have, with mind numbing repetition, always cautioned the proponents of the TST model not to conflate drug induced and naturally-induced trance states because there is a significant difference, but Lewis-Williams continues to do so. For example, in *Mind in the Cave* he cites a trance

reported by an individual who was listening to music while experiencing LSD-induced hallucinations, *as if* it were a typical example of trance as purportedly experienced by a Paleolithic individual. But, as we have demonstrated LSD was never used in Europe until recently, psilocybin was not found there until the past few decades and mescaline has never grown there. Thus, any trance experienced by a Paleolithic person would have to be a natural trance or induced by another hallucinogen. Yet, as we discussed in detail in Chapter 1, no natural trance states, nor hallucinogens growing in Europe other than mescaline, etc., produce the specific variety of trance to which he refers in all of his publications (2002: 226).

In "Neuropsychology and Upper Paleolithic Art," Lewis-Williams presents an interesting discussion of several lines of evidence demonstrating that specific innate neural substrates in the human brain mediate the perception of simple geometric figures *as if* we disputed that basic neuropsychological finding. For example, he wrote "Helvenston and Bahn ignore neurological research on geometric visual percepts" (p. 109). Had he read our booklet he would have known that not only did we **not** dispute this fact, we presented pages of evidence in support of it!

For example, we demonstrated that electrical or chemical stimulation of Area 17 (aka V1), primary visual cortex, resulted in images of assorted geometric figures. We discussed other evidence including migraine headaches, temporal lobe seizure disorders, and the effects of the three hallucinogens, mescaline, LSD and psilocybin (who produce their effects by directly stimulating visual cortices and /or temporal lobe structures). We pointed out that primates had most likely been discerning geometric figures for some 55 millions years, and we discussed a number of geometric figures that are perceived upon electrical stimulation of the deep temporal lobe structures that should be found in cave art but rarely ever are, a fact never addressed by Lewis-Williams.

We finally asked "since LW & D and proponents of the TST model emphasized the fact that so many different conditions seem to produce the same entoptics [geometric figures in our terminology], why don't they write about migraine-induced rock art, or fatigue-induced rock art or sensory-deprivation-induced rock art (p.47)?" Clearly, Lewis-Williams attempted to portray Helvenston as a neuropsychological idiot by writing *as if* she hadn't even considered the fact that very simple geometric images are indisputably hard-wired into the primate brain. To put it simply, he set up a straw man and wasted much of his paper trying to discredit it by discussing migraine scotoma, various visual pathologies such as Charles Bonnet syndrome, hypnagogia and hypnopompic states, (the latter two being topics we covered for *CAJ* in "Waking the Trance Fixed"), when there was never any disagreement about the fact that these conditions demonstrated the innate nature of geometric visual percepts in the first place!

Interspersed in his attempts to mislead the reader as to our position on the innate nature of geometric figures "hard wired" in the visual cortex, he also claimed that we "considered Heinrich Klüver *passé…"* Nothing could be further from the truth. In our booklet we cited Klüver as the unquestioned expert on the hallucinatory effects of mescaline, and we stated that Klüver's "observations of mescaline intoxication are still considered classic" (p.10, fn 15), but his interpretations, completed in 1928 and 1942, about "what such findings indicated about the nervous system are *generally* obsolete." In other words his

findings are classic, but we know a good deal more about the nervous system now, than we did in 1942 when Klüver was speculating and some of those suppositions are now superseded. We also included a discussion of how his data had been distorted and misused by LW & D. In fact, Helvenston knew and greatly admired Klüver who was a Professor Emeritus at the University of Chicago when she was a graduate student and postdoctoral fellow there and she considered him one of her most important mentors. She was intimately familiar with all of his work, including his classic experiments with mescaline. Indeed, her knowledge of that body of research enabled her to instantly recognize that the TST model was based upon Klüver's findings, although he was not properly credited, in her view, by LW & D. For example, in their 1988 paper, they do not discuss Klüver's centrality to their own theory. They cite him (p. 202) along with a number of other investigators when they state "psychoactive drugs generate the percepts" [meaning entoptic phenomena]. How disingenuous that Lewis-Williams now chooses to focus on Klüver's contributions to his own work, as if he had never slighted him in the first place.

Lewis-Williams attempts to perpetrate another major factual error when he states "The first stage of the model is the one that is disputed. Helvenston and Bahn claim that it is induced only by certain hallucinogens." We have, again with brain deadening reiteration, constantly stressed that it is the overall pattern of the mescaline-induced trance that is crucial. We devoted our entire booklet to demonstrating that the TST model is based upon a very specific *type of trance*, which its originators have stressed is most frequently characterized by three stages and that hypnotic trance is not consistent with that pattern. The description of the trance experience proposed by the TST model is taken directly from Klüver's work with mescaline, and indeed only mescaline, LSD, and psilocybin produce that same pattern and form of trance. That pattern is characterized by vivid visual hallucinations of geometric figures which are gradually supplemented and then replaced by "iconic" figures (animals, humans, and therianthropic figures). We exhaustively considered many other forms of trance that can produce visual images, but most often are characterized by assorted strong affective experiences. We simply have never found any other trance (except the one induced by these three hallucinogens) that conforms to the same pattern and content as the trance put forward in the TST model, and let us hasten to highlight, neither has Lewis-Williams or any other proponent of that hypothesis, although at this point they have had two years to do so. In the current paper Lewis-Williams seems to believe he can demonstrate that the perception of images of geometric figures is a *typical* feature of deep hypnosis. Let us examine this claim in greater detail.

Lewis-Williams positively rhapsodizes over one experiment conducted by E. Cardeña on 12 subjects, the results of which were never completely published. This is how Lewis-Williams refers to Cardeña's **one** experiment, "he has conducted thorough quantitative and qualitative **experiments**…and has found that geometric percepts are experienced in deep hypnosis." Lewis-Williams then cites **three** sources (pp. 108-9), *as if* these findings were based upon a whole series of experiments! Lewis-Williams suggests that we don't know the literature on hypnosis because no matter how "diligently she and Bahn may have searched the literature" (p. 108) we never found Cardeña's unpublished results! We were familiar with Cardeña's 1988 paper entitled "Deep Hypnosis and Shamanism: convergences and divergences," but he

does not describe that any subjects reported geometric images in that paper. This may seem rather suspicious to many, given that some 11 years later when he was interviewed by David Wilson in 1999, while describing a number of typical affective hypnotic experiences, he reported that "there might be some geometric figures as well that were happening, seeing tunnels, grids, things of that sort" (CAJ 14(1):86). The reader needs to keep in mind that the original results of that one experiment had still never been published in their entirety. Had Cardeña learned about the significance of geometric figures to the TST model in the intervening years and decided that the few geometric figures he had omitted from his original paper were significant? Or, had he learned of the significance of geometric figures to the TST model and gratuitously included a few descriptions? He certainly knew that was the subject of Wilson's video and it would have been obvious that Wilson bought the TST model hook, line and sinker, so that results compatible with it would have been desirable. These are all legitimate questions, but we chose to take Cardeña at his word and we described our personal communications with him, as well as our analysis of his data in Chapter 3, so we won't belabor that point here.

Suffice to say that we suspect Cardeña's subjects were using psychedelic drugs prior to, or during the experiment, whether they acknowledged such or not, as we know that Feldman's subjects were (Unpublished doctoral dissertation, 1976). Feldman's subjects also reported a smattering of geometric figures as did one or two of Cardeña's subjects. Moreover, the critical point is that this was not a typical experience, even among subjects who were heavily involved with psychedelic drugs (but not mescaline), as it would have to be to conform to the TST model. Additionally, we have always stressed the fact that it is the overall pattern of the trance specific to the TST model that is crucial, geometric images progressing to more complex images of animals, people, and lots of therianthropic figures. No animals or therianthropic figures at all were reported by Cardeña's subjects. Thus, even if the subjects undergoing deep hypnosis in this experiment occasionally perceived a geometric figure, it was uncommon and they did not see any animals at deeper stages of the trance, as is a necessary component of the TST hypothesis. Finally, let us examine what Cardeña did not say in his pers. comm. with Lewis-Williams, he never used the word "hallucination" at all to describe the experiences reported by his subjects (p. 109), and he certainly did not describe any particularly vivid visual experiences whatsoever - - affective experiences are the most typical characteristic of hypnotic trance. In short, although hypnotic trance may have one or two superficial similarities to mescaline-induced trance as we pointed out in our original booklet, it is not equivalent to the pattern and content of the highly-specific trance postulated for the TST model by LW & D.

Currently, Lewis-Williams also claims that we are "ignoring the role of the cortex in the generation of geometric visual percepts" (p. 109). However, it was *we* who repeatedly stressed the fact that geometric visual percepts and phosphenes are considered by neuropsychologists to be simple visual hallucinations that are mediated by Area 17 (primary visual cortex) as demonstrated by many experimental and clinical facts summarized in Chapter 1.

Lewis-Williams further asserts that he has "repeatedly emphasized that geometric percepts are generated in the brain, not merely in the eye itself. (Those generated by, say, pressure on the eyeball are

sometimes called 'phosphenes', while 'entoptic phenomena' and 'form constants' are terms best reserved for those that derive from the cortex – but we must not become bogged down in comparatively trivial disputes over nomenclature)" (2004: 109). There are so many issues packed into these 4 1/2 sentences that we must take a moment to expose them all. Originally, LW & D's definition of entoptic phenomena was that they consisted of two classes: "phosphenes which are 'within the eye' and 'form constants' (a term he utilizes when referring to geometric figures] derived from the optic system, *probably* (our italics) beyond the eye itself" (1988: 202). So, "form constants" or simple geometric figures were probably generated beyond the eyeball – no mention of cortex whatsoever. Indeed, we have been unable to find any references in which Lewis-Williams states unequivocally that geometric figures are mediated by the cortex, including his recent book, *The Mind in the Cave*, (2002:127). LW & D have always assumed that what they refer to as complex "iconic" hallucinations must be mediated cortically because of the cultural inputs, and they have minimized the hard-wired aspects of those complex hallucinations as induced by mescaline, psilocybin, or LSD as we discussed in our original booklet.

Currently Lewis-Williams writes that "entoptic phenomena and form constants are terms best reserved for those [phenomena] that derive from the cortex" (p. 109). In short, he is now claiming that entoptic figures (i.e., phosphenes and form constants by his own definition) and form constants are derived from the cortex." This is quite fantastic, as he is contradicting himself within the same sentence by saying at the beginning of the sentence that phosphenes are generated by pressure on the eyeball and at the end that they are generated by the cortex. Moreover, he is contradicting all of his former definitions. In fact, he is now claiming that the opinions we presented in our booklet are really *his* opinions and always have been! There are classic psychological explanations for this form of pathological confusion, but we will tactfully avoid going into them here. Indeed, Lewis-Williams seems to be hopelessly confused as to the meaning of his own idiosyncratically-defined terms. No wonder everyone else who tries to decipher what he is talking about becomes hopelessly "bogged down" and entangled in semantic distinctions and disagreements, to the point that one wonders if much of the purpose for such ambiguous definitions is the deliberate mystification of critics. Words can mean whatever Lewis-Williams says they mean at any given time. Far from being "trivial disputes over nomenclature," issues of definition are critical in facilitating accurate and meaningful communication and debate among scientists.

Because nomenclature is indeed of crucial significance in neuropsychology, we will continue to discuss how Lewis-Williams misuses standard terminology by citing sources who assign meanings that are unusually eccentric. For example, LW & D (1988:202), say that "they follow Tyler (1978:1633-39) in using entoptic phenomena (from the Greek, 'within vision') to mean visual sensations derived from the structure of the optic system anywhere from the eyeball to the cortex" (p. 202), but what they do not say is *including the cortex*. Had LW & D been familiar with neuropsychological terms they would have realized that Tyler was an unfortunate choice of experts because although he recognized that the *usual* definition of the term "entoptic" in medicine and neuropsychology was understood to mean phenomena arising from "within the eye", [indeed, the definition of "entoptic" has been for the past 50 years, if not longer, a term

"noting visual phenomena which have their seat within the eye" (Dorland's Medical Dictionary 1961:456)], he nevertheless cited questionable translations of "entoptic" and "entophthalmic" which he claimed were based upon the original Greek terms. For example, he claimed that "entoptic" actually meant "things perceived within vision." This, however, is not the Greek definition of entoptic. In fact, that term is not found in the entire Greek-English Lexicon by Liddell & Scott (1868) generally recognized as the definitive source of Greek terminology. The only term that is found is οπτικοσ (optikos) which is derived from οπσ (ops), the Greek word for eye. According to Liddell & Scott, οπτικοσ means "belonging to seeing or sight (p. 1041) and the Greek ινοσ (inos) may be translated as en, meaning made of, or belonging to. That the Greek οπτικοσ does not refer so much to vision in general as to the eye can be ascertained by reviewing what the Greeks meant by "optics." First, optic meant laws of sight, while τα οπτικοσ (ta optikos), referred to the theory of the laws of sight. Optics was a branch of mathematical perspective in which the path of rays of vision (light) was discussed by deductive geometry. The earliest surviving optical treatise was Euclid's *Catoptrics*, 280 BC, in which he recognized that in homogeneous media, light (i.e. rays of vision to the Greeks) traveled in a straight line from the eye to the object, and when the ray (which originated in the eye according to Plato and all Greek philosophers) touched the object (traveling at an almost infinite speed according to the Greeks), the object was "seen." The entire focus of optics was to study the various paths by which light rays emanated from the eye to an object, and these pathways and their purported relationships were examined according to deductive geometry. Thus, it is obvious that the Greeks focused on the eye, not so much on vision or the visual system *per se* in any modern sense, i.e., as terms that are based upon modern neuroanatomical and neurophysiological empirical findings. It is likely that such etymological considerations were behind the generally accepted definition of "entopic" as meaning "within the eye".

Tyler claims that the Greek term "entophthalmic", derived from ινοσ (en), plus οφθαλμοσ (ophthalmos, which means eyes), should be used to mean "within the eye," when according to the above analysis both "entoptic" and "entophthalmic" refer to "within the eye or eyes." As mentioned Tyler maintained that "entoptic" should be reserved to mean "visual sensations whose characteristics derive from the structure of the *visual* system." But interestingly, LW & D refer to the *optic* system rather than the *visual* system, the former term harkening back to the Greek study of optics, i.e., the geometrical relationships among the eye, rays of vision, and objects. Either they are defining the *optic* system as the eye, or they are using *optic* in a highly idiosyncratic fashion as a synonym for *visual*. It is not possible to determine from their descriptions in which sense they are referring to the *optic* system.

Like Tyler (1978: 1633), LW & D state that hallucinations have no structural foundation, or as they put it, "hallucinations have no foundation in the actual structure of the *optic* system" (1988:202), if by optic system they mean eye, then they are correct since hallucinations are generated by the cortex. On the other hand, if they mean *visual* system when they discuss the *optic* system then, as implausible as it seems, they are arguing that visual hallucinations do not involve some portions of the visual system (by definition visual system includes all structures from the retina to, and including the cortex, mediating some aspect of

visual reception and perception). As we argued vigorously in our booklet, geometric figure perception [one class of entoptic phenomena) as well as phosphenes [the second type of entoptic phenomena] are both simple hallucinations, and are both primarily a cortical matter (visual cortex, Area 17, aka Area VI, p. 12 original booklet). Although stimulation of the optic nerves or lateral geniculate bodies (structures between the eyeball and the cortex) can produce hallucinations, these may result from cortical feedback circuits. Far from ignoring the role of the cortex we emphasized it whereas Lewis-Williams omitted it. In short, LW & D are using an idiosyncratic meaning of "entoptic" which is not consistent with standard neuropsychological nomenclature, in spite of the fact that they refer to their model as a "neuropsychological model." Obviously, they don't know what they're talking about and bandy neuropsychological terms about consistent with Humpty Dumpty's philosophy as expressed to Alice in *Through the Looking Glass*, where Humpty Dumpty says, in a rather scornful tone, "when I use a word it means just what I choose it to mean - - neither more nor less."

Finally, there is a tactic that the proponents of the TST model, notably Lewis-Williams, utilize with monotonous frequency: they attempt to actively discredit their critics, not with empirical data, but with innuendo and character assassination. Lewis-Williams' current paper is no exception to that prototype. For example, although Lewis-Williams lists Cardeña's most salient honors, he refers to Helvenston only as a "practicing clinical neuropsychologist. . .who had used hypnosis for over 15 years," as if that were the extent of her qualifications. He completely ignores the fact that the utilization of hypnosis was but a small fraction of her professional activities, as shown by credentials listed in the *Introduction* (Chapter 1, Part A). Moreover, hypnosis was simply one of many treatment modalities she used in clinical practice. It was never a research interest and she never claimed it was, but Lewis-Williams wrote that "no publications were cited," as if she had never published anything in her field, a blatant falsehood. To Helvenston, her findings with hypnosis were such a minor portion of her career, not the sole extent of it as implied by Lewis-Williams, that she never considered reporting her findings in a paper because she regarded them as completely ordinary clinical data.

Other phrases used by Lewis-Williams throughout his paper such as "unaware of neuropsychological literature", "ignoring the role of the cortex", "ignore neurological research", are not only egregious fabrications, they imply that Helvenston, after spending 30 years as a research and professional clinical neuropsychologist, knows less about neuropsychology than does Lewis-Williams which is a bizarre assumption from someone who discusses but a few of the many techniques used by neuropsychologists to study brain function and then says [they] "would therefore not assist us in explaining the evolution of the human brain. This may seem an unduly cavalier dismissal of much valuable research" but…I don't "totally reject all this work: I just feel that we can proceed with our investigation of Upper Paleolithic art without exploring all these controversial avenues" (2002:103-4). The reader will recall that LW & D refer to their TST model as "a neuropsychological model," and yet when challenged, Lewis-Williams denigrates the methods of the very discipline he claims to utilize. This scorn is conveyed with an air of lofty disdain, the loquacious and self-congratulatory pleasure of a schoolmaster correcting a dim

boy's homework for the amusement of the rest of the class – which seems somewhat ironic, emanating as it does from a Professor of Archaeology who, as Whitley reminds us is "not...trained as a cultural anthropologist and not an archaeologist" (1994: 82).

Other critics of LW's ideas have also commented upon his mode of raising unimportant or meaningless concerns which he then addresses at length as if he is correcting a witless moron, thereby avoiding the central issues in contention. For example, LW (CA 2004: 404) recently criticized a paper by C. F. Klein, et al. (CA 2002) in which the authors had argued that the word " 'shamanism' is, in general, too vague a term to be very useful." Klein & Stanfield-Mazzi replied to LW in some detail (CA 2004:405-6), noting that LW does not mention or address the broad arguments they had discussed. They note that "By insisting that our mission was to attack the work of certain scholars, he has managed to avoid discussing the main points of our article." Of course, this is exactly one of our major objections to LW's so-called review of our booklet. Moreover, Klein & Stanfield-Mazzi conclude their response by pointing out that LW "would have us believe that variations in practice do not justify abandoning the word "shamanism." On the other hand, *they* "continue to insist that it serves no heuristic purpose". . .and that the "careless use of that amorphous concept may actually distort our understanding of other peoples, their behaviors, and their beliefs." They close by noting that "the term 'shamanism' creates more problems than it solves. This was the central point of our article. It is a point that LW appears to have missed." We believe that such tactics are entirely deliberate and we await the time when some brave editor will challenge LW on such unscholarly and serpentine schemes.

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Authors' note introducing Chapter 5. In our original booklet (pp. 43-4), we discussed the fact that some proponents of the TST model had suggested that hallucinations could be produced by oxygen deprivation through the inhalation of smoke from campfires or through the build up of CO^2 in the recesses of deep caves. As explained in detail in our booklet, any hallucinogens thrown on campfires and inhaled in the smoke would have likely sickened or killed the participants. Chapter 5 contains a detailed refutation of the suggestion that CO^2 is a hallucinogen, but we cannot resist pointing out that all the proponents of this hypothesis had to do was to search *Google.com* under CO^2 in order to find hundreds of reader-friendly references that would have proven them hopelessly wrong. They utterly failed to carry out even this simple search and we have to conclude that such shoddy scholarship has no place in any scientific discipline.

Chapter 5
Is CO^2 a hallucinogen?

In a singularly enthusiastic review of Lewis-Williams' recent book *The Mind in the Cave*, Clottes (2002) has endorsed and approved that author's speculations concerning the use of carbon dioxide (CO^2) in decorated caves as a means of inducing altered states of consciousness. We will show that these speculations are totally ill-founded, and should be firmly rebuffed before they spread any further.

In *The Mind in the Cave*, Lewis-Williams states that the [Lascaux] "Shaft is characterized by a very high content of naturally produced carbon dioxide." The carbon dioxide is pumped out today, adds Lewis-Williams, but it is still noticeable at the bottom of the Shaft. "Did, we may wonder, this high concentration of carbon dioxide induce altered states in prehistoric people" (Lewis-Williams, 2002). The reader may recall that LW & D (1988), in their "three stages of trance" model, suggested that shamanic altered states of consciousness, in which individuals hallucinated, inspired most Paleolithic cave art. Although Lewis-Williams did not refer to the actual concentration of CO^2 in the shaft, it is about 6% (Brunet, pers. comm.). As we will see, even though this is a high concentration that is considered within the toxic range, it does not produce hallucinations, but a variety of other highly unpleasant signs and symptoms instead.

Speleologists know a great deal about the effects of CO^2 poisoning, so let us begin by examining, in some detail, what they have to say about "foul air." We believe that a review of the following findings should put Clottes' and Lewis-Williams' suppositions that high concentrations of CO^2 produce altered states of consciousness (ASCs) and hallucinations to rest for all time.

In a paper published in the 22nd Biennial Australian speleological Federation Conference Proceedings, 1999, speleologist Garry K. Smith notes that a cave atmosphere containing > 0.5% CO^2 and/or lower than 18% of O^2 by volume is considered "foul air." For comparison sake, it should be noted that the normal concentration of CO^2 in the atmosphere is 0.03%, whereas the concentration 0^2 is about 21%. Smith adds that a caver's first experience with foul air is a hazardous and frightening one, because there is typically no smell or visual sign associated with it and the first signs are increased pulse and breathing rates. Higher concentrations of carbon dioxide lead to severe headaches, dizziness, clumsiness, and even death. Experienced foul air cavers may notice a dry acidic taste in their mouth of which the average caver may be unaware (Smith, 1999). Note that Smith does not refer to any sort of altered state of consciousness as that term is understood by proponents of the "three stages of trance" model. Severe headache,

clumsiness, coma and death do not qualify as ASCs, and are simply not conducive to spending hours painting cave walls!

A summary of the effects of increasing levels of CO^2 by Smith reveals that at prolonged exposure to 2% CO^2, respiration increases by 1½ X and headache occurs after several hours of exposure. At a concentration of 4% CO^2, respiration is increased by 3X, accompanied by throbbing headache with flushed face, nausea and sweating. At a concentration of 7-10% CO^2 there is mental deterioration, increased rate and volume of breathing, accelerated pulse rate and diminished ability to maintain attention. This specific level of CO^2 is intolerable for more than a few minutes, and there is violent respiratory distress (Smith, undated). These guidelines, by which committed speleologists gauge the dangers of heightened concentrations of CO^2, indicate that at a concentration of 6% CO^2 in the Lascaux shaft, a Paleolithic artist would have become violently ill within a few minutes and been unable to do anything but attempt to make a hasty retreat!

As levels of CO^2 increase above 10%, there is unconsciousness within minutes, spasmodic, neuromuscular twitching and convulsions, followed by death (Smith, 1999). This summary of data utilized by speleologists certainly fails to support any claims regarding hallucinations and ASCs produced by CO^2 toxicity. Moreover, there is a vast experimental literature that studies the empirical effects of CO^2 on human behavior and physiology, all of which parallels and supports the above findings.

Empirical studies on the toxicity of acute carbon dioxide exposures have identified many overt clinical symptoms. For example, Schaefer (1963), reported symptoms of headache, dizziness, restlessness, dyspnea (subjective sensation of "hunger" for air), increased motor activity, sweating, numbness, visual color distortions (colors faded out, and appeared blurry), and loss of balance in subjects inhaling 7.5% CO^2 for 15 minutes. No hallucinations were reported. A similar report by Busby found that at concentrations of CO^2 at 7.5% for 15 minutes subjects experienced dyspnea, headache, dizziness, sweating, restlessness, disorientation, and visual distortion (blurring and fading of color) (Busby, 1968). No hallucinations were reported. Busby also reported symptoms of dyspnea, impaired hearing, nausea, vomiting, a strangling sensation, sweating, and stupor within several minutes and loss of consciousness with 15 minutes at concentrations > 10% CO^2. Again, no hallucinations were reported. In every study cited here and numerous others that reported similar findings, there were no reported hallucinations.

What can we conclude from these empirical studies? In short, the most prominent symptoms of CO^2 poisoning ($CO^2 \geq 7.5\%$) are an almost overwhelming dyspnea, dizziness and severe headache (NIOSH, 1976), but no hallucinations. These symptoms are not equivalent to altered states of consciousness, primarily because they are evidence of toxic, irreversible brain damage and a prelude to actual, not "metaphorical" death. It is difficult to see how any rational person, when presented with the evidence cited above, would continue to speculate that high concentrations of CO^2 led to ASCs in which individuals experienced hallucinations that inspired Paleolithic cave art – yet Clottes (2002, 1999) even sees the mortal levels of CO^2 in the Lascaux Shaft as a link to the theme of death which he believes is present there.

Indeed it seems highly unlikely that Paleolithic artists ever experienced visual hallucinations as a result of simply being in a cave, with or without the help of CO^2. In an interview with the French magazine Notre Histoire (No. 179, July/August 2000), Clottes cited a book (Pathologie de la Spéléologie, although the correct title is Spéléologie et Médecine; see Féniès, 1965) which, according to him, states that caves are known as a "hallucinogenic milieu" and which devotes not a chapter but less than two pages (41-2) to brief anecdotal accounts of assorted visual phenomena which can occur during prolonged darkness. Some of these anecdotes are reported by people who have been sleep-deprived for over 50 hours, so the effects of sleep deprivation are a definite confounding factor.

Moreover, there are only two reports of "visual hallucinations," one of which consisted of "luminous dots," the other of a light which became brighter and brighter until it was almost blinding and then disappeared. Clearly, these descriptions are of no importance or frequency in this domain, as has been confirmed to us by speleologist friends. In another recent book review, Lewis-Williams (2003), expresses the hope that "with a bit of luck, [the] book may be a prelude to some more cries of 'mea culpa' ".

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Authors' Note introducing Chapter 6. We submitted a paper to *World Archaeology* in April, 2004, for their special debate issue. In that paper we criticized a number of other assertions by Lewis-Williams. The paper was rejected because the editor thought the paper more suitable for *CAJ*, and because it contained some information already printed by *CAJ*, which we could have very easily omitted, if that was actually the reason for the rejection. For reasons that may already be obvious to our readers, we prefer not to submit any forthcoming papers to *CAJ*. Thus, we are publishing some of the sections from the submission to *WA* in Chapter 6.

Chapter 6
Challenging the Three Stages of Trance Model: Methodological and Theoretical Criticisms

Methodological Challenges to the TST model

In addition to the lack of empirical evidence propounded by Lewis-Williams and his followers for the TST model which we have included in the previous 5 chapters, we have also demonstrated that numerous other hypotheses, such as that CO^2 produces hallucinations, are utterly false. Even Lewis-Williams has had to acknowledge that "an argument of impeccable logic can lead to a false conclusion if its data-content is unsound" (1991: 149-62) and there can now be little question that the foundational database of the TST model fails to support it. However, there are other major deficiencies of the TST model that need to be explored. The first of these concerns the methodology used by proponents of the model, followed by criticisms of one of the major theoretical assumptions underlying it as it applies to European Paleolithic art. Lewis-Williams devoted several papers to outlining a series of "canons" that he felt should be used to evaluate a hypothesis, the latter three of which were devoted to arguing the merits of the TST model and selecting between two competing hypotheses based upon 7 criteria in the first paper (1985) and 5 criteria subsequently (1991; 2001a; 2001). These criteria appear to have been quite deliberately selected by Lewis-Williams to support what he believes to be the strengths of the model. In 1985, he posited 7 canons that included (1) Verifiability. (2) Compatibility with well-supported anthropological theory. (3) Internal consistency. (4) Compatibility with relevant ethnography. (5) Diversity of data explained. (6) Quantity of data explained. (7) Heuristic potential. By 2001 (2001a), Canons (1) and (4) had vanished from the list. We view it as noteworthy that no where in this list is there any mention of the importance of confirming empirical data, and although verifiability implies recourse to such information, it has been dropped from the list. The disappearance of (4) will be discussed shortly. We suggest the emphasis on factors other than supportive empirical observations has arisen because the model's most serious failing is the fact that the data-base upon which it was formulated actually refutes it.

Lewis-Williams (2001a:58-66) has attempted to divert attention away from the lack of empirical evidence for the TST model by criticizing and disparaging empirical methods and those who view them as crucial in the search for knowledge. For example, he stated that although "ethnographic analogical argument is rightly criticized" . . . inductive, empiricist research only produces "an illusion of objectivity" He also emphasized the fact that philosophers of science have said it is "impossible to collect data 'objectively' " (1991: 149). He continued his efforts to discredit empirical research by claiming that the "notion of proof is, in any event, inappropriate in evaluating reconstructions of the past," because "people who claim that sort of objectivity are only using this method to say something about their own social

status" (1991: 160). It is quite true that assertions of "absolute proof" as discussed by Popper and classical statisticians have been supplanted by an attitude that is much more probabilistic and is generally accepted by philosophers and scientists alike. That attitude may be summarized as follows: "while absolute certainty cannot be expected, nevertheless, the explanations thought up by scientists and tested by searching experiments may secure for themselves an epistemic status somewhere between being certainly right and certainly wrong" (Howson & Urbach, 1996: 9).

This spectrum of degrees of certainty has traditionally been characterized as a spectrum of probabilities, and is an approach that has great significance in all scientific endeavors. Today, in actual practice, when most scientists speak of falsification of hypotheses they do not mean in the absolute sense, but rather in the probabilistic sense. This should not, however, obscure the fact that there are certain types of hypotheses that can be accepted or rejected at a near absolute degree of certainty. These would include hypotheses that suggest the presence or absence of certain plants growing in locations of interest, for example. While there is always the possibility that some specific plants have not been detected in certain locations, the more plants that are identified in those same locations, the greater will be the certainty, (approaching the absolute) that the plants in question that have not been uncovered simply never grew there

The spectrum of probabilities was first noted in 1905 (Poincaré:186) and for over 50 years most scientists have recognized that in certain fields, largely the social sciences, including anthropology, sociology, psychology, and to some extent ethology and history, it is possible for experimenter bias to influence the accuracy of observations, perceptions, and theoretical constructs (Maslow 1966:128-138). Scientists have devoted untold hours and energies to designing methods and statistical techniques to minimize such biases. Moreover, Maslow, a psychologist, stressed the fact that all knowledge is valuable, including that obtained by such subjective methods as participant-observation in psychotherapeutic research and anthropological ethnographic studies, and statistical methods have been developed to analyze information acquired under these circumstances.

Maslow also stressed that the "truth" of acquired knowledge is a spectrum of probabilities, with some methodologies resulting in a higher degree of certainty of the accuracy of information than others do. These are the real complexities of empirical research and there is absolutely no reason to dismiss all empirical observations because some may be tainted with bias as Lewis-Williams and the poststructuralists would have us do. The scientific community will discover and correct such biases over the longer term, a process which Thomas Kuhn referred to as "normal" science. In fact, over the past decades, statistical techniques have been developed for evaluating one hypothesis as opposed to another and these techniques are constructed to take into account some experimenter bias in each hypothesis (Malakoff 1999, Jefferys & Berger 1992, and Howson & Urbach, 1991). We suggest that the TST model should be evaluated based upon such techniques that have been developed by sources independent of the proponents of the model.

In further condemnation of "empiricists" Lewis-Williams (1991:149-162) also emphasized that philosophers of science believe "it is impossible to collect all data." Certainly philosophers of science have taken issue with various aspects of the scientific method, most of which are largely irrelevant to the actual

practice of science (Howson & Urbach 1996:1-37, for a discussion of these issues) but instead concern themselves with abstract and ideal universes from the point of view of logic and mathematics. However important logic and mathematics may be in and of themselves, they are not grounded in empirical reality as the logical *proofs* of medieval scholastics so aptly remind us. Indeed, Lewis-Williams' entire canon is much more grounded in logic than empirical observation.

As far as the idea of the impossibility of collecting all data is concerned, it is important to note that philosophers of science postulate an infinite universe of all possible observations, a theoretical construct that has limited value when dealing with a finite universe dictated by the laws of nature. For example, when considering the veracity of the statement "all swans are white," a philosopher of science would say that one has to rule out, by observation, all possible contradictory statements, such as "swans are purple with blue polka dots," or "swans are jade green with white stripes," etc. Certainly scientific researchers recognize that although these feather colors may be possible in a theoretically unending universe of color combinations, they are red herrings when it comes to actually observing a biological universe wherein swan feather colors are much more limited. In short, philosophers of science deal in abstract theoretical and statistical constructs while scientific researchers are constrained by the imperfections (from a logical point of view) and realities of the empirical world and their sometimes arduous attempts to study it. The differential focus between the two is, however, a naive reason to reject the methods and findings of empiricists.

It has been years since scientists have referred to a "theory-free" process of data collection, in contrast to assertions by Lewis-Williams (2001a:58). Indeed Popper (1959: 74-95), a hardcore empiricist, pointed out that many observations assumed significant theoretical knowledge. Such encumbered observations were considered a problem by Popper and other philosophers of science, but Nagel (1979:29-49) argued that the theory-ladenness of observation-statements need cause no problems in practice. Nagel accepted that observation-statements presuppose various theories and background information. Still, he held that theories can be tested by observations because the theories assumed by the observation-statements that report the results of some experiment will generally be different from the theory that the experiment is testing. For example, proponents of the TST model hold that shamanic trances of a very specific type inspired Paleolithic art. It happens to be a fact that only mescaline, psilocybin, or LSD can produce such a specific type of trance, therefore in order for the TST model to be affirmed, these substances must be shown to have grown in Europe during the proper time periods and in the proper locations. But the process and method of testing whether or not these substances grew in Europe does not depend upon the TST model itself.

Lewis-Williams devoted considerable effort to defending his use of analogical methodologies based upon ethnological research. We recognize the importance of ethnological research when it is interpreted accurately, as we believe that San historical documents are treated by Solomon (1997, 1999, 2001). She clearly demonstrates that Lewis-Williams has projected his shamanistic TST theory into that body of data, as had Pager (1994) and Hromnik (1991) before her. We suggest that Lewis-Williams' canon (4) Compatibility with relevant ethnography vanished by the time 2001a was written because of Solomon's

challenges beginning in 1997. Also, we believe that arguments from analogy are an acceptable method, as long as they are supported by some historical and/or ethnographic sources. In the absence of those sources, such a method becomes essentially an informed speculation and should be identified as such, particularly when attempting to posit mental and sociocultural attributes to *Homo sapiens sapiens* some 15,000 – 30,000 years before the present.

A Theoretical Challenge - Trance, Therianthropes, and Paleolithic Cave Art

Based upon the therianthropic images depicted in San rock art, supposedly seen in trance, proponents of the TST model have stressed that therianthropic images depicted in Paleolithic Cave Art are a key sign that the paintings were inspired by trance (LW & D, 1988, 212). However, even in the case of the San rock art, such assumptions are certainly not settled. In fact, Thackeray (1993), presents a sound argument suggesting that at least some "examples of therianthropic art are representations of the actual use of animal skin costume, rather than depictions of images perceived by 'medicine men' in trance." With respect to European Paleolithic cave art, therianthropic images are dominant in hallucinations induced by LSD, mescaline, or psilocybin which are unlikely to have inspired any cave artists as we have shown, but they are relatively rare in the art.

Finally, the idea that humans are closely related to and inextricably entwined with animals is very ancient. It is estimated that in the third millennium BCE, a Sumerian tale referred to as *The Epic of Gilgamesh* was first created. This myth was based upon the life and adventures of the ruler, Gilgamesh of Uruk. The hero, Gilgamesh, is a half man-half God figure whose daemonic energy exhausted his subjects. They prayed to the Gods to provide a companion for him. Not long thereafter, Gilgamesh encounters Enkidu, who represents the "natural man." Enkidu is covered with hair, reared with animals, and appears to be part man-part beast, in other words, a therianthropic figure. Gilgamesh and Enkidu become like brothers and Enkidu is gradually civilized (Sanders, 1980).

It seems that from the beginning of recorded history, we have written evidence that humans have seriously pondered their relationship to both animals and supernatural beings. Of course, these ideas most likely date far back into prehistoric times. From the dawn of written records, the ancients assumed that animals exemplified human and/or divine traits which they admired, feared, or disliked. In time these ideas about animals were confirmed in religious rituals, literature, and art. Humans worshipped the bull or goat because the qualities which they attributed to them seemed divine. The ancient Greeks believed the animal was a symbol, a word which is taken from the Greek word *συμβαλλειν*, meaning "to throw together." "When a concrete object becomes a symbol, it constitutes the semblance of something which is not shown but is realized through its association" (Rowland, 1973). It is transformed into a metaphor. In short, animals became symbols of qualities admired by man, and animal figures were depicted with human faces, or vice versa. This idea is expressed throughout ancient Near Eastern art and religious beliefs, where one sees countless therianthropic images, none of which appears to have anything to do with trance (Klingender, 1971).

After considering all of the problems with the TST model, what can we say about its applicability to the inspiration of Paleolithic cave art? Merely that the art appears to have religious nuances, and thus, it seems that we are now back to the future because in the past it was believed that one of the major inspirations for Paleolithic art was what we refer to today as "religious" ideas and feelings in the broadest sense of belief in supernatural beings. Bahn (2003:11-20) has demonstrated that the positioning of Paleolithic cave and rock art, i.e., the location of the art, is one method that might differentiate "religious" art from art inspired by other motives, and this could prove a fruitful area of continued research.

Put simply, some cave art is on open display so that, in the larger caves at least, it could conceivably have been seen by large numbers of people, although we can never know if that ever happened. However, in cases where, as at Candamo, Cougnac, etc., stalagmites and stalactites were deliberately broken to make the images more accessible and readily visible, it is highly probable that the artist meant them to be seen by his or her fellows. In many cases, however, the imagery was purposely placed in remote locations, up high chimneys, or tucked away under low overhangs or niches. Here it seems clear that the images were not made to be seen by the artist's fellows, but instead were intended to be seen by – or were offered to – something else, something non-human or supernatural, perhaps a deity, spirit or ancestor. It is this inaccessibility which is the key – indeed one often has the impression that it was the overcoming of obstacles, the suffering of discomforts and dangers, which was more important than the actual images produced – or that it was the process of journeying to a location and leaving an image there which counted, rather than the image itself, or its appearance, degree of completeness or durability. In such cases, one inevitably turns to the idea that some cave art (but not necessarily all of it) was clearly religious in some way and produced out of strongly held motivations.

A more speculative approach to the interpretation of motivation and meaning in Paleolithic art has always been attempting to interpret it by means of the subject matter, although this approach has some merit for Neolithic sites in certain specific cases. For example, Muzzolini (2001:632) points out that the so-called Bubaline and Round Heads paintings of the Sahara have some "general convergence with Egypt, such as the cult of the ram, the masked men or the jackal-headed therianthropes of the Mathendous (which bring to mind the pharonic Anubis), or the horned goddesses that evoke the Egyptian Hathor." While this approach may link some images to specific gods and goddesses dating back several thousand years for specific Neolithic sites, it is more speculative that the animal and few therianthropic Paleolithic images have some general religious connotations, because of the depth of time involved and the fundamental limitations of our knowledge regarding Paleolithic ritual and the nature of Paleolithic mind.

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Authors' note introducing Chapter 7. David S. Whitley has been one of the most vocal and well-known proponents of the TST model in terms of interpreting Native American Rock Art and in this chapter we challenge many of his assertions, as well as his interpretations of older ethnographic sources. In doing so we consider a section from LW's *Mind in the Cave* that discusses somatic hallucinations and their alleged relevance to the "wounded men" of Paleolithic cave art. We also include a section disputing Keyser and Whitley's (2004) accuracy citing ethnographic sources when they criticize Alice Kehoe in a paper they published in the *International Newsletter of Rock* Art #38.

Chapter 7
Challenging the TST Shamanic Model of Native American Rock Art in theWestern U S

Whitley and early 20th century ethnographers

David S. Whitley has been one of the most enthusiastic proponents of the TST model in the US, basing his work upon rock art created by Native Americans in the far West. However, as we have read his numerous papers we have been increasingly concerned about the accuracy of his descriptions of historical ethnographic resources (Bahn 2001; Hedges 2001a; Quinlan 2001). It is the purpose of this chapter to consider some examples wherein we have consulted those sources, only to find that his versions are inconsistent with the original documents. For example, in 1987 he published a paper examining the *Socioreligious Context and Rock Art in East-Central California*, in which he examined "two motif complexes": a Tubatulabal ritual community (of the Kern River and South Fork of the Kern River) where the pictographs (painted art), characterized by geometric designs, were alleged to have been painted in a communal public religious ceremony, and a Coso Shoshone community in the mountains (Coso and Panamint ranges) and Mojave desert east of the southern Sierra Nevada mountains, in which representational pictographs were alleged to have been created in personal and private ceremonies (pp. 159-188).

Although Whitley refers to ethnographic studies by J. Steward (1933,[208] 1938, 1968) to support his interpretations *as if* Steward were reporting on the Coso Shoshone, Steward's (1933) report actually studied the Owens Valley Paiute (OVP) in California (sometimes referred to as the Eastern Mono) as opposed to the Coso Shoshone community Whitley discusses (Coso, Koso, or Panamint, appear to be terms used synonymously by contemporary authors). Both the Owens Valley Paiute and the Coso Shoshone spoke a Shoshonean language, although the OVP spoke a language of the Western division whereas the Coso Shoshone spoke a Central Numic language.[209] Although they shared some similar mythological beliefs, OVP were not the same group of people as the Coso Shoshone (Steward 1933: 236), although there was contact between the groups and intermarriage. Steward found several pictograph sites in the Owens Valley to which he attributed a historical Paiute origin, but his informants no longer had any rock art traditions, although one thought that the Paiute of his grandfather's time may have made petroglyphs of mythological or visionary animals and birds at Fish Springs. Steward (1929:74, Fig. 14; Plate 30), shows depictions of

[208] Whitley lists the year of publication as 1934, but it was 1933 according to the official document.

[209] Whitley groups the Owens Valley Paiute, the Kawaiisu, and the Koso Shoshone all together as "Numic peoples" who share such an identical cultural heritage and language group that all Coso petroglyphs may be interpreted identically (2003: 95). Of major significance is the fact that Coso Shoshone spoke a Central Numic language, the Kawaiisu spoke a Southern Numic language and the Owens Valley Paiute spoke a Western Numic language. Whitney's assumptions regarding these peoples would be like declaring that all speakers of Romance Languages have identical art, languages and cultures!

petroglyphs from this spring, only a few tiny figures of which are remotely representational and they depict crude human figures. Otherwise all the figures are geometric. It appears that the consultant was confused about the actual drawings at Fish Springs and his report must therefore be viewed with considerable skepticism. Or, the report might suggest that mythological animals were represented by geometric signs which would make them extremely difficult, if not impossible, to decipher.

Steward does not mention "trance" per se with respect to the shamanistic elements that were still a part of the OVP culture. However, one informant, describing the successful treatment of a person who had "lost his soul" did indicate that the shaman told the audience, through his interpreter-assistant, that he was traveling far to the east, west, etc., searching for the lost soul. Whether the shaman was in trance or merely performing is impossible to discern from the description.

The OVP all had various "powers" (i.e., special abilities): some individuals were adept at doctoring, others at gambling, or hunting, dancing, warfare, etc., or had several different proficiencies. They derived these "powers" from assorted objects in nature, which could include animals, snow, obsidian, the blue haze in the valley, and even a specific mountain. These "powers" came in unexpected, vivid dreams. Moreover, the OVP, men, women and children, all used native tobacco, as well as jimson weed (*Datura*), topics to which we will return shortly as they have great significance in understanding "trance" phenomena described for these peoples. The OVP did not utilize fasting, self-torture, lonely vigils or other trance-inducing techniques in the quest for their special "powers" as many other Native American peoples did. Shamanistic "powers" came, like other powers, in vivid dreams, except that the would-be shaman then underwent a long period of training "in doctoring" and mythology, the acquisition of special songs, dances, and the use of other paraphernalia. During the shamanistic performance the doctor might sing, dance, shake rattles, smoke tobacco, and heal by sucking out, or blowing away, disease.

We have more information about the OVP from Driver (1937:86) who was not cited by Whitley. Driver's informants included both Owens Valley Paiute and Panamint (Coso) Shoshone. None of the OVP in Driver's study knew anything about pictographs, demonstrating even less knowledge than the informants of Steward. Moreover, the rock art located in the area occupied by the historic OVP is highly distinguishable from that found in the region of the historical Panamint Shoshone. For example, Coso Painted Style pictographs have the following characteristics: They are elaborate, often polychrome paintings that always contain images of bighorn sheep and often depict historic Euro-American subjects. Other elements featured on the Coso Style painted panels include concentric circles, hand prints, shield-like patterns, stylized anthropomorphs, deer, hunters with bow and arrows, coyotes, mountain lions or dogs, sunburst symbols, atlatl and dart-or arrow-impaled animals, horses, horse and riders, people with broad-brimmed hats, and cattle [long horn steers?] (Garfinkel 2004). These pictographs are markedly different from the Owens Valley pictographs in that the latter contained no quadrupeds (zoomorphs) or bighorn, only a few crude anthropomorphs, and the paintings were all rendered in a monochrome red pigment (Smith and Lee 2002).

When the Coso (Panamint) Shoshone that Whitley (Ibid) refers to were questioned by Driver (Ibid), one of them said that pictographs[210] were made by recent humans; none said they were made by shamans or ordinary people, and three said they were made by babies! Steward (1968: vii-x) again emphasized that his Shoshonean hunters had no tradition of rock art, had no rain shamans, and "the nearest thing to supernaturalism in hunting was special powers acquired by individuals in dreams, such as the ability to run fast, hunt skillfully or perform other feats" (Ibid: ix). Whitley misrepresented Steward's 1968 paper when he wrote "Due to the refusal of his informants to admit knowledge of rock art he inferred that the presence of the large numbers of petroglyphs in the Coso region signified a cultural devolution from the past" (p. 162). However, rather than making an inference based solely upon his informants, Steward outlined several lines of evidence supporting his belief that pre-Numic peoples had created the petroglyphs including the detailed study reported in *Rock Drawings of the Coso Range* (Campbell, Baird & Pringle 1968). Steward's "failure" cannot be ascribed to him, but rather is a result of lack of knowledge on the part of his informants. As Whitley, himself, pointed out, Steward (1929) was clearly very interested in and curious about Indian rock art, and made a detailed study of rock art sites across California prior to his Owens Valley research. Clearly, the evidence fails to support Whitley's contention that these same Shoshone created rock art in private "socio-religious" ceremonies (in his subsequent papers, shamanism becomes the socio-religious phenomenon of choice). This raises the question, who did create the pictographs Whitley refers to? We will return to this issue shortly.

Whitley (Ibid) cited Voegelin (1938:61) as his ethnographic source with respect to the Tubatulabal. How accurate was he in quoting her? He wrote that Voegelin averred that her Tubatulabal informants thought the rock art was produced by "water babies" or supernatural beings of an indeterminate nature (Ibid: 162). What Voegelin actually said was that the Tubatulabal believed their entire territory provided a dwelling place for supernatural beings, in human or animal form, including "spirit" animals acquired by shamans, all of whom were referred to as *yum•u•gi•wal*. These beings had to be respected, if not feared. One group of these beings included dwarfs or "brownies" (*ya'hï'ïwa*l), and pictographs in the area were "attributed to these brownies." Also, some of the *yum•u•gi•wal* were water spirits; "in every spring, pool, river there dwells a spirit who owns that particular body of water" (p. 61). This may seem a minor point, but repetitive distortion of ethnographic sources, as we will see is characteristic of Whitley, suggests disrespect for them, as well as a scholarly sloppiness that can and should undermine the credibility of the author.

Voegelin (Ibid: 62-66) found that among the Tubatulabal, shamanistic power was believed to be conferred at birth, and there was nothing anyone could do to acquire this power if not born with it. Although these peoples used jimsonweed voluntarily in one ritual, it was not seen as having anything to do with the acquisition of shamanic powers. However, when a shaman, after adolescence, took jimsonweed

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dart-or arrow-impaled animals, horses, horse and riders, people with broad-brimmed hats, and cattle (long horn steers?) Garfinkel 2004: 1-17).

[211] Toward the end of the paper, Whitley (pp. 183-4) states that "Steward failed to find ethnographic evidence of rock art production," an implication that this was due to Steward's deficiencies.

and dreamed of "spirit" helpers he became absolutely convinced that he possessed certain powers conferred by them, the implication being that such ability had been suspected but remained unconfirmed until this point. There was a special period of training for shamans and during it the prospective doctor would dream he was visited by his "guardian" spirit animal. This animal was then referred to as *yum•u•gi•wal* and conferred "powers" to cure, but only if the animal was a bird such as the eagle, a species of hawk, chicken hawk, or other large raptor. Men could be either healing shamans or witches, women could only be witches.

Although there were three important rituals practiced by the Tubatulabal, only one involved trance (drug-induced), and that was the Jimsonweed Ceremony. A group of 5-6 boys and girls were taken to a sweat house for 3 days and nights. They were subjected to dietary restrictions and given herbs to make them vomit each day. During the morning of the 3rd day, they were given jimsonweed, after which they fasted for a day. During this time the visionary, in a stupor, was visited by various animals, one of whom might become his power or guardian "spirit." Some did not acquire a "spirit" nor were these neophyte shamans. Participation in the ritual was voluntary but encouraged, and was believed to confer life-long health benefits (Voegelin: 67-68). Tubatulabal shamans and others all utilized tobacco. There was no evidence that shamans went into trance other than that induced by *Datura* (Ibid: 62-67), or that any member of the community created any rock art. In spite of the fact that neither of the ethnographers Whitley cited provided any evidence of ritualistic practices involving rock art, he concluded "rock art ultimately is the product of prehistoric ritual. . .created in an environment of ceremony and ritual" (Ibid: 184).

In 1992 Whitley published what appeared to be an impressive paper entitled "Shamanism and Rock Art in Far Western North America" (pp. 89-113), in which he emphasized the link between shamanistic trance (which was assumed to be the same type of trance postulated by the TST model, and therefore based upon mescaline ingestion) and rock art sites. He cited Gifford (1932:52), and Driver (1937: 86) as both having stated that the "paintings depicted 'dreams' (i.e., visions or hallucinations). . ." and were "created by shamans," but that is not an accurate reflection of what these sources actually said. For example, Gifford, who was reporting on the Western Mono (North Fork Mono), stated that a *puhake* (shaman) was characterized as one who received a visitation from an animal spirit during a *dream*, or when he "went into the forest to sing and dance" (p. 49). Throughout the remainder of his study he emphasized the importance of *dreaming* in receiving animal spirits by anyone in the group and not just would-be shamans (p. 52). Although the *puhake* could theoretically have experienced an altered state of consciousness similar to hypnosis, which is not characterized by hallucinations, there is clearly no mention of any form of trance. What does Gifford tell us about the link between shamans and rock art? He noted that "the North Fork Mono were "firm believers in the significance of dreams. A pictograph in a cave four miles east of Fuller's meadow, Madera County, was said to depict a *man's* dream (our italics). Dreams did not always make a man a shaman, however," and he cites the example of a woman whose dream forecast an experience she had a few days later (p. 52). In other words, Gifford is noting that members of the tribe other than shamans could depict their *dream* experiences in pictographs.

In citing Driver, Whitley notes he had said that the "spirit" guide comes first in a *dream*, but not content to let Driver speak for himself, Whitley adds, "That is, the paintings portray the visions seen by shamans during hallucinations." All of the Mono informants denied that the shaman acquired power in trance (p. 103) and no where is there any mention of hallucinations. Moreover, although Driver noted that 4 of 5 North Fork Mono informants said that pictographs were made by shamans (p. 86), he also emphasized that everyone had "powers" and sought "spirit" guides, that there was little difference between shamans and everyone else (p. 141) and that both shamans and others used tobacco and *Datura*, the latter of which was consumed in both group ceremonies and by individuals (p. 98, 102-3).

By 1998, Whitley (pp. 22-37) was emphasizing that new advances in the neurosciences, coupled with ethnographic and ethnohistorical records associated with the "shamanistic state of consciousness," were enabling rock art researchers to "understand the origin of motif forms, and the symbolism of graphical metaphors portrayed in the art." Again he focused upon the Coso Range of eastern California and asserted that since Kroeber (1925) "there has been widespread agreement that much, if not all, of Native Californian rock art was a product of shamanism." He then lists a series of other sources (Whitley ibid: 23), as if all of these researchers had agreed with his statement. However, after having read Kroeber's *Handbook of the Indians of California* before reading Whitley's summary of Kroeber we think all the original ethnographic sources should be consulted rather than taking Whitley's interpretations at face value. For example, Whitley asserts Kroeber "provided an earlier suggestion for a connection between rock art, hallucinogenic drugs and shamans' altered states of consciousness, implying that the art portrays the mental imagery of trance" (ibid :24). No doubt this is what Whitley wishes Kroeber might have said, but it does not reflect what Kroeber actually did say. For example, his *Handbook* was the result of 17 years of study of what he referred to as "50 little nations" in which

> The local variations are so numerous that their consideration would have smothered the systematic presentation of general points of view. On the other hand, the elimination of this detail would have left the presentation as an abstraction, too largely dependent upon the subjective attitudes of the author, and sterile in the sense of lacking the color and life in which, after all, the characteristics of civilizations are manifest" (Kroeber 1925: v- vi).

It almost seems as if Kroeber were prescient, he has so beautifully captured the shortcomings of Whitley and so many contemporary "specialists" in rock art studies who present an abstract, universalistic trance model with no diversity among different groups. Kroeber did suggest that some of the tribes of California mentioned "shamanism" as we have seen above, but the records were extremely sparse in most cases and he emphasized this point repeatedly. Moreover, he discussed numerous tribes that practiced jimsonweed cults, some of whom had shamans assisting in puberty rites (the few ceremonies that can be said with certainty to have involved drug-induced trance), but most of whom relied upon an elder of the village to provide guidance. In many tribes there was no shaman although elements of shamanism could be seen in *toloache*, but Kroeber warned that this did not support the conclusion that shamans had once been a part of that group. Whitley (2003: 83-104), in a critique of Hedges (2001a: 123-136) who disagrees with him on this point, has insisted that the *toloache* ceremony was shamanistic among the Luiseño, Juaneño,

and Diegueño, stating that they consumed hallucinogens (tobacco), had dreams, and acquired a spirit helper. However, Kroeber, speaking of these same groups stated that

> the suggestion of a personal guardian spirit in these beliefs must not be overestimated into their interpretation as a part of shamanism, since the protective animals [spirit helpers or guardian spirits] were acquired not through involuntary dreams or individual seeking, but during a state of intoxication produced in a communal ritual (1925: 640-41).

We would add to this admonition the fact that these "spirits" were only acquired with much prompting and coaching from adult helpers as reported by Kroeber (Ibid) who cited G. Boscana (unknown date of original document, trans. 1846), as his authority regarding the *toloache* ceremonies cited above, as did Whitley. Additionally, the Juaneña also blistered the novices with fire, whipped them with nettles and laid them on ant hills according to Kroeber (Ibid). No wonder initiates reported visions, whether they experienced them or not, simply to end the torture, for as soon as they reported "seeing" one of the acceptable "spirit" animals the ceremony ceased and they were given water and food.

Although proponents of the TST model give lip service to the influence that "cultural factors" may have on the specific mescaline-induced trance required by their model, they place far more emphasis upon uniform "trance" patterns than they do upon local mythologies. But throughout his text Kroeber pointed out that the mythologies of the unique groups influenced all dreams and visionary experiences, including the dreams induced by *toloache*. For example, in discussing the jimsonweed initiation among the Yokuts, Kroeber said that the "drug is not only a narcotic but produces visions…" the effect of which "must have also been enhanced by the preceding period of fasting. Expectation, based on current folkways, would lead the novices to see even inanimate objects as persons, as is said to have happened" (Ibid: 503). Nowhere does he discuss any specific patterns, symbols, or motifs that were supposed to have occurred during all shamanistic trances. In fact, Kroeber does not discuss the "shaman's" trance in any detail at all, but simply makes a casual reference on rare occasions to the "shaman entering trance."

In this same paper Whitley (1998: 22-37) wrote that "much if not all of Native Californian rock art was a product of shamanism" and cited Steward (1929) Driver (1937), and Gayton, 1930 & 1948a & b). We have already discussed Driver (1937: 86), most of whose Mono informants reported that shamans were associated with pictographs, while the majority of his Yokut informants denied such an association. Steward (1929) listed a number of examples where male and female adolescents from the Nez Perceé, Cupeña, Luiseño, and Quinault tribes created rock art during puberty ceremonies, and from this he went on to *suggest* that many examples of rock art were *probably* associated with religious or ceremonial activities (p. 235). He added that explanations of some realistic figures may have been related to clan symbols, individual guardian spirits, or shamans' powers (p. 236) but he did not cite any ethnographic studies to support his speculations.

Finally, Gayton (1930: 361-420) does not mention rock art in this study, although Steward cited her as believing that some of the "strange pictographs" in Tulare county were "doctors marks" (1929: 226). She did however, have some very interesting comments to make about Mono-Yokut shamans. For example, totemic animals were distinguished from "dream helpers" (p. 368) the latter of which could be sought by

anyone (or occur spontaneously), including prospective shamans. Everyone had supernatural powers that were qualitatively indistinguishable from those of the shaman, shamans simply possessed more power quantitatively because they were more preoccupied with dreaming, and interpreting and analyzing dreams. Dreams were considered the vehicle by which "powers" were acquired. Many individuals were believed to have strong "powers" but avoided becoming shamans because the latter could be killed if they failed to heal (pp. 388-92). Also, many people were unwilling to observe the rules of fasting, praying in isolated locales, taking tobacco emetics and basking in the sun, all of which were necessary to a successful relationship with the occult (p. 386).

She gave many examples of the fear with which shamans were viewed, because it was widely believed they exercised their powers in order to kill other people, indeed, most, if not all illness was believed to be conferred by "witches", i.e., evil shamans (pp. 391-98). She also discussed the fact that many members of the tribe were skeptical of "shamanic" healing, and describes the very strong "performance" aspect of healing ceremonies and shamanic "tricks" without ever mentioning trance or hallucinations a point Bahn addressed previously with respect to the Mongols and Buryats (2001: 55). Noteworthy is the fact that Eliade, the preferred source of TST proponents, emphasized that there was a major dramatic performance aspect to the shaman's rituals, where the shaman could easily "pretend" he was in trance and he cited examples where the shaman was clearly narrating a dialogue full of mythical reminiscences (1964: 225-26) and was not in any state of trance. The performance aspect of shamanism has been given far too little attention by modern commentators,[211] who have assumed a full-blown, genuine trance experience for all shamanic healing ceremonies. Finally, as with the other groups discussed, some individuals among these Mono-Yokut peoples used *Datura* and tobacco. In short, one band of natives Whitley referred to believed there were links between shamanism and rock art (Driver), while others didn't, and Steward suggested there might be a link between shamanism and rock art, although he noted many other explanations for the art as well. In the source Whitley cited for Gayton (1930), no mention of rock art was found.

Gayton (1948a & b) was cited by Whitley (1998: 23) as a source believing that "much if not all of Native Californian rock art was a product of shamanism," but no where in those documents does she make such a claim, although she does describe ceremonial body paints (1948a: 23; 1948b: 264). The 1948 monographs provided more detail than the 1940 document with regards to the use of tobacco, *Datura*, and assorted shamanistic practices among the Yokuts of Tulare Lake (2 informants), Southern Valley (4 informants), and Central Foothills (14 informants) (1948a). The informants were interviewed between field trips from 1925-28, and again in 1929 and 1930 (p. iii). The information reported would have applied to the years 1840-90 (p. 1). Among the Yokuts of Tulare Lake anyone could seek power in dreams (p. 31). The would-be shaman would continue to fast, dream, and pray over a long period of time and secured various talismans from his "dream helper" animals (p. 33). Jimson Weed was taken once in a lifetime by men of about age 20, who were assisted by an elder who had consumed it himself. These men did not become shamans, nor did they, during narcosis, attempt to heal anyone (p. 38). Jimsonweed was used both as a

[211] However, this was not true of the first reports of shamanism in the 18th century, which did focus upon performance as discussed in G. Flaherty, *Shamanism and the Eighteenth Century*.

medicine and as an anesthetic poultice of the mashed roots that was applied to broken bones (Ibid).*Datura* was not used by shamans, but rather anyone who knew the procedures could imbibe the plant in concoction (p. 39).

Among the Yokuts of the Southern Valley, both Tobacco and *Datura* were used. The tobacco was ground with lime and used to aid dreaming (p. 52). Jimsonweed was taken ceremonially once in a life-time as described for the Yokuts of Tulare Lake and a specific set of procedures had to be followed before its ingestion, including boiling a mixture of the mashed root and water. When the drinkers became unconscious they were laid on mats. By evening of the day of ingestion, they were roused and kept in a semi-conscious state such that by the following morning (24 hours after ingestion) they were "voluble" and could reveal their dreams (p. 53). *Datura* was frequently used as a medicine for setting fractures whereby the victim drank a concoction of it and while in a coma the broken bone was set. The acquisition of power was open to anyone who wanted to take the trouble and was not restricted to shamans.

Yokuts of the Central Foothills also used Tobacco and *Datura* for similar purposes as had the Yokuts of Tulare Lake and the Southern Valley. Also, anyone could seek power and acquire it he was willing to take the trouble. A man who dreamed of curing could become a shaman with proper training, but he did not have to become a shaman – if he wanted to remain ordinary, he could let his dreams "pass" (p. 108). During the dream, an animal helper would appear and reveal to the would-be shaman a talisman which should be used in curing. However, when the talisman had been used in a curing ceremony, it could not be used again until a new dream re-vivified its power (p. 109). Noteworthy is the fact that among these three groups of Yokuts, there is no mention of trance, anyone could acquire special powers, and the powers were revealed in dreams. No mention is made of rock art whatsoever. Obviously, during the *Datura* intoxication the users were probably in a drug-induced trance upon being awakened prior to having slept the effects of the plant off.

Gayton (1948b) reported similar information as that discussed above from the Yokuts of the Northern Foothills (8 informants), as well as from a transitional Yokut-Western Mono group (3 informants) and the Western Mono (7 informants) with some minor variations. For example, among the Yokuts of the Northern Hills, both men and women took *Datura*, and both used it to insure health and a long life (pp. 150-51). After ingesting the *Datura* mixture, the drinkers became comatose, and it was only a few days later after they had recovered that they reported what they had seen. During the intoxicated state they reported being able to discern who was ill, who had sent the illness, and the ability to "see" some distance away. Among the Western Mono, practices were similar to the Yokuts just discussed. Anyone could seek power, all people sought it in the same way, the shaman being an individual who chose to gain additional training from his "spirit" helpers and perhaps older shamans. Ordinary people sought their own power as a protection against illness or accidents (p. 275). Again, trance is never mentioned although, as with the Yokuts, it seems clear that those who used *Datura* were in a state of drug-induced trance. There is no mention of rock art and power is sought in dreams by everyone.

Dating Coso Petroglyphs and Pictographs

Whitley (1998 Ibid) asserted that various anthropomorphic petroglyphs from the Coso Range exemplified shamans in trance. Furthermore, he maintained that the Coso sheep petroglyphs, also known as "classic" Coso style petroglyphs (Garfinkel 2004b:1), could be interpreted according to these historical ethnographic documents, but that is extremely unlikely for the following reasons. It is important to note that for some years there has been a controversy as to whether Numic speakers moved into the Great Basin, probably from the Sierra Nevada, only about 1000 years ago, replacing the people who were already living there, or whether Numic speakers and their direct ancestors have been in the Great Basin for many thousands of years, using the same motifs in rock art over the course of that time. Whitley has been a proponent of the second possibility (as late as 2003: 95), but the preponderance of recent evidence suggests Numic speakers arrived about 1000 AD. Recent studies have tended to confirm a dating schema for most of the Coso petroglyphs to 600-1300 A.D. (Gilreath 1999, Rogers and Rogers 2003. A terminal date of 1300 A.D. for Coso representational rock art is now the most substantiated (Coombs & Greenwood 1981, Garfinkel & Pringle 2003, Garfinkel 2004, Hildebrandt & McGuire 2002:245).

Additionally, mitochondrial DNA evidence has supported the hypothesis that the current inhabitants of the Great Basin, the Numic speakers, are recent immigrants into the area who replaced the pre-Numic speakers (Kaestle & Smith 2001: 1-12). Steward (1968) had suggested that the cessation of rock art production was correlated with a distinctive discontinuity between the creators of this rich artistic tradition and the aboriginal people occupying the area during the historic era, and these recent studies confirm that interpretation. Such a shift is now thought to be associated with a change from large game hunting (mountain sheep) to one more targeted to the gathering of vegetal foods and the hunting of smaller animals (Bettinger & Baumhoff (1982: 485-503) and is consistent with the ethnographic records Steward published in the 1930s and 40s where the Nevada Shoshone (some of whom lived in the Death Valley, and Panamint areas of California) had no tradition of hunting mountain sheep. No wonder Steward's Shoshone informants "refused to admit knowledge of rock art" (Whitley 1986: 162)! The rock art in question was probably created prior to 1300 A.D.

Obviously, no historic ethnographic information we have can be applied to the pre-Numic artists of the Coso Range prior to about 1000 AD, so none of Whitley's speculations about the shamanistic nature of this art can claim any support from these sources. Furthermore, neither can any of his interpretations of the meaning of various geometric petroglyphs. Whitley (1998:23, Figure 1) showed an anthropomorph petroglyph from the Coso Range and claimed that "the concentric circle face, also common in this region, symbolizes the whirlwind which, like the shaman, concentrates supernatural power" but he cited no specific historical informant or ethnographic source. Since this art has most recently been dated to pre-Numic peoples, none of the local Indian groups can actually tell us what the concentric circle meant to those ancient ones. The most they could do would be to cite historical ethnographies, the vast majority of which lack any such details.

Moreover, let us note that the Coso Range is a wilderness area covering over 55,525 acres of the upper Mojave desert where over 14,000 individual engravings are known (Grant 1968:120-21). Other Coso

Style petroglyphs are known outside this area in the El Paso and Panamint Mountains and the Argus Range, areas through which numerous bands (as Whitley acknowledges, 2003: 83-104) would have ranged (Garfinkel & Pringle 2004: 1-14). Even if some of these petroglyphs were created by Numic peoples as Whitley maintains (including speakers of the Western, Central and Southern Numic branches) there is simply no way to determine to which bands the art might be ascribed.

For example, the historical Kawaiisu, neighbors to the Coso Shoshone, traveled widely throughout this same area during seasonal trips, and concentric circles were prominent in some of their creation myths. In one myth-fragment, animal-people formed concentric circles around a piñyon pine tree to prevent anyone from stealing the cones, but a Kawaiisu ancestor managed to steal one and brought it to their territory and that is how the Kawaiisu came to have so many pines in their homeland. In another myth, a concentric circle of animal-people surrounded a small fire so that the Kawaiisu could not learn how to control it, but a Kawaiisu hero managed to steal this fire (Zigmond 1972:130) and that is how they learned to regulate fire (prior to this incident the Kawaiisu knew only the uncontrolled fire started by lightning, but nothing about how to tame fire for their own purposes). The concentric circle among these peoples could easily suggest some spirit power associated with mythological animal-people, or it could symbolize specific ancestor spirits who evaded or transcended or tricked the animal-people. These are all plausible explanations but we cannot know the unique meaning since it varies considerably depending upon the local mythology which dictates the art, not some standardized, universal form of mescaline-induced trance.

Additionally, Steward (1929:178) demonstrated that the concentric circle was widely distributed across California, south-western Nevada and central Arizona, in both petroglyph and pictograph form, indicating this figure was depicted by numerous groups of Native American peoples with widely divergent belief systems. As opposed to his belief that the Coso petroglyphs were created by Numic speakers, Whitley is on much firmer ground when he attributes Coso painted pictographs to Numic speakers attested in historical ethnographies, although even here there are problems with his interpretations. One of the reasons Whitley has accepted the idea that the same groups of people lived in the Coso area for several thousands of years is because the pictographs in this region are quite similar to the much earlier petroglyphs. It has recently been suggested that the Coso Painted Style Pictographs (Garfinkel 1978: 94-101) discussed in detail at the beginning of this paper, very likely date from between the 1850's to the early 1870's (Garfinkel 2004a: 1-17) and can plausibly be attributed to the historical Coso (Panamint) Shoshone and the Kawaiisu. Garfinkel makes a good case that the latest depictions of this art were created during the Ghost Dance ceremonies toward the end of that period, and he cites studies that demonstrate white pigment representations of concentric circles have been associated with those ceremonies (Carroll et al. 2003 & Stoffle et al. 2000: 11-38). Garfinkel (Ibid) also suggests that during this same period, as the traditional ways of these peoples were vanishing, there was a renewed interest in emphasizing ancient designs in basketry, rock art, etc., and that the Coso Shoshone copied the ancient petroglyphs in pictographs and basket designs without knowing their meaning or symbolism,

Garfinkel (Ibid) enumerates a series of devastating droughts, wars, and forced relocations of the

Coso Shoshone, the Owens Valley Paiutes, and the Kawaiisu, that decimated their populations from the 1870's – 1890's. It is certainly possible that any rock art traditions that existed prior to these disasters simply died out and were never revived; resulting in the lack of knowledge on the part of informants as highlighted in the ethnographic sources from the early 1900's regarding rock art. Rather than assuming that the ethnographers were unable to elicit information from consultants, it may be time for Whitley and others of like mind to simply admit that there is no empirical evidence to support their claims about an obligatory link between shamanism, trance, and Native American rock art. Indeed all the data indicate that many tribes had no shamans, some did, and other groups evidenced some shamanic elements in puberty ceremonies. Among tribes who did have shamans, other people in the tribe had similar powers. Dreams were the primary method of communicating with the "spirit" world for everyone, and shamans as well as other people possessing "powers" were said to create rock art. The most important points are: (1) there was an enormous amount of local variability regarding these matters, and (2) specific mythological beliefs were profoundly important in affecting the content and interpretation of dreams.

Use of Tobacco and *Datura* among California Native Americans

The significant, although incomplete, evidentiary record regarding North American shamanism, supports Kroeber's insistence on the huge variability of such practices. As we have seen, tobacco and *Datura* were widely used by the Paiutes, Tubatulabal, Western Mono, Yokuts, and Coso Shoshone. Steward also found tobacco use widely distributed among the Shoshonean groups he studied in Nevada, and shamans were reported to consistently smoke during ritual ceremonies, *only going into trance when recovering souls* (Steward 1941: 262). In other words, shamans conducted many ceremonies without ever going into trance, this state of altered consciousness being reserved for the treatment of soul loss. Shamans among the Northern and Gosiute Shoshone also reportedly smoked during ceremonies (Steward 1943: 345). Unfortunately, Steward does not discuss the preparation and use of tobacco in any detail, so we will turn to a consideration of some neighboring peoples, the Kawaiisu who traditionally occupied the area of the Piute Mountains of south central California. This group of tribes spoke Kawaiisu, a Southern Numic language as did the Ute and Southern Paiute. The Kawaiisu were consulted by Maurice Zigmond in annual field trips between 1936-40, in 1941, and again in 1971-72 and we will focus upon his findings regarding their use of tobacco and *Datura* to illustrate the attitudes and practices common among Native Americans with regard to these plants.

The Kawaiisu had an elaborate form of preparation for the tobacco they used, which was most often in the form of cakes that were licked, swallowed or snuffed throughout the day by both men and women (Zigmond 1981: 43-46) and in the evenings groups of women and children as young as 6 continued to ingest the tobacco. It appears that this constant ingestion of tobacco served a similar purpose for these Americans as did chewing coca leaves among the Andean populations. Additionally, it is noteworthy that tobacco smoking is a common indicator of major depressive illness where users attempt to self-medicate their anxiety and mood disorder by using this substance. Tobacco was regularly *smoked* by men and only during the evening hours when, according to their mythology, malevolent spirits or ghosts were driven

away by the smoke (Zigmond 1972: 129-34). After a few puffs before retiring the smoker was said to have good dreams (Zigmond 1981: 43-46).

Zigmond (Ibid), citing Twisselmann (1967:332-33), reminds us that the physiological consequences of smoking tobacco were so marked that using the term "recreation" seemed inadequate. Indeed, Twisselmann was told by his Kawaiisu informants "that even inhalation of its [tobacco] smoke from burning dried plants is said to be hazardous for humans." This quote reminds us to point out that tobacco is one of the primary ingredients of many insecticides. Hence, tobacco in the dosages used by the Kawaiisu was not only a euphoriant and intoxicant, it was highly addictive. Since prolonged use throughout the day leads to deep sleep and much dreaming, believed to be the mechanism of contact with the supernatural, it had a sacred value to them. This is evidenced by one of their myths that indicated tobacco was one of four "First Medicines" given to the Kawaiisu at creation, along with jimsonweed which we discuss shortly.

Interestingly, a swallowed mixture of lime and tobacco was viewed as an effective emetic, in that it caused violent vomiting. Such a mixture was also used on cuts where "it stopped bleeding" and on insect bites where it stopped "itching". It was used both as an infanticide and as an effective poison for rattle snakes. Clearly this substance was recognized to be not only dangerous, but deadly in high doses, and when inhaled, and was treated with considerable respect by Native American peoples. Zigmond (Ibid) noted that shamanistic procedures were only vaguely described among the Kawaiisu, but one informant said a shaman ate tobacco and another said he smoked it.

It seems clear from the above discussion that a shaman who ate and/or smoked tobacco repetitively all day, and then performed any rituals during the evening, could well be experiencing a euphoric intoxication, but we have been unable to find any medical sources that suggest hallucinations of any kind accompany nicotine toxicosis, in spite of numerous claims that tobacco is a hallucinogen (Furst 1976: 23-33, Whitley 2003: 83-104). Some of these claims seem to have been based upon the use of tobacco in conjunction with ayahuasca in South America,[212] the latter of which appears to be a hallucinogen derived from a mixture of various plant substances, the psychoactive constituents of which include N,N-dimethyltryptamine and β-carboline alkaloids with MAO-inhibiting properties (Riba et al 2002: 613-28). From the data we have reviewed for Native Americans of Nevada and California it seems more likely that shamans, as well as other tribal members, men, women and children, might have been in a dreamy state where "visions" were likely hypnagogic and/or hypnopompic phenomena (Mavromatis, A. 1987), or simply vivid dreams shaped by the local mythology. Certainly there is no report of any sort of trance similar to that described by the TST model.

Whitley (ibid: 90-92.) repeatedly asserted that tobacco was a hallucinogen commonly used in female puberty rites among several groups of southern California natives such as the Luiseño, Juaneño, and Diegueño. He based this assumption upon descriptions provided by Fray Geronimo Boscana, mentioned

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[212] *Ayahuasca* is a psychoactive mixture consisting of two species of *Banisteriopsis – B. caapi* and *B. inebrians*, that also includes numerous other plant additives (Schultes & Hofmann 1992: 120-27) and it is used in north westernmost South America.

earlier, who reported that a drink was administered to children that consisted of tobacco reduced to a powder, and mixed with other *intoxicating* ingredients (most likely jimsonweed, i.e., *Datura*), which "caused them to become insensible" whereafter they were deprived of food and water for three days, during which time they suffered from delirium, and beheld all kinds of visions (Whitley ibid).

Clinical Effects of Nicotine and *Datura*

As we have seen, both tobacco and *Datura* were widely used among the Indian groups we have been discussing, so we would now like to acquaint the reader with some details about these substances. In the Great Basin and California the species of tobacco most utilized by the indigenous peoples was *Nicotiana bigelovi*, the active property being nicotine, an alkaloid that is present in concentrations 3-4 times higher in the native plant than in modern cigarettes (Furst 1976: 23-33). The method of nicotine delivery (smoking, snuff, nicotine gum or nicotine patch) determines the time to reach the peak nicotine level and how high the level will be (Fiore et al 2000).[213] Since nicotine has a half-life of 1.5-2 hours, it must be used repetitively throughout the day. Nicotine toxicity may result from high dosages of tobacco and symptoms include: nausea, excessive salivation, increased pulse rate, cold sweat, headaches, problems with sleeping, i.e., *particularly vivid dreams.* These facts make it easier to understand the profound importance of both tobacco and *dreams* as a communication with the supernatural "spirits" for shamans and ordinary people alike among most Native American groups as reported in historical periods.

Nicotine is a highly addictive drug which induces euphoria, serves as a reinforcer of its use, and leads to nicotine withdrawal syndrome when absent. It affects mood and performance and is the source of addiction to tobacco. Nicotine releases hormones in the brain that act on receptors in the "reward" system by altering the availability of dopamine and serotonin and by increasing levels of endorphins (natural opiates) in the rat brain (Sharma et al 2004: 1-15) and is believed to perform a similar role in humans, leading to heightened feelings of happiness and well being. In fact, the subjective effects of nicotine use are similar to those of cocaine, amphetamines and morphine (Ke et al 1998:825-40). Small rapid doses of nicotine produce alertness and arousal, as opposed to long drawn-out doses which induce relaxation and sedation with vivid dreaming (Sharma ibid).

Moreover, the ethnographic sources we have been discussing, as well as Kroeber who surveyed all California tribes, discussed numerous groups that practiced jimsonweed cults. As discussed in Chapter 1, *Datura* produces a deep sleep and dreams are not recalled unless the subject is awakened, during which time hypnopompic dreams may occur. The user is awakened in most of the ethnographic reports we have discussed, and kept awake, during which "hallucinations" may be experienced. Otherwise, if the user is simply allowed to sleep off the intoxication, waking naturally, dreams are not remembered. Jimsonweed (*Datura wrightii* or *Datura inoxia* are the most common species utilized in the Western U. S.) is a highly toxic plant that has been used throughout the world to induce "visions." Many individuals who have heard about its hallucinogenic properties have been hospitalized or died from ingesting a mixture of crushed jimsonweed and water (Zigmond 1981: 23). The toxicity of *Datura* is caused by anticholinergic poisoning

[213] Inhaling tobacco smoke delivers the fastest and highest nicotine level, which maximizes the psychoactive effects on the brain. Nicotine from cigarettes reaches the brain in 7 seconds.

resulting from inhibition of muscarinic receptors (one type of cholinergic receptor in the central nervous system). The symptoms of poisoning include ataxia, disorientation, short term memory loss, confusion, hallucinations (auditory and visual), psychosis, agitated delirium, seizures, coma, respiratory failure and cardiovascular collapse. In 1993 nearly 400 cases of *Datura* toxicity were reported, along with 2 deaths, to the Center for Disease Control (Bruns, Jr. 2001). Additional symptoms include mydriasis with loss of accommodation (blurred vision), photophobia, hyperthermia, agitation, combativeness, dry mucous membranes and axilla, urinary retention, and tachycardia (Wagner & Keim 2004). Obviously, *Datura* poisoning is a most unpleasant and very serious business, and traditional Native American healers were aware of the risks as we will see, although contemporary "experts" on Native American shamanism seem unaware of the dangers.

Zigmond described the use of jimsonweed (*moop*i) by the Kawaiisu in some detail and we will summarize those results here because they provide some important insights into the nature of the plant not found in many other sources. As mentioned, to the Kawaiisu *Datura* was one of the "First four medicines" bequeathed to them during the period of creation and was known to be a highly dangerous plant. The drinking of the jimsonweed concoction was referred to as *toloache*.[214] It was expected that *toloache* would stimulate dreams or visions, but its use was sometimes associated with clairvoyance for ordinary people – no shamanic use of jimsonweed was reported by Zigmond (1981 Ibid) and Kroeber (1976: 604) indicated that there was little on record regarding Kawaiisu shamanism, except that they reportedly had powerful rain doctors, and as we will see, are referred to by Zigmond (Ibid) with respect to *toloache* rites. Jimsonweed was never harvested during the summer because it was deemed too toxic for any but external uses, implying that the leaves, roots, blossoms and seed pods were viewed as deadly. The primary external use of the plant seems to have been as a potent analgesic, treating stab wounds, arthritis, and other injuries, but it was also widely believed that *toloache* could convey health benefits for life.

Generally only the roots were harvested by old women who presumably had the experience to prepare the plant, and only during the winter time, according to certain specific ritual requirements, i.e., the eastward direction the root pointed, etc. Although *toloache* could be taken by various individuals, it was most frequently associated with religious rites of passage such as puberty ceremonies. According to Kroeber this rite contained elements suggesting that it had been influenced by shamanistic practices. For example, the dream of the initiate was believed to have life-long meaning and he cites an example of a young girl who dreamed of a grizzly bear under the influence of *Datura* and was very frightened by it. Henceforth, she was forbidden to eat bear meat (Ibid). *Toloache* was a liquid made from water and the burned, roasted root of *Datura*, and was ingested prior to the ceremony. Following a day of food and water deprivation, the youth, boy or girl, was instructed to drink as much of the concoction as possible without breathing. The individual was then taken by the hand and led about by a companion (shaman or village elder) who would reveal the animals that would be seen in dreams. If the companion was a shaman, he/she

would reveal the animals that were believed to bring disaster. If the drinker dreamed of such animals she/he *might* become a shaman.

Observers of the ceremony engaged in a great feast, and festival, but the drinker was unconscious. He/she was awakened before dawn and was given a drink of water, after which he/she vomited. This cycle repeated itself three times. During this process the drinker later reported that everything seemed to be in constant motion, in a wormlike fashion. Angry people were seen approaching, and many other people were "around". The drinker was frightened, indeed terrified of everything and tried to run away but the watcher wouldn't allow it because one could wander off and be bitten by a rattle snake or fall over a cliff. Some Kawaiisu youth reported that during the ceremony they imagined that ants were crawling over their skin (a haptic hallucination reminiscent of alcoholic delirium tremens and chronic cocaine abuse) and repetitively tried to brush them off, as was observed by the watcher. The drinker went back to sleep the second night and upon awakening the dreams were gone (Zigmond Ibid: 24-25). Clearly, none of the dreams are in any way consistent with the TST model. Modern clinical studies reveal that most deaths from *Datura* intoxication result from poor judgment and incoordination associated with accidental death (Arnett 1995:1-4), thus confirming the Kawaiisu fear that the initiate could fall over a cliff, or be so drugged he/she might fail to avoid deadly rattle snakes. There are reports of individuals wandering naked, attempting to board a bus, train, plane or hitchhike during *Datura* intoxication, who have been taken to hospital emergency rooms because they were obviously in a delirium, or psychotic.

Occasionally, *moopi* seeds that had been cooked would be chewed. Perhaps the cooking served to reduce the toxicity because as little as ½ teaspoon (≈ 50 seeds) of uncooked *Datura* seeds can kill a human and the highest concentrations of the deadly tropane alkaloids are contained in the seeds, although the entire plant is toxic. One of the factors making the use of this plant so deadly is that the concentrations of alkaloids can vary in different parts of the plant, according to species and variety, season of harvest, soil conditions temperature, , rainfall, etc.[215]

Even so-called "acid heads," who have been known to consume almost anything, recognize the dangers of *Datura* as indicated by a search of Google.com. Most websites that reported any information about this plant warned, in no uncertain terms, about its deadly effects. Some sites showed the skull and cross bones next to recommendations that no one ever attempt to use any part of this plant. One site reported anecdotal descriptions from people who claimed to have used the plant once, but swore they would never do so again. The descriptions provided by the drug users indicate that they suffered from many of the symptoms of *Datura* toxicity mentioned above. For example, some reported they were convinced they would die from fever, others said their pupils remained dilated for days, during which time they could not even see to read the newspaper and they had become terrified they would never regain their vision. It seems that the common experience was one of becoming aroused initially and feeling intoxicated but not in

[215] Contemporary clinical studies have indicated that the four toxic alkaloids in *Datura* are hyoscyamine, hyoscine, atropine and scopolamine. The seeds are 2-3mm in length and it is estimated that 50-100 seeds contain 3-6 mg atropine, the lethal dose being > 10 mg (Arnett ibid). Since the plant also contains three other deadly alkaloids, the lethal dose of scopolamine being > 2-4 mg, ingestion of 50 seeds would seem extremely risky.

any sort of desirable way, followed by delirium, overwhelming fatigue, stupor and sleep. Some reported dreams, unpleasant in nature, and hallucinations in which they were convinced that old friends were visiting them until the apparition vanished into thin air. Many were unable to differentiate whether they were dreaming or awake and hallucinating. These symptoms lasted 24-72 hours and were accompanied by dehydration, vomiting, confusion, disorientation and panic. These anecdotal reports are consistent with those provided by the Kawaiisu and other Indian groups described above, as well as clinical examples from hospital and drug treatment facilities.

Prehistoric Use of *Datura*

Based upon the above discussion of the use and effects of *Datura* and the respect for the substance as documented by Native Americans during historical periods, it seems likely that the plants may have been used in prehistoric times as well. One of the studies that employ empirical evidence rather than all-inclusive hypotheses such as the TST model deserves special attention in its focus upon the possible pre-historic use of *Datura*. Boyd and Dering (1996: 256-75), who we discussed in Chapter 1, have attempted to link specific rock art sites (referred to as the Pecos River Style from south western Texas, dated to circa 2950-4200 years BP) to the shamanistic use of *Datura wrightii.* Because shamans have reportedly used *Datura* among the Tarahumara and the Huichol Indians of northern Mexico in historical time periods (both of these Indian groups recognized the extreme danger of *Datura*), Boyd and Dering assume that the Pecos River Style rock art, depicting what they believe were *Datura* seed pods, was associated with important ritual and medicinal *Datura* plant usage by shamans in prehistoric periods. As evidence for their interpretation they cite the presence of *Datura* in the sediments at some archaeological sites. For example, they note that 5 seeds were found in a grass mat near a hearth from the lower Pecos River region dated to circa 4500 years BP. At another site, about 900 seeds of *Datura wrightii* were found in a room that yielded ceremonial objects in New Mexico northwest of Reserve. These were the two sites closest to any locations depicting Pecos River Style rock art.

It seems that *Datura* seed pods could be reasonably linked to some of the Pecos River Style rock art as depicted in panels from Panther cave (Boyd and Dering (Ibid:259-60). These representations closely resemble the *Datura* seed pod as illustrated in drawings of *D. stramonium L*., and *D. wrightii Regel*, (Ibid: 265), (in spite of the fact that the "pods" in the rock art panel are more elongated, the 4-lobed nature of *D. stramonium* is not depicted, and the scale of the "pods" in the art is much larger than would be expected based upon their actual size. It is well known from ancient and medieval visual artistic depictions that the importance and "power" of the object is the determining factor for size, e.g., kings are portrayed as gigantic, while ordinary subjects are tiny, so the size of the pod in the panel may have reflected its significance to the artist, not its empirical dimensions). Given these caveats, and based upon our detailed consideration of the use of *Datura* by the Kawaiisu and other tribes, Boyd and Dering's analysis has at least some plausibility based upon empirical evidence, in marked contrast to the speculations of Whitley, Lewis-Williams and other proponents of the TST model. And, if the healers did use *Datura*, it was not to induce a trance that had any resemblance whatsoever to that dictated by the TST model.

Although Boyd and Dering refer to shamanistic healing they do not emphasize the form of trance that might have been experienced and they cite a number of typical induction techniques such as hallucinogenic or psychoactive plants, mainly *Datura*, fasting, thirsting, blood-letting, self-hypnosis, and various rhythmic activities. Whoever used the *Datura* would have had visions somewhat similar to those reported by the Kawaiisu or our modern drug users, although of course, any local mythologies would have dictated the exact nature of the content and the interpretation thereof. As Zigmond reminds us, the mythological

> … tale must have a setting and it is to be expected that the setting will be derived in large part from the world with which the narrator is familiar…the framework is likely to be the immediate environment of the story-teller and his audience. And the physical and biological surroundings may well play more than a passive role. As the plot unfolds, certain features of the landscape and certain characteristics of the flora and fauna may emerge as significant factors. In many instances the point of the story lies in its explanation of the state of things…(1972: 129-34).

Historical ethnologies might suggest some themes that could theoretically have been present circa 4300 years BP or later, provided we have a realistic fix upon what the environment was like at that time and who the people occupying it were, but otherwise, details would have to remain an educated guess.

The producers of the Pecos River Style rock art may have used *Datura* as an anesthetic, rubbed on externally as did the Kawaiisu. Surely, any substance that could relieve the pain of assorted cuts, wounds, arthritic diseases, broken bones and other ailments, would have had almost as significant a role in influencing the culture and rock art motifs as the functions it might have had in producing stupor, vomiting and rather unpleasant dreams, as documented in the reports from the Kawaiisu (Zigmond 1981 ibid) of California and the Huichols (Furst 1976: 135-46) and the Tarahumara (Bennet, & Zingg 1935) of Mexico). Moreover, the individuals who might have used the *Datura* could have selected the seed pod as the symbolic depiction of the plant because of its fairly distinctive visual properties so as not to confuse it with other similar appearing plants, not necessarily because they consumed the seeds. For example an abstract depiction of the Morning Glory blossom (*Ipomoea purpurea*) would not be distinguishable from a *Datura* blossom in rock art given the level of realistic detail manifested in much of native American rock art during the pre-historic period as exemplified by the Pecos River style, but the seed pods, although similar, are characterized by spines covering the entire four lobes of the *Datura* seed pod but not the Morning Glory which has a different type of pod (See Figure 1). *Ipomoea purpurea* has hallucinogenic properties similar to LSD (except that it is about $1/20^{th}$ as potent) and has also been known as a sacred plant by many American Indian groups of the southwestern US and northern Mexico and it grows profusely across much of the same area as *Datura*.

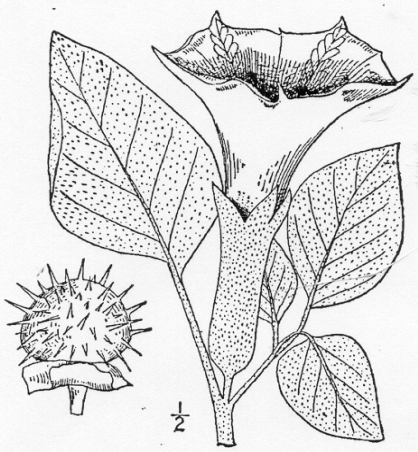
Lewis-Williams and Whitley on Somatic Hallucinations

We now digress briefly to provide a background for other assertions by Whitley regarding somatic hallucinations that we will discuss shortly. Lewis-Williams (2002:270) devoted some ten pages to discussing what he referred to as "somatic hallucinations", under which category he included haptic or tactile, as well as synesthesic hallucinations (Ibid: 298) in order to explain the "shamanistic nature" of the

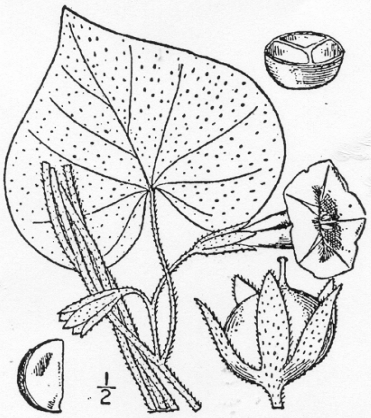
Paleolithic "wounded men" figures depicted in Cougnac and Pech Merle, Quercy district, France. LW assumes that these figures, which appear to have lines emanating from them, represent men whose bodies have been impaled by "spears" (Ibid: 278) and that the wounds produced by the spears reflect haptic hallucinations of "pricking and stabbing" sensations experienced during shamanistic trance (p. 270). There are so many fallacies included in this interpretation of these artistic depictions that it is difficult to know where to begin. The most logical point would seem to be with the figures themselves**.**

Firstly, these images are more accurately described as humanoids or anthropomorphs, and there is absolutely no indication of their sex. Indeed at least one of the Cougnac images barely deserves the description of humanoid. Secondly, to claim that the lines associated with them are spears or other missiles is extremely tenuous; as mentioned elsewhere (Bahn & Vertut 1997: 173), it is very dangerous to make such facile claims, since the lines could indicate something either entering or leaving the bodies, and that something is by no means certain to be a missile. Thirdly, even if one were to accept the "missile" interpretation, there are many possible explanations -- myths, perhaps, or sacrifices, or symbolic killings. And finally, even if one were to accept LW's extraordinarily tenuous interpretation, it remains a crucial point that this motif is known in only two French caves (though there is an even more doubtful "pierced humanoid" in Cosquer Cave), and comprises only three or four images out of the tens of thousands known from the Ice Age -- hardly a predominant theme, therefore, and thus one unlikely to tell us very much about the content or motivation of the phenomenon of Ice Age art. But one of the principal hallmarks of work by the proponents of shamanic interpretations is their extreme selectivity of, and focusing on, highly unrepresentative motifs which might suit their purpose, while ignoring the masses of images which do not.

We will now turn to a consideration of the evidence LW assembles in support of his "haptic hallucination" theory of Paleolithic shamanic trance and "wounded men" figures. Let us first state categorically that once again, Lewis-Williams has conflated drug-induced hallucinations with the rare vivid imagery accompanying naturally-occurring trance states. Moreover, haptic hallucinations are rare in any circumstance in which they occur. Very few schizophrenics ever report such hallucinations, auditory hallucinations being by far the most common experience for sufferers of this severe mental illness. This type of hallucination is more common in temporal lobe epilepsy but is usually characterized by simple sensations of numbness and tingling, rarely burning. We find no studies whatsoever where sensory deprivation alone produces haptic hallucinations, visual hallucinations being the most common, followed by auditory. Some hallucinogenic substances may induce haptic hallucinations, the most complex form of such hallucinations occurring under the influence of LSD, mescaline (as described by Klüver) or psilocybin, all of which we discussed in detail in Chapter 1, while more simple types of haptic hallucinations are produced by species of *Datura* and *Ipomoea purpurea* as discussed above. Most importantly, naturally occurring forms of trance, such as deep relaxation, hypnotic trance, and meditation, are not known to produce haptic hallucinations. Lewis-Williams (2002: 272) notes that it is important to distinguish between somatic sensations and somatic hallucinations, but he then continues to confuse the



Datura inoxia



Ipomoea purpurea

Figure 1

two conditions. For example, in deep states of relaxation or meditation, the subject can experience a sense of warmth, numbness or tingling (we have found no reports where individuals in these states experienced any itching whatsoever which LW asserts is a common reaction) but almost always in response to suggestion or auto-suggestion, and these sensations are most appropriately referred to as somatic sensations. Yet as we shall see, later in this same discussion LW refers to such sensations as hallucinations.

A similar situation applies to hypnotic trance wherein the preponderance of simple tactile sensations such as numbness, warmth, burning, tingling, are produced in response to guided suggestion, either self-induced or induced by a hypnotist. Lewis Williams (Ibid) states that Ronald Siegel (1978:309-

314), attempting to "clarify the relationship between visual hallucinations and somatic hallucinations, argues that there is 'an orderly progression of hallucinations from simple snow lights through geometric forms to tactile sensations' ". What LW fails to mention is that this process only applies to chronic cocaine abusers (see our Chapter 1). Moreover, the haptic hallucinations of chronic cocaine abusers are referred to as "cocaine bugs, because they most frequently describe sensations of insects crawling over or under the skin (as noted above, *Datura* can produce the same sensations). Other tactile hallucinations, reported following cocaine binges of heavy abuse over several days, include feeling animals under the skin, itching (primarily hands, arms and back), moving itches, and the sensation of people brushing against the body (Siegel ibid:312). Interestingly, Siegel cites another researcher (Maier) who classified so-called cocaine "hallucinations" as illusions, i.e. distortions of objective reality and stated that they were rare among cocaine abusers (p. 310), but LW does not include this information in any of his writings, so obsessed is he to prove that any sensation in any modality is a hallucination and that they are each and every one, common components of all trance phenomena. LW (Ibid: 272) reports that Siegel, after taking peyote, said that "his skin prickled with electricity," which isn't surprising since the primary active ingredient in peyote is mescaline. In the same paragraph LW discusses cocaine abuse, the use of *ayahuasca,* and peyote, combining the hallucinatory experiences of individual persons using each of the three drugs into one description, as if there were no differences whatsoever in the form of trance produced by each. In fact, after describing pleasant sensations induced by ayahuasca*,* LW reports that other people experience "terrifying hallucinations" but fails to note that the latter were cocaine addicts, who sometimes "saw" worms crawling out of their bodies at the same time they experienced them under the skin! There is a major difference between the unpleasant experiences induced by chronic cocaine abuse and those induced by the occasional use of ayahuasca!

LW continues to discuss the Jivaro of the Amazon Basin, who supposedly experience sharp, pricking sensations in trance. Noteworthy is the fact that LW does not report that these alleged sensations occur during intoxication with ayahuasca [*Banisteriopsis caapi*] (Harner (1973:15-27). If that drug is not strong enough to produce hallucinations, *Datura arborea*, an even more powerful hallucinogen is added to the drink, along with massive amounts of tobacco juice, to which the numerous shamans of the Jivaro appear to be addicted. These "teas" are potent and easily available to all, thus any man or woman who wishes to become a shaman may do so by simply imbibing them, and about 1 in 4 adult males refer to themselves as shamans. In addition, the Jivaro believe that each shaman has a spirit helper in the form of a "dart" and these are the main supernatural forces believed to cure or to cause illness and death. A healing shaman is believed capable of holding these "darts" in his stomach and can regurgitate them at will to help him cure. Other bewitching shamans are able to shoot supernatural darts to kill or sicken victims. Thus the traditions of these people dictate one aspect of the experience that is expected following ingestion of *B. caapi*, i.e., sharp, pricking sensations from the disease-producing "dart". When Harner took the hallucinogenic brew he encountered numerous bird-headed and dragon-like creatures, and aided by spirit helpers he attempted to fly through the "far reaches of the Galaxy" (ibid: 16), but he did not report

experiencing any pricking sensations, whose presence in trance is far more likely to be dictated by Jivaro myths, legends and traditions than the concoction itself.

We now turn to a discussion of the ethnographic sources that LW (Ibid: 273) cites in support of his haptic hallucinatory theory of Upper Paleolithic "wounded men" figures. For example, he cites a report from Isaac Tens, a Gitksan Native American shaman interviewed by Barbeau (1958: 51-2) who refers to his dreams as "visions". In one such dream Isaac reported being in a strange land where "I saw huge beehives, out of which the bees darted and stung me all over my body" (Ibid). No mention is made by Isaac as to whether or not he experienced the pain of the bee stings in his dream, and it is a well-known fact that dreams are not usually accompanied with the physical sensations suggested by the visual images in the dream, so we don't know that Isaac "felt" anything. Moreover, Isaac represents a rather unique individual in that he appears to have been suffering from a partial complex seizure disorder. For example, he fell into unconsciousness twice, and remained dazed, in and out of trance, and very ill for months at a time, a process which was described by him as his "call" to the profession. Shamans attempted to cure him to no avail and he was told he must become a shaman. Thereafter, he frequently "went into trance", apparently spontaneously, as is characteristic of temporal lobe seizure disorder. During these trances he would have "visions" which may or may not have been hallucinations, although this type of seizure disorder is known to produce hallucinations in all sensory modalities, along with numerous other odd neurological experiences, unconsciousness, impaired consciousness, bizarre behavior, etc. (Bear 1979: 357-84).

Shamanism was primarily hereditary among his people, and two of his uncles had been shamans, again perhaps suggesting some predisposition toward seizure disorder. In fact, this trait may have been common among his group, because it was believed that when one was "called" the initiate suddenly became very ill, collapsed into unconsciousness and had many visions (dreams in this instance). This pattern of events most likely formed the anticipated mode of "initiation" into shamanism for the Gitksan, and anyone who wished to become a shaman would have had to either experience a similar pattern because of epilepsy, or to imitate the prototype understood to be obligatory for initiation. In short, there is no evidence that Tens experienced any haptic hallucinations in his dreams, although he might have during his epileptic seizures (trances). However, this type of epilepsy is not common and if Tens is going to be a model for the Paleolithic "wounded men" figures, we must then assume that they were suffering from temporal lobe epilepsy in order to postulate any reasonable expectation of haptic hallucinations.

LW (Ibid: 275) next discusses several sources cited by Eliade (1972:43-45), including the Tungus, the Buryat and other Siberian peoples, in which there was a predictable blueprint for the initiation trance which was based upon a culturally dictated set of rituals and religious beliefs including demonic beings cutting the initiate's body into pieces, boiling it, exchanging his organs for better ones, etc. These experiences were dictated by the traditions of the group, not trance *per se* and there is no evidence cited that the initiate "felt" any of these sensations.

LW asserted that the Ju/'hoansi believed bees were vehicles for potency (i.e. bees carried Num)

and cited Katz (1983:94), who at that time referred to them as Kalahari !Kung of the Dobe area.[216] "Num to the Kung meant invisible" (Ibid) and it was a spiritual power that was believed to be possessed by those experiencing *kia* (an altered state of consciousness during the healing dance). Num was "located only by its existence in a particular form, whether it was a person, a song or a bee. It was not personalized or personified" (Ibid: 94). The main point of all this is that Katz was not discussing a haptic hallucination of bee stings among the Ju/'hoan as LW's citation would lead one to believe, he was describing the fact that "Num is sent by means of invisible arrows from God which are felt as painful thorns or needles," or like the sting of a bee, according to !Kung tradition (Ibid: 120). Thus, when LW cites Katz (Ibid: 46) describing a !Kung shaman who said, "In *kia,* around your neck and your belly you feel tiny needles and thorns which prick you, then your front spine and your back spine are pricked by these thorns" he was referring to the arrows of Num striking the dancer. Because the !Kung anticipated feeling needles or arrows pricking their skin in a state of *kia,* their *expectations* during this highly suggestible state, not trance *per se*, generated these sensations.

LW (2002: 275) cited another example reported by old K"au, a Ju/'hoan man who reported that when he was in god's (Kaoxa) presence flies clustered over his sides. There were also mambas, pythons (creatures that surround Kaoxa in his home in the sky), bees and locusts: "When you go there, they bite you. Yes, they bite you [gestures to legs] and they bite your body". These examples were cited as if they supported his theory of haptic hallucinations. Although this excerpt was taken from M. Biesele's thesis (1976: 154-173), LW cited Halifax (1979:54-62) who presented a short abstract of one section. Even in the abstract it is obvious that old K"au is referring to multiple myths and folkloric beliefs, which LW ignores. However, Biesele emphasizes the profound effect that these tales have upon *kia* for the Ju/'hoan. Had LW read *Women Like Meat*, the book Biesele (1993) published based upon her thesis, he would have understood that the folklore of these people is extremely complex, as is their language, full of nuance, strings of metaphors, and allegorical references, which Biesele calls "verbal art."

All of these factors come into play as old K"au reports an experience of *kia* in which, while he is in god's presence, he is surrounded by assorted types of animals (various snakes), insects (bees and flies) and objects (metal implements), all of which convey the implication of tremendous supernatural power as might be expected to characterize the environment surrounding Kaoxa (who himself is the penultimate possessor of n/om [num as per Katz]). For example, metal implements (Biesele 1993: 198-200) are carriers

[216] One of the most frustrating aspects of trying to verify LW's citations regarding the San is the fact that these peoples have been known variously as the Bushmen, the San, the Kalahari San, the Kalahari Bushmen, the Nyae Nyae Kung, the Ju/'hoansi, the Kung Ekoka, the E!xu, the Basarwa, the !Kung of Angola, the /Xam etc., and most of the groups of one hundred to a few thousand do not understand each other's languages, of which there are estimated to be about 50. The Kalahari Desert covers some 500,000 kilometers, which includes 50% of Botswana, parts of Namibia, Zimbabwe, and South Africa. Needless, to say there are many distinct tribes among the 88,000 San occupying these regions who have varying rites and mythologies and they have no collective name with which to identify themselves. So, when LW cites Katz discussing the Ju/'hoan and their concepts of Num (spiritual energy, Katz 1982:34) the reader must remember that this same group of people was formerly referred to as the Kalahari !Kung. It should be underscored that the practices of the Ju/'hoan, as they prefer to be called lately, have been dramatically influenced by those who have studied them and any scholar is forced to ask how much these people now parrot, by rote, the theories of investigators like LW, Dowson, and others of like mind. For example, in 2002 Helvenston was considering the purchase of a South African painting by a Kalahari San artist. When she inquired of the art dealer if the animals and plants represented in the painting had any special symbolism, the art dealer described the trance experiences of the San as presented in LW & D's TST model. He was amazed to learn that there was no evidence for such experiences reported in any historical ethnography of the San. We wonder if some contemporary San are now reporting trance experiences consistent with the TST model ! This topic alone is certainly worthy of a Ph.D. dissertation.

of n/om, and if insects and snakes bite one, and there are no harmful effects, this state of affairs signals that the individual (in this case old K"au) has "good luck" or a happy fate and has the power to influence weather, food supplies, etc., as discussed in the complex idea of n!ao (Ibid: 106-115). These are extremely significant "powers' among the Ju/'hoan and the possessor of them is very highly regarded. In other words, this individual is "special." Moreover, to have all of these insects and snakes biting one at the same time signifies a most extra-ordinary situation, and thereby conveys a world "that is an unknowable and inexplicable 'beyond', in the sense of 'beyond human comprehension' "(Biesele 2004 pers. comm.).

In brief, then, the haptic hallucinations that LW describes refer to assorted stinging or pricking sensations that he asserts are experienced during trance, but contrary to his assumption of a "universal trance experience" they are dictated by each group's rituals, traditions, mythology, folklore, expectations and neurological impairments. Therefore, without a detailed knowledge of the mythology of the Paleolithic artists it simply cannot be plausibly asserted that depictions of "the wounded men" represent haptic hallucinations experienced in some form of trance (and certainly not any trance induced by mescaline, psilocybin, LSD or *Banisteriopsis*)!

Whitley subsequently addressed the theme of haptic hallucinations and "wounded men" in a review of *The Mind in the Cave* (2003: 271-73) by citing additional examples among the Yurok, Karok, and Shasta of northernmost California, as described by Kroeber (1925:301), that he believed supported LW's thesis. For example, Whitley stated that there was a "feeling of stabbing or stinging that can accompany entry into an altered state of consciousness" but we remind the reader that these sensations only occur when the mythology of the group dictates that such perceptions are an inherent part of shamanistic trance. In the case Whitley described, the Shasta informant dreamed of swarms of yellow jacket bees. These bees in the Shasta mythology were believed to be spirits who signaled impending shamanic power. Later on in the inception of the acquisition of supernatural power, the initiate would dream that a spirit would aim an arrow at her heart after which she would fall into a senseless seizure. Subsequently, the same spirit would reappear and warn her that he would shoot her with his "pain".

There is no mention that the initiate "felt" stinging or soreness in any of these instances, even though such sensations were prescribed under certain conditions in well-known mythological traditions by many of the northern California tribal groups. The "pains" were both the source of the shamans' powers and the cause of disease, i.e., a malevolent shaman could shoot a "pain" into someone to cause illness and a curing shaman could shoot "pains" into the sufferer to cure the illness. The soreness or ache that Kroeber translated as a "pain" among the Chimariko was believed to be an animate mythological creature, a small double-pointed object that caused sickness and discomfort in the body (Ibid: 111). Some of the "pains" were thought to have a personality, but they did not possess human form or resemblance, although they were believed to be physically concrete objects (Park 1938: 80-81). Among the Hupa "pains" were all different colors: one looked like rough flesh; some were like crab, water-dog, an arrow-point, or a little deer (Ibid). The "pains" sucked out by the Shasta shaman were shaped like a tiny icicle, spindle-shaped and sharp at both ends, while those of the Atsugewi were either small needle-like objects or worm-like things

that were animate, and could propagate and talk. When extracted from the patient they could be made to tell who sent them to cause illness (Ibid). Thus, the Shamaness (most Shamans were female among the Yurok, Shasta, Chimariko and other tribes in the area) could store these mythological creatures in her own body and extract them to cure aches, throbbing, stinging, and other discomforts that were experienced by her patients in various areas of the body. Once again, the mythology and beliefs of the group in that location, cultural context, and historical period, dictated the specificity of the trance experience.

Whitley (Ibid: 272) discussed another example of what he referred to as "this somatosensory effect" involving the ritual use of stinging nettles (*Urtica holosericea*) which he believed to have been hallucinogenic, although he was reconsidering that opinion and believed that the nettles might have been used to mimic the *effects* of trance. We note that there is no evidence whatsoever that *Urtica holosericea* has any hallucinogenic properties. Whitley cited Zigmond, "Young people seeking dreams were said to walk through a growth of nettles, pressing them against the bared chest, causing severe lacerations" (1981:68-9). Of course, it is well-known that scarification, whipping, cutting, bleeding, and other forms of self-inflicted mutilation can induce an altered state of consciousness, and the nettles ripping and tearing the flesh would certainly fall into the category of known methods for inducing trance. Zigmond (Ibid) also reported that the plant was used as a counter-irritant, spread over a wound, ache, fracture, etc., much as hot pepper rubs are used to mask the pain of arthritis and back injury today. The nettle was also used as cordage for rabbit nets and carrying nets. Additionally, *U. holosericea* was viewed as having some magical powers and in Kawaiisu mythology was one of the four medicines given to the people "in the beginning." In our view, none of the above examples are convincing evidence of haptic hallucinations.

In the above discussion we have seen some evidence of shamanism and the profound influence of mythology upon the practices of healers both in and out of *trance*. What has been ignored by authors like Whitley is the tremendous diversity of all sorts of "healers" in Native American cultures. For example, Buckley (1992:117-161), in discussing the Yurok, presented a particularly impressive list of many different healers, only a few of whom had any supernatural power consistent with shamanistic beliefs. Moreover, we have found little evidence of rock art traditions associated with those California shamans described in the early 20th century ethnographical studies, who according to Whitley were supposedly depicting their dreams, visions, or hallucinations on rock surfaces.

Keyser and Whitley Criticize Alice Kehoe

Recently Kehoe (2002a: 384) asserted that [T]here is no published record of a shaman making rock art. Nor have I found primary ethnographic documentation directly linking rock art to trance," and she was sharply criticized for it by J. D. Keyser & D. S. Whitley (2004:17:24) who cited three sources which they claimed disproved her statements. One source was a reference to California Western Mono and Yokuts, based upon the 1937 study by Driver (p. 126). In that study, one Western Mono informant stated that "doctors (pó hage) painted their 'spirits' (anit) on rocks to 'show themselves, to let people see what they had done'." Notably, Keyser and Whitley substituted the word shaman for doctor. Moreover, they failed to add that the same informant said the "spirit must come first in a dream." It may be news to Keyser

and Whitley, but dreams are not considered trance. Additionally they stated that dreams were not distinguished from visions, but reading the narrative reveals that the dreams *were* the visions. Driver cited numerous different types of healer including herb doctors, spirit doctors, rattlesnake shamans and bear shamans (ibid: 141-44). Additionally, there were weather shamans. He noted that usually doctors received their supernatural powers from an inherited totem animal. This animal would appear in a dream and would hence forth be referred to as the "spirit" helper.

All doctors were believed to have some supernatural powers, but many other persons were believed to have supernatural powers and they never became doctors. For example, the "doctor's power and the supernatural experience necessary to acquire it differed only in degree from that of an ordinary person. That shamans had any organization or sanctioned public ceremonies, other than the rattlesnake rite or bear dance is doubtful" (Ibid: 141). Doctors were believed to drink *Datura*, as did many other tribal members, and nearly everyone ate tobacco, particularly prior to the vision quest. Thus, the individual seeking his "spirit" in a *vision* would walk alone to the top of a hill and eat tobacco. In large doses of the species consumed in their habitat (*Nicotiana bigelovi*, which was 3-4 times as powerful as the tobacco in use today), it is initially a potent euphoriant then it becomes a soporific, producing a deep sleep with dreams (Furst 1976: 23-33). The seeker would remain over night, returning to camp in the morning and this process would be repeated until eventually his spirit animal would appear in a dream. Such quests were open to anyone, not just would-be doctors.

In short, "shamans" among these Indian groups were hardly distinguishable from anyone else, there is no evidence that they went into "trance," and dreams (i.e., *visions*) were available to anyone in the tribe. Finally, seven informants that Driver interviewed stated that pictographs were painted by recent humans and six said that pictographs were painted by shamans. The only shaman interviewed, a Yokut, said pictographs were painted by anyone (Ibid: 86). Notably, he did not indicate that he had ever created any rock art. We leave it to the reader to decide which informants knew the most about who produced rock art.

Clearly this example, cited by Kehoe's critics, provides more support for her position than it does theirs! Searching through older ethnographic studies is difficult because they are hard to obtain, but well worth the effort as they provide a record uncontaminated by new age theories of trance, hallucinations, and shamanism that have infected subsequent studies, and thus are much more likely to reflect the actual realities of Native American life at that time and not the imaginings, hallucinations, trances, and *visions* of contemporary "experts" on shamanism.

Let us turn now to the second example cited by Keyser and Whitley (Ibid: 20) in their effort to discredit Kehoe. In the mid 1980's an Ojibwa tribal elder, Fred Pine, born in 1897, told an archaeologist/anthropologist that his great-grandfather, reputed to be a shaman, created some of the rock art at Agawa, a pictograph site on the northeastern shore of Lake Superior about two hours drive north of Sault Ste. Marie (Conway & Conway, 1990: 19, 55, 65-68). We are in no way attempting to impugn the honesty or integrity of Mr. Pine, many of whose recollections of oral family tradition have been corroborated in

historical documents by the Conways, but family traditions can become exaggerated, confused, distorted, and subject to contamination by new information over the course of a lifetime, and he was 88 years of age when he reported to the Conways.

For example, Mr. Pine, or those who told him the stories he repeats, appears to have confused and conflated the exploits of two different ancestors of the same name, one who lived in the 17th century and one who lived in the 19th century. Nothing is known of the former aside from Ojibwa oral tradition that he was a companion of Myeengun, who the Conways believe may have been an Ojibwa war Chief during the Ojibwa-Iroquois wars of the late 1600's. Mr. Pine has claimed that this 17th century Shingwauk (1) painted some pictographs at Agawa and that he was a powerful shaman. Unfortunately, there is no way to independently confirm this, or determine whether Mr. Pine confused Shingwauk (1) with the latter Shingwauk (2). Briefly then, we have no independent evidence as to whether or not Shingwauk (1) was a shaman, a war chief or both, or whether he ever painted anything at Agawa, and if he did paint anything, is it still there? In the 1870's large slabs covered with the "best" paintings, according to a contemporary observer familiar with the site, fell into the lake and his account was reported in a newspaper article in 1879 cited by the Conways (p. 46). We will return to this point shortly.

The Shingwauk (2) of the 19th century (1773 - 1854) was well attested in historical documents including photographs, and was reputed to have been a great medicine man who specialized in the regulation of the "natural order on earth, fertility, and the reincarnation of souls by studying the stars, the moon and the sun" (Conway & Conway Ibid: 470). One of the Agawa panels (Panel X) depicting a horse and rider, has been attributed to Shingwauk (2) by Mr. Pine who dated it to about 1850. The panel also contains 4 large concentric circles which the Conways believe may refer to Shingwauk's status as a fourth degree member of the *Midewewin* or *Grand Medicine Society* (Ibid: 30) and they present a detailed discussion of other symbols in the panel (Ibid: 75-8). Their interpretation seems very reasonable and grounded in Ojibwa tradition and culture and not a ritualized discussion of geometric figures reputed by some to be routinely "hallucinated" in trance.

We think the evidence here may support the suggestion that this acknowledged shaman was known to have created a pictograph. However, whether it was the panel now attributed to him is less obvious. The observer of the Agawa rock site that we mentioned earlier made specific reference to a painting of a horse, which according to the Conways is very rare in northern Ontario. He also reported that that painting was on one of the panels destroyed in the 1870's, leaving "the coarser ones - a caribou, a bear, and some other animals" (Conway Ibid: 46). The painting done by Shingwauk (2), dated to 1850 may well have been the one destroyed, as apparently no other horse was depicted on the panel at that time. It is plausible that one of his descendants or compatriots, having been familiar with the painting, subsequently reconstructed it. Or, it is equally plausible that somehow, someone else entirely, some undocumented artist who may have heard descriptions of the lost pictograph, painted the panel now attributed to Shingwauk (2). We don't see any reconciliation to this problem based upon the evidence submitted to date. However, we do want to emphasize that there is no mention whatsoever of trance with respect to the painting, in fact the

Conways, who believe it was painted by Shingwauk (2), explicitly state that the panel represents a dream from a vision quest (p. 30).

Indeed dreams appear to be a typical way in which *visions* were acquired by the Ojibwa and the two terms may be synonymous as appears to have been the case with the Mono and Yokut just discussed. In another book significantly entitled "Painted Dreams: Native American Rock Art," Conway does refer to "trance" as induced by fasting, drumming and praying (1993: 108-109). The vision quest would occur at a special location, referred to as a *dreaming* rock, located along the shore of the lake where various sounds were heard from the high cliffs (a rooster or chicken or clicking noises) which were believed to be made by supernatural beings. The seeker would be "put there to dream," i.e., have "visions" and be deprived of food and water for 10 days, as well as all social contact (Ibid: 98-99). The seeker would be in a state of sensory deprivation since the sounds of the wind, the sea, and the images of the sky would be the only sensory input experienced and he/she would rapidly habituate to those perceptions. It appears that dreams, visions and trance are all terms that have been used with respect to the experiences of the vision seeker and the Ojibwa may not have distinguished between these states as we do. From the text, it does seem that trance referred to "waking dreams", as opposed to those dreams or visions that occurred during sleep. Of course, during the conditions of such prolonged deprivation as the vision quest just described, there could have been a blurring between waking and sleeping, such that all dreams seemed to merge into one stream of consciousness.

Another panel (VIII & IX) includes a famous rock art painting entitled *Michipeshu* (The Great Cat). Tribal elders have likewise ascribed this painting to Shingwauk (2) but the Conways have stated that the association between that painting and Shingwauk (2) has been "difficult to fully document" (Ibid. 74), so we don't consider it an example that contradicts Kehoe. The Conways (1990) noted that in the 1840's Shingwauk (2) provided Sault Ste. Marie Indian agent, Henry Schoolcraft (who made extensive research into Ojibwa culture recorded in a six volume set), with a story about the exploits of Myeengun, the 17th century war chief referred to earlier, who may be recorded as one of the leaders present in 1701 at a peace treaty signing in Montreal. The Conways present a good argument for this, but all we really know is that Shingwauk (2) told the story of a warrior chief by the name of Myeengun and that there was a tribal leader by that name who was cited with respect to a 1701 treaty document.

Shingwauk (2) also provided drawings of pictographs on Agawa Rock which he attributed to Myeengun. Those drawings (Panels III & IV) depict a vertical group of canoes and animal leaders (spirit guides, totems) and they appear to refer to the historically documented events during the Ojibwa-Iroquois wars. Furthermore Shingwauk (2) born in 1773 (possibly a descendant of Shingwauk (1) who was said to have accompanied Myeengun), referred to him [Myeengun] as a chief, medicine man, and member of the great secret medicine society, *Midewewin*, which first appears in historical records around 1700. Shingwauk's (2) description to Schoolcraft indicated that Myeengun painted the panel to commemorate his successful war party (Conway and Conway 1990: 58). To us, this appears to be a plausible documentary chain of evidence that suggests this war chief, also described as a medicine-man, could have painted a

panel of great historic and personal interest to him and his descendants (part of the story includes the Ojibwa's first encounter with the white man, certainly a very significant event in their history).

We do not, however think this matter is settled, and would believe that the claim would gain in significance if the painting could be objectively dated by independent means. If the panel attributed to him was painted by Myeengun, the recorded evidence suggests it had no direct relationship to his role as a healer of souls, but was rather a means of marking a great victory in battle (even if his roles as war leader and medicine man may not have been separable in his own mind, they are in ours).

Keyser and Whitley did not mention that Chief Norma Fox of the Cockburn Island Ojibwa (somewhere around a hundred miles from Sault Ste. Marie in the northern channel of Lake Huron) told a myth of how the pictographs in her area originated. It involved seven dangerous "little wild men" artists, whose images are said to be depicted in many local pictographs. Fred Pine and his relative Dan Pine were both very familiar with the "little wild men" who were believed to be intermediaries between human vision seekers and the supernatural (Conway 1993: 100-01). The paint used by these mythological little creatures was supposed to be made from the blood of the giant serpent, another mythological creature living in the depths of Lake Superior whose flesh was made of copper or silver. "The cliff paintings are made from the serpent's blood which proves that if the snake is made of copper or silver, then it can last or endure a very long time" (Conway and Conway 1990: 29). One possibility that this tale suggests is these particular Ojibwa believed the paintings to be very old, possibly predating their arrival in the area. It is believed the island was settled about 1800, and the date of the rock art is unknown. Perhaps, because they did not have a tradition of any sort, shamanistic or otherwise, associated with the pictographs, there was a need for a creation story to explain their origin. This example also shows that two different groups of Ojibwa with knowledge of the same myths and living a few hundred miles apart might have significantly different traditions about the creation of rock art.

Another very important point to make is that the Conways have linked many of the pictographs such as the Giant Serpents, *Chignebikoog,* the little wild men, and the *Michipeshu* (Ibid: 24-29, for example, to the local Ojibwa myths. As we have just seen, myths may be created to explain pictographs, or pictographs may be created to depict myths. Numerous other pictographs have been linked with locally popular totemic animals or in some cases, specific historical events. There are myths about a boy turning into a bear that have shamanistic associations for the people near Agawa Bay and some pictographs in Northern Ontario depict the transformation of people into thunderbirds. This is but a further demonstration of the profound importance that knowledge of local myth and folklore contributes to understanding the meaning of specific rock art productions. As Thor Conway put it, "often mythic events led to the creation of rock art sites" (1993: 98).

In the third example Keyser and Whitley cite Cline (1938:131-183) as their source for maintaining that rock art was produced by shamans of the Columbia Plateau Okanagon. As a context for their quotations it is necessary to point out that the editor, Spier, and contributors to the work cited claimed in the preface that

> It is unanimously our feeling that this ethnographic account is incomplete and inaccurate. Local differences in culture seem to have been marked: informants had quite diverse backgrounds. These, plus the inevitable contradictions of informants caused confusions which were never resolved. It is our feeling that the culture of the Sinkaietk should be restudied by one who will use these data as *merely provisional* [our italics] (Ibid: 6).

Moreover, they noted that the shamanistic procedures discussed by Cline were long gone, and many informants were at least nominal Catholics, although the old religious outlook, with its emphasis on guardian spirits, prevailed to a surprising degree (Ibid). We note that Cline's writing style is quite vague and it is unclear at times whether he is referring to "people" in general, shamans, other healers, warriors, hunters, etc.

The Okanagon in this study put a great deal of emphasis upon the acquisition of "power" which appeared to refer to outstanding ability in some domain, such as warfare, hunting, salmon fishing, picking berries, curing rattlesnake and spider bites, herbal and practical medicine, and shamanistic healing. One could also be referred to as having "power" to spear fish, having "power" to win at gambling, or having "power" to be a chief. The individual who was successful in these and other pursuits, and at amassing wealth was said to have "power" because "spirit guides" had conferred it upon her/him. Considerable wealth was required in order to be able to sponsor the "winter dance" and distribute gifts, an event of great importance in establishing the relationship between "power seeker" and "spirit" guardian. Moreover the formal relationship between the "power" seeker and his or her "spirit" guardian was established only at the "winter dance" and new shamans were revealed at that dance. However, it is clear that such "power" was inferred only after the demonstration of outstanding ability in some domain of every day activity considered important by these people. As Cline phrased it, "The Okanagon regarded power as an essential cause of success. Actually, their belief in a person's power seems to have been the *result* (our italics) of his success" (Ibid: 136). According to Cline, "after childhood, every normal man and woman possessed it [power] in some measure; without it, he or she would have played little part in society" (Ibid).

Finally, Cline presents numerous examples of shamans trying to kill each other or other "powerful" people in the band by spiritual means in order to steal their "power" or to enact revenge. Indeed, shamans in this group were numerous and malevolent, at least according to the data presented. As a result of these beliefs, shamans and others in the band were very reluctant to reveal their "spirit" helpers for fear someone else would try to steal them. In fact, "powerful" people, including shamans were afraid to sleep because it was believed that theft of "spirit" guides could occur easily at that time. Revelations of ones "spirit" guides were only supposed to occur during the "winter dance." Finally, the "spirit" guardian was sought in childhood in a "vision" but was largely forgotten until adulthood when the individual dreamed of the guardian "spirit" which insured the formal association between the "spirit" and the "power" seeker conferred in the ceremonies at the "winter dance". Descriptions of actual shamans (who could be male or female) referred to trance during the "winter dance" but nothing was reported by Cline with respect to the training of the prospective shaman. Some allusions in his chapter indicate that the prospective shaman may have been identified by an already recognized shaman at that dance, *only after the novitiate had already sponsored several previous "winter dances"*.

With this background in mind, let us compare what Cline actually wrote with what Keyser and Whitley said he wrote. We want to emphasize that they combine ¶1b and 2b on p. 136 with ¶ 5b, p. 143 in one long paragraph.

Cline (¶ 1b, Cline, p. 136)
Shamans were simply those men and women whose power enabled them to practice curing as a profession. [Several sentences follow describing the status of shamans].

Cline (¶ 2b, p. 136)
There were special ways and occasions for one to announce his power. Two men on confidential terms might talk to each other about their guardian spirits, and watch each other paint symbols of them on a large rock in the hills. One of the men later told people that his comrade had painted these to show his power. When one had performed some special feat, as in hunting or war, he might declare his power to those who had witnessed the deed or benefited by it.

Keyser and Whitley (2004: 19)
Shamans were simply those men and women whose power enabled them to practice curing as a profession. . .There were special ways and occasions for one to announce his power. Two men on confidential terms might talk to each other about their guardian spirits, and watch each other paint symbols of them on a large rock in the hills. One of the men later told people that his comrade had painted these pictures to show his power. [Keyser and Whitley now skip to p. 143 ¶ 5b and continue quoting Cline as if there were no hiatus of 6 pages.] Only people with strong power painted pictures on rock. . .when he painted these pictures. . .[he]said to his friend 'I'm painting these here so you can call on me to help you.' The painters companion told other members of the tribe that so-and-so had painted the pictures which thus served as a kind of advertisement…These pictures…assisted the painter to employ his power, especially to cure sickness.

Cline (¶ 5b, p. 143). (The sentences in the following quotation that are omitted from Cline by Keyser and Whitley are indicated in italics). Only people with strong power painted pictures on rock. *One did not do this until he had sung his power song at his first winter dance.* When he painted these pictures*, he had with him a friend who knew their meaning and who could later call on him for aid from the pictures. The painter said* to his friend, "I'm painting these here so that if you ever have any illness or get hurt you can call on me to help you." The painter's companion told other members of the tribe that so-and-so had painted the pictures, which thus served as a kind of advertisement*. Often both men made rock paintings at the same time. There was no formal obligation in such friendship, though the two shamans usually remained friends for life and told their troubles to one another.* These pictures, *in some vague way,* assisted the painter to employ his power, especially to cure sickness, *but the cure itself did not have to take place near the paintings* (Ibid: 143-44).

Obviously, when quoted in its entirety, Cline's ¶ 2b does not address shamans at all. Moreover, by quoting from two widely-separated pages, they have deliberately distorted Cline's meaning to fit into their hypothesis that Okanagon shamans painted pictographs, in spite of the fact that Cline's original document contradicts them on significant points. Finally, there is no way to know if the paragraph on p. 136 refers to the same people as described on p. 143, (as Keyser and Whitley's method of selective quoting implies) but since the quotation on p. 136 discussed warriors and hunters explicitly, while only shamans are referred to on p. 143, we suggest it does not.

As a context for p. 143-144, beginning with p. 143 ¶ 5b, Cline had been describing the appearance of the guardian "spirit" in a dream during adulthood with respect to anyone in the band, and the discussion had not been limited to prospective "shamans." We want to note that at the "winter dance" people, who had been visited by their guardian "spirit" in a dream sometime during the previous year, had that relationship formalized during the ceremony. Some of the people, who were wealthy enough to sponsor such a dance and had done so on several occasions, subsequently became shamans, perhaps by self-selection and the affirmation of their choice by a recognized shaman. However, during the ceremony all members of the

band who had "acquired" their "spirit" and special "power" might also have that relationship formalized, and indeed this was one of the primary purposes of this dance.

Summarizing from the discussion of Cline's work, it seems clear from ¶ 5b that shamans did paint pictures on rocks, but once again, such painting does not appear to have been restricted to them, as anyone with "powers" might do so. Moreover, these paintings were associated with their "spirit" guardian and presented in symbolic form, which could not be understood by anyone else, unless the painter himself had revealed the meaning to a companion. Obviously, after the creators of the pictographs died, no one who had not heard the original story would have had any idea how to interpret them. The paintings were not related to trance experience, because the significant appearance of the guardian "spirit" to the individual occurred in a dream during adulthood, and it was the "spirit" guardian in the dream that was depicted.

What can we conclude from the three examples just analyzed? When Kehoe wrote that "there is no documented record of a shaman making rock art" she was mistaken; Keyser and Whitley have provided one source, the Conways, who have documented a reasonable *possibility* of one, perhaps two such instances. They have also provided the quotes from Cline that indicate shamans, as well as other individuals with special "powers" among the Okanagon, did paint rock images. On the other hand, none of the examples brought forth by Keyser and Whitley provide "any primary ethnographic documentation that in any way directly links rock art to trance," so Kehoe stands completely vindicated on that point. Since we have detailed the method of providing deliberate disinformation that Keyser and Whitley have utilized, it seems to us that given the passion of their criticisms against Kehoe, and the disingenuousness of much of what they wrote, as well as their distortions of primary sources, their "sins" of omission and commission greatly outweigh hers. We hope that the exposure of their nefarious methods can become widely disseminated, and it is our hope that in some small way we have contributed to that process.

In conclusion we submit that the examples included in this chapter suggest a pattern of distortion of primary ethnographic materials by Whitley, just as Hedges (2001a:123-136) suggested some years ago when he wrote:

> For the record, there is no confusion about what Whitley is doing. . .He chooses to selectively quote his sources, omitting information that is not only pertinent, but essential to a thorough understanding of the subject (p. 134).

We would add that Whitley also cites impressively long lists of classic ethnographic sources as if they support his views, but as we have seen, more often than not, this is not the case. It seems to us that anyone interested in the actual details of North American shamanism needs to obtain the primary documents and double check them, rather than relying upon Whitley's interpretations of them.

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Authors' note introducing Chapter 8. As mentioned above, we have encountered a distinct bias in the CAJ against critics of the TST model. For example, in addition to publishing an endless stream of pro-shamanic papers over the years, the journal chose to have the recent book by Pearson (*Shamanism and the Ancient Mind*) reviewed not by an impartial scholar, let alone a critic of the approach, but by the equally trance-fixed Chippindale (CAJ 13(1):129)! And similarly, after LW's own summary of his *Mind in the Cave* (CAJ 13:263), there were no invited comments from any specialists in cave art, let alone in neuropsychology -- the two major themes of the book -- but instead a series of comments from non-specialists in these domains which ranged from slavishly sycophantic to very mildly critical.

This phenomenon is by no means limited to the CAJ, and is actually quite widespread -- for example in the unrefereed *International Newsletter on Rock Art* (INORA) whose editor (an occasional co-author with LW) indulges in shameless plugs for pro-shamanic works, and enthusiastically prints outrageous personal attacks on critics of the approach, attacks which had previously been rejected by more reputable and refereed journals. Amid the mutual backslapping, seen most blatantly in the leading proponents "reviewing" each other's books in various journals, there have also been numerous scandalous cases on several continents of the blocking of articles and books which do not "toe the line". And we have already mentioned (p. 50) the utterly one-sided TV documentary made by Wilson, which took great pains to omit any hint of skepticism. In all these cases, the bias is so simple and self-servingly selective that it would have made the old editor of *Pravda* blush...

Chapter 8 contains one example where the dead hand of censorship was directed at Bahn. The second piece (Part B) is an answer to the question "What do you think of David Lewis-Williams' *The Mind in the Cave?* which was one of a series of questions answered by Bahn for an interview on the website of Oxbow Books in 2003. Following furious and all-too-predictable protests from a single source, Oxbow succumbed to pressure and reluctantly removed this answer from the web. Legitimate comment and criticism clearly cannot be tolerated in some quarters!

It was, in fact, somewhat curious that Bahn, Britain's leading specialist in Ice Age art, was never asked to review the book in any British journal; instead it received some rave reviews from individuals whose knowledge of the subject was, to say the least, minimal or outdated. However, he was subsequently invited to review the French edition, and so the first piece (Part A) is the full version of that review, written for the French journal *La Recherche*, October, 2004, which, alas, has strict word limits and so could only publish a summary of it.

Chapter 8, Part A
Bahn's Review of *The Mind in the Cave*
L'Esprit dans la grotte. La conscience et les origines de l'art.

By

David Lewis-Williams.

Traduit par Emmanuel Scavée
.Editions du Rocher, Paris. 2003. Ý22,50 E

This book, filled with speculations about hallucinations and "altered states of consciousness", is itself something of a mirage, an illusion -- because most unaware readers will be swayed by the author¹s eloquence into believing that he has mastered the various subjects covered in the text. Unfortunately, this is not the case. For example, his contrasting of Middle and Upper Paleolithic material culture is woefully out of date; and in his denigration of Neandertals as ignorant brutes with no capacity for imagination or culture, the author is not only about 50 years behind the times, but also carefully avoids all mention not only of the probable hybrid child of Lagar Velho, but also of the increasing number of specimens of Neandertal art, most notably the stone and bone "mask" of La Roche-Cotard, so well studied recently by Michel Lorblanchet, which alone serves to blow his whole approach to pieces. It goes without saying that he is equally silent about possible Lower Paleolithic artistic activity such as Israel's Berekhat Ram proto-figurine, and the inclusion of fossils in handaxes, etc, all of which attest to aesthetic concerns.

The main message of the book -- i.e. the author's well-known obsession with attributing virtually everything in cave art to shamans and to trance phenomena -- is based on apparently solid but in reality

erroneous foundations: firstly, on his highly idiosyncratic and distorted definition of shamans and shamanism which, in contrast to true specialists in the subject, he insists on applying to an enormous range of different practitioners around the world, and which he claims (p. 240) to be "omnipresent" in hunter-gatherer communities, which is simply untrue. Secondly, on his version of neuropsychological data, in particular the "3 stages of trance" which, he believes, are represented in cave art -- alas, the author's data have been revealed to be false or outdated by professional neuropsychologists, and the "3 stages of trance" model has been definitively refuted. Thirdly, he relies on his own highly selective and distorted interpretation of South African rock art and ethnography, all of which has been vigorously called into question, as has the equally controversial and disputed work by his disciples on North American rock art and ethnography.

Where cave art itself is concerned, he focuses on a very small number of carefully selected caves (Lascaux, Gabillou, each with a therianthrope) and extremely unrepresentative motifs (the "wounded men" of Cougnac and Pech Merle) to support his beliefs about the role and function of the caves. Fantasies about cave-walls being "veils" and "membranes", and speculations about what people did in which part of the caves, rapidly become "choses admises". Nothing is said about similar imagery in rock-shelters or the open-air, which of course are harder to link to "vision quests" and other such phenomena. The author's obsession drives him to utterly ridiculous speculations about sensory deprivation, and even to wonder (p. 305) if high levels of CO^2 were used by the Paleolithic people to produce altered states of consciousness -- but any speleologist could have informed him that CO^2 makes you ill or kills you -- it does NOT produce altered states of consciousness! At least, this time around, we are spared other ridiculous notions such as his earlier claim (Clottes & Lewis-Williams 1996:96) that the artists of Gargas chopped off their fingers in order to enter altered states of consciousness!

Throughout the book, the author stresses his mode of argumentation, insisting (understandably!) that proof is irrelevant and relying instead on weaving different strands of evidence together to form a "cable" rather than a chain of inference. Unfortunately, the vast majority of his evidence is fatally flawed, and, there are numerous simple errors of fact. For example

a) On p. 25 we are given a hackneyed and erroneous account of the supposed debate between Wilberforce and Huxley. In fact, nobody actually knows what was said in their exchange, and the traditional version was made up 25 years after the event -- this was spelled out in great detail more than a decade ago (e.g. Gould 1992).

b) Contrary to LW's claims (pp. 28 and 32), it is certain that Ruben de la Vialle did indeed see the animal depictions of Niaux in 1660, since he wrote his name on the only panel of the Salon Noir left undecorated by the Magdalenians (see Simonnet 1980:13; Bahn & Vertut 1997:16).

c) Contrary to LW's statement (p. 29), the first Paleolithic art objects were not found in the grotte Chaffaud in the 1830s, but in that of Veyrier in 1833; the famous Chaffaud piece was found in 1852 (Bahn & Vertut 1997: 14, 214).

d) The caption to figure 6 on p. 31 is riddled with error. The carved spearthrower depicted is from Bédeilhac, not Le Mas d'Azil; the carving of a bison licking itself, from La Madeleine, is not in mammoth ivory but in reindeer antler; and similarly, the Lortet baton is not bone but reindeer antler.

e) On pp. 38-40, LW states that Breuil played a central role in the discovery of the clay bison in the Tuc d'Audoubert in 1912; and that Bégouën sent him a telegram about Magdalenians also modelling clay, to which Breuil telegraphed in return "J'arrive". In fact, the exchange of these famous telegrams was between Bégouën and Cartailhac. Breuil was informed of the find by letter, and he played no role at all in the discovery.

f) On p. 44, LW tells us that Willard Libby was a physicist who received the Nobel prize for Physics; in fact he was a chemist who received the Nobel prize for Chemistry.

g) On p. 65, we are told that three school boys found Lascaux. In fact there were four of them, though the true story of the discovery is actually far more complex (see Delluc & Delluc 2003).

Readers may well find each of these errors a trifling matter, and certainly, when looked at separately, they may appear to be trivial threads; but when woven together they form a strong cable of evidence pointing to very sloppy standards of scholarship, a lack of mastery of the subject, and an apparent reluctance or inability to check basic facts. The same can certainly be said of other aspects of this author's work, particularly his handling of neuropsychological data (see Helvenston & Bahn, this volume).With the exception of LWs collaborators, I do not know of a single specialist in Ice Age art who takes this misinformed book or this whole misguided approach seriously. It is a telling fact that no mention is made in this book of the abbé André Glory's equally ill-informed obsession with shamanism in relation to cave art in the 1960s, nor of André Leroi-Gourhan's succinct but severe rejection of that approach. Lewis-Williams denies that he is simply applying ethnography to the Upper Paleolithic, and is instead seeking generalisations, but it is obvious that he is indeed applying a simplistic and flawed model to a highly complex phenomenon, and fitting facts to the theory, instead of vice versa: in his own words (p. 133) "Nous avons là un bel exemple de contamination de notre connaissance du passé par les valeurs et les pratiques d'aujourd'hui" (What we have here is a case of our knowledge of the past being contaminated by present-day values). I fear that the contamination by this book will do considerable damage to cave art studies for years to come. Some readers may feel this judgment is severe but, as the literary critic James Wood put it, "I am accused of being too harsh, but the critic's job is to look at the threats, the menaces to literature". I certainly consider this book to be a threat and a menace to the study of cave art. The artists deserve far better than this.

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Part B
Bahn's response to question, "What Do You Think of *The Mind in the Cave*"?

I will limit my remarks to this book's treatment of cave art, since I could go on at equal length

about its incredibly blinkered and outmoded view of Neanderthals. In recent years the world of rock art studies, and of cave art studies in particular, has been enduring an epidemic of what has been called "shamania", in that virtually every corpus of rock art, from any period or region, has had the label "shamanic" or "shamanistic" slapped onto it for no good reason; and an obsession with linking rock art with so-called "entoptics" and "altered states of consciousness" and "trance imagery" has been substituted for objective and original thought. This new book is merely the latest example of this distressing and damaging trend. I could write pages about this, but it will suffice to direct interested readers' attention to a recent book, *The Concept of Shamanism: Uses and Abuses*, edited by Henri-Paul Francfort and Roberte Hamayon, 2001) in which a large number of rock art specialists from all round the world have explained why this is all nonsense, and why it is simply impossible to identify rock art imagery that can plausibly be linked to something like "shamanism" -- even in Siberia, the heartland of true shamanism.

As far as I know, *The Mind in the Cave* has yet to be reviewed by a specialist in cave art. The recent review in the *Sunday Times* was appalling, since its author clearly knew absolutely nothing about cave art, let alone about Neanderthals, and so admiringly swallowed the book's claims whole -- and the headline in the newspaper's review section that "the mystery of Lascaux cave" had been solved was the last straw! The vast majority of Ice Age art specialists find this entire approach a waste of time, a great leap backward to the 1920s when the ethnography of so-called "primitive" societies was simply transferred en masse to Ice Age data. The difference this time is that the "new" approach was -- apparently solidly -- based on two platforms: the interpretation of ethnographic testimony from southern Africa; and the concept of "entoptics" and the universal "3 stages of trance" model, derived from neuropsychology. Unfortunately, both of these platforms are riddled with woodworm.

Anne Solomon has already shown repeatedly that the sparse testimony from Bushmen in the late 19th century should be interpreted literally, rather than through the tortuous metaphors of the "shamaniacs", and that it relates their rock art to mythology. Moreover, the shamaniacs have always claimed that the southern Bushmen are extinct, and so they take their ethnography about "trance dances" and so forth from the remote Kalahari Bushmen who never had any rock art. But now, several scholars have tracked down numerous descendants of the southern Bushmen, who still visit the decorated shelters and can tell us things about them -- needless to say, what they tell us bears absolutely no resemblance to this "trance imagery" nonsense.

And second, the neuropsychological data that have been presented to validate the model were already erroneous, distorted or hopelessly outdated when first put forward in 1988. Unfortunately, rock art specialists have no contact with that domain, and so we all -- myself included -- simply accepted what we were told, trusting that the authors knew what they were talking about. It certainly sounded convincing, and well-researched, and scientific enough, with quotations from impressive sources. Had we bothered to check the facts with neuropsychologists at the time, we would have learned the truth so much more quickly.

In fact it was only in late 2001 that I was contacted by Dr Patricia Helvenston, an eminent American neuropsychologist, who was absolutely incensed at the travesty of her discipline's data that was

being promulgated by the shamaniacs. She and I therefore published a booklet last year *Desperately Seeking Trance Plants: testing the "three stages of trance" model* -- which, for the first time, exposed the utterly bogus nature of the model: none of the numerous kinds of natural "trance" produces the "3 stages**",** and the only drugs which do so are mescaline, LSD and psilocybin. So we present the first test of this unverified and unverifiable model -- i.e. if you want to argue that the cave artists underwent 3 stages of trance, and that these show up in their imagery, you have to prove that they had access to, and used, these hallucinogens -- which of course they did not. It's rubbish. Alas, I don't have space here to get into the massive and widespread misuse of the terms "shaman", "shamanism", "trance" (often falsely equated with shamanism), "entoptics", and so forth.

What is so exasperating is that nobody checks the facts -- and, as I say, I was as much to blame for this as others until recently. I am willing to bet that the publishers of this new book did not get a neuropsychologist to take a look at it, let alone an objective cave art specialist -- despite the crucial importance of doing so. So the bandwagon rolls on, and the uninformed and the uncritical believe what they are told, even though it is completely erroneous. It's really "pashmina prehistory", a fad which is now on its last legs, fortunately, as word gets around -- it is a common phenomenon that many people start following a trend just as it goes out of fashion! But this one is particularly unfortunate – it's easy-listening, and media-friendly, of course -- the media love to be told that we know what cave art or rock art means, and of course anything that smacks of drugs, magic, hallucinations and so forth is bound to appeal to them. Basically, it's McArchaeology – all additive and no substance.

But while it is sad that the public is being fed such baseless stuff, the principal danger comes from the fact that most American and British students do not have access to, or cannot read, the literature in French or Spanish, and consequently the few available books in English become their only source of information about cave art -- so it is imperative that those few sources should present as factual and objective a picture as possible. I fear it will take years to repair the false image that this very eloquent book is likely to produce in gullible or uncritical minds.

I am reminded of another recent case; that of the controversial book by Bjorn Lomborg called *The Skeptical Environmentalist* which has aroused tremendous publicity despite being panned by almost all the specialists in that field -- as one critic, Tom Burke, wrote of Lomborg, "he is a cunning manipulator and a good communicator. He has a weak case but presents it so well that everyone switches off their crap detectors."

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