Awakenings VI

Salience

SALIENCE
MAY 19, 2025

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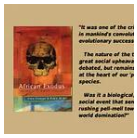

Awakenings II

PETER WEBSTER • 15 APRIL 2024

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Awakenings

SALIENCE • 23 MAY

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Perplexity AI: “The word *salience* derives from the Latin verb *salire*, meaning "to leap" or "to jump". The noun form comes specifically from the Latin present participle *saliens*, which means "leaping" or "bounding". This etymological root captures the sense of something that stands out, projects, or "leaps out" from its surroundings — a meaning that has persisted into modern usage.”

Wikiwand: “[The perception of] Salient events is an attentional mechanism by which organisms learn and survive; those organisms can focus their limited perceptual and cognitive resources on the pertinent (that is, salient) subset of the sensory data available to them.”

Along about 1990 I began to collect reports, papers, books, and published research that would support the idea that psychedelic experience could be at least partially explained by positing that psychedelic chemicals produce an increase in the perception of salience. Not just for sensory input, but also for ongoing thinking, heuristic quests, creative projects, and other ongoing cognitive processes both conscious and perhaps unconscious as well. My hypothesis was not just something out of the blue, but followed from some ideas expressed by Alan Watts, Aldous Huxley, and tentatively supported by my own and some friends' introspective explorations while experiencing a few low-to-moderate-dose LSD sessions.

I had read Alan Watts' thoughts on the matter:

> I have said that my general impression of the first experiment was that the "mechanism" by which we screen our sense-data and select only some of them as significant had been partially suspended. Consequently, I felt that the particular feeling which we associate with "the meaningful" was projected indiscriminately upon everything, and then rationalized in ways that might strike an independent observer as ridiculous—unless, perhaps, the subject were unusually clever at rationalizing. However, the philosopher cannot pass up the point that our selection of some sense-data as significant and others as insignificant is always with relation to particular purposes—survival, the quest for certain pleasures, finding one's way to some destination, or whatever it may be. [1]

And of course by 1990 just about everyone had read Aldous Huxley's account in *The Doors of Perception*, published in 1954:

> I took my pill at eleven. An hour and half later I was sitting in my study, looking intently at a small glass vase. The vase contained only three flowers — a full-blown Belle of Portugal rose, shell pink with a hint at every petal's base of a hotter, flamier hue; a large magenta and cream-coloured carnation; and, pale purple at the end of its broken stalk, the bold heraldic blossom of an iris. Fortuitous and provisional, the little nosegay broke all the rules of traditional good taste. At breakfast that morning I had been

> struck by the lively dissonance of its colours. But that was no longer the point. I was not looking now at an unusual flower arrangement. I was seeing what Adam had seen on the morning of his creation — the miracle, moment by moment, of naked existence... [I was seeing] a bunch of flowers shining with their own inner light and all but quivering under the pressure of the significance with which they were charged... [And] the books, for example, with which my study walls were lined. Like the flowers, they glowed, when I looked at them, with brighter colours, a profounder significance. Red books, like rubies; emerald books; books bound in white jade; books of agate, of aquamarine, of yellow topaz; lapis Lazuli books whose colour was so intense, so intrinsically meaningful, that they seemed to be on the point of leaving the shelves to thrust themselves more insistently on my attention... At ordinary times the eye concerns itself with such problems as Where? — How far? — How situated in relation to what? In the mescalin experience the implied questions to which the eye responds are of another order. Place and distance cease to be of much interest. The mind does its perceiving in terms of intensity of existence, profundity of significance...

But (perhaps for a deficit of salience detection among those in the research community?) there seemed to be no research followup to Huxley's repeated stress on how his increased perception of salience, "profundity of significance", was a major if not pre-eminent feature of his psychedelic experience. Could a comprehensive theory be developed that salience *amplification*, generated by a psychedelic chemical, was the mystery cognitive process between "chemicals on receptors" and the vast multiplicity of "effects" as enumerated in the psychedelic literature? (see figure 1 and text in Awakenings V).

Whatever the mystery cognitive process was, I concluded early on that

1. It can operate at a great range of intensity or levels of efficiency, perhaps analogous to the range of fear a human can experience, from a mild cautiousness to a hair-raising attempt to flee the scene. This may be an apt analogy also since the range of intensities of a single thing, fear, can lead to a wide variety of completely different behaviours, not just a single behaviour

carried out at different levels of exertion. And in that observation it is evident that a choosing agent is involved. ...The *brain* doesn't decide on and determine conscious behavior, the *person* does.

2. Its intensity of operation is determined by the size of drug dose, or in the case of alternative methods, the diligence of the meditator, the level of extreme sport exertion, the length and or nature of the "religious technique", and so on. In other words, the characteristics of the input determine whether the cognitive process is merely a mild change, or perhaps a radical and overwhelming influence on what the person then *does* (*not what happens to him*!) during his experience.

3. It is the same operation in all cases, whether weak or strong, incited by a drug or other input, or even no apparent input at all (spontaneous mystical experience).

4. The mystery cognitive process is something that is positive, i.e., not a lack or corruption of some other type of neuro-cognitive activity, not the cessation or pollution of some normal process nor the confusing or "entropic" disruption of normal brain operation, nor is it an overload or breakdown of some brain circuits or cognitive system. (I was perfectly aware that some researchers had extensive libraries of fMRI Brain Scans that they claimed showed such effects as "overload", "breakdown", etc., but under such conditions it would seem more logical that the psychedelic experience would be one of confusion, not of clarity, not the sort of thing Huxley describes, not an Awakening.)

5. It is also a *normal* function and always present to some degree as a precursor and contributor to our conscious awareness, our *do-ings*, although it might be radically diminished or essentially eliminated in certain persons in some circumstances.

6. When psychedelic drugs are used as "curative agents", it must therefore be the case that the activation of the mystery cognitive process, perhaps to an extreme level, is what leads to the curative result, i.e., the patient is therefore

"curing himself" since the drug *only affects the in-between process* and the resulting behavior is *voluntary.*

Some further support came from a paper in *50 Years of LSD: Current Status and Perspectives of Hallucinogens* [2]

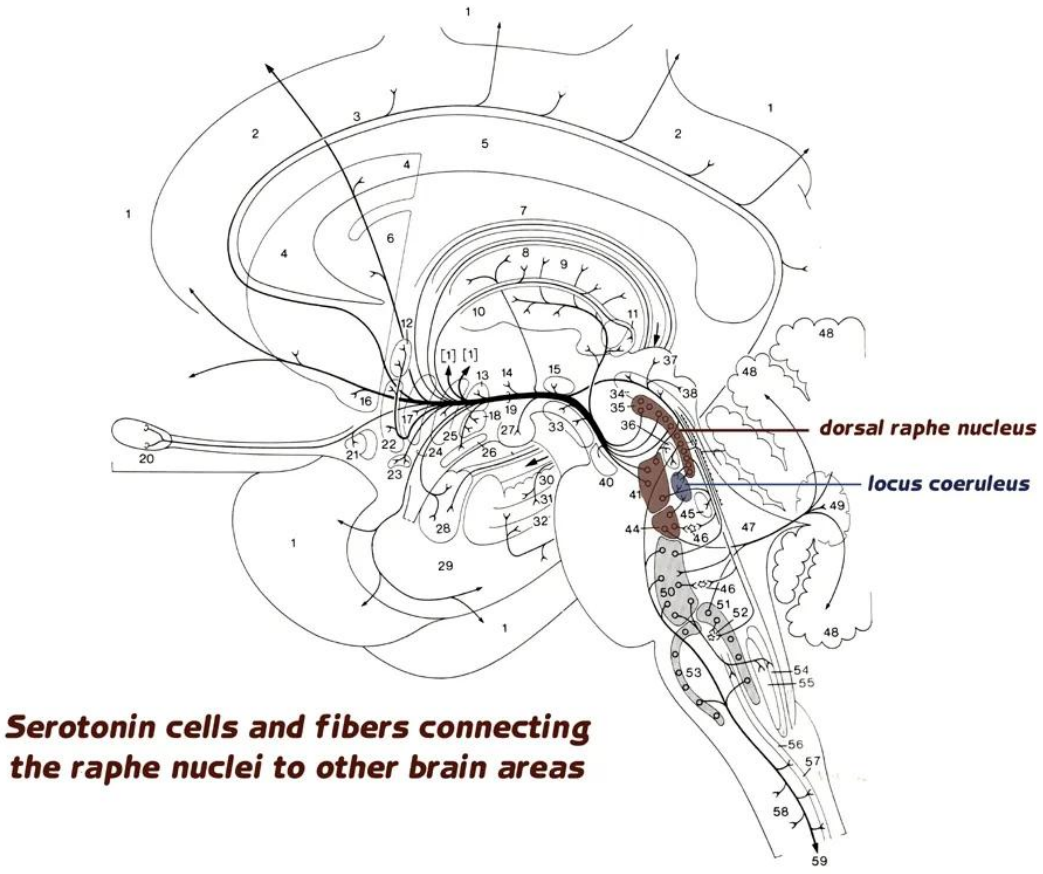
G.K. Aghajanian, chapter 3:

“LSD and phenethylamine hallucinogens: common sites of neuronal action”,

SHARED ACTIONS OF HALLUCINOGENS

Locus coeruleus

> The locus coeruleus (LC) consists of two dense clusters of noradrenergic neurons located bilaterally in the upper pons at the lateral border of the 4th ventricle. The LC, which projects diffusely to virtually all regions of the neuraxis, receives an extraordinary convergence of somatic, visceral and other sensory inputs from all regions of the body and has been likened to a novelty detector!



and, on page 19 of 50 *Years*:

> A significant observation was made in 1968 by Aghajanian and colleagues, who showed that systemic administration of LSD caused a cessation of spontaneous firing of the 5-HT- containing neurons of the dorsal and median raphe nuclei. These early observations have been confirmed and extended by numerous other investigators.

I continued my studies on the matter, and in June of 2001 I decided to write to Jaak Panksepp, author of the remarkable treatise, *Affective Neuroscience: The Foundations of Human and Animal Emotions*, [3] to see if my ideas might hold some promise, I wrote:

> I've noticed in your book, and in a few other sources, a mention of the fact that the locus coeruleus is seen to be very active when an animal is experiencing significant or salient features in its environment, whether they be threatening or pleasing, positive or negative. But in the sources I've seen that mention this, it seems that it is taken for granted that the locus coeruleus is "reacting" to the salience observed and oriented to by the animal.
> In my investigations of what might be the initial "causes" of the altered states of consciousness produced by hallucinogens I have been snooping around the neuro-cognitive literature, and come up with an idea that instead of reacting to salience, perhaps the locus coeruleus is the controlling center for a brain-wide functional module whose major task is the *detection* of salience, not only for the sensory input in animals in general, but enlarged in function in humans to provide detection of salience even in ongoing heuristic thought. That this module would involve such an ancient brain part might be understandable if we grant that rapid "automatic" detection of salience in the environment would be of such advantage that evolutionary pressures would have brought it into existence very early, in very primitive brains. I believe that even very simple animals have locus coerulei. [4]
>
> I won't trouble you with further explanations of my idea here, nor mention

> any of the evidence I've discovered that might support it, but simply would like to know your "down-and-dirty" opinion of this hypothesis, and perhaps suggest some leads that might shoot it down or, hopefully, indicate its possibility. In reference to the effects of hallucinogens, of course, it seems that the serotonin system is first altered by these substances, but I believe that the raphe nuclei have a controlling function over the locus coeruleus, perhaps acting to control the "gain" of whatever functions the locus coeruleus accomplishes. My overall hypothesis must thus be clear to you! Such theorizing is of course best undertaken by professionals, but due to the lack of well-funded teams of such pros who even consider altered states of consciousness something worthy to be studied,[footnopte remember this is in 2001 before the Psychedelic Research Bonanza of the past few years got underway] now the task is left to amateurs like myself who have thus necessarily made a hobby of the cognitive neurosicences!

Professor Panksepp replied,

> Hi Peter,
> I am just off for a few weeks in Europe in a few hrs, so let me give you a quick reply. Your hypothesis is very much in the right direction. . . indeed, I suspect it is implicitly in the minds of most neuroscientists. It has been long known that the LC sets up attentional processes in the cortex, and there are many sensory and emotional inputs that could achieve this. Lots of neuropeptides feed into the LC, so it is really not necessary to make it the first and only link in the salience cascade, but certainly a prominent one. In short, I see no problem with this hypothesis, and in a sense it is implicit in the neurophysiological finding that LC-NE increases signal to noise levels throughout sensory cortices.

In Aghajanian's paper mentioned above, the association between the Locus coeruleus and the Raphe nuclei are discussed in detail. "Thus, the effects of hallucinogens on the LC appear to be mediated by 5-HT2 receptors."

Encouraged by all this support for my hypothesis, I prepared a lecture for the 2006 Basel LSD Symposium. The lecture is still online at

The idea that psychedelic drugs might cause an *amplification* of some neurocognitive process must be credited to pioneer LSD researcher Stanislav Grof who very early on wrote:

> By and large, I have not been able to discover during the analyses of my data any distinct pharmacological effects of LSD in humans that would be constant and invariant and could therefore be considered drug specific. At the present time, I consider LSD to be a powerful unspecific amplifier or catalyst of biochemical and physiological processes in the brain. It seems to create a situation of undifferentiated activation that facilitates the emergence of unconscious material from different levels of the personality. [5]

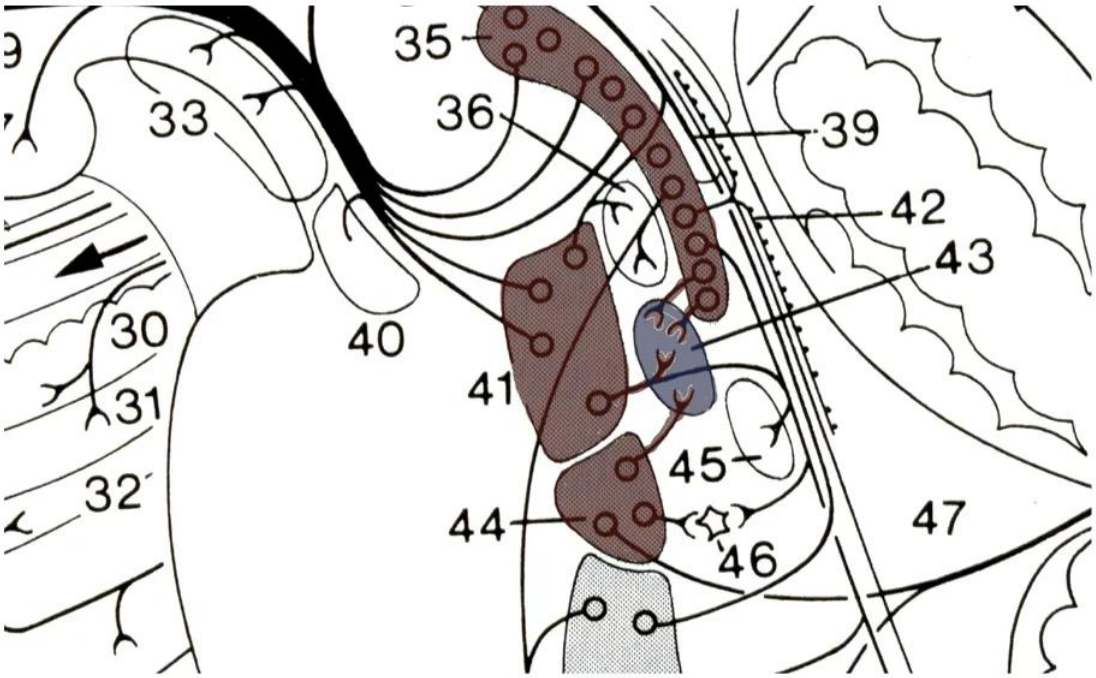
The problem with LSD being an *unspecific amplifier* parallels the problem stated in Awakeninmgs V: How to get from "chemicals on receptors" — an event that for similar-sized doses is essentially the same no matter where or when the dose is taken — and the astonishingly wide range of "effects", which I noted should be called "features of the psychedelic state" and not "effects" of the psychoactive chemical. If the amplificatin is to be unspecific, what then

determines the outcome of that amplification, what features of the psychedelic experience occur — surely it is not just a random selection.

Also, *contrast* is needed: if all ongoing processes are ampified the voyager is pretty much in the same state as before, whereas if one specific neurocognitive process is amplified, it stands out from the rest, and becomes the important factor in the chain of causation and voluntary action. Based on experience, memory, and yes, set and setting, we detect *saliens*, which means "leaping" or "bounding". This etymological root captures the sense of something (in the perception of objects, sounds, even odors, and most important, *ideas*) that stands out, projects, or "leaps out" from its surroundings.

It was a short step to take the amplifier idea and propose that a very specific cognitive process was the target. Now it could be stated that a distinct pharmacological effect of LSD in humans that was constant and invariant had been discovered:

"Biochemical evidence for serotonergic control of the locus coeruleus"
J. Pujol, P. Keane, A. McRae, et al.
In: Interactions Between Putative Neurotransmitters in the Brain,
New York, Raven Press, 1978, 401-410.



39 = DoIrsal Raphe Nucleus, 43 = Locus coeruleus

Psychedelic drugs directly produce an amplification of salience detection via the LC/DRN and the Salience Network.

See: 5-HT2A receptor's role as a modulator of salience

and 5HT2a receptors on locus coeruleus and raphe

I would draw the reader's attention to the fact that the SN, Salience Network, had not yet been discovered nor described when, in the 1990s, I first proposed (and therefore predicted) its existence and then at the 2006 Basel LSD conference delivered a lecture on the subject. [6]

Just recently I asked *Perplexity Pro* about the locus coeruleus (LC), the raphe nuclei (DRN), and the salience network (SN). It delivered quite a collection of studies!

One must forgive *Perplexity* however, and the great majority of neurocognitive studies for blind adherence to the ADB paradigm (it's All Down to the Brain — Crick and Dennett) and also for falling prey to the mereological fallacy in neuroscience (the Brain credited with doing things that only the organism as a whole can logically do — see Awakenings IV). In addition, a largely uncritical reliance on *brain scans* would call into question some, if not many of the conclusions of studies. For another excellent critique see

The Limits of Neuro-Talk: On the dangers of a mindless brain science, by Matthew B. Crawford

I also asked *Perplexity* whether it — as well as AI in general — was subject to the GIGO phenomenon. The reply was a definite yes. How could *Perplexity* get it right about the dying ADB paradigm or avoid the mereological fallacy when all the studies it accesses also are guilty?

My updated ideas on SD amplification are that the effect is not a totally involuntary matter, but rather that the chemical/cognitive action provides the psychedelic voyager with an *increased ability* to differentiate, to evaluate and

choose, and to use the amplified ability to experience at a higher level. The amplified ability seems also to draw attention to overlooked ideas, memories, happenings, and to augment one's abilities to more completely analyze and correlate the aspects of perception and thought ongoing at the time.

Reading Aldous Huxley's account one sees that he is voluntarily directing his attention to various items in his vicinity, and *using* his increased ability for SD to marvel at their sacred character: "I was not looking now at an unusual flower arrangement. I was seeing what Adam had seen on the morning of his creation - the miracle, moment by moment, of naked existence..."

In the creativity research of Harman and Fadiman we see clearly that the increased SD ability is not something randomly enforced by neuronal systems, but is voluntarily directed at a task. See:

Psychedelic Agents in Creative Problem-Solving: A Pilot Study

Selective Enhancement of Specific Capacities Through Psychedelic Training

also of interest:

The Creative Process and the Psychedelic Experience by Frank Barron

What about spontaneous mystical experience such as described by Albert Hofmann (and many others)? And meditation, various religious practices, etc.?:

Here is a phenomenology of Altered States of Consciousness in general, compiled by A.M. Ludwig.[7] Again, these are better thought of as features of the ASC, not effects of the method, whatever it may be: meditation, hypnosis, breathwork, religious trance, delirious states, various intoxications other than psychedelic, spontaneously occurring mystical experience, even extreme sport has been claimed as a catalyst of ASCs similar or identical to the results of other methods or paths to psychedelic experience. Note that both positive and negative aspects of ASCs are included, although the chosen wording of a description may imply some negativity that may nevertheless be not so negative for some, even positive:

A. Alterations in thinking. Subjective disturbances in concentration, attention, memory, and judgment represent common findings...reality testing seems impaired to varying degrees. The distinction between cause and effect becomes blurred, and ambivalence may be pronounced whereby incongruities or opposites may coexist without any (psycho)logical conflict...

B. Disturbed time sense. Sense of time and chronology become greatly altered. Subjective feelings of timelessness, time coming to a standstill, the acceleration or slowing of time, and so on, are common. Time may also seem of infinite or infinitesimal duration.

C. Loss of control. As a person enters or is in an ASC, he often experiences fears of losing his grip on reality and losing his self-control. During the induction phase, he may actively try to resist experiencing the ASC...while in other instances he may actually welcome relinquishing his volition and giving in to the experience.

D. Change in emotional expression. With the diminution of conscious control or inhibitions, there is often a marked change in emotional expression. Sudden and unexpected displays of more primitive and intense emotion than shown during normal, waking consciousness may appear. Emotional extremes, from ecstasy and orgiastic equivalents to profound fear and depression, commonly occur...

E. Body image change. A wide array of distortions in body image frequently occur in ASCs. There is also a common propensity for individuals to experience a profound sense of depersonalization, a schism between body and mind, feelings of derealization, or a dissolution of boundaries between self and others, the world, or universe.

F. Perceptual distortions. Common to most ASCs is the presence of perceptual aberrations, including hallucinations, pseudohallucinations, increased visual imagery, subjectively felt hyperacuteness of perception, and illusions of every variety.

G. Change in meaning or significance. After observing and reading

descriptions of a wide variety of ASCs induced by different agents or maneuvers, I have become very impressed with the predilection of persons in these states to attach an increased meaning or significance to their subjective experiences, ideas, or perceptions. At times, it appears as though the person is undergoing an attenuated "eureka" experience during which feelings of profound insight, illumination, and truth frequently occur.

H. Sense of the ineffable. Most often, because of the uniqueness of the subjective experience associated with certain ASCs (e.g., transcendental, aesthetic, creative, psychotic, and mystical states), persons claim a certain ineptness or inability to communicate the nature or essence of the experience to someone who has not undergone a similar experience.

I. Feelings of rejuvenation. ...On emerging from certain profound alterations of consciousness (e.g., psychedelic experiences, ...hypnosis, religious conversion, transcendental and mystical states), ...many persons claim to experience a new sense of hope, rejuvenation, renaissance, or rebirth.

J. Hypersuggestibility. ...The increased susceptibility and propensity of persons uncritically to accept and/or automatically to respond to specific statements...or nonspecific cues (i.e., cultural or group expectations for certain types of behavior or subjective feelings).

Note especially item G: Change in meaning or significance!

As an example of spontaneous mystical, psychedelic experience Albert Hofmann recounts one such event that occurred naturally, in his youth:

> There are experiences that most of us are hesitant to speak about, because they do not conform to everyday reality and defy rational explanation. These are not particular external occurrences, but rather events of our inner lives, which are generally dismissed as figments of the imagination and barred from our memory. Suddenly, the familiar view of our surroundings is transformed in a strange, delightful, or alarming way: it appears to us in a new light, takes on a special meaning. Such an experience can be as light and fleeting as a breath of air, or it can imprint

> itself deeply upon our minds.
> One enchantment of that kind, which I experienced in childhood, has remained remarkably vivid in my memory ever since. It happened on a May morning—I have forgotten the year—but I can still point to the exact spot where it occurred, on a forest path on Martinsberg above Baden, Switzerland. As I strolled through the freshly greened woods filled with bird song and lit up by the morning sun, all at once everything appeared in an uncommonly clear light. Was this something I had simply failed to notice before? Was I suddenly discovering the spring forest as it actually looked? It shone with the most beautiful radiance, speaking to the heart, as though it wanted to encompass me in its majesty. I was filled with an indescribable sensation of joy, oneness, and blissful security. [8]

I propose that the Salience Network, and its amplification whether by chemical, natural, or *practised methods*, is the key to understanding how these psychedelic states occur. They are all, in an important sense, voluntary. We must not fall into the trap of the ADB paradigm (it's all down to the brain, as per Crick and Dennett in Awakenings V), nor the mereological fallcy, as discussed in Awakenings IV.

Briefly, some other findings amongst the vast neurocognitive literature:

Everyone familiar with LSD experiences has noticed how one's pupils become dilated, sometimes extremely so. *Perplexity AI* says:

> Pupil dilation serves as a dynamic biomarker of salience processing, reflecting interactions between the locus coeruleus-norepinephrine (LC-NE) system and the salience network (SN). These systems jointly prioritize attention and regulate cognitive resource allocation during task performance and rest. The LC's phasic norepinephrine release drives rapid pupil dilations, enhancing signal-to-noise ratios for salient stimuli.

High level SD during a psychedelic experience results in norepinephrine (NE) depletion and the day following psychedelic use one may experience low energy, mild lethargy and fatigue, a need to rest and reflect on the previous

days' events, etc., *and an inability to attain another psychedelic experience until NE recovery (tolerance).*

Last but not least: Does not the Salience Amplification hypothesis fit perfectly with what is needed to Awaken people of all sorts, including that "advanced ape," the *proto-Homo sapiens* who stuck around Africa unchanged for at least a hundred thousand years not realizing he had all the equipment necessary to bring about advanced civilization? All it took was a little salience amplification so that he, too, was not looking at an unusual flower arrangement out in front of his humble abode, but was seeing what Adam had seen on the morning of his creation - the miracle, moment by moment, of naked existence... The rest is “history”. Q.E.D.

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1 from “The New Alchemy” in *This Is It*, Alan Watts, Random House, 1958

2 Symposium of the Swiss Academy of Medical Sciences. Lugano, Switzerland, October 21-22, 1993, Edited by A. Pletscher and D. Ladewig, The Parthenon Publishing Group

3 Oxford University Press 1998

4 Even Alligators have Locus coerulei — *Complexity AI*:

The locus coeruleus (LC) is a vertebrate-specific nucleus and a conserved feature across all vertebrate classes, including "primitive" animals such as fish, amphibians, reptiles, and birds

While its size and neuronal complexity vary, the LC's fundamental role in arousal, stress responses, and neuromodulation via norepinephrine (NE) remains consistent.:

- The LC exists in the most ancient vertebrate groups, including zebrafish (*Danio rerio*), which have only 10–20 NE-producing cells.
- In amphibians (e.g., frogs *Rana perezi*), reptiles (e.g., lizards *Varanus exanthematicus*), and birds (e.g., pigeons *Columba livia*), the LC shares homologous axonal projections to brain regions like the striatum, septum, and optic tectum:

- The LC modulates primitive survival behaviors such as dark/light adaptation in amphibians and visual alertness in fish.
- It is part of the ascending reticular activating system, a phylogenetically ancient network critical for arousal and autonomic function.:
- LC neurons in non-mammals exhibit similar dendritic branching patterns, gene expression profiles, and widespread axonal projections as mammalian LC.
- For example, in birds, LC neurons project to the optic tectum layers involved in visual processing, akin to mammalian superior colliculus pathways.

LC neurons in primitive vertebrates develop early and occupy positions analogous to their adult locations, suggesting minimal migration during embryogenesis.

This developmental stability underscores its evolutionary importance.

In summary, while the LC becomes more neuronally complex in mammals, its presence in all vertebrate classes-including phylogenetically older groups-confirms its status as a conserved, primitive structure critical for survival and adaptive behaviors

5 Stanislav Grof, Realms of the Human Unconscious, The Viking Press 1975, New York. p.32

6 *Perplexity AI*: The salience network was first described in 2007 by William Seeley, a neurologist at the University of California, San Francisco, in collaboration with Michael Greicius. Their seminal work identified this network as a distinct set of brain regions-primarily the anterior insula and dorsal anterior cingulate cortex-that coactivate to detect and filter salient internal and external stimuli, and to recruit other functional networks as needed. The term "salience network" was chosen to reflect the network's proposed role in prioritizing information that is most relevant for behavior and cognition.

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

8 *LSD - My Problem Child*, 1980 McGraw-Hill Book Company