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Psilocybin-Assisted Preparation and Neuralink BCI Integration: A Comprehensive Exploration

Executive Summary

- **Neuroscience & Brain States:** Psilocybin (a psychedelic from "magic mushrooms") profoundly alters brain network dynamics – weakening rigid connections (especially in the Default Mode Network, or DMN) and boosting global neural flexibility [1]. This causes acute "ego dissolution" (loss of the usual sense of self) and induces a hyperplastic brain state conducive to forming new neural pathways [2] [3]. These changes may interface with Neuralink's brain–computer interface (BCI) by *potentially* enhancing the brain's adaptability to the implant, but also raise questions about agency (sense of control) when one's brain is simultaneously influenced by a psychedelic and connected to a machine.

- **Psychological Well-Being:** A structured psilocybin-assisted therapy program can improve emotional stability and self-awareness. Clinical evidence shows single high doses of psilocybin yield rapid, sustained reductions in depression, anxiety, and trauma-related distress [4]. Users often report increased **openness**, reduced **neuroticism** (emotional volatility), and greater self-compassion following psychedelic therapy [5] [3]. Such outcomes could help Neuralink patients psychologically prepare for implantation by alleviating fear, facilitating **trauma integration**, and building resilience – e.g. reframing personal narratives around disability or identity change in a positive light.

- **Cognitive Performance & BCI Function:** Psilocybin's effects on cognition are complex and time-dependent. **During** acute intoxication, attention, working memory, and executive function may be impaired, and cognitive control is loosened [6]. **Afterwards**, however, many users experience an "afterglow" with enhanced cognitive flexibility, creativity, and even improved executive function in the weeks following a session [7] [3]. In patients with treatment-resistant depression, for example, psilocybin increased cognitive flexibility up to 4 weeks post-treatment [3]. This post-psychedelic boost in mental adaptability and learning capacity might improve BCI training and motor decoding accuracy – potentially enabling users to more swiftly master control of Neuralink's devices. (Conversely, any immediate neural signal disruptions or noise during acute psychedelic states would necessitate careful scheduling *around* BCI calibration sessions.)

- **Ethical & Legal Frameworks:** Combining an invasive BCI with a psychedelic regimen sits at the cutting edge of neurotechnology and medicine, raising significant ethical and legal considerations. **Neuro-rights** proposals argue for protections like mental privacy, cognitive liberty, and personal identity in the age of BCIs [8] [9]. Neuralink's devices can read and potentially write neural data, introducing privacy risks if brain data were misused [10]. Informed consent is paramount – patients must fully understand the risks of surgery *and* psychedelics, and special care is needed if any decision-making occurs under altered states. Psychedelic use remains federally restricted (e.g. **Schedule I** in the US [11]), though recent FDA guidance (2023) is helping pave the way for clinical trials under strict safety measures [12]. Any psilocybin-BCI program would require compliance with both medical device regulations and controlled substance laws. Internationally, initiatives like Chile's constitutional neurorights amendment

underscore the importance of safeguarding freedom of thought and mental integrity as these technologies converge [13] [14].

- **Philosophical & Future Perspectives:** The intersection of psychedelics and BCIs prompts fundamental questions about consciousness, self, and the co-evolution of humans with technology. Psychedelics can dissolve the boundaries of the ego, fostering a sense of unity and "extended mind," while Neuralink's implant literally extends the mind's reach into machines. Some theorists suggest that psychedelics, by inducing neuroplasticity and **self-boundary dissolution**, could facilitate a symbiosis between organic and synthetic cognition [15] [16]. Enhanced **agency** and identity fluidity might emerge – or be challenged – when one's thoughts interface with an AI-driven device. We are essentially probing what it means to be human when **mind** is simultaneously expanded by psychedelics and integrated with silicon. Ensuring that human values, autonomy, and dignity remain central in this frontier is critical, even as we imagine new horizons of consciousness and capability.

Introduction

In recent years, two radical frontiers of neuroscience have been making headlines: **clinical psychedelics** and **brain–computer interfaces (BCIs)**. Psychedelic therapy – in particular the use of psilocybin, a psychoactive compound from *Psilocybe* mushrooms – has re-emerged as a promising tool for treating mental health conditions and catalyzing profound psychological growth. Meanwhile, companies like **Neuralink** (founded by Elon Musk) are developing invasive BCI implants that connect the human brain directly to computers, with the aim of restoring lost functions (e.g. enabling paralyzed patients to control devices via thought) and potentially augmenting cognition. It was perhaps inevitable that these two frontiers would intersect: one deals with expanding and healing the mind, the other with technologically extending the mind.

What happens when they meet? This report explores how a *structured psilocybin-assisted preparation program* might affect humans receiving Neuralink BCI implants. In essence, we consider using guided psychedelic therapy *before and/or after* Neuralink implantation as a way to improve patient outcomes – neurologically, psychologically, and functionally. Such a program would involve careful preparation, a high-dose psilocybin session guided by therapists, and integration sessions to help the individual make meaning of the experience, all in the context of adapting to an implanted device.

We will delve into five key dimensions of this scenario:

- **Neuroscience findings:** How psilocybin alters brain activity and connectivity in ways that relate to sense of self (**ego**), **cognitive flexibility**, and neural plasticity – and how those changes might interface with Neuralink's capabilities (recording neural signals, inducing stimuli, etc.).

- **Psychological well-being:** The potential emotional and mental health benefits of a psilocybin program for BCI patients – including reduced anxiety, better **trauma integration**, heightened self-awareness, and overall resilience in coping with life after implantation.

- **Performance metrics:** Possible impacts on cognitive and motor performance – for example, could psilocybin-prepared patients see improved **cognitive performance** or faster learning in controlling the BCI? Conversely, might the psychedelic experience introduce any disruptions to the precision of **motor decoding** or other BCI functions?

- **Ethical and legal frameworks:** An examination of the ethical issues (neuro-rights like mental privacy and autonomy, the challenges of informed consent under altered states) and the legal/regulatory landscape for combining a Schedule I psychedelic with an experimental neural implant.

- **Philosophical and speculative perspectives:** Broader reflections on consciousness and identity when one's **organic mind** is both chemically altered and technologically augmented. This includes the notion of human-machine co-evolution – might the combined use of psychedelics and BCIs pave the way for new forms of hybrid awareness or "extended" cognition?

We prioritize recent (2023–2025) research and expert commentary throughout. Many aspects of this topic are speculative, as no published trials have yet combined Neuralink implants with psychedelic therapy. Nonetheless, by synthesizing the latest findings in psychedelic neuroscience, BCI technology, neuroethics, and philosophy of mind, we aim to provide a detailed picture of both the promise and perils at this uncharted intersection.

Neuroscience of Psilocybin and Neuralink: Altered States and Brain Networks

Psilocybe cubensis mushroom growing in the wild – the source of psilocybin. Psilocybin's active metabolite (psilocin) stimulates serotonin 5-HT_2A receptors in the brain, leading to dramatic alterations in neural firing and network connectivity [17] [18]. These neurobiological effects underpin the profound shifts in consciousness that users experience.

Psilocybin's impact on brain networks is striking: Within minutes of ingestion, psilocin diffuses throughout the cortex and subcortical regions, "hijacking" normal serotonin signaling. One of the hallmark findings is that psilocybin causes a **desynchronization of brain networks** – a breakdown of the usual distinct oscillatory rhythms and connections that separate functional networks [19] [1]. In a 2024 Nature study with precision fMRI mapping, a high dose of psilocybin induced a **3-fold greater change in functional connectivity** across the brain than a stimulant drug (methylphenidate) used as a control [19]. Under psilocybin, brain regions that normally fire in tight concert loosen their synchrony, and areas that typically anti-correlate (fire in opposition) lose that antagonism [1]. In simpler terms, the

brain enters a more **integrated and flexible** mode: signals travel along unusual pathways, and the rigid "compartments" between networks (vision, attention, self-referential thought, etc.) begin to dissolve [20].

A central player in these effects is the **Default Mode Network (DMN)** – the brain's introspective network associated with self-reflection, identity, and our baseline ego. Psilocybin robustly suppresses the DMN's coherence [21]. Normally, the DMN (which connects midline cortical areas and the hippocampus) is active when we daydream or ruminate about ourselves. Under psilocybin, DMN hubs show reduced blood flow and lower synchrony; this has been correlated with the subjective feeling of **"ego dissolution"** – the sense that one's self boundaries have melted away [2] [22]. Notably, researchers have found that the greater the decoupling between the **hippocampus** and the **DMN**, the more intense the reported ego dissolution [22]. This decoupling is significant because elevated hippocampal–DMN connectivity is linked to depression and rigid negative thinking; decreasing it seems to "loosen" entrenched patterns [23]. Indeed, persistent drops in hippocampus–DMN connectivity have been observed for weeks after a psilocybin session, suggesting a possible neural correlate of the drug's long-term therapeutic effects [24].

Beyond the DMN, psilocybin increases **global brain entropy** – the brain explores a richer repertoire of states than normal. This manifests as increased **cognitive flexibility** and the potential for new neural connections (hence the term "psychoplastogen" sometimes used for psychedelics). For example, one study showed that psilocybin-treated rats had *improved cognitive flexibility* on task-switching, performing better than controls [25]. In humans with depression, psilocybin therapy led to **heightened cognitive flexibility** up to a month later [26]. Mechanistically, at the cellular level, psilocybin transiently boosts glutamate release and triggers cascades that promote **synaptogenesis** (formation of new synapses) in frontal cortical circuits [18] [27]. This aligns with findings that a single psychedelic dose can induce measurable increases in neuronal connections in animals [27]. In short, psilocybin puts the brain in a state of **hyperplastic potential** – akin to a fresh snowfall, erasing old footprints and allowing new paths to be laid.

How might these altered states **interface with Neuralink's BCI** capabilities? Neuralink's implant is a network of fine electrodes that penetrate the cortex, designed to record electrical impulses and even stimulate neurons. A psilocybin-altered brain state could influence the BCI interaction in several ways:

- **Enhanced Learning and Adaptation:** The neuroplastic "window" opened by psilocybin might accelerate the user's ability to adapt to the BCI. Typically, BCI use requires a learning period where the brain and device **co-adapt** – the user practices generating the right brain signals while the decoding algorithms calibrate [28] [29]. Increased neural flexibility could help the brain discover novel signal patterns or strategies for control. For instance, if psilocybin acutely reduces activity in a user's motor cortex but increases broader network recruitment, the BCI might initially get noisy signals. But as connectivity rebounds in the days after, the brain might "rewire" in ways that improve control. There is precedent in other contexts: patients show boosted **neurofeedback learning** when brain plasticity is enhanced, so a psilocybin-prepared brain might achieve higher BCI proficiency faster (though direct research is not yet available).

- **Agency and Sense of Control:** A key question is whether ego dissolution and altered agency under psilocybin would affect how a person engages with a BCI. Some scientists worry that BCI users could experience a diminished sense of authorship over actions if the device heavily assists or overrides their intent (for example, a BCI autocorrecting a motion can blur whether "I did that" or "the device did") [30] [31]. Interestingly, a psilocybin-induced state often involves *surrendering control* – users report feeling that thoughts and sensations flow more freely, sometimes guided by the environment or therapist suggestions (the concept of "set and

setting"). It's possible that exposing a patient to controlled ego-dissolution experiences could paradoxically **prepare** them to accept a BCI as an extension of themselves. By experiencing a flexible ego boundary ("I am not just my body/brain"), they might integrate the Neuralink implant into their body schema more naturally, viewing it as part of "me" rather than a foreign tool. This is speculative but aligns with the idea of the **"extended mind"** – if the drug experience shows the mind's fluidity, the patient may more readily embrace a cybernetic extension of mind.

- **Neural Signal Changes:** On a practical level, psilocybin's acute effects (tremendous shifts in oscillatory activity and network coupling) would almost certainly affect the neural signals that Neuralink's electrodes pick up. During a psychedelic session, there is typically a broadband reduction in **power of brainwaves** (especially alpha oscillations) and more aperiodic, high-frequency activity [18]. If one attempted to use the BCI *while tripping*, the decoder might struggle because the signal features it was trained on (in the normal state) have changed. However, a structured program would likely **not** have the patient use the BCI during the psychedelic effects. Instead, psilocybin sessions would be separate therapeutic events. The relevant point is whether *after* the trip, the person's brain signals are more favorable for BCI control. Persistent changes like **lowered DMN connectivity** (which correlates with less self-referential distraction) and **strengthened task-positive networks** might improve focus when using the BCI [23] [32]. Additionally, any psilocybin-driven synaptogenesis could, in theory, improve signal consistency as new circuits form to compensate for lost function (useful in paralysis, for instance). This remains untested, but ongoing studies of psychedelic neuroplasticity are examining if benefits like **improved motor function** occur in certain patient groups (e.g. there's interest in psychedelics for stroke rehab, hinting at motor network plasticity).

In summary, psilocybin profoundly alters the neural landscape – acutely disrupting network hierarchies and chronically promoting plasticity. For a Neuralink implant recipient, these changes could be a double-edged sword. On one hand, a more plastic, **integrative brain state** might synergize with the adaptive learning process required for BCI use. On the other hand, care must be taken to ensure that Neuralink's decoding algorithms (and the patient's sense of agency) remain stable through any acute perturbations. Timing the BCI calibration and usage in relation to the psychedelic sessions would be critical. Neuroscientists are only beginning to map this terrain, but the early data on psilocybin's network "reset" effects [33] suggest a powerful tool that – if harnessed responsibly – could enhance the human brain's readiness to interact with high-bandwidth neural interfaces.

Psychological Well-Being: Emotional and Integrative Benefits Post-Implant

Undergoing major neurosurgery and adapting to a brain implant can be a psychologically daunting journey. Patients slated for a Neuralink BCI (often individuals with paralysis, neurological injury, or other serious conditions) may carry significant emotional burdens – trauma from their injury or illness, anxiety about the procedure and its outcome, and shifts in self-identity (e.g. "Will I still be *me* with a chip in my head?"). A psilocybin-assisted preparation program aims not only to alter brain networks, but also to provide **psychological healing and fortitude**.

Psychedelic-assisted therapy has shown remarkable outcomes for emotional well-being in clinical trials over the last few years. **Rapid reductions in depression and anxiety** are commonly reported after guided psilocybin sessions [4]. For instance, patients with major depression who received psilocybin (with therapy) often moved from severe depression to remission within 1–2 sessions, with effects lasting for months in many cases [4]. In trials with cancer patients facing end-of-life distress, a single high dose of psilocybin produced **sustained relief from existential anxiety and depression** [4]. These

outcomes are thought to stem from a combination of the biological "reset" (discussed above) and the **mystical or insightful experiences** that the psychedelic can catalyze. Many participants report confronting deep-seated emotions, processing grief or trauma, and emerging with a renewed sense of peace and acceptance [34] [35].

How could this translate to Neuralink recipients? First, psilocybin-assisted therapy might help individuals **process trauma** related to their condition. For example, consider a patient who became quadriplegic from an accident – they may harbor trauma from the event and intense grief for their lost abilities. A psilocybin session, conducted in a safe therapeutic setting, often brings up emotionally significant memories and feelings, allowing the patient to work through them with a new perspective. The concept of **integration** in psychedelic therapy is key here: after the drug session, therapists help the patient "integrate" the insights into their daily life, reframing personal narratives in a more constructive way [36] [37]. Through integration, someone might move from "My life ended with that accident" to "I survived something terrible; I still have purpose and worth, and this BCI is part of my new path." Indeed, a recent review on psychedelics for PTSD and trauma-related disorders noted that these substances, combined with therapy, can facilitate processing of traumatic memories in a safe emotional space [38] [39]. The **acceptance** and emotional catharsis induced can reduce symptoms of PTSD, depression, and shame that often accompany trauma [40].

Another benefit is the fostering of **emotional stability and positive personality change**. Traditional measures of personality have shown shifts post-psychedelic therapy: notably, **neuroticism** (the tendency toward negative emotions and volatility) tends to decrease, while **openness** increases [41] [5]. Openness is associated with curiosity, creativity, and tolerance of new experience – traits that would certainly help someone embracing a high-tech implant. In one trial, psilocybin therapy in depressed patients not only alleviated depression but significantly *increased openness and extraversion* at a 3-month follow-up [5]. Lower neuroticism implies less anxiety and emotional reactivity; indeed, multiple studies have found lasting reductions in anxiety and improvements in **emotional processing** after psilocybin [7]. For a Neuralink patient, being more emotionally stable and open could mean they cope better with the stresses of recovery and rehabilitation. Instead of reacting with panic or frustration to BCI training setbacks, they might exhibit patience and curiosity – approaching the device as a new opportunity rather than a reminder of loss.

Self-awareness and **mindfulness** are also enhanced. Psilocybin sessions often lead to profound introspective insights – patients might confront aspects of themselves (their fears, hopes, identity) with clarity. One study found that, compared to placebo, a single psilocybin session **enhanced mindfulness and improved psychosocial functioning** in participants months later [42] [32]. Mindfulness – the ability to remain present and observe thoughts without judgment – can be invaluable when adjusting to an implant. For example, if a patient feels discouraged by slow progress with the BCI, a mindful approach (possibly strengthened by prior psychedelic therapy) could help them avoid spiraling into self-criticism. Instead, they can observe the feeling, recall the broader perspective gained during their session (many report a lasting sense of *gratitude* or connectedness [43]), and continue with training in a calmer state.

Crucially, a psilocybin program could help with the **identity transition** inherent in BCI implantation. Post-surgery, patients often grapple with being a person with a brain implant – it can feel unsettling or alien initially. Psychedelic experiences frequently include a sense of "oneness" or unity beyond the ordinary self [35]. This could make it easier for patients to incorporate the device into their identity. Anecdotally, some BCI users name their devices or speak about them as a "part of me." Psychedelic therapy might accelerate this comfort by reducing the psychological resistance to things that challenge the ego's boundaries. When the ego is temporarily dissolved during a session, patients sometimes report that they can reassess rigid notions about themselves. For instance, a patient might enter the session subconsciously thinking "I'll be a cyborg, I won't be human." In the psychedelic state – especially

if guided by a skilled therapist – they might experience a revelation such as "I am more than my body; my mind and spirit remain human and *the tech is just an extension*." Such a reframe, combined with the emotional acceptance that the drug can facilitate, might drastically improve post-implant adjustment.

There is also the aspect of **social and emotional support**. BCI users can feel isolated by their condition or their pioneering status (being one of the first humans with such a device). Psychedelic sessions, particularly in group therapy settings, have been noted to increase feelings of empathy and social connectedness. Psilocybin has been observed to **enhance emotional empathy** (the ability to feel others' emotions) without harming cognitive empathy [44]. A preparatory program could include group integration sessions where multiple patients share their experiences, possibly fostering a supportive micro-community. The increased openness and empathy may help them bond and feel understood, reducing loneliness and building a network of resilience.

It's important to temper these possibilities with caution: psychedelics are powerful and not universally positive. A poorly handled session can lead to overwhelming anxiety (a "bad trip") or even **transient psychotic-like effects** in vulnerable individuals. Proper screening, therapeutic support, and integration are essential. But when done according to best practices, the outcomes in recent trials have been predominantly positive, with difficult experiences often transformable into meaningful insights with therapist help [45]. For Neuralink patients, any psychedelic use would require a licensed clinical setting – potentially as part of a comprehensive rehabilitation program.

In summary, **psilocybin-assisted therapy could serve as an emotional and psychological catalyst** for patients receiving BCIs. By alleviating depression/anxiety, increasing emotional resilience, and helping patients reconceptualize their identity and story, it lays a stronger foundation on which the new relationship with the Neuralink device can be built. A patient who has made peace with their past (trauma integrated), feels optimistic and open about the future, and possesses tools like mindfulness is likely to engage with the BCI more positively and persist through challenges. These benefits, of course, must be weighed against safety considerations and individual differences – but the therapeutic potential is highly promising, as evidenced by emerging clinical science.

Cognitive Performance and Motor Decoding: Potential Impacts of Psilocybin Preparation

One of the more intriguing (and speculative) aspects of combining psilocybin therapy with BCI implantation is whether it can influence **objective performance outcomes** – that is, how well the person's brain and the Neuralink device work together to achieve tasks. Here we consider two angles: general cognitive functions (memory, attention, executive function) that could affect a BCI user's daily life and training process, and the specific **motor decoding accuracy** or control efficiency of the BCI itself.

Cognitive effects of psilocybin can be paradoxical and time-sensitive. During the acute phase of a psychedelic (the 4-6 hours of the "trip"), individuals often have impairments in conventional neuropsychological tasks. A recent systematic review (2024) noted that in healthy volunteers, **global cognitive function and processing speed** usually remain **unchanged or slightly impaired** during intoxication [46]. Certain abilities like **working memory** and **attention** may dip in the immediate aftermath, likely due to the overwhelming flood of sensory and emotional information. Indeed, psilocybin can cause short-term **distractibility** – one might be so engrossed in inner thoughts or visuals that focusing on, say, a memory test is difficult. **Cognitive flexibility and creativity**, interestingly, were reported to "initially decline but potentially improve over time" in that review [6]. This suggests that acutely, one might struggle to maintain a structured train of thought (a temporary

increase in chaos), but later on, there could be a rebound or even enhancement as the brain re-stabilizes in a more flexible configuration.

Crucially, **post-acute improvements** have been documented, especially in clinical populations. In patients with depression, after psilocybin therapy, researchers observed improvements in certain cognitive domains once the acute effects subsided [7]. For example, **sustained attention, working memory, and executive function** showed improvements in some studies a week to a month after psilocybin (particularly in those who had deficits to begin with, like treatment-resistant depression patients) [47]. Emotional processing tasks also improved: patients became better at recognizing positive facial expressions and were less biased towards negative stimuli after psilocybin [47]. These changes align with the overall antidepressant and anti-anxiety effects – as mood improves, so does cognitive function linked to motivation and concentration.

For a Neuralink BCI user, even subtle improvements in attention or executive function could be beneficial. Operating a BCI (especially a complex one controlling a computer cursor or robotic limb) requires **focus, mental endurance, and the ability to learn from feedback**. If psilocybin-assisted prep results in a user who is less mentally fatigued by negative emotions and more capable of sustained focus, they might perform better in training sessions. There's also the matter of **learning rate** – some evidence (including animal studies) suggests psychedelics can promote **synaptic plasticity** that enhances learning of new behaviors [27]. In a BCI context, this could mean the brain more readily forms the associations between mental intention and the device's feedback. Imagine trying to learn to move a computer cursor by thinking – the brain has to experiment with firing patterns until it finds one that the decoder interprets correctly (e.g. increasing firing in motor cortex moves cursor right). A more plastic brain may have an easier time discovering that pattern or even **inventing alternate pathways** if the usual motor neurons are damaged (a concept known as *degeneracy* in neural systems, where multiple solutions can achieve the same end).

Now consider **motor decoding accuracy** – basically, how precisely the Neuralink can read the user's intended movement from neural signals. This depends on both the device's algorithm and the user's neural consistency. Psilocybin's long-term effect of reducing rigid network activity (like breaking up pathological slow-wave rhythms in depressed brains) might actually make neural signals *cleaner*. For instance, depression and anxiety often come with ruminative neural patterns in the DMN that can introduce "noise" or distraction in brain activity; by alleviating those, psilocybin might yield a brain signal that is more task-focused when needed [48]. Some researchers have hypothesized that the **entropy increase** under psychedelics allows the brain to "reset" from overly synchronized, rigid patterns (such as the excessive beta oscillations seen in Parkinson's disease, or the hyperconnectivity in depression) [33] [23]. If a Neuralink is decoding motor intent, it benefits from clear, differentiated signals rather than background noise of mind-wandering or pathological oscillations.

However, we must also consider any *negative* impacts. **Timing and state dependence** are critical. If a patient were to attempt BCI use **during** a psychedelic session (which, to be clear, is not the intention of a prep program, but worth exploring hypothetically), it could be problematic. The user's ability to concentrate on the required mental task might be impaired (imagine trying to perform fine cursor movements while your visual field is warping with hallucinations and your sense of time is distorted). Moreover, the Neuralink decoder, usually calibrated on the user's normal waking brain state, might misinterpret signals from the psychedelic state. For example, psilocybin can induce unusual **oscillatory bursts** and cross-talk between networks that could appear as spurious commands to a BCI. Therefore, any *operational* use of the BCI would likely be scheduled when the patient is sober and baseline.

In the preparation model, the idea is that **after** the psilocybin therapy (in the integration phase and beyond), the patient's cognitive functions and neural patterns have shifted beneficially. We might expect to see:

- **Faster calibration**: Perhaps the number of training sessions needed for the Neuralink system to achieve a certain accuracy could be reduced, thanks to the patient's increased cognitive flexibility and adaptive neural signaling. If, say, an average person takes 10 sessions to reach 90% accuracy in controlling a cursor, a psilocybin-prepared person might do it in 7–8 (this is hypothetical but grounded in the notion of enhanced learning).

- **Better error tolerance**: BCI use can be frustrating – misinterpreted signals cause wrong actions. A user who has greater emotional equanimity (less neuroticism, more mindfulness) might stay calm and **strategize through errors** instead of becoming discouraged. This psychological aspect loops back into performance: studies in BCI have shown that user motivation and mental state significantly affect performance. A positive mood and "growth mindset" could correlate with making steady progress.

- **Motor imagery vividness**: In many BCI paradigms, users control devices by imagining movements (if they are paralyzed and cannot actually move). The *vividness* and strength of motor imagery can influence the neural signals. Some evidence suggests psychedelics can increase sensory imagery and perhaps even motor imagination (there are anecdotes of people "feeling" movements or sensations during trips due to synesthesia-like effects). It's conceivable that after a psychedelic experience, a user might have a richer internal visualization, aiding motor imagery tasks. No direct research confirms this, but it's an interesting angle (perhaps the user could mentally rehearse controlling the BCI during the imaginative state of the trip – though again, actual device use during the trip would be done cautiously, if at all).

It should be noted that **safety comes first**: any cognitive improvements must not come at the cost of stability. We wouldn't want a scenario where the patient is cognitively scattered for days after a session and unable to use the BCI effectively. Fortunately, clinical data shows that by the next day or so, acute cognitive disturbances of psilocybin subside, and many functions normalize or improve [46] [6]. Integration therapy typically involves talking about the experience the day after, which in itself helps cognitive organization (storytelling and reflecting on the trip).

To summarize this section: **psilocybin preparation could potentially enhance the cognitive and motor performance aspects of BCI use**, through improved learning, flexibility, and post-therapy mental health gains. It's like "fertilizer" for the brain's learning capacity. That said, this remains a theoretical benefit – one that should be investigated in trials. Researchers could measure, for instance, the number of trials to reach a target BCI control accuracy in those who had psychedelic therapy vs those who didn't. They could also measure attention span, reaction time, and memory in BCI users with and without the prep program. Until such data is available, our expectations should be moderate. But given what we know – e.g. psilocybin's ability to **improve associative learning** (like making stronger semantic connections and mental flexibility in problem-solving tasks) [49] – there is reason to be optimistic that a brain primed by a profound psychedelic experience might interact with a cutting-edge neural prosthetic in a synergistic way.

Ethical and Legal Considerations: Neuro-Rights, Consent, and Regulation

Marrying a psychedelic therapy regimen with an invasive brain implant is not just a medical or technical challenge – it's an ethical frontier that demands careful examination. Both psilocybin and Neuralink touch on deeply personal domains: one on **mind and consciousness**, the other on the **integrity of the brain and self**. Ensuring that such an approach respects the rights and safety of individuals is paramount. In this section, we consider key ethical principles and current legal frameworks (or lack thereof) relevant to this scenario.

Neuro-rights and cognitive liberty: In recent years, scholars and policymakers have begun discussing "neurorights" – proposed fundamental rights to protect people in the era of neurotechnology. These typically include the right to **mental privacy** (your brain data and thoughts should be protected from unauthorized surveillance or hacking), the right to **personal identity and continuity** (tech should not radically alter who you are without consent), the right to **free will or agency** (protection from outside manipulation of your decisions), and **cognitive liberty** (the freedom to alter one's own consciousness, for instance using drugs or technology) [8] [50]. When combining psilocybin and Neuralink, *all* of these come into play.

Neuralink's BCI, especially as it advances, could theoretically read complex brain activity patterns – even unintended thoughts or emotions – raising privacy concerns. If the device has a two-way interface (Neuralink has indicated plans for stimulation capabilities in the future), it might be able to *write* information into the brain, which makes ensuring **voluntary agency** critical [30] [51]. Now, add psilocybin: during a psychedelic session, a person is in an extremely suggestible state where their thought patterns can be influenced by external cues (this is why having a trained therapist and controlled environment is standard). Ethically, this means that any **therapeutic suggestions or interactions while the person is under psilocybin must be handled with great care** to avoid inadvertent manipulation. Patients should have the right to **cognitive security** even while their mind is "open." The therapist's role is to support, not steer the person's fundamental beliefs or decisions, especially regarding something as sensitive as a brain implant.

An example: Imagine a patient is undecided or fearful about using their Neuralink device. It would be unethical to use the psilocybin session to "convince" them of anything while they are suggestible. Instead, the session should allow them to explore their feelings and come to their own conclusions, which are then respected in sober follow-ups. The principle of **autonomy** is central – the patient's authentic wishes and comfort level with both the drug and the device must guide the process.

Informed consent: This is always a cornerstone of ethical research and treatment, but here it has special nuances. For one, obtaining truly informed consent for a **psychedelic session** means explaining that the drug will alter perception, possibly causing hallucinations or intense emotions, and that while under its influence they may think or say things they otherwise wouldn't. Patients need to trust that their caregivers won't take advantage of that state. Likewise, for the **BCI surgery and usage**, informed consent involves acknowledging unknown risks (Neuralink is experimental – long-term effects are not fully known) and lifestyle commitments (e.g. time needed to train the BCI, maintenance, data monitoring).

A challenge is that **some Neuralink candidates might have impaired communication or decision capacity** (e.g. patients with severe paralysis like locked-in syndrome). In such cases, obtaining consent is tricky – they may be desperate for any improvement, potentially feeling coerced by their condition to agree (termed "therapeutic misconception"). Ethicists caution that with BCIs, especially invasive ones,

we must ensure patients aren't consenting simply out of hope without understanding burdens [52]. Introducing psychedelics doesn't simplify this – it adds another layer to consent ("do you consent to undergo a mind-altering drug session as part of your prep?"). Ideally, consent for the psychedelic component is obtained separately, far in advance of any dosing, and can be withdrawn at any time. Moreover, the patient should designate **a trusted person or an advance directive for decision-making during the session** – for instance, if they become very agitated and want the session stopped, therapists should honor that (practically, a sedative can be given to abort a bad trip if absolutely necessary).

From a legal standpoint, **psilocybin remains a controlled substance** in most jurisdictions. In the US, it's Schedule I federally, meaning it's illegal outside of approved research or extremely limited therapeutic programs. However, the landscape is rapidly changing: Several states and cities have decriminalized personal use (e.g. Oregon has a state-regulated psilocybin therapy program as of 2023, Colorado is implementing one, and numerous municipalities have made enforcement of personal use the lowest priority) [53]. Internationally, countries like Canada and Australia are opening pathways for medical use (Australia in 2023 authorized psychiatrists to prescribe psilocybin for resistant depression in controlled settings). Still, any program combining psilocybin with a Neuralink trial would have to work within regulatory frameworks: obtaining FDA authorization for the drug's use under an Investigational New Drug (IND) protocol, likely requiring DEA approval given the schedule status [54]. The **FDA's draft guidance in 2023** on psychedelic trials highlights unique challenges – such as ensuring drugs are manufactured to quality standards, having safety monitoring for adverse psychological reactions, and considering the role of therapy in the protocol [55] [12]. The Neuralink device itself falls under medical device regulations (and has gotten FDA approval for early trials in 2023). So, legally, a combined trial might need both a drug trial approval and a device trial approval – a complex but not impossible situation.

Privacy and data protection are paramount. Neuralink devices will generate a lot of brain data. If a patient undergoes psilocybin, one might even record brain signals during and after to study effects (with consent). But where does that data go? Could it be misused (e.g. analysis of someone's neural patterns to infer private thoughts or psychological vulnerabilities)? A **Chilean court ruling in 2023** explicitly dealt with this, affirming the right to mental privacy in the context of a consumer EEG device – the court recognized that **neurodata are intimately tied to one's personality and dignity** and may require special protection beyond typical personal data laws [56] [57]. With Neuralink, which is far more invasive and detailed than a simple EEG, the need for robust data safeguards is even greater. Companies and researchers must ensure encryption, strict access controls, and transparency with patients about what is recorded and why. Patients should have the right to delete their data or opt out of certain data uses (akin to how one might opt out of certain tracking on apps – but here it's your brain activity).

Integration into identity and potential vulnerability: Ethicists also discuss the concept of "personal identity" changes. If a Neuralink device can modulate your brain (for example, suppressing tremors or enhancing memory) and a psychedelic can modulate your mind, how do we define the line of personal identity? Some worry about a "ship of Theseus" problem – if we keep altering parts of the mind/brain, is the person the same "self"? This is mostly a philosophical issue, but it has ethical weight when considering **consent over time**. For instance, a patient may consent now, but after a year of BCI use and perhaps multiple psychedelic sessions, they might say "I feel like a different person and I wouldn't have consented to this now." We have to respect that evolving perspective. Continuous consent (the ability to withdraw from the study or stop use at any point) is vital.

Also, consider **equity and access**: Will this kind of advanced therapy be available only to a privileged few? Neuralink and psychedelic therapy are both potentially expensive (Neuralink hardware and

surgery, plus the need for a specialized psychedelic therapy team). There's an ethical imperative to ensure that if this approach proves beneficial, it doesn't just become a transhumanist luxury for the rich. Early on, it will be rare and experimental, but stakeholders should plan for pathways to broader access if it works – possibly through healthcare coverage, subsidies, or open science that allows more centers to offer it.

Legal responsibility and liability is another facet. If a patient under psilocybin makes a decision about their BCI (like choosing to enable some risky feature or to have it removed), and later regrets it, what then? Clear protocols should delineate which decisions *cannot* be made under the influence (e.g. signing any legal documents, changing one's will, etc., during the session would be invalid). If an adverse event happens – say a patient has a psychotic break or a medical complication – who is liable? The consent process must cover these risks, but also providers need contingency plans (having medical doctors on call, insurance for clinical trials, etc.).

On the topic of combined use, regulators might worry about **safety interactions**: could an implanted device interacting with brain signals be affected by a psychedelic in a way that causes harm? For example, if Neuralink is delivering some stimulation and psilocybin lowers seizure threshold slightly (psychedelics can on rare occasions trigger seizures in susceptible individuals), does that pose extra risk? These questions have to be addressed in a risk assessment. Monitoring during the psychedelic session (like having an EEG or the Neuralink itself record activity) might actually enhance safety – one could potentially see if a seizure was brewing or if brain activity becomes concerning (though typically psilocybin is physiologically safe, with main risks being psychological).

Finally, there is **the court of public opinion and ethics of innovation**. Neuralink has already faced criticism from some quarters for moving fast (e.g. concerns about animal research practices, or that their first human trial was announced with less transparency than ideal) [58]. Psychedelics still carry stigma in parts of society. Merging them could attract intense scrutiny. It's ethically important that such a program is conducted with *rigorous scientific oversight, independent ethics review, and publication of results* (good or bad). The worst outcome would be a mishap that sets back both fields due to lost trust. Conversely, if done responsibly, it could become a model for interdisciplinary innovation.

In summary, **the ethical and legal landscape for a psilocybin-Neuralink program is complex but navigable**. Key pillars must include: unwavering respect for patient autonomy and informed consent (especially given altered states), robust protection of mental privacy and identity (neurorights by design), compliance with drug and device regulations (likely via carefully designed clinical trials under regulatory agency watch), and proactive engagement with ethical guidelines (perhaps even creating new guidelines as this is novel territory). The concept of *cognitive liberty* looms large – the patient's right to choose to explore their consciousness with a psychedelic, and to augment their brain with a BCI, should be upheld, provided it's done safely and knowledgeably. As societies adapt, we may see neurorights charters or laws (Chile's example of adding neurorights to its constitution in 2021 is a pioneering step) [59]. Ultimately, the goal is to **maximize potential benefits** (better mental health, restored function) while **minimizing risks and protecting human dignity** in this brave new blend of mind technologies.

Philosophical and Speculative Perspectives: Consciousness, Identity, and Co-Evolution

Conceptual illustration of a futuristic brain implant (inspired by Neuralink) seamlessly integrated behind the ear. As technology embeds itself within us and psychedelics expand our inner horizons, humanity stands at a threshold where **organic consciousness and synthetic augmentation** begin to intertwine. This raises profound philosophical questions: What is the "self" when part of our cognition is farmed out to a chip? How does **consciousness** evolve when periodically plunged into psychedelic oneness and then interfaced with AI? Could the combined use of BCIs and psychedelics accelerate a kind of co-evolution, leading to new forms of hybrid intelligence or even novel states of being?

From a **consciousness studies** perspective, both Neuralink and psilocybin offer tantalizing avenues to probe the mind's mysteries. Psychedelics have long been a tool for philosophers and psychologists to explore the nature of consciousness – they reliably induce experiences of unity, transcendence of space and time, and sometimes encounters with what feels like a larger, conscious universe [35]. Such experiences challenge a strictly reductionist view of the mind. Meanwhile, Neuralink's BCI is rooted in a materialist approach: by reading/writing electrical signals, it aims to *translate* mind into machine-readable data and vice versa. If one were to record brain activity during a mystical psychedelic experience using a Neuralink, we might correlate certain neural patterns with reports of "ego dissolution" or visions. Could this help us understand if those states are purely internally generated or tapping into something fundamental about consciousness? Some theorists, like those behind integrated information theory (IIT), might be keen to see if a brain with a BCI has higher "Φ" (a metric of consciousness) and how that is affected by psychedelic entropy.

There's also the notion of **the extended mind**, a theory in philosophy of mind (Clark and Chalmers) that our mind is not just bound to our brain, but extends into tools and environment when we use them seamlessly. A smartphone with a calendar, for example, becomes part of your memory system. A Neuralink literally extending your neural circuits into the digital realm is a prime example of an extended mind. Now, when someone takes psilocybin, their sense of mind expands – people often report feeling at one with others or with nature, as if the boundaries between self and world have thinned. If you combine these, you get a scenario where one's mind is at once extended *outward* through a device and *dissolved* into a larger consciousness via a psychedelic. In a fanciful sense, a group

of Neuralink-implanted individuals on a group psychedelic session could form a sort of **techno-telepathic collective**, especially if the devices were networked. That's far-off speculation, but it illustrates the scale of change we're contemplating: the line between **"me" and "not me"** could be blurred both chemically and electronically.

Identity and agency are central philosophical themes here. Neuralink BCIs, as mentioned, blur the line between human and machine. Am I the one moving the cursor, or is it the software in my chip that's helping? Over time, users might feel the device is part of their identity ("I'm a person who is part-cyborg"). Psychedelics, on the other hand, can temporarily *annihilate* the sense of self ("ego death") and then allow it to reform in potentially new ways (people often say they come back with a changed perspective on who they are). Michael Pollan, in discussing psychedelics, suggested they can update the "story of self" that our default mode network constantly generates. If a Neuralink is implanted, it too becomes part of that story – maybe initially as an external "thing" but eventually just another aspect of self. Perhaps a psychedelic journey could hasten the acceptance: under psilocybin, one might converse internally with the implant as if it were a sentient part of them, symbolically integrating it. This sounds sci-fi, but patients have used personification techniques with medical devices (e.g. naming a cochlear implant or insulin pump). The philosophical question is, at what point does the boundary of personhood extend to include non-biological components? Some neuroethicists argue we might need to redefine personhood when cognitive implants become common, to include these "exo-cortex" devices as part of the person's mind (and thus, harming the device or hacking it would be an ethical violation akin to harming the person).

Psychedelics also raise the question of **free will** (do we have it if a molecule can dramatically change our thought patterns?) and **authenticity** of experiences (is a revelation under psilocybin "real" or just drug-induced hallucination?). Introducing a BCI adds another layer: if your emotions or decisions are in part influenced by neural modulation or AI assistance, is that "you" deciding? Consider a future Neuralink that can suggest a course of action via a direct neural cue (maybe a prompt like a mental "nudge"). Now imagine you're also microdosing psilocybin (a sub-perceptual dose some people use for creativity) – your cognitive biases are reduced, you're more open to new ideas, and this neural nudge appears. Are you more likely to accept it, and if so, did *you* truly choose it or did the system steer you? Philosophers refer to this as the problem of **agency** in human-technology coupling. A positive spin is that these tools (AI, BCI, psychedelics) could *free* us from destructive patterns – for example, an addict might use both a BCI (to monitor cravings or deliver anti-craving stimulation) and psychedelics (to address psychological roots) to regain their free will from addiction. But a dystopian view might imagine the tools eroding agency if abused (e.g. using a BCI to feed propaganda directly, combined with a drug-induced suggestible state – a Black Mirror nightmare).

The concept of **co-evolution** of humans with technology posits that as we design tech, it in turn reshapes us, in a feedback loop. With BCIs, this is literal – the brain may reorganize itself to accommodate the implant's functions, and future implants might be designed to leverage those neural changes. Psychedelics could accelerate the brain's ability to reorganize (via plasticity and new insights), potentially speeding up this loop. Some authors like Michael Winkelman (2025) argue that psychedelics historically have played a role in human cultural evolution – by enhancing creativity, social bonding, and problem-solving [60] [16]. If we place BCIs into that mix, one could speculate on a future where **"psychedelic transhumanism"** is a movement – using substances to break old cognitive limits and BCIs/AI to establish new ones. We might see humans with "fluid identities" who can plug into different networked collectives, use substances to shift perspective, and treat consciousness like an exploratory playground.

From a more metaphysical angle: Psychedelics often prompt spiritual or existential questions – users may feel they touched something divine or fundamental. Neuralink's goal of high-bandwidth brain

communication could, in theory, allow direct brain-to-brain sharing of such experiences (imagine replaying a recorded mystical experience in someone else's head – a far future scenario). This raises questions of **empathy and shared consciousness**. Could technology + psychedelics foster a greater collective understanding, even a hive mind? Or does it risk homogenizing experience if not careful?

We must also consider the **ethical philosophy**: is it "right" to enhance humans in this way? The classic bioethics debate of therapy vs enhancement appears. Using psilocybin to heal trauma is one thing (therapy), but using it in concert with a BCI to become "more than human" cognitively edges into enhancement territory. Some philosophers welcome this, citing principles of morphological freedom (the right to modify oneself) and even moral enhancement (the hope that such modifications could increase empathy or reduce violence). Others urge caution, invoking concepts of human dignity or the wisdom of natural evolution. The convergence of BCIs and psychedelics challenges us to update these philosophies. Perhaps the synthesis of organic insight and machine precision can yield more **wisdom** – not just cleverness. One could hope that a person who has touched the interconnectedness of all life on a psychedelic and who wields an AI-boosted intellect via BCI might use that power more wisely and compassionately [61] [16]. That's an optimistic vision of co-evolution: a kind of **self-transcendence** where we overcome some limits (physical disability, mental illness, even cognitive biases) while retaining core human values.

In contrast, a pessimistic view wonders: do we lose something ineffable about humanity by relying on tech and drugs for transcendence? Some spiritual traditions would argue true enlightenment doesn't come from artificial means. There's also the risk of dependency – would people come to feel that without the chip or without a psychedelic experience now and then, they are "less" or empty? Identity could become fluid to a fault, with people unsure of who they are without their enhancements.

Philosophers also discuss the concept of **"neurodiversity" and the right to self-modification**. As we normalize interventions like BCIs and psychedelics, we must respect those who choose not to partake. Cognitive liberty implies one is free *not* to merge with AI or chemically alter oneself, as much as to do so. Society could fragment into those who embrace these augmentations and those who remain "unmodified" – raising potential ethical issues of **post-humanism vs humanism**. Will enhanced individuals still empathize with unenhanced ones, and vice versa? These are broad societal questions, but starting these conversations early is part of responsible innovation.

To conclude this speculative section: The combination of psilocybin and Neuralink is like a mirror held up to the age-old human quest for expansion – expansion of the mind's understanding and the body's capabilities. It forces us to examine what we consider the essence of self and consciousness. Perhaps the greatest takeaway is one of **humility and awe**: we are at the cusp of tools that might let us peer into our own psyche and reshape it with unprecedented precision. Philosophically, this is both exhilarating and sobering. It urges a balance between **exploration** and **ethics**. As we venture into these inner and outer spaces, maintaining a guiding light of compassion, informed consent, and reverence for the unknown will be crucial. The hope is that, in co-evolving with our creations and pharmacopoeia, we do not lose sight of the very human values that make the journey worthwhile – the empathy, creativity, and search for meaning that define consciousness at its best.

Conclusion & Future Outlook

The idea of a psilocybin-assisted preparation program for Neuralink BCI recipients represents a bold synthesis of ancient mind-expansion and cutting-edge neuroengineering. Our deep dive has highlighted both substantial promise and significant cautionary considerations:

- On the **neuroscience front**, psilocybin offers a unique "reset" of brain networks – dissolving rigid patterns and potentially creating a fertile ground for new learning and adaptation [1] [3]. This could complement Neuralink's goal of integrating with neural circuits, perhaps easing that integration through heightened plasticity and flexibility. Yet it remains to be seen in practice if these neural effects truly translate to improved BCI performance or simply add complexity to calibration.

- In terms of **psychological well-being**, there is strong evidence that psychedelic therapy can alleviate the emotional burden often carried by patients with severe neurological conditions [4]. For someone about to embark on life with a brain implant, this could be emotionally fortifying – reducing depression, instilling hope, and reframing their journey as one of growth rather than loss. The synergy here seems highly positive, provided therapy is delivered expertly.

- Regarding **cognitive and functional outcomes**, initial analyses suggest post-psychedelic cognitive enhancements (like improved executive function in some patients [7]) could assist with the demanding task of learning BCI control. However, controlled studies are needed to quantify this – for example, comparing BCI skill acquisition curves between those who had psychedelic prep and those who did not. It's entirely possible that some metrics improve while others show no change or even slight detriments (e.g. perhaps memory recall is unchanged, but creativity in problem-solving is up). Future research should employ neuropsychological test batteries and BCI performance logs to get a full picture.

- The **ethical and legal dimension** is perhaps the most crucial gating factor. Before any widespread adoption, frameworks for neurorights and psychedelic therapy need to mature. We may see new policies emerging: for instance, requirements that any invasive neural device trial includes a neurorights impact assessment, or that any psychedelic used in conjunction with BCIs be administered only with independent monitoring to protect autonomy. The positive news is that dialogues in both areas are active – ethicists, lawmakers, and scientists are already engaging with neurorights (e.g. UNESCO and OECD have had discussions on neurotechnology guidelines) and with psychedelic integration into healthcare (e.g. the FDA's guidance and state-level initiatives). The convergence of the two will likely produce novel guidelines. We might imagine something like a **"Neurotech-Psychedelic Ethics Board"** becoming a fixture for research studies that combine them.

- On a **philosophical and societal level**, the narratives we craft around these advancements will matter. Will we frame the psilocybin-BCI combo as a healing alliance of nature and machine, unlocking human potential responsibly? Or will it be feared as a loss of our humanity to techno-chemical alteration? Public understanding and education will be key. Demonstrating positive case studies – say, a paralyzed patient who, with the aid of psilocybin therapy, successfully learns to operate a robotic arm and reports not only functional gain but improved mental health – would go a long way to assuage fears and highlight benefits. Conversely, any misuse or mishap could generate backlash. Therefore, transparency in research and an emphasis on patient-centric values are non-negotiable.

Looking to the **future**, the next few years (2025 onwards) could see pilot studies that formally test aspects of this synergy. Perhaps a small clinical trial will give psilocybin (or a related psychedelic like LSD or MDMA) to a cohort of BCI patients in a controlled setting and measure outcomes like BCI control speed, psychological well-being, and neurological changes via brain scans. Such a study would be groundbreaking – akin to the early days of cybernetics meeting the consciousness revolution. If results are promising, they could herald a new paradigm of integrative neurotherapy.

We should also keep an eye on **technological advancements**: Neuralink is just one company, and their device is evolving (e.g. a higher electrode count, wireless transmission, etc.). There are other BCIs (some non-invasive, like EEG-based caps, and other implantables like those used in academic studies) which could also interface with psychedelic therapy. It may turn out that even non-invasive BCIs (which pose fewer ethical issues) could benefit from psychedelic prep. For instance, someone training on an EEG-based typing interface might also gain from the mental flexibility psilocybin provides. Thus, the ideas discussed are extensible beyond Neuralink per se.

In conclusion, combining a **structured psilocybin-assisted program with Neuralink implantation is a visionary proposition** – one that embodies the ethos of holistic neurotechnology (treating the whole person: mind, brain, and device as part of an integrated system). It carries echoes of shamanistic healing into the realm of brain–machine symbiosis. While much work remains to validate and refine this approach, our exploration suggests that done conscientiously, it has the potential to enhance patient outcomes both **internally** (psychological health and personal growth) and **externally** (functional abilities and BCI performance).

The journey of humans co-evolving with our technology is just beginning. As we proceed, grounding each step in rigorous science, ethical integrity, and compassion will ensure that this journey leads us not only to greater capability but also to greater humanity. The marriage of psychedelics and Neuralink, improbable as it might sound at first blush, could become a shining example of such mindful innovation – expanding the human experience in a way that is as wise as it is powerful.

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