

## Neuropsychology and Upper Palaeolithic Art: Observations on the Progress of Altered States of Consciousness

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Criticisms of the three stage model of altered consciousness and its utility in the study of certain rock arts (Lewis-Williams & Dowson 1988; 1993; Lewis-Williams 2001; 2002) were recently put forward in a privately published, but widely disseminated, pamphlet. The authors, Patricia Helvenston and Paul Bahn, sum up their principal point:

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 psilocybine. The 'three stage' model does not describe naturally induced trance states . . . (Helvenston & Bahn 2002, 7).

Near the beginning of a more recent article, they reaffirm this position:

This systematic consideration [the 2002 pamphlet] of the most common trance states demonstrated that the only trance states that are consistent with those described in the TST [their acronym for their own name: Three Stages of Trance] model are drug-induced trances caused by plants containing mescaline, lysergic acid diethylamid (LSD), or psilocybine. The TST model does not describe naturally-induced trance states nor trance states induced by other hallucinogens contained in plant materials (Helvenston & Bahn 2003, 213; parentheses in square brackets added).

The second part of Helvenston and Bahn's argument is, as they themselves say, posited on this initial point:

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 . . . (Helvenston & Bahn 2002, 7).

Helvenston and Bahn are, however, apparently unaware of neuropsychological literature that destroys their contention that psychoactive substances are essential for the induction of the three stages of altered consciousness. Their extended argument is constructed on an empirical and easily exposed error.

But what exactly is this model?

### The three-stage neuropsychological model of altered states of consciousness

The first stage of the model is the one that is disputed. Helvenston and Bahn claim that it is induced only by certain hallucinogens.

Experienced in a comparatively mild altered state of consciousness, stage one includes geometric, luminous, non-veridical visual percepts, such as undulating lines, grids, and nested curves. These geometric percepts are referred to in the literature as phosphenes, form constants or, the term I favour for reasons given in 1988, entoptic phenomena (Lewis-Williams & Dowson 1988, 202). 'Entoptic' means within the optic system (i.e. anywhere from the eye to the visual cortex); recent research has shown that the geometric percepts originate principally, though not exclusively, in the neuronal structure of the brain (see below). 'Within the eye itself' is better designated by 'entophthalmic' (Walker 1981).

At this point, a corollary of the identification of geometric visual percepts needs to be mentioned. It pertains to my own argument concerning Upper Palaeolithic imagery that I base — *in part only* — on the human universality of entoptic phenomena (Lewis-Williams 2002). Both in our 1988 article and subsequently, Dowson and I made an important but often overlooked point: 'As much as any of our critics we resist identifying practically any geometric motif by itself as entoptic in origin and therefore indicative of shamanism' (Lewis-Williams & Dowson 1990, 407). Elsewhere, I have set out in detail the structure of the argument that may, in some instances, lead to the suggestion that some geometric rock-art imagery may have originated in entoptic percepts (Lewis-Williams 1991; 2002); I need not repeat it here.

In stage two of the model of altered consciousness, subjects begin to make sense of the geometric percepts. They may, for instance, say that iridescent undulating lines *are* snakes. Stage three is characterized by 'visions' of people, animals and monsters, as well as hallucinations in all the senses; subjects participate in their own imagery. Geometric imagery may now be peripheral or combined with iconic images. The third stage is frequently reached by seeming to pass through a vortex or tunnel, or by a sensation of flight.

We need to note briefly two general points. First, the model does not imply that the three stages are ineluctably sequential, as Helvenston and Bahn seem to believe. This point has been made explicitly:

'These three stages are not necessarily sequential. Some subjects appear to move directly into the third stage, while others do not progress beyond the first' (Lewis-Williams & Dowson 1988, 204). Depending on cultural circumstances and sometimes on explicitly generated expectations, subjects may proceed swiftly to stage three and have little or no memory of stage one. Secondly, Dowson and I made it plain that the stages grade one into another; they are not separate entities: 'Nor should the stages be considered discrete. Construal, for instance, may occur in Stage 3, with construed entoptics accompanying true iconic hallucinations' (Lewis-Williams & Dowson 1988, 204). The model is a heuristic device that is superimposed on that part of the spectrum of human consciousness that includes autistic (inwardly directed) states (Lewis-Williams 2002).

Now here is the nub of the matter. Are Helvenston and Bahn correct in their pivotal claim that a sequence of all three stages is *exclusively* a result of drug-induced altered consciousness?

### Evidence

They base their assessment largely on Helvenston's years as a 'practicing clinical neuropsychologist' in Denver and Chicago (Helvenston & Bahn 2002, 3): '(A)s 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"' (Helvenston & Bahn 2002). No publications by Helvenston are cited. Whatever may have been her experience and however diligently she and Bahn may have searched the literature, there is, contrary to their claim, evidence that stage-one entoptic phenomena (the disputed element) may be experienced, as may stage-two and stage-three hallucinations, *without drug stimulation*.

Perhaps the simplest case is the migraine scotoma, the glittering 'fortification illusion' experienced by so many people without recourse to drugs (Sacks 1970; Richards 1971; ffytche & Howard 1999, 1252). This luminous, jagged arc starts near the centre of the field of vision and expands until it passes beyond the periphery. Sacks (1995) also writes of migraine-induced latticed, faceted and tessellated motifs, as well as images reminiscent of mosaics, honeycombs, Turkish carpets or moiré patterns.

In addition to migraine, geometric percepts are also experienced in hypnagogic states. Hypnagogia, a liminal state between wakefulness and sleep (very similar hypnopompic states are between sleep and

wakefulness) is, like all altered states of consciousness difficult to define. It is easier to deal with the phenomenology of what is experienced in those conditions.

Klüver, whom Helvenston and Bahn cite on other points, found, *contra* those writers, that entoptic elements (form constants, in his phrase) occurred in hypnagogic states:

Some or all of the form constants found in mescaline hallucinations are also found in certain hypnagogic hallucinations, in entoptic phenomena, in the visual phenomena of insulin hypoglycemia, and in phenomena induced by simply looking at disks with black, white, or coloured sectors rotating at certain speeds (Klüver 1966, 67).

More recent hypnagogia studies have provided further evidence:

A great many reports begin with references to moving clouds of bright colours or mist and to 'little luminous wheels, little suns that whirl rapidly round, little bubbles of different colours that go up and down,' 'luminous points and streaks, which shift and change in remarkable ways,' 'thin threads of gold, silver, purple and emerald green, which seem to cross over or curl up in a thousand different symmetrical patterns, continuously vibrating, forming innumerable little circles, diamonds or other regular shapes,' and often developing into complicated structures, faces, scenes or landscapes (Mavromatis 1987, 15).

The three-stage model that leads from geometric percepts to iconic hallucinations is readily discerned in this account. In hypnagogic states, mercurial geometric shapes precede the kind of hallucinations characteristic of stage three, even though no drugs are involved. Significantly, the faces reported were 'human, but resembling animals' (Mavromatis 1987, 17); therianthropy is commonly experienced in altered states (Lewis-Williams & Dowson 1988, 212). Like other mental imagery, hypnagogic percepts can be cultivated and controlled; such is the goal of some shamanistic training (Noll 1985).

This information, drawn from migraine and hypnagogia, is alone enough to discredit Helvenston and Bahn's argument, but there is more.

Etzel Cardeña, currently president of the Society for Clinical and Experimental Hypnosis and past president of the Society of Psychological Hypnosis of the American Psychological Association, has conducted thorough quantitative and qualitative experiments with suggestion-free hypnosis and has found that geometric percepts *are* experienced in deep hypnosis. It is perhaps not surprising that Helvenston

did not find a similar pattern in her clinical hypnosis work. She does not seem to have employed Cardeña's method: he used hypnotic virtuosos and asked them to go as deeply into hypnosis as possible, a procedure that is not typical of therapeutic hypnosis sessions. Cardeña (1988; 1992; 1996) has published his research, so it is indeed available. He has kindly summed up his results thus:

Qualitative enquiry showed that a typical experiential sequence was to have mild alterations in body sensations and image (including geometric patterns, tunnels, etc.) during light hypnosis, followed by more complex, realistic, and disembodied experiences during medium hypnosis. In the deep state of hypnosis, participants mentioned very unusual experiences such as a sense of utter darkness and voidness, alternating with a bright light, and a sense of potentiality and being in contact with everything. Results show that high hypnotizables have consistent alterations of consciousness in a minimal suggestion hypnosis context, that these alterations can be better conceptualized as distinct states rather than along a continuum of alterations, and that these phenomena are remarkably similar to those reported in other literatures dealing with mystical, near-death, shamanic, and other anomalous experiences (Cardeña pers. comm. 2003; his parenthesis).

Interestingly, Cardeña compared his subjects' experiences with those of shamans in an article that received the 1997 Society for Clinical and Experimental Hypnosis's Hilgard Award (Cardeña 1996). In it he shows that other common shamanistic experiences, like dismemberment and skeletonization, flying, passage through a tunnel, and a sense of brightness and light, are also experienced in hypnotic, non-drug-induced conditions. He concludes that, although cultural context plays a role in shamanistic experiences, 'it is still valid to speak of shamanism because of the striking similarities in general process ideation and content of the experience' (Cardeña 1988, 297).

Cardeña's work shows that the three-stage model is valid for hypnotic states and — once more — that the experience of geometric visual percepts as a prelude to iconic hallucinations is *not* exclusively a result of drug-ingestion.

Another pillar of Helvenston and Bahn's argument is that geometric entoptic percepts are not generated by sensory deprivation, such as is experienced in the dark, silent Upper Palaeolithic caves. Again, they are in error. Sidney Cohen writes:

The condition called sensory deprivation is of interest to those who are trying to understand hallucinogenic activity. Sensory deprivation consists of

the reduction or elimination of stimuli from the outside . . . The effects of prolonged diminution of sense input are remarkable . . . A mixture of visual pseudohallucinations and hallucinations may ensue; more rarely, auditory and tactile misperceptions are reported over the (laboratory) recording system . . . The hallucinatory activity is of interest because it is reminiscent of that induced with psychedelic drugs. *Patterned images are often seen and are described as wallpaper or stroboscopic designs* . . . Many of the signs of sensory deprivation are similar to those seen from time to time with LSD. . . the symptoms reported under both conditions overlap, although the intensity may be greater with the drug (Cohen 1964, 52–5; parenthesis and emphasis added).

So much, then, for the clear validity of the three-stage model. Next, we ask: If the mental imagery of all three stages is accessible independently of hallucinogens and if the stages are commonly experienced in migraine, hypnagogia, hypnosis and sensory deprivation, how may they be explained?

### In the brain

Ignoring the role of the cortex in the generation of geometric visual percepts, Helvenston & Bahn (2002, 11) aver: 'Today, few, if any, neuropsychologists would consider phenomena produced within the eyeball to have any significant relevance to typical hallucinations, either simple hallucinations (which would include geometric signs and phosphenes as referred to by LW&D) or complex hallucinations.' It is difficult to discover the force of this statement. In the first place, they ignore the fact that I have 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.)

Secondly, and more importantly, Helvenston and Bahn ignore neurological research on geometric visual percepts. It has long been thought that geometric entoptic phenomena are in some way wired into the human brain. Heinrich Klüver (1966), a writer whom Helvenston and Bahn consider *passé* but whose work has in fact been largely vindicated, concluded that the patterns reflect a fundamental neuronal mechanism, though he was unable to identify it. Dominic ffytche and Robert Howard (1999, 1255) have attempted to 'reformulate Klüver's intuition in

the light of what we now know of the neurophysiology of vision’.

They and other researchers have demonstrated the origin of geometric visual percepts in the anatomy of the visual brain, specifically in areas V1 and V2 of the visual cortex (Burke 2002). In studies that centred on visually impaired subjects who experienced hallucinations of animals, objects and patterns (such as grids and ‘scaffolding’) and that extended to other subjects with no visual impairment, ffytche & Howard reached a significant, clearly stated conclusion. They were able to show that geometric percepts are ‘reported by patients with visual pathway infarcts and by normal sighted subjects during visual sensory deprivation, stroboscopic stimulation, the hypnagogic state, and under the influence of psychedelic drugs’ (ffytche 2002, 472, emphasis added; see also ffytche & Howard 1999; ffytche *et al.* 1998; Santhouse *et al.* 2000).

This research, apparently unknown to Helvenston and Bahn, considers a number of geometric entoptic forms:

- Tessellopsia (grid patterns construed by subjects as brickwork, lattices, netting, crazy paving, cobwebs and chequerboards). Klüver (1966, 22), Horowitz (1975, fig. 2) and others had earlier identified these forms.
- Dendropsia (irregular branching forms described as maps, trees or branches). Horowitz (1975), Siegel (1971) and others had also noted dendropsia.
- Polyopsia (reduplication of images, both geometric and iconic) (ffytche & Howard 1999).

The results of this research show that geometric visual percepts can be caused by cerebral pathology, sensory deprivation and migraine, in addition to ingestion of LSD or mescaline. In the case of sensory deprivation, ffytche & Howard (1999, 1251) cite Heron *et al.* (1956): ‘This tended to be “simple” in form (rows of dots, geometric patterns, mosaics, etc.).’ Dendropsia was reported by subjects with cerebral pathology and migraine and who had ingested the named drugs.

ffytche & Howard (1999, 1249) relate the geometric percepts to ‘the known neurobiology of the visual brain’. Important comparable work has also shown that the clinically and ethnographically reported tunnel experience is also generated by the structure of the visual cortex (Bressloff *et al.* 2001).

All this neurological research invalidates Helvenston and Bahn’s argument. Yet again, we see that entoptic phenomena may be experienced without drugs.

In sum, the conditions that trigger stage-one entoptic percepts include certain pathologies (including migraine), stroboscopic stimulation, hypnosis, hypnagogia, and, especially damaging for Helvenston and Bahn’s argument, sensory deprivation. There is therefore no point in insisting, as they do, on finding traces of certain hallucinogens in site deposits.

### Is this a ‘debate’?

It needs to be emphasized that this conclusion is not a matter of ‘interpretation’ or ‘opinion’. On the contrary, it is an empirical issue: the literature reports research showing that the full range of hallucinations, as encompassed by the three-stage model, can be experienced in circumstances that do not include drug ingestion, and, moreover, that the experiences derive from the structure of the human cortex. The way in which the three-stage model may be used (or misused) in research is another matter altogether. As I have argued, it is certainly no ‘quick-fix’ tool that can simply and by itself demonstrate the shamanistic context of an art (Lewis-Williams 1991; 2001; 2002).

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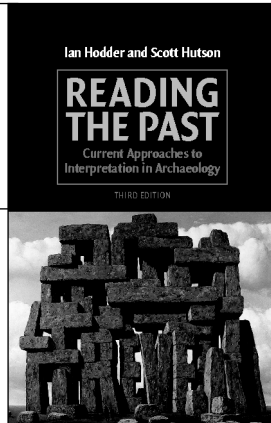
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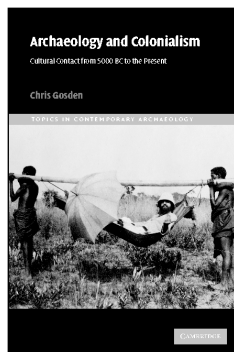
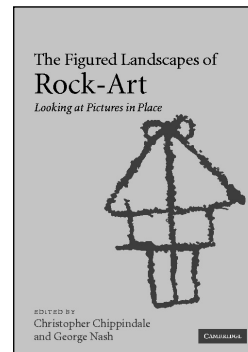
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