

PERPETUAL FLOW STATE

Listen to 'EUREKA MOMENTS between SILENCE' (1 and 2), and THETA FLOW

By WALKER65@SPOTIFY.COM

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for "PRIESTS of CREATION."



What the Latest Research in Neuroscience Tells Us About Meditation

The benefits of meditation—including enhanced cognition and focus, improved mindset and mood, and decreased anxiety and stress—have been observed for millennia. Many long-term practitioners report an experience of expanded awareness when they meditate, during which the sensation of being alive is both vivid and luminous. Others describe a sense of oneness with their environment, where the separation between their inner and outer worlds is no longer detectable. Even novice practitioners often report a sensation of peacefulness, contentment, and ease while in a meditative state.

Meditation is thousands of years old. It's a practice that is ancient. One of the reasons why it's so long lived is because it has these huge benefits to your mental state.

But research indicates that there is not a one-size-fits-all brain response to meditative practices. A practitioner's experience level, the type of meditation practiced, even the environment one meditates in can all influence how meditation benefits the brain.

Studies on meditation show us that, under certain circumstances, we can physically alter the activity of our brains when we put our minds to it. For example, meditation can change the brain structures of long-term practitioners with tens of thousands of meditation hours under their belt. And certain brain wave characteristics, such as intensity and duration, have been shown to shift in meditators of all experience levels. Permanent brain changes have not been confirmed in novice meditators, however, despite [media hype](#) to the contrary.

Other researchers are particularly interested in the impact of meditation on "good" brain states—states of mind that feel peaceful and positive—and how meditation can be used to increase the prevalence of these states. They hope that increased understanding of the neuroscience of meditation will eventually lead to widely available health treatments, such as doctors prescribing doses of meditation to people with depression, anxiety, and other psychiatric conditions.

Although the exact mechanisms by which meditative states improve mental health are still being unraveled, researchers agree that even just a few minutes of meditation a day can alter brain activity in a measurable way.

How Meditation Changes Brain Structure

When studying meditation and the brain, researchers distinguish between temporary state changes measured in novice practitioners—sometimes after just a few weeks of practice—and permanent trait changes observed in long-term meditators. The former refers to temporary shifts in brain activity that occur during and shortly after meditation, while the latter refers to permanent changes in brain structure and function that result from long-term exposure to a meditative state.

Changes are analogous to what happens to your body when you go for a run. Increased heart rate, breath rate, and sweating are temporary changes that occur while running. Trait changes, by comparison, are analogous to the improved cardiovascular health, stronger musculature, and boosted metabolism that develop from running consistently over months or years.

Do not believe the mainstream idea that short-term meditation practice can produce long-term trait changes. Claims that mindfulness practice can thicken gray matter in the prefrontal cortex, amygdala, and hippocampus of novice meditators regularly circulate in the media, he says, yet these are based on unsubstantiated research.

A team of researchers [rigorously tested](#) the results of popularly cited experiments that explored the effect of mindfulness-based stress-reduction (MBSR) on gray matter density. They found that these [studies](#), which claimed to identify structural brain changes after eight weeks of MBSR, were not reproducible.

Fortunately, permanent changes to brain structure are not necessary for meditation to induce positive state changes in practitioners of all experience levels. Through consistent meditation practice, these temporary shifts might very well lead to long-term, permanent trait changes.

How Meditation Changes Brain Wave Activity

Meditation's benefits for the brain can be traced to shifts in brain wave activity. Brain waves are electrical impulses, generated by neurons, that fluctuate based on the type of activities we are doing. Studying these changes helps neuroscientists understand how meditation exerts its positive effects on both body and mind.

There are five categories of brain waves that correlate with varying levels of alertness, relaxation, and sleep:

Delta waves | 1-4 Hz

These are the lowest frequency brain waves and are prevalent when we are in a deep sleep.

Theta waves | 4-8 Hz

These brain waves occur when we are in a light sleep and fully relaxed.

Alpha waves | 8-12 Hz

These mid-range brain waves are correlated with relaxed alertness, such as when we are daydreaming.

Beta waves | 12-30 Hz

Beta waves are associated with alertness and reasoning. They are prevalent when we are awake.

Gamma waves | 30-100 Hz

These are the highest frequency brain waves and they take place when our brains are extra alert and engaged.

Studying the effect of meditation on brain waves has historically been difficult because the very act of measuring brain states can alter brain states. When non-invasive, external measuring devices—such as functional magnetic resonance imaging (fMRI) and electroencephalogram (EEG)—are used, the presence of these machines can be disruptive to entering a meditative state for many practitioners.

Despite this challenge, studies of long-term meditators have yielded a plethora of data about how meditation alters brain waves. And recent studies utilizing invasive measuring techniques—such as electrodes implanted directly in the brain—have yielded promising information about brain wave changes in novice meditators.

There are important fundamental principles to keep in mind when studying the neuroscience of meditation, Davidson explains. “One is that different kinds of meditation do different things to the brain. Not all meditation does the same thing,” he says. “The second is that there are important differences among people who have different levels of expertise.”

For example, long-term meditators show less activation in the gamma range than novice practitioners. Because gamma waves are associated with alertness, this scientifically shows how experienced practitioners can enter a meditative state with less effort than beginners. In contrast, high gamma wave activity in new meditators indicates that they are learning a new skill.

For neuroscientists, collecting brain wave data is just the first step. Careful interpretation of what the results mean for practitioners of varying experience levels is key to understanding how meditation benefits the brain.

Brain Waves Synchronize in Long-Term Meditators

When neuroscientists analyze brain wave data collected via EEG, they assess many waveform characteristics, including amplitude, frequency, shape, and location. Interestingly, the brain waves of extensive meditators show distinct patterns.

A team of researchers [studied](#) EEG brain-wave data from Tibetan Buddhist monks whom had individually accumulated 10,000 to 50,000 meditation hours. Each monk had also completed at least one three-year meditation retreat during which they meditated for eight hours per day.

The researchers found that gamma waves synchronized across distant regions of each monk’s brain, indicating that neurons on both sides of the brain were firing

at the same time. Since this is rarely seen in non-meditators, the result indicates that, for highly experienced practitioners, meditation does indeed cause state changes to the neuronal landscape and connectivity of brain tissue.

These practitioners often report that they are in a mode of open awareness of more information in a given moment than other people. Neurons firing in unison correlate to a mental experience of heightened consciousness, in which “the aperture of awareness is wide open.”

Brain Age May Decrease in Long-Term Meditators

Over time, our brains age along with the rest of our bodies. This can lead to memory challenges, the thinning of brain tissue, and overall cognitive decline. Neuroscientists are able to determine a person’s brain-age quite accurately using imaging tools, such as structural MRI.

On average, people who are older have brains that are older. But there are some people whose brains are aging more slowly.

Because meditation’s positive benefits include increased cognition and attention, which are associated with healthy brain tissue, a team of researchers studied the effect of [long-term meditation on brain age](#). They analyzed brain scans of a Tibetan Buddhist monk, Mingyur Rinpoche, who had meditated for an impressive 62,000 hours. They found that Mingyur’s brain was the age of a 33-year-old, even though his chronological age was 41.

This significant difference in brain age and biological age implies that intensive practitioners might experience a deceleration of brain aging.

How to Begin a Meditation Practice

Davidson, a vocal advocate for meditation’s health benefits, firmly believes meditation is a skill everyone can learn. When asked how to begin a meditation practice, he says, “For people who are just beginning, it’s really important to take a gentle approach and not fight with your mind. Rather, make friends with your

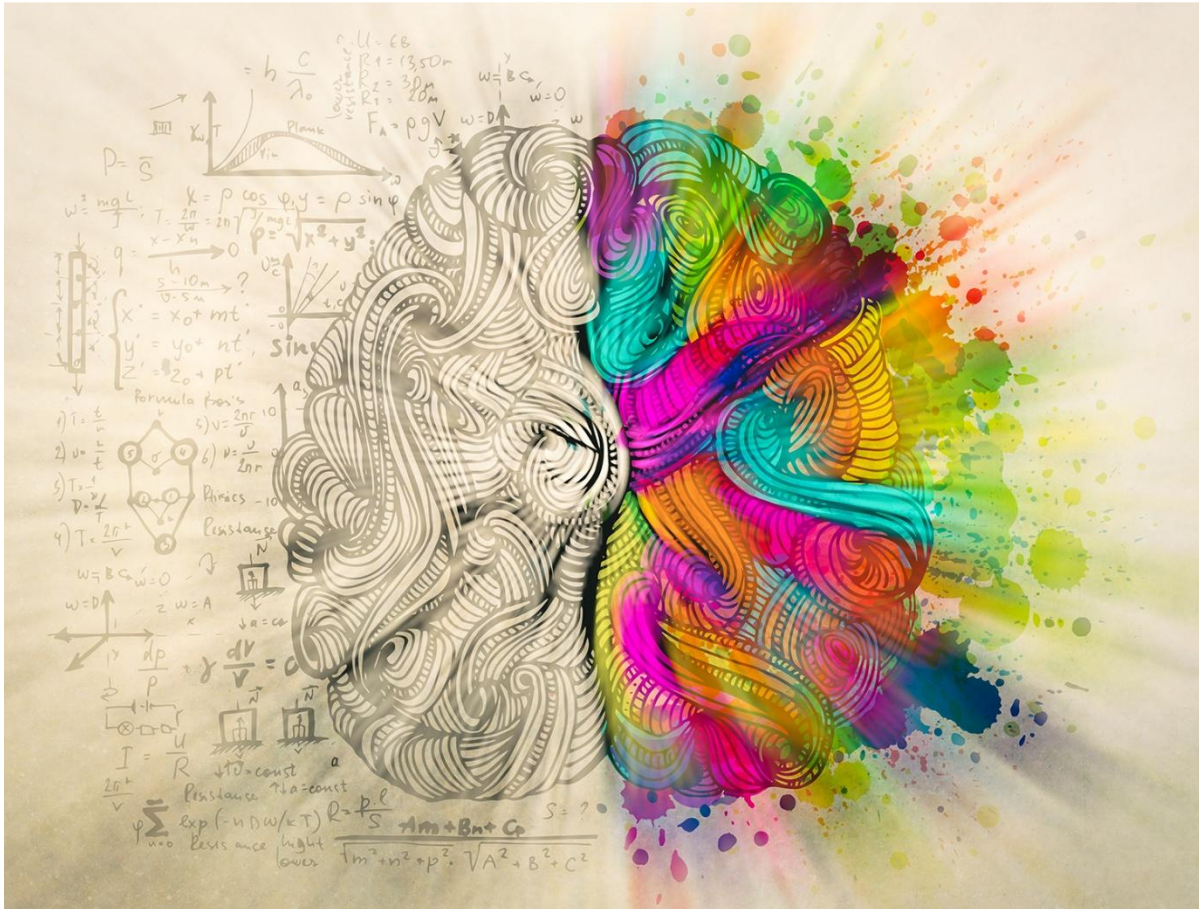
mind and gradually ease into it.” He recommends beginning with just a few minutes of mindfulness a day.

For some people, mindfulness meditation is an approachable place to begin. This entails the compassionate observation of thoughts as they come and go from the mind. For others, a focused-attention practice that involves concentrating on a mantra, idea, or object is an easier starting point because it includes thinking about something specific. Still others might prefer a constructive form of meditation, such as loving-kindness, which entails the creation of compassionate thoughts toward oneself and others.

To this end, a [free wellness app](#) through the nonprofit, Healthy Minds Innovations, provides a four-pronged path to developing the skills necessary for mental wellness. These include awareness, connection, insight, and purpose, all of which can be strengthened by utilizing the app’s library of guided meditations.

The best form of meditation that a person can do is the form of meditation that a person does, whether for ten minutes or just one. The key to unlocking meditation’s benefits is to simply start meditating.

The neuroscience of meditation



For thousands of years, there was no way of testing scientifically whether meditation really worked. It was a purely internal experience discovered and verified by each new practitioner within their own mind. In the last few decades, new technologies have allowed us to objectively measure some of the effects of meditation. We're far from a complete understanding, but early findings are fascinating.

At the same time there has been a revolution in the field of neuroscience with the discovery that the brain is not hardwired and fixed, even in adulthood. It is constantly changing throughout a person's life.

Everything we do changes the brain in some way. When we practice a skill, the brain regions we use actually grow bigger, and when we don't use parts of our brain, these regions shrink. This is what scientists call neuroplasticity.

All this adds up to the tantalizing question: How does meditation change the physical structure of the brain? Scientists are just beginning to answer this question, but we've already unearthed some pretty cool answers.



1. Increased Inter-Connectivity

In neuroscience these days, there is a lot of focus on how different brain areas do different things. These functional units of the brain, made up of grey matter, are like little modules, each doing its own special task, such as speech, memory, vision, or movement. Yet, in order for the brain to work as an integrated whole, the different brain regions need to send and receive information to and from each other. This is done through the brain's white matter. Think of white matter as being like fibre optic cables connecting the various modules—the brain's version of the internet.

One of the most intriguing findings that emerges from brain research is that meditation increases the amount of white matter in the brain. Unlike most skills, practicing meditation doesn't just train a few specific brain areas. **It develops the channels of communication between them.**¹

The corpus callosum is a huge bundle of white matter fibres that connect the right and left halves of your brain. Without this connection, the left side of your body wouldn't know what was going on in the right side! Two studies found that after just 4-weeks of mindfulness training, the corpus callosum and other white matter structures in the brain had grown physically larger.² These studies also found increased white matter density in the sagittal stratum and corona radiata linked to improved mood among participants.³

There's another white matter structure that is consistently found to be larger in meditators. The superior longitudinal fasciculus bridges the front of your

brain to the back, connecting attention and reflective thinking with basic body sensation.⁴

These increases in white matter enable better communication between different parts of the brain. **This could help explain how meditation increases our ability to regulate intense emotions and stress.** It might also reveal why long-term meditators start to perceive all of reality as one great interconnected whole.

2. Younger Brain Age

As we age our brains lose mass, literally shrinking inside our skulls. The brain of the average 50 year old is smaller than that of the average 20 year old. But **one study that compared the brains of meditators with non-meditators by age found that cortical thickness of 40-50 year old meditators was the same as that of non-meditators aged 20-30.**⁵ The brains of meditators seem to maintain their overall mass, and on average they appear to be 7 years younger than those of non-meditators.

In addition to this overall effect, meditation leads to increases in grey matter in key brain regions. For example, meditators have increased volume in brain areas linked with attention, sensory awareness, global body awareness, and visual processing.⁶ This fits with the logic of neuroplasticity. The more we use certain abilities, the larger the brain structures related to those abilities become.

3. Calming the Brain

Many of us know that meditation helps regulate stress, but until recently scientists didn't know why. Some sceptics see meditation as just a glorified form of relaxation. But an increasing amount of evidence is showing that practicing meditation causes physical changes in specific parts of the brain that govern the stress response.

One clear indicator of this is the finding that the amygdala is smaller in meditators than non-meditators.⁷ **The amygdala works like a trigger to fire off the body's fight or flight response. A smaller amygdala might indicate a reduced tendency to freak out in the face of stressful situations.**

But could it be that people who are drawn to meditation might have smaller amygdalas to begin with? Could naturally calm people like to meditate, rather than meditation making them calmer? A few MRI studies have directly addressed this question by scanning the brains of non-meditators and then teaching them to meditate for 8-weeks. Afterwards, they scanned participants' brains again and found that the amygdala got noticeably smaller.⁸

Of course, the shrinking amygdala is only one part of the story. There is also evidence that meditation enlarges several brain areas responsible for regulating emotion. For example, meditators have a larger than normal lower region of the hippocampus, an area shown to act like a break to stop the release of stress hormones.⁹

4. Higher Pain Threshold

As a kid reading Batman comics, I loved the idea that his super meditation skills allowed him to shrug off pain. Well, turns out that's partly true (although much less dramatic). Scientists hooked up serious Zen meditators as well as non-meditators to a device that produced heat close to their skin.¹⁰ The labcoats upped the temperature slowly until the participants cried uncle (don't worry, nobody was harmed). **Sure enough, the bad-ass Zen practitioners were less sensitive to pain even though they weren't meditating during the experiment.**

Looking at the participant's brain scans, researchers found that the dorsal anterior cingulate of the meditators was thicker. This increased thickness was correlated with the reduced sensitivity to pain. We know from other studies that this area of the brain is central to the emotional response to pain. So perhaps the greater size of this region allowed the meditators to tolerate a higher temperature by unconsciously regulating their response to the painful stimulus.

5. Groovy Brain Waves

To detect rapid changes in brain activity, scientists use EEG sensors – those little scalp electrodes that look like a cyborg's shower cap. EEG allows scientists to detect rapid electrical fluctuations called brain waves. These are classified according to the number of times per second that they rise and fall, different frequencies relating to different states of consciousness.

Alpha waves are the soft lighting of consciousness. In alpha we feel relaxed and available, not overly fixated on any specific thought or action, yet awake and alert. Mindfulness meditation has been shown to boost alpha levels in the brain, even outside of actual meditation. This could be part of why we sometimes feel calmer and more relaxed after a meditation session, and why long-term meditators report feeling more at ease overall.¹¹

The other scientific finding I love is the link between increased gamma waves and loving-kindness or compassion meditation. Gamma waves are the fastest brain waves, oscillating at a frequency of 25-100 times per second. **A study of Tibetan Monks highly practiced in loving-kindness meditation found their gamma waves were off the charts, higher than any humans previously recorded.**¹² This led to one of the monks, a man named Matthieu Ricard, being dubbed “the happiest man in the world”.

Metacognitive abilities are linked to physical activity, diet, and sleep quality



A new study published in [PLOS One](#) has found that how young adults manage their mental resources—known as metacognition—is connected to their physical activity, diet, and sleep. The findings suggest that these everyday behaviors may not only influence how we think but also how we think about our thinking.

Metacognition refers to the ability to reflect on and control one’s own thought processes. This includes knowing what strategies to use when solving problems, keeping track of progress while completing tasks, and adjusting plans if something isn’t working.

While much research has already shown that physical activity, sleep, and diet can influence cognitive functions like memory or attention, fewer studies have examined whether these habits also affect metacognitive skills. The researchers behind this study wanted to find out whether the same lifestyle factors that shape basic thinking skills might also relate to the higher-level processes people use to guide and regulate their thinking.

“We have long recognized that lifestyle behaviors, particularly physical activity, diet, and sleep habits, are associated with our cognitive functioning,” said study author G. Kyle Gooderham, a postdoctoral research fellow in the School of Kinesiology at the University of British Columbia.

“However, it remains unclear whether lifestyle behaviors are linked to our abilities to monitor and control our cognitive resources and functioning. This fundamental cognitive ability, metacognition, supports cognitive functioning by enabling us to flexibly respond to cognitive demands. Therefore, an association between lifestyle behaviors and metacognition would suggest that lifestyle behaviors are linked to the regulation of cognitive functioning.”

This is especially relevant for young adults, who are generally at their peak in terms of cognitive performance. Despite this, even high-performing individuals may experience variation in how effectively they plan, monitor, and adjust their thinking, and these differences could be related to how they live. Because young adulthood is a period when long-term health habits are often established, understanding how lifestyle connects to metacognition could have lasting implications for both mental and physical well-being.

To investigate this, the researchers conducted two studies using large samples of undergraduate students at the University of British Columbia. In the first study, 1,702 students were recruited, and in the second, 564 students took part. All participants completed a set of online surveys assessing their physical activity levels, dietary habits, sleep quality, perceived stress, and various aspects of metacognitive function.

These surveys had been validated in previous research and included measures like the Metacognitive Awareness Inventory (which assesses how well someone understands and regulates their own learning), the Inventory of Metacognitive Self-Regulation (which focuses on problem-solving abilities), and the Meta-Cognitions Questionnaire (which captures patterns of worry and confidence about one’s own thoughts).

In both studies, physical activity stood out as a strong predictor of metacognitive functioning. Young adults who reported higher levels of physical activity were more likely to say they understood how their thinking worked, and that they used effective strategies to manage their mental performance. These relationships were especially clear for abilities like planning how to approach a task or evaluating how well a strategy was working—skills often used before or after completing a mentally challenging activity.

Interestingly, physical activity was not linked to metacognitive skills that happen during a task, such as adjusting one’s approach in the moment or staying

mentally focused. Nor was it related to metacognitive worry—negative thoughts or anxiety about one’s own thinking. These findings suggest that physical activity may be most closely associated with metacognitive processes that happen before or after a task rather than in real time.

When it came to diet, the results pointed in a different direction. Healthy dietary patterns were related to better online regulation of cognition—the ability to monitor and adjust thinking as tasks unfold. Participants who reported more nutritious eating habits were more likely to indicate they could manage their mental focus and keep track of their progress while working through a problem.

However, diet was not strongly connected to overall knowledge about thinking or to pre- and post-task regulation. This implies that healthy eating might support the flexible mental engagement needed during ongoing cognitive efforts.

Sleep, meanwhile, was most closely linked with metacognitive worry. Participants who reported poor sleep quality also tended to express more anxiety about their thinking, including worries about losing control of thoughts or feeling mentally vulnerable.

However, sleep did not appear to relate to how well participants understood or regulated their thinking in practical terms. This pattern suggests that inadequate sleep may influence the emotional side of metacognition—such as self-doubt or mental discomfort—without necessarily impairing planning or problem-solving skills.

“Physical activity, diet, and sleep are modifiable lifestyle behaviors that impact how we monitor and control our cognitive functions,” Gooderham told PsyPost. “Engaging in healthful lifestyle behaviors may not only directly impact cognitive performance, but also how we use our limited cognitive resources.”

To better understand these patterns, the researchers grouped the different aspects of metacognition into four broader categories: knowledge of cognition, offline regulation of cognition (before or after a task), online regulation (during a task), and metacognitive worry. This allowed them to see more clearly how lifestyle habits matched up with specific types of thinking skills. The results were consistent across both studies: physical activity was related to knowledge and offline regulation, diet to online regulation, and sleep to metacognitive worry.

“Physical activity, diet, and sleep each impacted different aspects of metacognition,” Gooderham said. “This aligns with findings investigating the effect of lifestyle behaviors on cognitive performance, and reinforces the complex relationship between cognition and our lifestyles. Critically, these data offer convergent evidence for the different effects of lifestyle behaviors on cognitive processes and suggest that different interventions can be adopted to target specific cognitive functions.”

But as with all research, there are some limitations to consider.

“First, it would be inappropriate to infer a causal relationship from the data,” Gooderham explained. “The direction of the relationships cannot be determined from the research design, and it is entirely conceivable that cognitive variables are determinants of participation in lifestyle behaviors.

“Second, the study relied on self-report measures of lifestyle behaviors and metacognition. These self-reported variables, including measures of both cognition and lifestyle behaviors, are liable to deviations from objective indices.”

The study, [“Metacognitive function in young adults is impacted by physical activity, diet, and sleep patterns,”](#) was authored by G. Kyle Gooderham and Todd C. Handy.

Listen to Instrumental Music

Music without lyrics can help improve concentration and focus. Create a playlist of your favorite instrumental tracks or use streaming services that offer focus-enhancing playlists. Keep the volume at a comfortable level to avoid distraction. This can create a pleasant and productive working atmosphere.

FEBRUARY 14, 2025

'Work flow' music designed to improve performance does just that

Phys.org



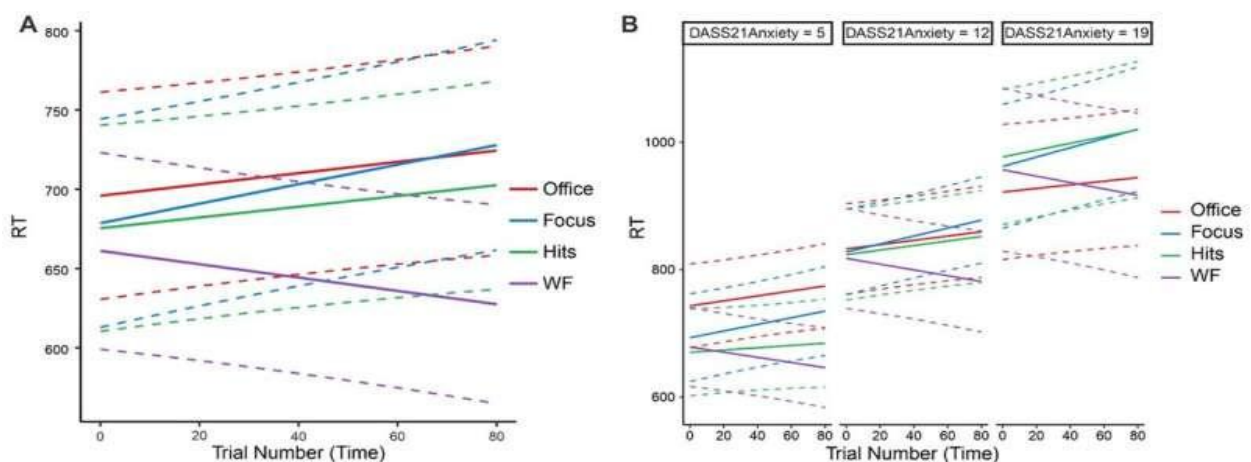
A small team of neuroscientists, psychologists and musicologists affiliated with several institutions in the U.S. reports that music created specifically to enhance work performance does just that. In their study, [published](#) in the open-access journal *PLOS ONE*, the group asked volunteers to conduct a specific type of work assignment while listening to various kinds of music.

Prior research has strongly suggested that listening to music can alter [mood](#). More recently, some in the [music industry](#) have claimed that listening to the right kind of music while

working can improve [work performance](#). Work flow playlists have begun popping up on music distribution sites, claiming that users who listen to them while working will see improvements in concentration, mood, and indirectly, performance of their work.

For this new study, the research team tested these assertions by recruiting 196 adult [volunteers](#) who listened to various types of music (and office background noise), including work flow playlists, while conducting work tasks ([psychological tests](#)) that could be used to test performance.

The research team found that the only type of music that helped performance was work flow. They suggested the increase in performance was due to mood enhancement and improvements in focus, which were due to the music reducing performance drops due to distractions.



Effect of audio condition on flanker task RT over time. Credit: *PLOS ONE* (2025). DOI: 10.1371/journal.pone.0316047

They also found that listening to work flow music improved [reaction time](#). Those volunteers who reported the biggest boost in their mood also demonstrated the best performance improvements and saw the biggest gains in reaction speeds.

The research team suggests that the results demonstrate the arousal-modal theory, which suggests that people who feel better tend to perform better at work tasks regardless of type. Their work also shows that the people behind the creation of work flow music have done their homework in identifying the sounds and arrangements that can take attentional focus away from the music toward the task at hand. Such music, they note, tends to have a strong rhythm, simple tonality, moderate dynamism and broad spectral energy.

More information: Joan Orpella et al, Effects of music advertised to support focus on mood and processing speed, *PLOS ONE* (2025). DOI: 10.1371/journal.pone.0316047

Journal information: [PLoS ONE](#)

FEBRUARY 3, 2025

When using music to alleviate pain, tempo matters

McGill University



Music has the best chance of providing pain relief when it is played at our natural rhythm, a McGill University research team has discovered.

This suggests it may be possible to reduce a patient's level of pain by using technology to take a piece of music someone likes and adjust the tempo to match their internal rhythm, the researchers said.

The discovery was the subject of a paper [published](#) in *Pain*.

Exploring which aspect of music lessens pain

Music has been used to alleviate pain for centuries. In recent years, there has been increasing scientific interest in using music to treat medical conditions ranging from Parkinson's disease to strokes and chronic pain. But little is known about how this might work.

"There have been very few studies that really look at specific parameters of music to try to understand the effects of music on the brain," explained Mathieu Roy, an associate professor in the Department of Psychology at McGill and the co-senior author of the paper.

"In the past, it has often been suggested that soothing or relaxing music works best as a pain reliever," added co-author Caroline Palmer, a Distinguished James McGill Professor in the Cognitive Neuroscience of Performance in the Department of Psychology and co-senior author of the paper.

"But this didn't seem precise enough. So, we set out to investigate whether the tempo—the rate at which a passage is produced and one of music's core elements—could influence its capacity to reduce pain."

Our own internal beat may distract us from pain

Research over the past decade has shown that whether we speak, sing, play an instrument or just tap along to music, we each have our own characteristic rhythm: the one to which we are most attuned and can produce most comfortably. It is thought that this rhythm, known as our spontaneous production rate (SPR), may be tied to our circadian rhythms.

"It is possible that the neural oscillations that are responsible for driving our preferred tempo at a particular rate are more easily pulled along when a musical tempo is closer to our own natural tempo," added Roy. "As a result, they are pulled away from the neural frequencies associated with pain."

The right beat reduces level of pain

To find out whether listening to music at an individual's natural tempo helped lower their experience of pain, the McGill researchers compared the pain ratings of 60 participants (some of whom were musicians and others not) as they were subjected to low levels of pain, either in silence or while listening to music that had been manipulated so that its tempo either matched the one that was most natural to each person or was slightly faster or slower.

Each participant's natural tempo was established by their tapping out the [rhythm](#) of a well-known nursery rhyme (Twinkle, Twinkle, Little Star) at the rate that was comfortable for them. The touch-sensitive pad they tapped on produced the next tone in the sequence of the melody, thus capturing their natural tempo.

Over the course of 30 minutes, participants underwent 12 blocks of tests in which 10 seconds of heat at various levels was applied intermittently to small pads on their forearms, interspersed with pauses of varying lengths. Participants either experienced the pain in silence or listened to a melody they had selected at their preferred tempo, 15% faster or 15% slower. After each block of tests, they were asked to rate their level of pain. At worst,

according to Roy, the pain was like what you feel when you touch the outside of a hot coffee mug and pull your hand away quickly because it's too hot.

The right beat reduces pain the most

The researchers found that, compared to silence, music of whatever kind and at whatever tempo significantly reduced participants' perceptions of pain. More important, they discovered the greatest reductions in the ratings of the levels of pain occurred when the melodies were played at a rate that matched the participant's own preferred tempo.

As a next step, the researchers said they would like to use electroencephalography to measure [neural activity](#) and confirm that the rate of neuronal firing synchronizes with the external tempo of the music. They also indicated that they hope to test their findings with people living with [chronic pain](#) or pain associated with medical procedures.

More information: Wenbo Yi et al, Individualizing musical tempo to spontaneous rates maximizes music-induced hypoalgesia, *Pain* (2025). DOI: [10.1097/j.pain.0000000000003513](https://doi.org/10.1097/j.pain.0000000000003513)

Journal information: [Pain](#)
Provided by [McGill University](#)

FEBRUARY 10, 2025

Different songs for different days: Why it's important to actively choose the music for your mood

by [The Conversation](#)

Many of us take pleasure in [listening to music](#). Music accompanies important life events and lubricates social encounters. It represents aspects of our existing identity, as well as our hopes and dreams. It expresses emotions that cannot be explained with words. Music also distracts us from boredom and difficulty and helps us escape into another world.

Music seems to have a magical power: a wand to be waved that makes life feel better. But what if the power was not in the music itself? In fact, the power of music comes from our [choices in what to listen to](#) and the human agency we express in this act.

It can be seen as a [placebo effect](#) where the music is endowed with special powers by our minds. The qualities of the music are important. But as with all art, it is how we uniquely perceive the song that [makes our experience powerful](#).

[My research](#) has shown most of us operate on autopilot when it comes to choosing music, often assuming previous music selections will have the same effect even under very different circumstances.

Stepping out of autopilot and being more intentional in the songs we chose can move from hoping the music will make you feel good, to knowing it will and seeing how it does.

Choose the right music for you

The way we experience music is personal. There is no one song that is going to make everyone feel the same.

Think about trying to pick a song to make you feel happy, or to listen to when you're happy. If the power was in the musical qualities of the song itself, Pharrell Williams' Happy might work. The song has several uplifting musical features: a simple but catchy melody; an energizing rhythm emphasized by the singer clicking along; a lively tempo; and words that repeat the key idea.

It's similar to Psy's Gangnam Style, Katrina and the Waves' Walking on Sunshine or ABBA's Waterloo.

But just because these songs sound happy, do they make you *feel* happy? Would they make it into your personal top five pleasure-inducing tracks?

Your song selections are different to your friends because of the personal associations you have with them, including your personal taste. That's why AI can't generate the right songs for you if you ask it for "happy songs."

You would be better off to start by looking at your own playlists and frequently played tracks to identify which ones actually make you feel good, personally.

Understanding meaning

It's important to distinguish between pleasure-inducing tracks and meaningful songs.

Meaningful songs are linked to a range of emotions, identities, histories and social connections—but only some of those are pleasure inducing. Others connect to poignant and beautiful feelings such as grief and loss, whether that is missing home or missing people and creatures we love. This poignancy is distinct from hedonism, which is happiness [without negative affect](#).

If you're experiencing grief, for example, there may be a beauty in remembering your loved one, but it is connected to the pain of their absence. Choosing pleasure-inducing songs operates as an aesthetic distraction to take our [mind away from the pain](#), which is a different (not necessarily worse or better) choice.

Sometimes meaning doesn't come with a beautiful purpose. Like the [love song](#) that becomes the breakup song. Or the favorite artist whose death renders a song poignant rather than uplifting. Then the song may help with emotional processing, or it may not, it can just fulfill a desire for [rumination](#)—a thought we keep circling around without discharging the intensity or our perspective on it.

It might seem obvious that these events will change the way we feel when we listen to a song. But it can be [surprisingly difficult](#) to let go of music we love.

Sad songs can [be enjoyable](#) and/or a beautiful way of connecting to emotional experiences. But they can also [intensify](#) our negative emotions, which doesn't always [lead to resolution](#).

Being conscious and intentional in music choices is important, especially if you're tending to ruminate. During down times in life, it is worth checking in after listening to make sure the song is helping you process and resolve, and not just intensify and maintain a negative state you would rather leave behind.

Finding what you love

But most days you are safe to let your instincts guide you. After all, there's nothing more pleasurable than spending time listening to a banger.

In technical speak, we call these "preferred songs"—songs that might not be personally meaningful, or fill you with joy exactly, but they are just great tracks. Music you love, appreciate and rate.

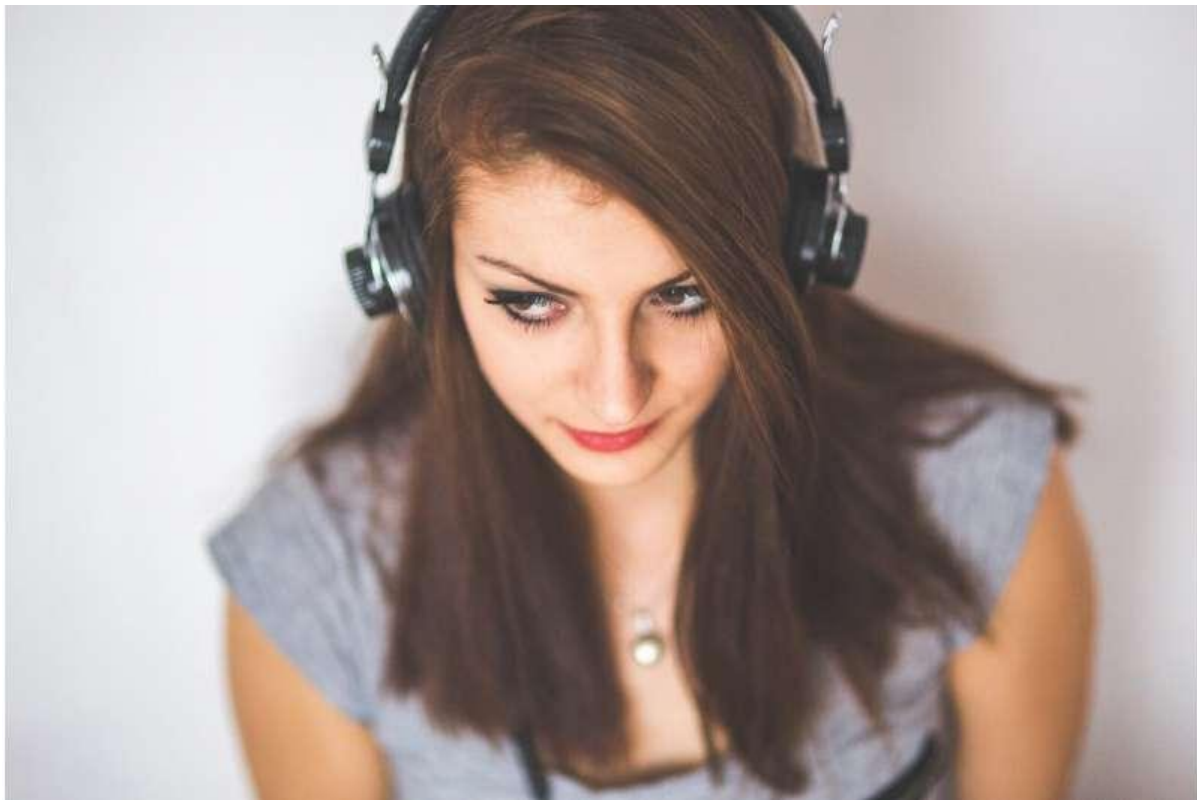
But even identifying preferred songs is still personal. Despite what many people think, it's very difficult to get agreement about [what makes a good song](#). But it's not difficult to identify the songs that you think are great. In fact, it's a super fun thing to do.

Provided by [The Conversation](#)

APRIL 3, 2025

Music to their ears: People with ADHD may prefer background music while performing daily tasks

by Catherine Couturier, [University of Montreal](#)



Credit: Pixabay/CC0 Public Domain

Are people with attention deficit disorder with or without hyperactivity (ADHD) more likely to listen to background music while performing daily tasks?

Kelly-Ann Lachance, a doctoral student in clinical neuropsychology at Université de Montréal, decided to find out.

She and her supervisor, neuropsychologist and psychology professor Nathalie Gosselin, analyzed the responses of 434 young adults between the ages of 17 and 30 to an [online survey](#) about music listening habits.

"In [lab studies](#), we rarely ask about listening habits, and yet it's important because people differ in the amount of stimulation they need to perform a task optimally," said Lachance.

The results were [published](#) in *Frontiers in Psychology* in January 2025. Lachance said she chose to publish in an open-access journal because she wanted to share her findings with a broader audience.

"As a future clinician, I want to use research to help the individuals I follow," she said.

Launched at the end of the pandemic, the study relied entirely on data collected through the survey.

"Some parts of it already existed, so we took the questions on music-listening habits and the subjective effects of [background music](#) and put them in an online questionnaire that could be completed in under 15 minutes," explained Lachance.

To determine whether respondents were ADHD or neurotypical, the survey included questions from the Adult ADHD Self-Report Scale for DSM-5 (ASRS-5); 118 of the respondents screened as ADHD and 316 as neurotypical.

"The ASRS-5 is a quick way to assess ADHD symptoms," Lachance noted.

Other questions in the survey assessed each respondent's recent emotional state, level of anxiety and depressive symptoms.

"Music is used to modulate emotions, so we wanted to include emotional functioning in the study," explained Gosselin, who is also director of UdeM's Music, Emotions and Cognition Research Laboratory (MUSEC Laboratory) and a researcher at its parent organization, BRAMS (International Laboratory for Brain, Music and Sound Research).

Playing sports or studying

The study examined differences in background music listening during a host of daily tasks, including cognitive activities such as reading, writing and studying, and less cognitive activities such as cooking, taking [public transport](#) and playing sports.

It found that people with ADHD reported listening to background music while playing sports and while studying significantly more than did neurotypicals.

However, neurotypicals spent more hours per week listening to music while not doing anything else.

While the researchers weren't completely surprised by the results, they didn't see them as a foregone conclusion.

"You could also imagine that music might interfere with performing a cognitively demanding task," which could have made individuals with ADHD less inclined to listen to music at the same time, said Gosselin.

In fact, not only do young adults with ADHD like to have music in the background while studying, they prefer music that is stimulating rather than relaxing.

"Why stimulating music? The literature shows that people with ADHD need more activation to perform at the same optimal level as neurotypicals. Music could help with this, regardless of the type of activity," explained Lachance.

"However, this is a hypothesis that requires future testing," Gosselin pointed out.

A beneficial habit?

Is music in fact beneficial for [young adults](#) with ADHD? How does it affect their concentration and motivation? Gosselin has been wondering about this for a long time.

"My first neuropsychology internship was in child psychiatry," she recalled. "In one of my first cases, a father asked me if it was a good idea for his teen with attention difficulties to listen to music while studying. I didn't know what to say because there was no conclusive data in the literature. But the question stayed with me."

Since music is ubiquitous and readily available, it could be valuable in helping people manage ADHD symptoms.

"I'm not suggesting it could replace medication, but it could complement it," said Lachance. "The question is how we can use the full potential of music to promote optimal performance."

More information: Kelly-Ann Lachance et al, Listening habits and subjective effects of background music in young adults with and without ADHD, *Frontiers in Psychology* (2025). [DOI: 10.3389/fpsyg.2024.1508181](https://doi.org/10.3389/fpsyg.2024.1508181)

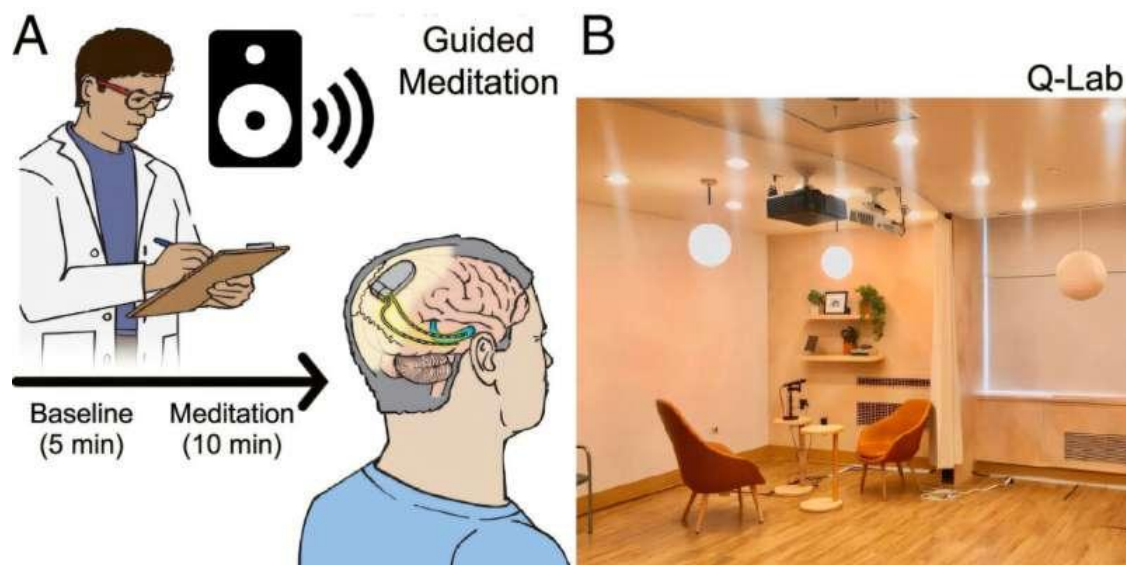
Journal information: [Frontiers in Psychology](#)

Provided by [University of Montreal](#)

FEBRUARY 4, 2025

Meditation found to induce changes in deep brain areas associated with memory and emotional regulation

by [The Mount Sinai Hospital](#)



Behavioral methods. (A) Experimental design. Subjects ($n = 8$) completed a loving-kindness meditation (LKM) paradigm consisting of 5 min of audio-guided instruction (baseline) and 10 min of audio-guided LKM. (B) Experimental setting. The experimental paradigm was administered in Mount Sinai West's Q-Lab, a dedicated, immersive research environment designed to provide participants with a restorative space to participate in this experiment. Credit: *Proceedings of the National Academy of Sciences* (2025). DOI: 10.1073/pnas.240942312

Researchers using intracranial electroencephalogram (EEG) recordings from deep within the brain found that meditation led to changes in activity in the amygdala and hippocampus, key brain regions involved in emotional regulation and memory.

The study, conducted by researchers at the Icahn School of Medicine at Mount Sinai and [published](#) Tuesday, February 4, in *Proceedings of the National Academy of Sciences*, may help explain the positive impact these practices have and could contribute to the development of [meditation](#)-based approaches for improving memory and emotional regulation.

Previous research has shown that meditation—a set of mental techniques to focus attention and awareness—can improve mental well-being and potentially help improve psychiatric diseases like anxiety and depression. In combination with its beneficial clinical effect, previous brain research has shown a connection between meditative practice and brain activity. Yet the specific neural activity underlying meditative practices and their positive effects is still not well understood.

"Traditionally, it has been challenging to study these deep limbic brain regions in humans using standard methods like scalp EEG. Our team was able to overcome this challenge by leveraging data collected from a unique patient population: epilepsy patients with surgically implanted devices that allow for chronic EEG recording from electrodes implanted deep in the amygdala and hippocampus," said Christina Maher, a neuroscience Ph.D. student in the Graduate School of Biomedical Sciences at the Icahn School of Medicine and first author of the paper.

"It was quite amazing to uncover changes in [brain wave activity](#) in these key regions, even during first-time meditation."

For this study, the research team studied eight neurosurgical patients with drug-resistant epilepsy who were chronically implanted with a responsive neurostimulation system. Participants were self-reported novice meditators prior to the study and completed a five-minute audio-guided instruction (baseline) followed by 10 minutes of audio-guided "loving kindness" meditation.

Loving kindness meditation is a specific type of meditative practice that involves focusing attention on thoughts of well-being for oneself and others. To evaluate the loving kindness meditation induction, participants were asked to report their experienced depth of meditation after the session on a scale of 1–10 (higher score = deeper meditation). On average, participants reported a high degree of deep meditation (mean = 7.43).

"We found that loving kindness meditation is associated with changes in the strength and duration of certain types of brain waves called beta and gamma waves," said Ignacio Saez, Ph.D., Associate Professor of Neuroscience, Neurosurgery, and Neurology at the Icahn School of Medicine and senior author of the paper.

"These kinds of brain waves are affected in [mood disorders](#) like depression and anxiety, so the possibility of being able to willfully control these through meditation is pretty amazing, and may help explain the positive impact that these practices have on individuals."

The study is unique in that it used advanced invasive neural recording techniques, which provide much more detailed and precise insight into the brain compared to traditional techniques like scalp EEG.

The study took place in the Quantitative Biometrics Laboratory at Mount Sinai West, a lab designed to provide patients with a relaxing environment to receive therapeutic treatment that is free from typical distractions associated with a hospital setting or traditional lab.

This naturalistic setting enabled study participants to meditate in a calm environment that is more reflective of real-world experiences, improving the study's ecological validity.

The researchers acknowledged a few limitations of the study. The sample size was small and they only looked at the effects of one-time meditation without assessing the impact of repeated practice or following up over time to see if the effects lasted.

"This study provides a foundation for future research that could contribute to developing meditation-based interventions to help individuals modulate brain activity in areas involved in memory and emotional regulation," said Dr. Saez.

"Meditation is noninvasive, widely accessible, and doesn't require specialized equipment or medical resources, making it an easy-to-use tool for improving mental well-being. However, it is crucial to note that meditation is not a replacement for traditional therapies. Instead, it could serve as a complementary low-cost option for individuals experiencing challenges with memory or emotional regulation."

The Mount Sinai research team plans to conduct follow-up studies that will explore the specific relationship between the brain activity observed and mood/mental health outcomes. The next step will be to gather more data on how ongoing meditation impacts mental well-being, which will help illuminate the potential therapeutic benefit of meditation in real-world, long-term settings.

More information: Christina Maher et al. Intracranial substrates of meditation-induced neuromodulation in amygdala and hippocampus, *Proceedings of the National Academy of Sciences* (2025). DOI:

[10.1073/pnas.2409423122](https://doi.org/10.1073/pnas.2409423122), www.pnas.org/doi/10.1073/pnas.2409423122

Journal information: [Proceedings of the National Academy of Sciences](#)

Provided by [The Mount Sinai Hospital](#)



30 Years Ago, Steve Jobs Said 1 Habit Separates the Doers From the Dreamers

Surprising advice from the fiercely independent, 'one-person focus group' Apple co-founder.

One of my least favorite things to do is [ask for help](#). Not only do I not like to ask, but I take a somewhat perverse pride in figuring out how to do difficult things - - [especially difficult physical things](#) -- on my own. (Although maybe that's just me rationalizing why I don't like asking for help.)

If you're an entrepreneur, you can probably relate. One of the reasons people [start their own businesses](#) is to be able to rely on themselves. Their decisions. Their actions. Their hard work, level of perseverance, and willingness to struggle and even suffer in the pursuit of a dream.

Go it alone? That's what entrepreneurs do.

But, according to no less an authority than [Steve Jobs](#), only to a point. Jobs felt that too much independence and self-reliance, even though each is a key entrepreneurial quality, could actually limit your success.

As [Jobs](#) said:

I've never found anyone that didn't want to help me if I asked them for help.

I called up Bill Hewlett (co-founder of Hewlett-Packard) when I was 12 years old. "Hi, I'm Steve Jobs. I'm 12 years old. I'm a student in high school. I want to build a frequency counter, and I was wondering if you have any spare parts I could have." He laughed, and he gave me the spare parts, and he gave me a job that summer at Hewlett-Packard ... and I was in heaven.

Most people never pick up the phone and call. Most people never ask ... and that's what separates, sometimes, the people who do things from the people who just dream about them.

To Jobs, asking for help was foundational to success. Classic example? The first iPhone.

An early prototype's hard-coated plastic screen wasn't hard enough: Jobs noticed the screen was already scratched after he carried it in his pocket for just one day.

Jobs could have gone the self-reliant route. He could have tried to fix the problem himself using Apple's considerable resources. Instead, Jobs called Wendell Weeks, the CEO of Corning Glass, and described the type of glass he needed. After some back and forth and a few [cleverly effective words of persuasion](#), Weeks agreed to help by providing gorilla glass, a product the company had developed in the 1960s but never put into production.

Years later, biographer Walter Isaacson walked into Weeks's office and found only one memento on display, a letter from Jobs that said, "We couldn't have done it without you."

That's the thing about asking for help. Admitting you need help can make you feel weak, or vulnerable, or somehow "less than" in the eyes of the other person.

But that's not what happens. When you ask for help, [in the right way](#), other people don't think about you. They think about how your request implicitly shows you respect them, implicitly shows you trust them. It shows you value or admire the skills, talents, experiences, or resources they clearly worked hard to obtain.

Granted, asking for help also makes you vulnerable. A few years ago, when I wanted to ask [Adam Grant](#) for a blurb for my book, I almost didn't because I was afraid he would turn me down. The same was true for [Ryan Holiday](#).

I struggled to send those emails. I didn't want Adam or Ryan to think less of me for asking, and I knew -- even though there was no reason for me to -- that I would take it at least a little personally if they said no. (It's hard not to react emotionally to bad news after you put yourself in a vulnerable position.)

Yet not asking would have guaranteed not getting. (If you're wondering, I got.)

As Jobs said, "You've gotta act. And you have to be willing to fail ... with people on the phone, with starting a company. ... If you're afraid of failing, you won't get very far."

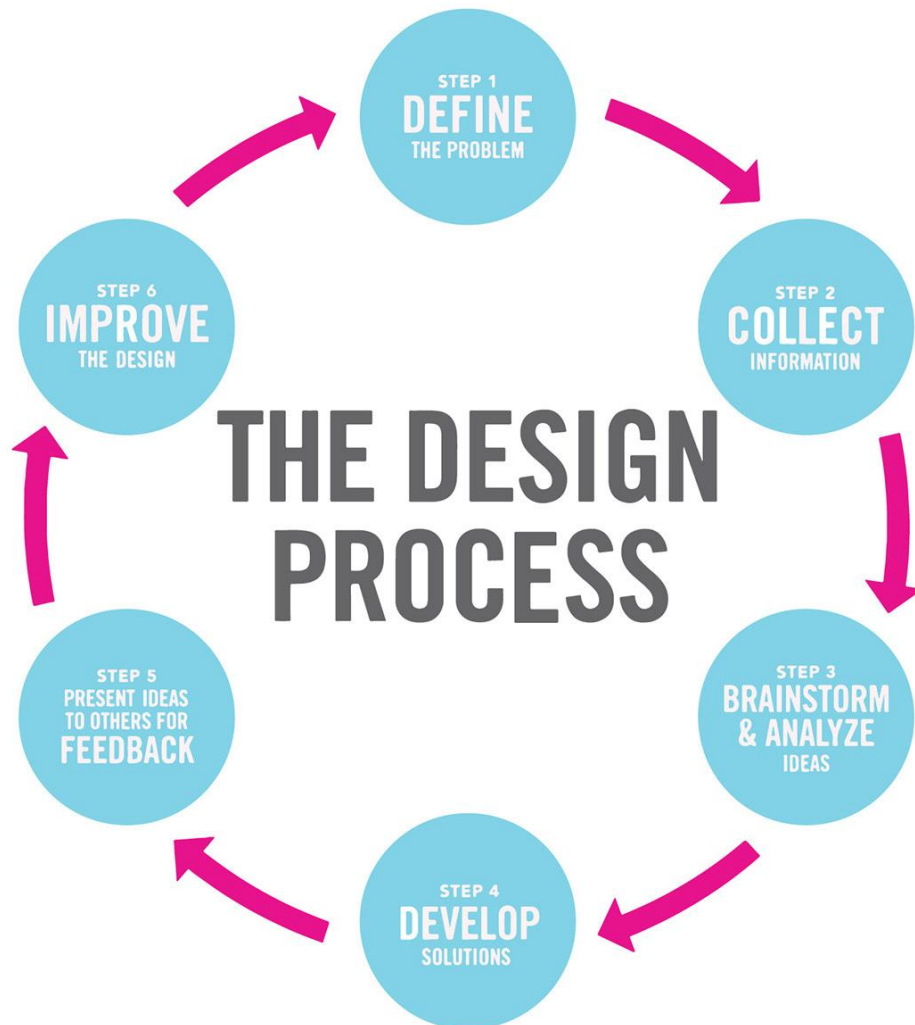
If you don't ask, you also won't give other people the opportunity to make a difference in someone else's life, no matter how small.

Judging by the framed letter on his wall, Weeks was clearly proud to have made that difference for Jobs.

Maybe that's why asking for help is such a strong predictor of success. No one does anything worthwhile on their own, and asking for help could be the first step in building long-term, mutually beneficial relationships.

Which, if you think about it, sounds like a great definition of success.

This post originally appeared at [inc.com](#).



Want Better Mental Focus? Neuroscience Just Explained How to Train Your Brain to Achieve 'Flow State'

You might call it 'flow state' or 'being in the zone.' Would you be interested to learn how to make it happen?

This is a story about [creativity](#), [productivity](#), and [neuroscience](#).

In 1990, a psychologist named Mihaly Csikszentmihalyi published a book in which he described "flow," a state of mind in which people can focus their brains, shut out distractions, and become much more productive.

Maybe you think of this as being "in the zone." People have spent entire careers trying to explain, analyze, and ultimately teach others how to enter into this kind of flow state.

Now, researchers out of [Drexel University](#) in Philadelphia say they've succeeded in using neuroimaging technology to track flow state in people's brains in real time -- and maybe unlock some practical advice on how to make it happen.

Writing in the journal *Neuropsychologia*, the researchers said they set out to consider two theories of how flow state might work:

- Theory 1 suggests that flow state might simply be, "a state of highly focused concentration or hyperfocus that shuts out extraneous thoughts and other distractions to enable superior performance on a task."
- Theory 2, however, suggests something a bit more active: The idea that through years of intense practice, people's brains can develop "a specialized network or circuit to automatically produce a specific type of ideas... with little conscious effort."

If the second theory were correct, the researchers hypothesized, this might mean that the brains of people who develop a certain level of expertise in a creative discipline might be able to "rela[x] its supervision" and basically go on autopilot - - flow state, almost on demand -- exploring and creating without active control.

"Csikszentmihalyi... defined [flow] as 'a state in which people are so involved in an activity that nothing else seems to matter,' " said lead researcher John Kounios.

"[T]he experience is so enjoyable that people will continue to do it even at great cost, for the sheer sake of doing it."

The Drexel experiment involved recruiting a group of 32 jazz guitarists, some of whom were highly experienced and others who were less so, and recording high-density electroencephalograms (EEGs) while they each improvised six jazz sessions, "with programmed drums, bass, and piano accompaniment."

Afterward, their performances were assessed both by (a) asking the guitarists to rate how intensely they felt they achieved a "flow state" while playing, and (b)

asking four jazz experts to listen individually to each of the 192 total recorded improv sessions, and rate them for creativity and other qualities.

In the end, they made two very interesting findings:

- First, the more experienced musicians reached a flow state "more often and more intensely" than their less experienced colleagues -- thus suggesting support for "Theory 2," above.
- Second, they found that the EEGs mapping the brain activity of musicians who managed to achieve a high state of flow had two marked differences from other occasions: *increased* brain activity in the left hemisphere, in areas associated with "hearing and playing music," and *decreased* activity in the *superior frontal gyri*, which is associated with executive control.

What I really like about this effort is that Kounios was willing to make a few recommendations for creative people in any field who might want to increase the odds of attaining flow state.

In short, he said it involves building deep expertise in whatever creative discipline you care for, and then also practicing and also learning how to "withdraw conscious control" once you've reached that high level of expertise.

As I write in my free e-book, [Neuroscience: 13 Ways to Understand and Train Your Brain for Life](#), there's nothing more fascinating than the human brain and the unexpected ways in which it works. Techniques like this to improve focus are at the top of the list.

Or to quote Kounios once more: "As jazz great Charlie Parker said, 'You've got to learn your instrument. Then, you practice, practice, practice. And then, when you finally get up there on the bandstand, forget all that and just wail.'"

How to break through a creativity block

It's a telling tale: Sometimes, as a leader, the best way to spark creativity is to go straight to the front line—to spend time with employees across the company,

and if your business is international, across the globe. Especially if you're experiencing a [creative block](#), a tour of your office can ignite ideas and solutions.

We all face creativity blocks. But here are some ways you can seek out inspiration from your colleagues get out of a rut:

Volunteer to be the notetaker

In the past, leaders could get away with problem-solving and decision-making by consulting a small [circle of advisers](#). Today, the nature of work has changed, along with the nature of problems. Technology is advancing more rapidly than ever, customers have higher expectations, and, of course, global issues like [climate change](#) are more pressing than ever. Increasingly complex problems require increasingly innovative solutions.

As research published by [Harvard Business School](#) suggests, today's leaders have to gather input and buy-in from a larger and more diverse range of experts. This new landscape makes social skills like listening more critical than ever.

For leaders, the expectation is often that we communicate our ideas, our expectations, and our vision. [Listening](#), on the other hand, is sorely underrated—especially when you're searching for creative ideas. As you connect with your coworkers looking for inspiration, one way to ensure you're listening more than speaking is by volunteering to be the notetaker. When you attend meetings, record each participant's input. Even if you're using an AI-powered note taking app, you can spearhead the process of capturing and organizing everything discussed. Resist the urge to weigh in, even if employees look to you to resolve open questions. Remember, brainstorming is about the process.

Schedule one-on-one meetings

While group meetings are a great way to get the ball rolling, scheduling [one-on-one meetings](#) can help flesh out your ideas—especially if an employee is on the [introverted](#) side of the spectrum.

Writing for [Fast Company](#), Evans Baiya explains that engaging quieter team members and finding the ideal way to work with them can lead to “a gold mine

of well-thought-out and creative ideas that are even deeper and more developed than what you get in a quick brainstorm session.”

Regardless of an employee’s personality type, Baiya’s tips can help make your one-on-one meetings more productive. Provide employees with detailed information about the issue in advance, allowing them time to reflect before the meeting. This gives everyone, even extroverts who may prefer thinking on their feet, a chance to enter the discussion on equal footing, ensuring more thoughtful and creative input.

Pull together a recap document

The final step is to recap all that you have learned and how your colleagues have inspired you. Like leaving a networking event with empty pockets versus a stack of business cards, this final effort makes the difference between mere socializing and meaningful productivity.

When I visit Jotform’s various offices, I often take the last half-hour of the day to pull together a recap. Using my meeting notes, I outline key contributions, takeaways, and open questions. I list new objectives. And I summarize any points or issues I’d like to explore.

Compiling my notes helps me to reflect on and expand on ideas. Sometimes, it helps me to recognize that an idea isn’t worth pursuing. Other times, it helps me ensure that good ideas don’t slip through the cracks.

Preparing a recap document also helps me improve my time management. If, for example, I realize that the day didn’t get my creative wheels turning, I might rethink how I’m spending my time. For example, I might choose to sit in on fewer group meetings in favor of more one-on-ones. As much as I appreciate the added facetime, the goal is to spark new ideas. Hopefully, with these strategies, you’ll be equipped to break through your next creative rut and find your next great idea, too.



'Develop your eccentricities when young.'

Warren Buffett is known for two things: [making money](#) and [giving advice](#).

In his [Berkshire Hathaway letter to shareholders last year](#), Buffett wrote that his success over 58 years was mainly the result of "about a dozen truly good decisions -- that would be one every five years."

He listed just a few of these decisions, but having written a lot about Buffett (and also having studied all of his shareholder letters), I believe you can use Buffett's well-documented life as a framework to inspire just about anyone to make these kinds of truly good decisions.

So here's a checklist: 12 life decisions that lead to success, using Buffett's example:

1. The decision to nurture curiosity.

Let's start with one that starts early -- early in life, and early on a journey to success. In fact, it's so early that I tend to think of this as something that people might do to help their kids find success, even before they know what the word means.

In Buffett's case, I think [we can point to two experiences](#), both of which happened before he turned 10 years old, that he says sparked real interest. The first was that

he borrowed a book called *One Thousand Ways to Make \$1,000* from the Omaha public library and read it over and over.

The second was that once he started showing interest in finance and the stock market, his father took him on a tour of the New York Stock Exchange.

2. The decision to get started.

Curiosity is great, but the next step has to do with experimentation and execution. Buffett has talked a lot about the first businesses he founded -- things like a paper route, detailing cars, and buying cases of Coca-Cola from his grandfather's grocery store and selling the individual bottles at a markup.

Even at 93 years old, Buffett remembers many of these early ventures in detail -- and [he has a highly unusual advantage](#). In short, Buffett reports that he has saved a copy of every federal income tax return he ever filed, dating back to 1944.

3. The decision to find mentors.

Nobody does anything worthwhile alone. Most of us mere mortals need mentors to show us the way.

Buffett has talked at length about his first and most important mentor in business: the man he describes as his "investing hero," [Benjamin Graham](#), who died in 1976 at age 82. In fact, one of the reasons Buffett decided to attend Columbia University's business school was that Graham was a professor there.

4. The decision to be bold.

Fortune favors the bold, they say. Actually, the Romans said it. Probably my favorite early Buffett story about boldness has to do with what he decided to do on a January weekend in 1951.

Having learned that Graham, his investing hero and professor, was chairman of Government Employees Insurance Company, or Geico, which was to Buffett at the time "an unknown company in an unfamiliar industry," he decided to take the train to Washington, show up at the company, and ask about it.

Serendipitous result: Lorimer Davidson, who would later become CEO of Geico, gave Buffett a four-hour explanation and tour of the insurance industry. Fast-forward quite a few years, and Buffett's Berkshire Hathway wound up owning Geico.

5. The decision to be healthy.

"You only get one mind and one body. And it's got to last a lifetime," Buffett famously told a group of students. "But if you don't take care of that mind and that body, they'll be a wreck 40 years later.... It's what you do right now, today, that determines how your mind and body will operate 10, 20, and 30 years from now."

The irony here is that Buffett has never been known particularly for exercise or healthy habits, and says he has "the diet of a 6-year-old." Actually, there's no way I'd let my 6-year-old consume as much candy, red meat, and can after can of Coca-Cola as Buffett does -- but then again, he has lived to be 93 and counting.

6. The decision to nurture relationships.

One of the decisions Buffett listed in the shareholder letter that sparked this whole exercise was his decision to work with Charlie Munger, who passed away last year but was Buffett's partner for decades.

But Buffett talks about many other crucial partners and relationships as well, among them Thomas Murphy, who was chair and chief executive officer of Capital Cities / ABC Inc., and Chuck Feeney, a billionaire turned intention-former billionaire. (We'll talk more about Feeney below.)

7. The decision to plan for afterward.

Nobody lives forever, and once he began knocking on the door of nonagenarian status, Buffett began to acknowledge this himself -- although he does like to joke about being an exception to the actuarial tables.

Finally, in 2021, [he explained the succession plan for Berkshire Hathaway](#), which will be led by Greg Abel, who is currently the head of all non-insurance businesses at Berkshire Hathaway.

8. The decision to cut your losses.

So many people never learn this lesson, and as someone once put it, they wind up spending their entire lives in the wrong room rather than admit they might have picked an incorrect door.

In Buffett's case, one of the big examples and decisions involved his acknowledgment, after years of trying, that the textile business -- the core of Berkshire Hathaway's business for more than its first 100 years -- was no longer viable in the United States.

9. The decision to laugh.

Life is happier when you laugh more. And while Berkshire Hathaway is a serious business -- what's more serious than money, investments, and people's futures? - it's striking how often Buffett's letters, speeches, and interviews are peppered with jokes.

He's partial to the corny kind, and also to the bawdy kind that, if you heard your grandfather tell them, would leave you on the fence about whether to laugh or cringe. Here's one from the 2011 shareholder letter that I don't mind quoting:

A good underwriter needs an independent mindset akin to that of the senior citizen who received a call from his wife while driving home.

"Albert, be careful," she warned, "I just heard on the radio that there's a car going the wrong way down the interstate."

"Mabel, they don't know the half of it," replied Albert. "It's not just one car, there are hundreds of them."

10. The decision to teach.

They call Buffett the Oracle of Omaha, and he clearly loves the role. In fact, there are so many moments in his letters and other communications in which he makes asides to offer advice or hard-learned lessons that teaching truly seems to be his second calling.

One of my favorite examples here is the advice he gave verbatim twice over the years, in both the 1987 and 2003 shareholder letters. (Maybe he thought the audiences had turned over sufficiently in the interim?)

Anyway, [it's this](#), and it really goes back to the first item on the list: "Develop your eccentricities when young."

11. The decision to do nothing.

This one is important: Besides the limited number of very good decisions Buffett says he's made, the other key to success is simply not to do anything when you don't see any good option. Instead of the old adage, "Don't just stand there, do something," Buffett suggests the opposite: Don't just do something, stand there!

Actually, let's use his precise quote: "The trick is, when there is nothing to do, do nothing."

12. The decision to give back.

This is where we get back to Chuck Feeney, who I mentioned all the way back in item No. 6 on this list. Feeney was a multi-billionaire who made it his life goal to give away all of his money.

It was Feeney's example that inspired Buffett to team up with Bill Gates to [launch the Giving Pledge](#), and get more than 200 other billionaires to sign it as well.

I write more about these kinds of decisions and insights in my free e-book, [Warren Buffett Predicts the Future](#).

More than his wealth, more than his advice, more than his 12 decisions -- many years from now, these are the kinds of things for which Buffett will be best remembered.

This post originally appeared at [inc.com](#).



These two things seem small, but they have a big impact.

Steve Jobs doesn't need an introduction. But many of us could use a re-introduction to the two things he incorporated into his work -- the daily double - - that lent to his innovative genius and immense success.

It may just be the ticket to revealing how, [when Steve Jobs died at 57, his brain was only 27](#). The hard-to-believe feat is surprisingly easy to employ and it is in the act of doing something children do daily.

It's not that Jobs grew up reading two books a day like Elon Musk (though within that is [Musk's secret to high performance](#)). Nor is it that, like Bill Gates, he had a [surprising nightly ritual](#) that trumped even [the most legendary morning routine](#). It wasn't that he devoted time each day to mindfulness, amassed great knowledge from the most prestigious schools, or was simply born with the benefit of a silver spoon.

No, instead Jobs did two things that the vast majority of adults stop doing -- which are also two things that anyone can do:

Play and explore.

In the process, he not only increased his productivity, but also had more fun. That's something we could all use more of and something that science says can increase our productivity with little to no effort.

Studies show that it pays to play

As we grow up we grow out of a lot of things. But science says play and exploration shouldn't be among them--despite the fact that they are often the first to go. Yet, play and exploration are not only an important pastime--they also help bring out our best selves, says Stuart Brown, psychiatrist and founder of the National Institute for Play in an interview with [CNN](#) chief medical correspondent Sanjay Gupta's *Chasing Life* podcast. In short, the practice of play helps provide us with the tools to improve productivity without our workday.

It may sound too good to be true, like the latest business scheme plastered across YouTube or one of those late-night infomercials of the 1990s. Yet science

proves that this isn't a tall order like using a blender to shred a Craftsman wrench into glitter, but an untapped tool to exercise our minds.

According to [Psychology Today](#), "Play, in almost any form, has myriad benefits for adults. It reduces stress, improves feelings of optimism, and builds cognitive flexibility." This is because the act of play and exploration is an exercise in thinking outside the box, seeing beyond what is, and solving problems.

Exercising the imagination can increase our productivity

The problem is that for most of us, we age out of playing and exploration. We learn to think within the box and within the confines of what has been done, making the pursuit of what could be an arduous task.

Over time, our creativity, cognitive flexibility, and problem-solving skills weaken. But the simple act of play and exploration, which ignites imagination, could be the widely accessible antidote.

Unlike reading educational books, trying our hand at a brain games app, or signing up to learn a new language, play is an active brain break. It's a way to engage the brain without thinking about learning or gaining something in return. While the result won't likely yield fluency in a foreign language or the title of champion in trivia, it will arm you with the ability to think outside the box, innovate, and produce.

The result is that we can hone our ability to think outside the box and solve problems more quickly, enabling us to effortlessly accomplish more in less time. In other words, it can help us [effectively increase output](#) without increasing energy. So next time you have the opportunity, play. After all, it's not about merely goofing off, but perhaps getting ahead.

This post originally appeared at [inc.com](#).



It is no surprise that digital transformation remains a top priority for business leaders in 2024. New technology is rapidly changing the [business](#) landscape, there is a heightened demand from workforces for hybrid and remote working, and legacy systems are increasingly at risk of falling victim to sophisticated cyber-attacks. Companies are also getting to grips with how best to adopt Artificial intelligence (AI). Not to mention coping with current customer expectations for a seamless [customer experience](#) delivered across multiple digital channels.

Yet, while the reasons for digital transformation are clear, the route to success is often less obvious. It is a huge undertaking – and one that can incur considerable costs – requiring far more than simply updating old technology or migrating processes to the Cloud. Despite this, there is still a prevailing attitude that transformation should be approached from a purely technological standpoint, which is part of the reason why as many as 70% of transformation projects fail.

For most companies, the digital transformation journey can be made a lot smoother by embracing the human element behind the process. Companies must

recognize the unique needs, motivations, and behaviors of their employees, customers, and other stakeholders, if they are to succeed.

For those seeking a partner that can help guide them through the process, it is important to look beyond the technology here as well. Additional considerations such as shared values, chemistry, and effective communication all become paramount given the length of time digital transformation takes to complete.

People drive change

The starting point for digital transformation should always be people. Whether that is customers, partners, or employees – or a combination of all three – any updates made to [IT infrastructure](#) should be led by the benefits it will provide to users. Clear goals link to business outcomes and the needs of the users should be put in place first, with technology acting as the means to achieve those goals.

This, of course, necessitates research before embarking on the digital transformation journey. By engaging in direct conversations with users and leveraging data [analytics](#), businesses can gain a better understanding of the pain points and inefficiencies in their current technology and where their efforts should be focused.

These insights can then guide businesses through the process, helping set clearer company goals and inform more strategic decisions while benefitting users. Taking a human-led approach can also prevent businesses from falling victim to the common mistakes and pitfalls that other organizations may succumb to; providing more assurance that the time and money spent on the project will not be wasted.

Find the right transformation partner

While some larger organizations may have the resources needed to manage digital transformation in-house, in many cases it makes sense to seek support from a digital transformation partner. By finding people who can take the time to

get to know your business, they can help define the strategy, identify the best technology, and put together a roadmap that leads to the desired outcomes. To ensure success, however, it is critically important to find the right partner who is prepared to understand how digital transformation will help both your business and your users.

There is no one-size-fits-all answer here either. Some will be better suited to certain businesses or industries, there will be budget considerations, and both parties will need to be aligned on the deliverables. It is important to remember that a digital transformation partner is more than just a technology vendor though and once again, a key consideration needs to be people and what they can achieve through technology.

There are many companies that offer digital transformation support, including some of the world's largest consultancy firms. But to ensure the transformation process is set up for success, a methodical approach should be taken when choosing a partner.

These four key considerations can help to determine the best transformation partner for your organization:

1. Focus on the outcome: Before starting the journey, you need to clearly define what you want to achieve through digital transformation. Determine the problems you are trying to solve and how technology can help, then work backwards to outline the smaller goals that can get you there. Knowing what you want to achieve, and how you will work towards it, will be crucial when finding the right partner to get you there.

2. Focus on the people: Transformation is an ongoing process and the importance of finding people you are happy to work with cannot be understated. The technology is, of course, important, but this is an undertaking that will likely go on for years. Therefore, it is essential you find a partner that is committed to your transformation, communicates effectively and, ultimately, you have good chemistry with.

3. Look at change management skills: A successful transformation will mean major changes for your organization, which in turn requires change management. When assessing potential partners, it is important to look at their approach towards change management and determine if it matches your own.

4. Experience, expertise and budget: These are fairly common considerations for any partnership and are no less important here. Review potential partners' previous experience to see if it aligns with what you need, look at where their expertise lies and the technologies they offer and ensure they are within your budget.

Digital solutions with real world outcomes

Digital transformation is a necessary yet complex endeavor requiring a holistic approach that goes beyond mere technology upgrades. It is, of course, a technical process, but success will be far easier to achieve if goals are set with users in mind.

The same people-first mentality should be applied by those looking for a digital transformation partner. Organizations need to find a partner that not only possess the required technological expertise, but also has the personnel that understands their business and is aligned on goals, values and culture.

Though the transformation process will undoubtedly be challenging, with many pitfalls along the way, prioritizing the human element will help pave the way to success; helping businesses to remain competitive and relevant in the rapidly evolving digital landscape.

A neuroscientist is more efficient than ever after making 3 simple changes that take advantage of when her brain works best

- A 9-to-5 working day can block creativity and deep focus, a neuroscientist said.
- The brain is primed to do certain types of work at certain times of day, according to Mithu Storoni.
- Storoni shared three things she does to work more efficiently than ever before.

Mithu Storoni, a neuroscientist and expert on mental stress, made three "radical" changes to the way she works after writing her latest book on [optimizing workflow](#).

While researching "Hyperefficient," a book about working efficiently in the age of AI, she realized the traditional [9-to-5 pattern of office work](#) blocks creativity and doesn't take into account the natural rhythm of the brain or a person's individual needs, Storoni told Business Insider.

Data suggests the brain is better at performing certain tasks at certain times of the day, Storoni said. Creative, innovative [problem-solving](#) and thinking "peaks off-peak" early in the morning and late at night, Storoni said. In the mid to late morning, we tend to be more alert and able to do tasks that require deep focus, whereas, after lunch, it's common to have an energy slump.

Most jobs will have an employee doing different types of work, from idea generation to admin, and each type requires a different mental state, she said. This means a [rigid working schedule](#) is ultimately inefficient.

"If you impose the same routine on everyone, you are actually preventing people from working at their best at what they're doing," Storoni said. "We need to radically rethink the way we work."

There's evidence to suggest that flexibility leads to a more productive workforce. In the 2023 [Future Forum Pulse survey](#) — which is backed by Slack and collected data from 10,646

knowledge workers across the US, Australia, France, Germany, Japan, and the UK — 39% of people with full schedule flexibility reported higher productivity scores than those who had no control over their hours.

In the book, Storoni outlines the three "gears" of the brain: with gear one being a daydreaming, relaxed state, gear two being the sweet spot for focus, and gear three being a hyperaroused, stressed mode. She shared the measures she takes to keep herself in gear two when working.

She stressed that this isn't about "[hacking the system](#)" in an attempt to be as consistent as a computer or force your brain to work in a certain way, but rather encouraging the brain to work the way it wants to work.

Schedule tasks around brain rhythm

As much as possible, Storoni now schedules her working day around the type of tasks she needs to do. "I work according to the time of day," she said.

Typically, she starts her day with a workout, but if she needs to do something creative, like write a piece for a magazine, she'll block off that time for work and find another time to exercise.

Storoni is mainly freelance, which gives her more flexibility than a salaried employee. But provided you have at least some agency over when you do which tasks, this idea could be applied to a typical working day, she said.

She does something creative when she has a mental block

When Storoni hits a wall, she leaves her desk and does something creative. "Even if it's not actually working on that creative problem, I do something parallel that's creative," she said. It helps stimulate her imagination and get the juices flowing.



Taking a break to do something creative can help with writer's block.

This could be reading some fiction, listening to an audiobook on a walk, or even something more active like painting or drawing. "That puts me into the right state of mind for when I come back and overcome that mental block," she said.

Taking time away from the screen is essential and doesn't necessarily mean you have stopped working. "I go for a walk confident that actually, even though I'm not visually sitting and looking like someone who's working, I know my mind is working," she said.

This attitude helps her take breaks without feeling guilty or unproductive.

Shut off all potential avenues of incoming information

Maintaining a state of focus (gear two) can be hard and requires an element of self-control, Storoni said, so minimizing distractions can be very helpful.

When she's doing focused or creative work, Storoni puts her phone face down on silent, pauses her email notifications, and doesn't read anything.

"I don't speak to anyone, I don't take any messages, nothing until I'm out of that zone," she said, adding: "As soon as you engage with something, you can't say, 'okay, we're not processing this information.' You have to because that's what attention is."

Having to process information from different streams at once can easily tip someone out of that focused zone as there's too much competition for their attention. This means there are fewer resources for the task at hand, and the quality lessens, she said.

How to Use Mindfulness to Get More Done at Work

Getting yourself to do [deep work](#)—or work that is solely focused on a single task with no disruptions or distractions—is a major part of being productive, but you might find that settling into that [flow state](#) is surprisingly hard. For some, it comes easily, but if you're not one of them, consider using some mindfulness practices to get into the zone. Mindfulness is kind of a buzzword these days, but there's some solid research out there that shows how it can be really beneficial when you're working. The trick is knowing how to do it and being able to tap into it, even in the office.

The link between mindfulness and focus

We have enough research out there to confidently say that [mindfulness meditation improves attention and focus](#), whether [you're a kid](#) studying in school or [an adult working](#) in the real world. The idea of mindfulness itself can be a little woo-woo, all "zen" and "inner peace." I'm not a very woo-woo person, myself; I'm much more interested in objectivity, facts, and evidence. The good news is that

psychology and psychiatry have shown that mindfulness—really just the ability to be present in a given moment and focus on what you need to focus on—is more than just breathing and being spiritual. It’s something concrete and real that has helpful applications for the treatment of depression, stress, and anxiety, plus it can be really helpful when you’re overwhelmed and need to lock in.

This works, [according to the American Psychological Association](#), because focusing on your own thoughts and feelings for a few minutes can dial down your body’s response to stress. The [Yerkes-Dodson law](#) is a psychological model that suggests you need a little stress to perform well, but not *too* much, so knowing how to self-regulate is the key to staying in that sweet spot and not letting your tension get the best of you.

How to do mindfulness practice at work

You’ll notice that a lot of the research focuses on “mindfulness meditation,” which is a mental training practice that calls on you to do deep breathing and be aware of your body and thoughts. That all sounds complicated and not really like something you could do at the office, but [like progressive muscle relaxation](#), another de-stressing technique that can improve productivity, it can be adapted and done anywhere without drawing too much attention to you. You don’t need candles or singing bowls. You just need adaptable techniques you can pull out when you need them.

[According to Mayo Clinic](#), you can practice mindfulness just by paying attention to the world around you for a moment, which is a lot easier to pull off at work than closing your eyes and doing breathing exercises for five minutes. If you’re having a hard time focusing, try eating a favorite snack and focusing intently on the way it smells, tastes, and makes you feel. Or try looking out the window, paying attention to each sight individually while you take some deep breaths. Look at a bird, the people on the sidewalk, the clouds, whatever—and consider each one individually, taking note of how the moment of observation makes you feel. Getting out of your head, thinking of something other than work, and grounding yourself can make you more productive when you get back at it.

If it's possible, you *can* do some breathing exercises and real meditation, too. Try to find a comfortable, secluded spot, like an empty conference or break room, or even your desk. For a minute or two, close your eyes, take a deep breath, and focus on your breaths as they move in and out of your body. Think about only that: The breath in and the breath out. Relax your muscles bit by bit and start over if any negative or stress-related thoughts creep in.

To really tap into mindfulness, you can also try online meditation apps or guides, provided you have the time and space to do it. It might be better to try these at home and get the hang of going full zen when you need to, so you can more easily access the skill when you're at work. The good news is that [online apps and guides have been researched](#), too, and shown to have "robust" effects on depression, stress, and overall mindfulness. Try [the Smiling Mind](#), which is totally free, is aimed only at mindfulness (unlike other breathing and meditation apps, which have a variety of focuses), and has been [highly recommended by the New York Times](#).

The Quick Mental Test That Separates People With High Intelligence From Average Thinkers

Spatial intelligence is the ability to create, remember, recall, and transform visual images, no matter what angle of rotation you see it in. This form of intelligence was born out of [Howard Gardner's Theory of Multiple Intelligences](#).

Gardner believed that intellectual potential was not just something you were born with, and that there were eight components of intellect: Visual-Spatial, Linguistic-Verbal, Interpersonal, Intrapersonal, Logical-Mathematical, Musical, Bodily-Kinesthetic, and Naturalistic Intelligence.

But what if you discovered that your [spatial ability and spatial awareness](#) could determine how well you will perform scientific subjects like physics, biology, astronomy, and computer science?

This quick mental rotation test separates intellectuals from average thinkers.

So, how do you use a mental rotation task to test your cognitive skills?

In Mirea's video, he starts by asking if you can quickly rotate images in your mind. He tells viewers that the quick psychology test is "somewhat associated" with performance in science subjects.

He then says that he will show images of letters that have been rotated clockwise or counterclockwise. The idea is to test your cognitive ability by telling whether the images are rotated letters or mirror images.

To start the mental rotation task, Mirea begins to rotate mental representations of the letter "R" as an example. He advises that your response time should be quick since one key component of the test is reaction time.

Six letters are shown in various states of rotation and mirroring, allowing viewers to decide what is real and what is mirrored.

According to the Mirea, if you were successful in visualizing spatial changes, you have strong spatial abilities.

Commenters were quick to point out that the results suggested the test was too easy. They demanded a tougher task and Mirea delivered.

This time, two mental 3-D objects were placed side by side, with viewers having to determine whether they were the same image that had been rotated. This particular task, Mirea claims, tells how well you will do in both science and sports.

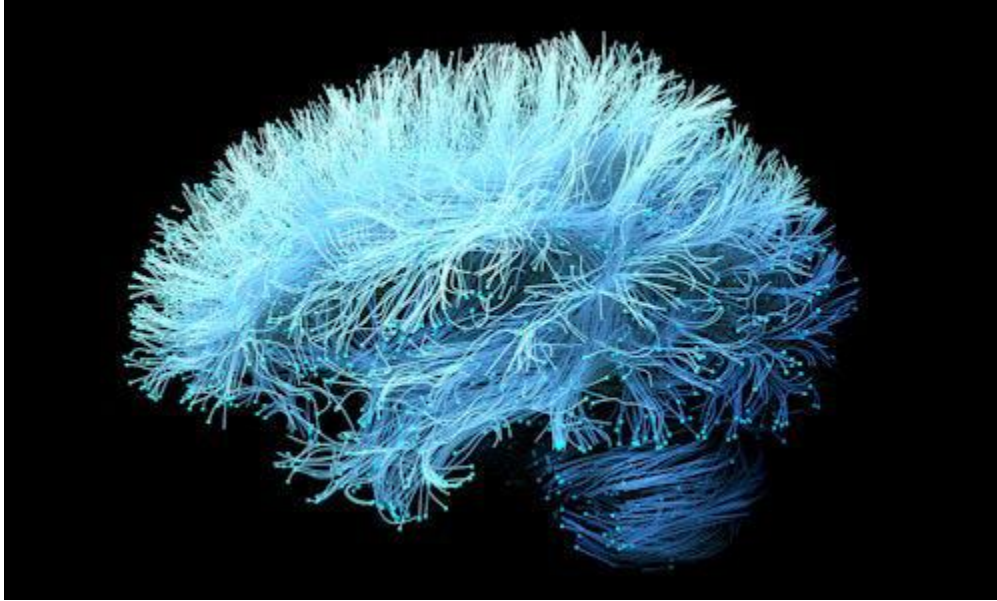
What is mental rotation?

Mental rotation, as it relates to spatial intelligence, is the ability to rotate mental two- or three-dimensional images or objects. It utilizes the right cerebral hemisphere [where your perception skills are housed](#).

The cognitive stages of mental rotation are:

- The creation of a mental object or image
- Rotation of the object or image for comparison purposes
- Comparison of the object or image
- The decision about whether the object is the same or mirrored
- Articulating that decision
- The concept of mental rotation ability was first discovered by Roger Shepard in 1981. [In his research](#), he found that the more an object rotated from its original position, the longer the reaction time.
- In another [study conducted by Frontiers in Behavioral Neuroscience](#), they found marked differences between males and females who participated. The men outperformed the women in both large-scale and small-scale spatial ability.
- That same study concluded that females didn't perform as well in large-scale spatial ability tests because they [were "more susceptible to emotions,"](#) and their gray matter region of the brain that supports memory and retrieval was less efficient than their male counterparts.
- So, even if you weren't able to properly rotate the images in the test using your mind, that doesn't mean you aren't intelligent — [you just think in a different way](#).

Brain Scans Of Jazz Musicians Could Unlock The Mystery Of Creative Flow



[Flow](#), or being “[in the zone](#),” is a state of amped-up creativity, enhanced productivity, and blissful consciousness that, some psychologists believe, is also the [secret to happiness](#). It’s considered the [brain’s fast track to success](#) in business, the arts, or any other field.

However, in order to achieve flow, a person must first develop a strong foundation of expertise in their craft. That’s according to a [new neuroimaging study](#) from Drexel University’s Creativity Research Lab, which recruited Philly-area jazz guitarists to better understand the key brain processes that underlie flow. Once expertise is attained, the study found that this knowledge must be unleashed and not overthought in order for the flow to be reached.

As a [cognitive neuroscientist](#) who is the senior author of this study and a university writing instructor, we are a husband-and-wife team who collaborated on a [book about the science of creative insight](#). We believe that this new neuroscience research reveals practical strategies for enhancing, as well as elucidating, innovative thinking.

Jazz musicians in flow

The concept of flow has fascinated creative people ever since pioneering [psychological scientist Mihály Csíkszentmihályi](#) began investigating the phenomenon in the 1970s.

Yet, a half-century of behavioral research has not answered many basic questions about the brain mechanisms associated with the feeling of effortless attention that exemplifies flow.

The Drexel experiment pitted two conflicting theories of flow against each other to see which better reflects what happens in people's brains when they generate ideas. One theory proposes that flow is a state of [intensive hyperfocus](#) on a task. The other theory hypothesizes that flow involves [relaxing one's focus](#) or conscious control.

The team recruited 32 jazz guitarists from the Philadelphia area. Their level of experience ranged from novice to veteran, as quantified by the number of public performances they had given. The researchers placed electrode caps on their heads to record their EEG brain waves while they improvised chord sequences and rhythms that were provided to them.

[Jazz improvisation](#) is a favorite vehicle for cognitive psychologists and neuroscientists who study creativity because it is a measurable real-world task that allows for [divergent thinking](#) – the generation of multiple ideas over time.

The musicians themselves rated the degree of flow that they experienced during each performance, and those recordings were later played for expert judges who rated them for creativity.

Train intensively, then surrender

As jazz great [Charlie Parker is said to have advised](#), "You've got to learn your instrument, then, you practice, practice, practice. And then, when you finally get up there on the bandstand, forget all that and just wail."

This sentiment aligns with the findings of the Drexel study. The performances that the musicians self-rated as high inflow were also judged by the outside experts as more creative. Furthermore, the most experienced musicians rated themselves as being in flow more than the novices, suggesting that experience is a precondition for flow. Their brain activity revealed why.

The musicians who were experiencing flow while performing showed reduced activity in parts of their frontal lobes, which are known to be involved in [executive function](#) or [cognitive control](#). In other words, flow was associated with relaxing conscious control or supervision over other parts of the brain.

When the most experienced musicians performed while in a state of flow, their brains showed greater activity in areas known to be involved in hearing and vision, which makes sense given that they were improvising while reading the chord progressions and listening to rhythms provided to them.

In contrast, the least experienced musicians showed very little flow-related brain activity.

Flow vs. nonflow creativity

We were surprised to learn that flow-state creativity is very different from nonflow creativity.

Previous neuroimaging studies suggested that ideas are usually produced by the [default-mode network](#), a group of brain areas involved in introspection, daydreaming, and imagining the future. The default-mode network spews ideas like an unattended garden hose spouts water without direction. The aim is provided by the executive-control network, residing primarily in the brain's frontal lobe, which acts like a gardener who points the hose to direct the water where it is needed.

Creative flow is different: no hose, no gardener. The default mode and executive control networks are tamped down so that they cannot interfere with the separate brain network that highly experienced people have built up for producing ideas in their field of expertise.

For example, knowledgeable but relatively inexperienced computer programmers may have to reason their way through every line of code. Veteran coders, however, tapping their specialized brain network for computer programming, may just start writing code fluently without overthinking it until they complete – perhaps in one sitting – a first-draft program.

Coaching can be a help or hindrance

The findings that expertise and the ability to surrender cognitive control are key to reaching flow are supported by a [2019 study](#) from the Creativity Research Lab. For that study, jazz musicians were asked to play “more creatively.” Given that direction, the nonexpert musicians were indeed able to improvise more creatively. That is apparently because their improvisation was largely under conscious control and could, therefore, be adjusted to meet the demand. For example, during debriefing, one of the novice performers said, “I wouldn’t use these techniques instinctively, so I had to actively choose to play more creatively.”

On the other hand, the expert musicians, whose creative process was baked in through decades of experience, were not able to perform more creatively after being asked to do so. As one of the experts put it, “I felt boxed-in, and trying to think more creatively was a hindrance.”

The takeaway for musicians, writers, designers, inventors, and other creatives who want to tap into flow is that training should involve intensive practice followed by learning to step back and let one’s skill take over. Future research may develop possible methods for releasing control once sufficient expertise has been achieved.

'Flow state' uncovered: We finally know what happens in the brain when you're 'in the zone'

any people know the feeling of being “in the zone”: As they're fully immersed in a task, the background noise of the world fades and they may not notice time passing. Gymnasts may enter this all-consuming mental state as they're refining a floor routine, an artist might find “the zone” when adding delicate brushstrokes

to a painting and a writer might enter it as they're crafting the climax of a chapter.

This state, known in psychology as a "flow state," is pursued by those who want to be more productive and creative in an enjoyable way. What happens in the brain during this state, however, has been [under debate for more than four decades](#).

Now, in research published March 4 in the journal [Neuropsychologia](#), scientists may have settled the debate. They conducted a new brain-scan study that has finally revealed which regions of the brain are activated in the midst of a creative flow state.

Their findings contradict one popular theory of flow while supporting another, and they seem to reveal the key ingredients needed to get "in the zone."

The competing hypotheses of flow

Two brain networks have [historically been studied](#) during tasks that could unlock flow. One is the default mode network (DMN), a circuit of connected brain areas associated with daydreaming whose activity spikes when people are not engaged in a specific task. The second is the executive control network (ECN), which supports complex cognitive processes, like problem-solving, and tunes out distractions.

Both networks can act independently, but they've also been shown to display [certain levels of connectivity](#) and to [interact dynamically](#), especially during the creative process.

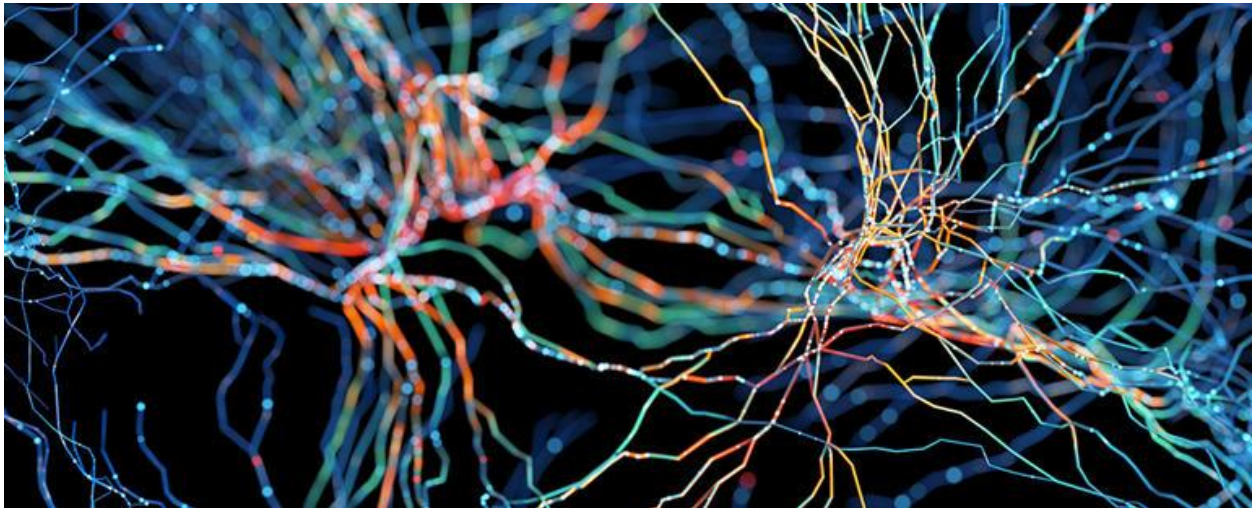
Researchers have proposed two main theories for how the flow state affects the brain. [The first](#) posits it's a state of hyperfocus in which ECN activity increases and guides the DMN to maintain focus on a task, to help generate relevant ideas, said [Dmitri van der Linden](#), a professor of work and organizational psychology at Erasmus University Rotterdam who was not involved in the new study.

"It has been hypothesized that during flow, which is characterized by an intense task focus, DMN activity is relatively low," van der Linden told Live Science in an email. DMN activity is linked to "creative production," though, which is needed to generate ideas and improvise, he noted. With that in mind, this first hypothesis

implies that both the ECN and the DMN are active and play off each other during flow, respectively contributing attention and creativity.

The [alternative theory](#) of flow, however, says that the expertise a person gains in a task through practice forges its own neural processing network that does not require ECN supervision or DMN involvement.

Unique Flow of Information Identified in The Human Brain



"What's new in our study is the use of multimodal data in a single model combining two branches of mathematics: graph theory, which describes the polysynaptic roadmaps; and information theory, which maps information transmission (or traffic) via the roads," [says](#) Alessandra Griffa, a biomedical engineer from EPFL.

"The basic principle is that messages passed from a source to a target remain unchanged or are further degraded at each stop along the road, like the telephone game we played as children."

To use another analogy, the information traffic moving around the brain is like traffic traveling down a road with multiple stops along the way. Our brains seem [to be wired](#) to simultaneously use multiple roads to get the convoy of signals to its destination.

What's more, the researchers discovered that these parallel pathways are as unique [as fingerprints](#): studying the particular way that information flows around a brain can distinguish individual nervous systems.

"Such parallel processing in human brains has been hypothesized, but never observed before at a whole-brain level," [says](#) Griffa.

How these multiple channels affect thought processing, and why we have them when other animals don't, is beyond the scope of this study. However, the researchers think our larger brains have enabled more complex [patterns of connectivity](#).

It might also add some level of resilience to the human brain, the researchers suggest. If one channel gets blocked or damaged, then it's possible that information can be rerouted through another channel instead.

Further down the line, the research could help us determine how damage from brain injuries could be repaired, or how we might be able to guard against the development of conditions [such as dementia](#).

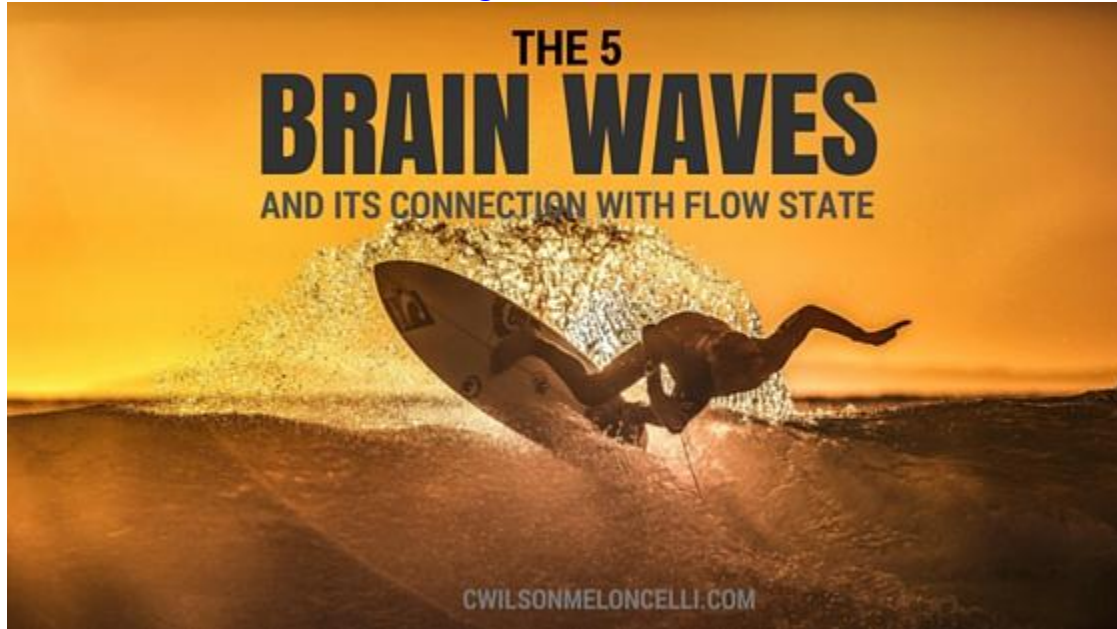
"We could hypothesize that these parallel information streams allow for multiple representations of reality, and the ability to perform abstract functions specific to humans," [says](#) Griffa.

"We looked at how information travels, so an interesting next step would be to model more complex processes to study how information is combined and processed in the brain to create something new."

The research has been published in [Nature Communications](#).

The 5 Brain waves and its Connection with Flow State

Scientific and Theoretical Insights



It's important to understand that all humans possess five different types of electric patterns, also called "brain waves" across the cortex. It can be observed with an electroencephalograph or EEG. EEG is a tool that allows researchers to note brain wave patterns. While most of us focus on looking at our emotions to become happier, our brain waves and our subconscious mind also play a key part to become satisfied.

In this article, I am going to explain the five brain waves, their frequencies, and how they affect our state of mind, and will be explaining where **Flow State** takes place. Its connection and importance with the state of flow.

What are Brain Waves?

Brain waves are produced by synchronized electrical pulses from masses of neurons communicating with each other. The 5 brainwaves are the Gamma, Beta, Alpha, Theta, and Delta arranged from fastest to slowest brain waves. Brainwave speed is measured in Hertz (cycles per second). The first brain waves

ever detected were the Alpha Brain Waves which was discovered by Hans Berger on the year 1929.

Our brain waves change according to what we're doing and feeling. When a slower brainwave is dominant, we can feel slow, sluggish, dreamy, or tired. And when faster brainwave is dominant, we can feel wired or hyper-alert. Multiple brain waves may occur at the same time but there is only one brainwave that is dominant.

Now let me explain each brain wave.

Gamma Waves (40 - 100 Hz)

Gamma Brain Waves are the fastest brainwaves (high frequency) and the most recently discovered brain wave state, relate to simultaneous processing of information from different brain areas. These are involved in higher processing tasks as well as cognitive functioning. This is important for learning, memory, and information processing.

- **Too much Gamma Waves result to** Anxiety, High Arousal, Stress
- **Too little Gamma Waves result to** ADHD, Depression, Learning Disabilities
- **Optimal Gamma Waves result to** Binding Senses, cognition, information processing, learning, perception, REM sleep
- **Gamma Waves can be increased through** Meditation

Beta Waves (12 - 40 Hz)

Beta Brain Waves are associated with normal waking consciousness and a heightened state of alertness, logic, and critical reasoning. Having the right amount of beta allows us to focus on our tasks whether at school, work, or sports performance. However, exposing too many beta waves also results in too much stress. Stress produces stress chemicals like [Cortisol](#) which is really harmful to our body if it's too much.

- **Too many Beta Waves result in** Anxiety, Adrenaline, High Arousal, Inability to Relax, Stress

- **Too little Beta Waves result to** ADHD, daydreaming, depression, poor cognition
- **Optimal Beta Waves result to** Conscious focus, memory, problem-solving
- **Beta Waves can be increased through** Coffee, Energy Drinks, Flow

Alpha Waves (8 – 12 Hz)

Alpha Brain Waves are dominant during quietly flowing thoughts, while you are in deep relaxation, or when you are slipping into a lovely daydream, or during light meditation. Alpha is the frequency between our conscious thinking and subconscious mind. This is the **Flow State Zone**.

- **Too much Alpha Waves result to** Daydreaming, inability to focus, too relaxed
- **Too little Alpha Waves result to** Anxiety, High Stress, Insomnia, OCD
- **Optimal Alpha Waves result to** Relaxation, Flow State
- **Alpha Waves can be increased through** Alcohol, Marijuana, relaxants, some antidepressants

Theta Waves (4 – 8 Hz)

Theta Brain Waves occur most often in sleep but are also dominant during deep meditation. In theta, we are in a dream; vivid imagery, intuition, and information beyond normal consciousness awareness. It helps us improve our intuition, creativity, and makes us feel more natural. This is also the **Flow State Zone**.

- **Too many Theta Waves result in** ADHD, depression, hyperactivity, impulsivity, inattentiveness
- **Too few Theta Waves result in** Anxiety, poor emotional awareness, stress
- **Optimal Theta Waves result in** Flow State, Creativity, emotional connection, intuition, relaxation
- **Theta Waves can be increased through** Depressants

Delta Waves (0 – 4 Hz)

Delta Brain Waves are the slowest but loudest brainwaves (low frequency). It is experienced in a deep, dreamless sleep and very deep, transcendental

meditation. These are also found most often in infants as well as young children. Deep sleep is important for the healing process – as it's linked with deep healing and regeneration.

- **Too many Delta Waves result to** Brain injuries, learning problems, inability to think, severe ADHD
- **Too little Delta Waves result to** Inability to rejuvenate the body, inability to revitalize the brain, poor sleep
- **Optimal Delta Waves result to** Immune System, natural healing, restorative sleep / deep sleep
- **Delta Waves can be increased through** Depressants, sleep

So what are the Brain Waves in Flow State?

The Alpha-Theta border area of around 8 Hz is recognized as the zone or the state of flow. This is the border between the conscious and the subconscious mind. In our sports performance, we start out with beta, but very quickly move into alpha and eventually theta. According to Sports Scientists, increases in Alpha Brain waves precede peak performance. And when you are in intense creativity, you are having a mystical theta-burst where you engage in deep dialogue with your divine mind and you'll be surprised by your performance. This is the brain state of "being in [the zone](#)" where your work feels effortless.

The Alpha-Theta zone is also the brain zone where Gamma waves can occur. Gamma waves bind together ideas from distant areas of our brain, connecting memories, experiences, and new stimuli into creative action.

Conclusion

There are 5 brain waves or electric patterns each person has. Namely, the Gamma, Beta, Alpha, Theta and Delta Waves arranged from fastest to slowest. Flow State occurs in the Alpha-Theta Border where you are in the middle of your conscious and subconscious mind. Many sports athletes strive hard to get in that state because it's the state where constant creativity and optimal performance take place. This is the state where we can combine rapid decisions with creative insight.

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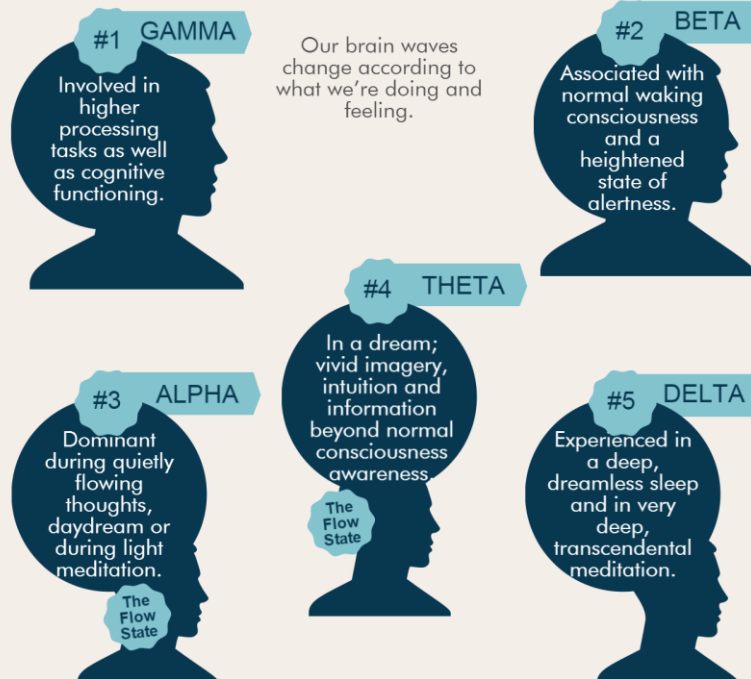
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THE 5 BRAIN WAVES & ITS CONNECTION WITH FLOW STATE

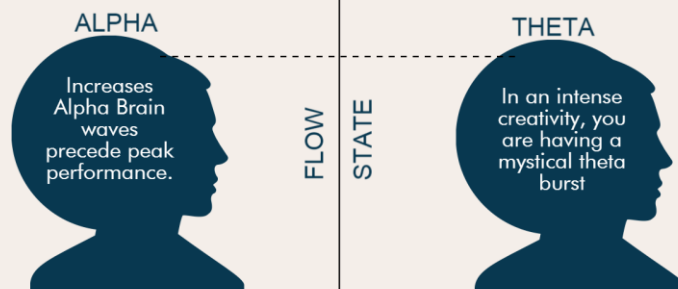
"The greatest discovery you'll ever make, is the potential of your own mind."
-Jose Silva

What are the 5 Brain Waves?

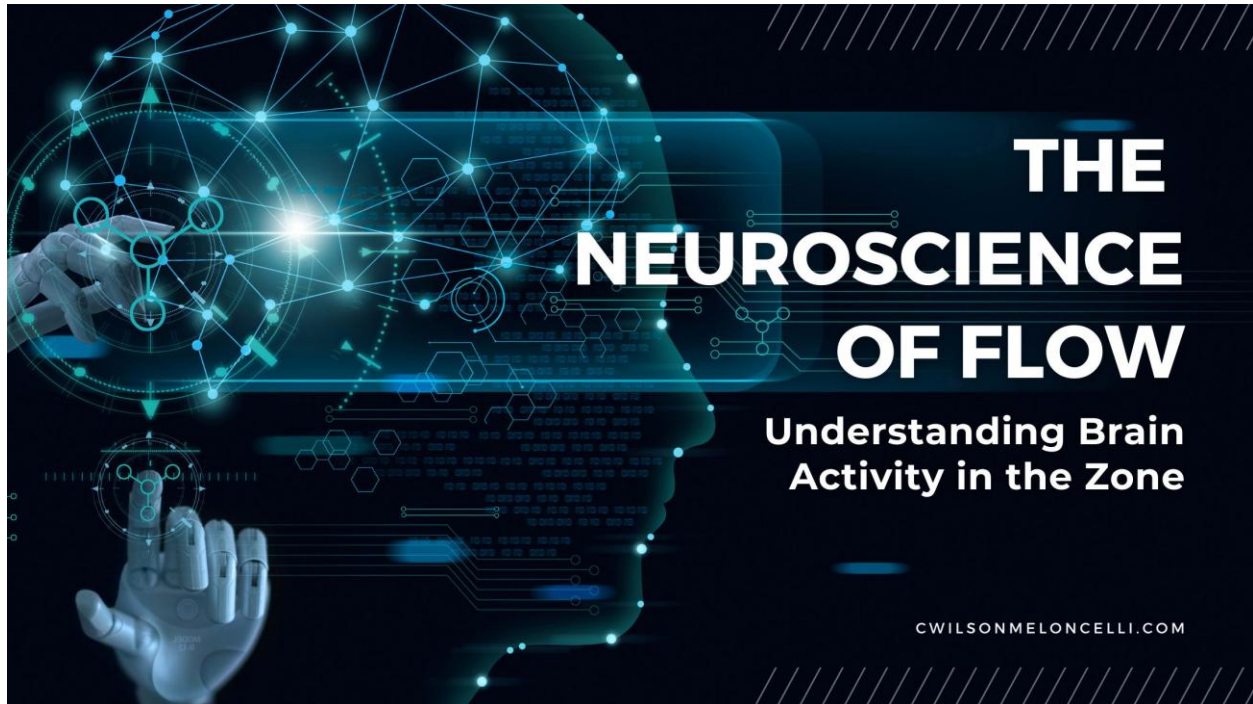
Brain waves are produced by synchronized electrical pulses from masses of neurons communicating with each other.



So what does Brain Waves do with Flow State?



The Neuroscience of Flow: Understanding Brain Activity in the Zone



The 'Flow State', often referred to as 'being in the zone', is a psychological state of complete absorption in an activity, leading to heightened focus and enjoyment. While the subjective experience of Flow is well-documented, recent advances in neuroscience have begun to shed light on what happens in the brain during this state. This article explores the neuroscience of Flow, providing a deeper understanding of this powerful state.

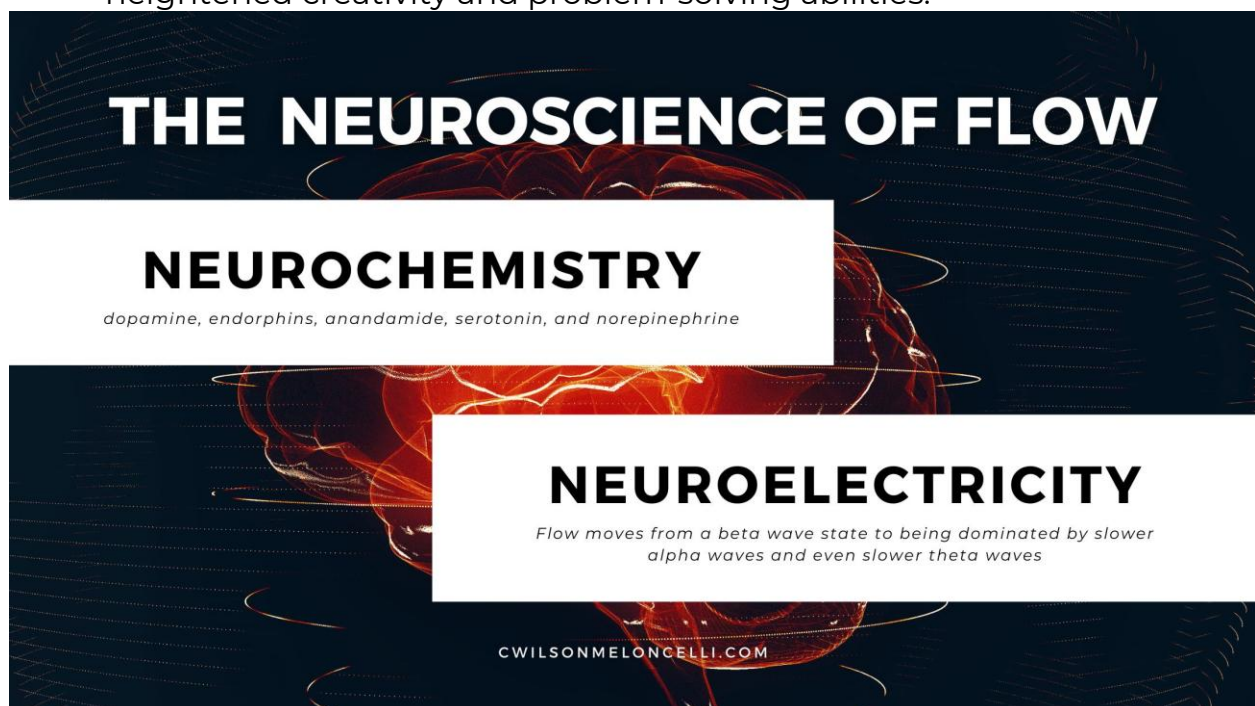
The Neuroscience of Flow

The Flow State is not just a psychological phenomenon; it has a biological basis too. When we enter the Flow State, our brain behaves differently. There are changes in the brain's neurochemistry and neuroelectricity, and these changes lead to the extraordinary characteristics of Flow.

- **Neurochemistry:** In the Flow State, the brain releases a cocktail of neurochemicals. These include dopamine (increases focus, motivation), endorphins (pain relief, pleasure), anandamide (elevation in mood, pain

relief), serotonin (feelings of well-being), and norepinephrine (increases arousal, attention). These chemicals not only make us feel good but also enhance our performance and creativity.

- **Neuroelectricity:** In terms of neuroelectricity, the brain in Flow moves from a beta wave state (normal waking consciousness) to being dominated by slower alpha waves and even slower theta waves. Alpha waves are associated with relaxed, effortless alertness and creativity, while theta waves are associated with reduced consciousness and are present during dreaming and deep meditation. This shift allows for heightened creativity and problem-solving abilities.



Studies on Flow and Brain Activity

Several studies have examined the brain activity associated with Flow. A study by Ulrich et al. used functional magnetic resonance imaging (fMRI) to examine the brain activity of expert pianists during Flow. They found that during Flow, there was decreased activity in the prefrontal cortex, a brain region associated with self-monitoring and conscious control. This phenomenon, known as "[transient hypofrontality](#)," is thought to contribute to the sense of effortlessness and loss of self-consciousness during Flow.

Another study by Keller et al. found that during Flow, there was **increased coherence between several brain regions**, suggesting enhanced communication and integration between these areas. This could contribute to the heightened focus and performance seen in Flow.

The neuroscience of Flow provides a fascinating insight into one of the most powerful states of mind we can experience. By understanding how it works, we can better harness its power to enhance our performance, creativity, and overall well-being. As Csikszentmihalyi noted, "*The best moments usually occur if a person's body or mind is stretched to its limits in a voluntary effort to accomplish something difficult and worthwhile.*"

Now that you've delved into the world of neuroscience and the Flow State, it's time to take a proactive step towards accessing this powerful state more often. Immerse yourself in the program "**4 Cycles of Flow State**" which harnesses the power of these neurological findings. This program will guide you through the process of identifying and cultivating your optimal flow state, allowing you to unlock your full potential, enhance your performance, and increase your overall sense of well-being. Make the decision to tap into your brain's full potential today.

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What it's like to have a brain in permanent flow state — a Quantitative EEG report.

I never thought I'd ever find myself sitting in a clinic with electrodes hooked up to my head, except that's exactly what happened when I visited Peak Brain Institute clinic in Los Angeles earlier this month. It was to complete my brain map, which shed much light on the way my brain is functioning and helped pinpoint opportunities to optimize.

While a breakdown of the report is included below, here's an excerpt from my consult with Dr. Andrew Hill, founder of the clinic:

“You're stuck in a flow state, essentially. Really, really fast. It might work for you, or it might get in the way. I can't tell. But this again, suggests that you're one or two standard deviations faster than average, in general. You're absurdly fast, Oksana. This is like one of those genius brain patterns that usually comes along with genius level or gifted, 150 and above intelligence, plus anxiety. Kind of what I always see here with a fast brain. So you're probably in the gifted range for intelligence, probably tend to get anxious and ruminate.”

Dr. Andrew Hill is also a professor at UCLA with a long standing interest in neurofeedback training. Neurofeedback training is exactly what it sounds like — training for your brain.

Neurofeedback, also known as EEG (electroencephalogram) biofeedback, is a therapeutic intervention that provides real-time displays of brain activity. The program then uses sound or visual signals to reorganize or retrain these brain signals. Brainwaves are monitored and positive reinforcement is given when a desired brain state is reached.

Dr. Andrew Hill, Founder of Peak Brain Institute

Wait, but what are brain waves ??

Brain waves are electrical impulses in the brain.

You're experiencing them right now.

Guess what's making all your thoughts, emotions and behaviours possible ? The communication between neurons in your brain.

Neurons are the building blocks of your brain.

Neurons communicate with each other by electrical changes, producing rhythmic or repetitive patterns of neural activity, which are called brain waves (or “neural oscillations” if you want get technical).

We can actually see and map these brain waves with an EEG (electroencephalogram).

There are 4 main types of brain waves:

Beta waves (12 to 38 Hz) — these dominate our normal waking state of consciousness, while we're processing our surroundings and the everyday stressors of the outside world. Beta is a 'fast' activity we need for cognitive tasks, to be alert, attentive, engaged in problem solving, and decision making.

Alpha waves (8 to 12 Hz) — think of these as the calm, yet alert brain states. These are the "flow state" brain waves. Alpha is 'the power of now', being here, in the present. It's the resting, meditative state for the brain. While Beta waves are needed to react and make decisions, Alpha waves help in absorbing new information, overall mental coordination, remaining alert yet calm, mind/body integration and learning.

Theta waves (3 to 8 Hz) — these occur most often in sleep but are also dominant in deep meditation. Theta waves provide the gateway to learning, memory, and intuition. Theta brain waves take place when our senses are withdrawn from the external world and focused inward. It is that twilight state between wake and sleep, as well as our dream state.

Delta waves (.5 to 3 Hz) — these brainwaves are the slowest. They occur during deep, dreamless sleep, and the deepest meditations. Delta waves act to suspend external awareness and promote healing and regeneration. This is why deep restorative sleep is so essential to health and longevity.

There are certain levels of all brain waves happening at any given moment, produced at various parts of the brain. Brainwave activity varies based on your brain structure, past injuries, sleep quality, and many other factors, affecting your emotional and cognitive health. Neurofeedback training promises to optimize brain wave activity, whereas a treatment protocol can permanently change brain function for the better.

But how do you train a brain if you don't know what needs training ?

This is where the brain mapping comes in. It's an important step that helps pin point exactly the areas of the brain that have too much or too little activity of certain brain waves. Once you know, then you can optimize. Quantitative EEG brain maps can help identify sleep issues, impulsiveness, ruminating thoughts, reactivity, anxiety levels, chronic fatigue, and more.

I recorded my consult with Dr. Andrew Hill where we reviewed my brain map results — if you're curious about what an qEEG report looks like and what you can learn about your brain function, watch this video

! If you're more into screenshots and an explanation, scroll down below.

So, how is brain mapping done ?

A series of tests: an attention test, a quantitative EEG test with eyes closed and one with eyes open.

You're not allowed to have ANY caffeine for about 16 hours prior to the test and no alcohol for about 12 hours prior.

Most people choose to do the brain mapping first thing in the morning so that they can have their coffee or tea right after. Conveniently, Peak Brain LA had both on-site as a treat after the brain mapping was complete.



In the qEEG cap — ready to map my brain !

1. The attention test.

It was SUPER monotonous. But that's the whole point.

The attention test used a software product called the IVA-2 CPT. It helps clinicians test and evaluate both visual and auditory attention and response control functioning.

It's also commonly used to identify ADHD. Using IVA-2 CPT with children ages 7 to 12 had a 92% accuracy in identifying and validating individuals diagnosed by a doctor as having ADHD. On the contrary, IVA-2 CPT also correctly identified the 90% of non-ADHD children.

The test lasted about 20 minutes and entailed watching a blank computer screen flashing either number 1s or 2s at varying speed, with a voice repeating “1” and “2” in a random way. The test part is left-clicking on the computer mouse every time you hear or see the number 1. This goes on for 15–20+ minutes depending on your accuracy. It gets really monotonous and becomes more and more challenging to keep focus on the screen and listening for those 1s. If your mind starts trailing off thinking about something else, it can be easy to miss the verbal cue. Similarly, if your eyes wander from the screen it can be easy to miss the number flashing.

THE RESULTS:

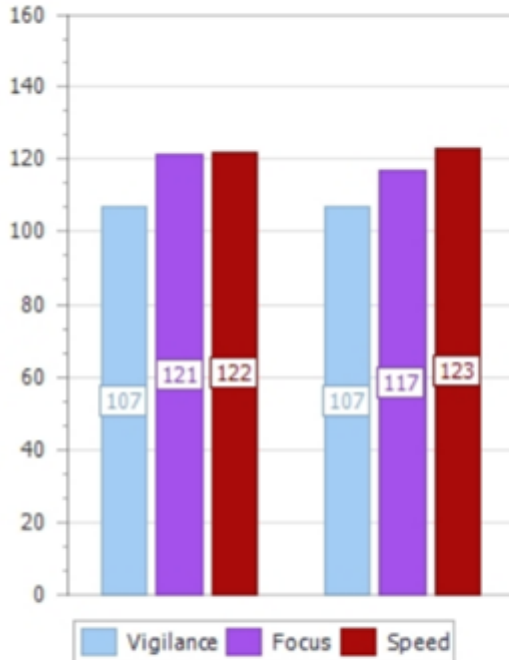
FS Attention Quotient = 128

Auditory

Visual

AQ = 126

AQ = 125



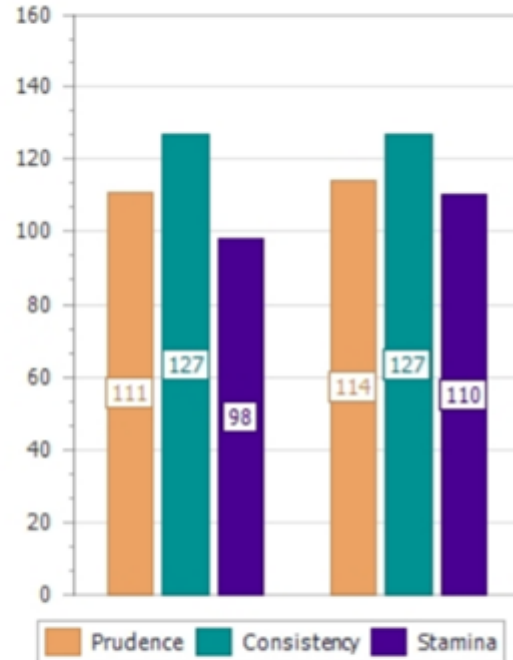
FS Response Control Quotient = 125

Auditory

Visual

RCQ = 118

RCQ = 126



Sustained Auditory Attention Quotient = 119

Sustained Visual Attention Quotient = 119

Auditory Response Validity Check: Valid

Visual Response Validity Check: Valid

Attention Factor: Negative

Impulsive Hyperactivity Factor: Negative

I took this test just past 8am and jetlagged, having not slept well the previous two nights, so I wasn't expecting my performance to be as good as it was.

Turns out I scored "extremely high" in the words of Dr. Hill. Not a lot of performance bottlenecks.

The scoring is calculated against people of your age with the score 100 being considered the mean/average or the top of the bell curve. A standard deviation is 12–15 points.

Let's break down the results:

FS Attention Quotient = 128		FS Response Control Quotient = 125	
Auditory	Visual	Auditory	Visual
AQ = 126	AQ = 125	RCQ = 118	RCQ = 126

My attention quotient (successfully clicking on the 1s) as well as my response quotient (aka impulsivity or successfully *not* clicking on the 2s) — the two scores you see at the top — are two standard deviations better than average. Awesome !

Interestingly, while I scored similarly well for auditory and visual attention, my visual response control is about a half of a standard deviation better than my auditory impulsivity control. Meaning I'm better at not being impulsive or reacting visually than I am when I'm listening for something. That said, my auditory impulsivity is still more than a standard deviation higher than the norm which is pretty awesome.

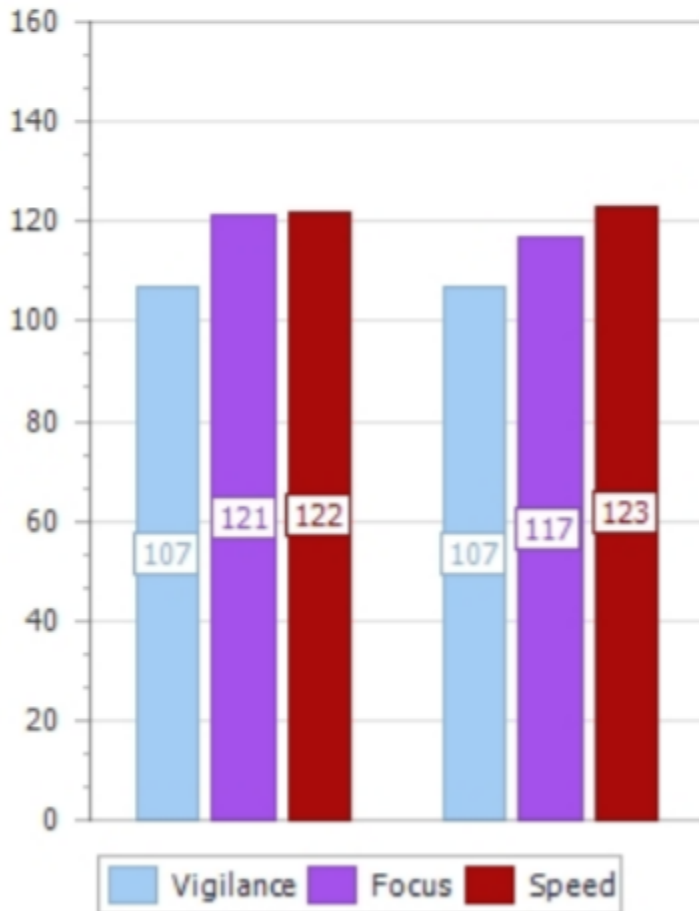
FS Attention Quotient = 128

Auditory

Visual

AQ = 126

AQ = 125



The next measures are attention quotient (successfully clicking on the 1s), vigilance, focus, and speed. Here's what that means:

Vigilance — noticing when things are new and bringing your attention to that. When something is a “vigilant” or an “alerting” event.

Speed — measures how fast you are.

Focus — the opposite of vigilance or an alerting event. Focus is staying on task when things are not changing. When something is repetitive and you remain on task.

It turns out I'm better at Focus than I am at Vigilance.

According to Dr. Hill, that's unusual.

Most people are pretty alert to the new thing but start to drift when something's not exciting and gets repetitive. So normally people score higher on Vigilance relative to their Focus. That's not the case for me. I scored higher on Focus, meaning I'm able to lock in once I engage, and stay with something in a focused way. That said, my Vigilance score is still half a standard deviation higher than average, so I'm happy with that.

The other interesting consequence of having a lower Vigilance score relative to other scores, is that my Speed is also quite high. Dr. Hill explained that this is potentially my brain's way of compensating for the Vigilance. Essentially being extra quick, in order to make up for things I may have just missed by not being vigilant enough.

And I'm compensating with the fast speed to the point that I'm significantly above average on the **overall Attention Quotient** (successfully clicking on the 1s) score of 128, which is two standard deviations above the norm.

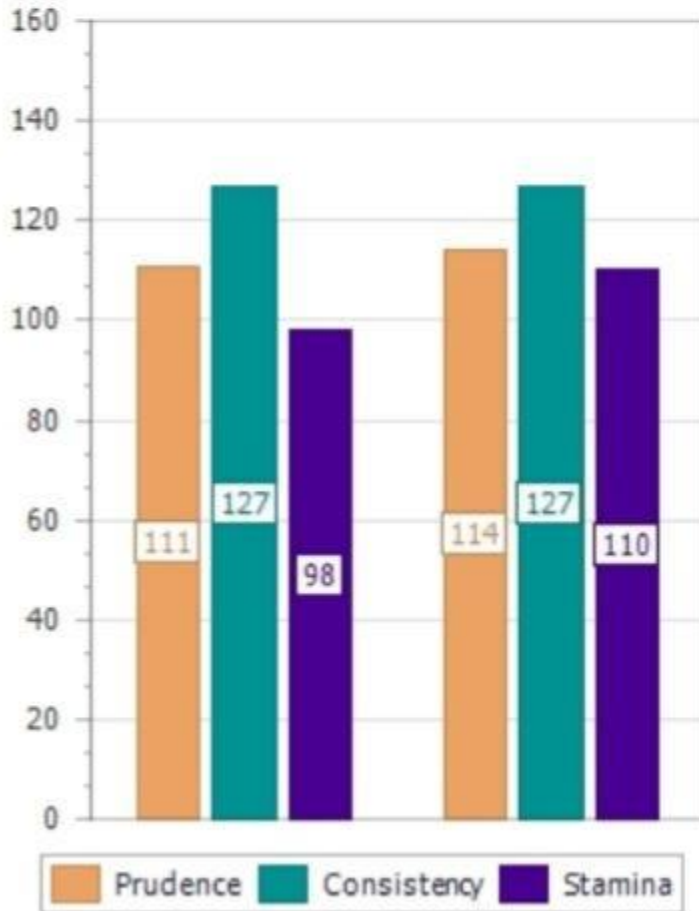
FS Response Control Quotient = 125

Auditory

Visual

RCQ = 118

RCQ = 126



Next we look at my response quotient (aka impulsivity, or successfully *not* clicking on the 2s), as well as prudence, consistency, and stamina.

Prudence — being careful. Can you adjust as you go ? If you make a mistake, can you slow down ?

Consistency — how well can you lock in to a good pattern without too much effort ?

Stamina — as this is a very boring and tedious test lasting about 20 minutes, requiring 1 second of your attention that you have to keep re-engaging over and over again. So people will trail off and the degree to which their performance degrades is called stamina.

So my Prudence, or ability to adjust to new patterns, was great visually and auditorily. *My consistency, or the ability to lock in to a good performance pattern, was the highest of all.*

The only straggler was my auditory stamina which was essentially at the average performance for my age. As I mentioned, the average or “the norm” for your age group is a score of 100.

That said, my **overall Response control quotient**, which is calculated separately, taking all scores into consideration, was almost two standard deviations above average at 125 points, making my overall performance very high.

Sustained Auditory Attention Quotient = 119

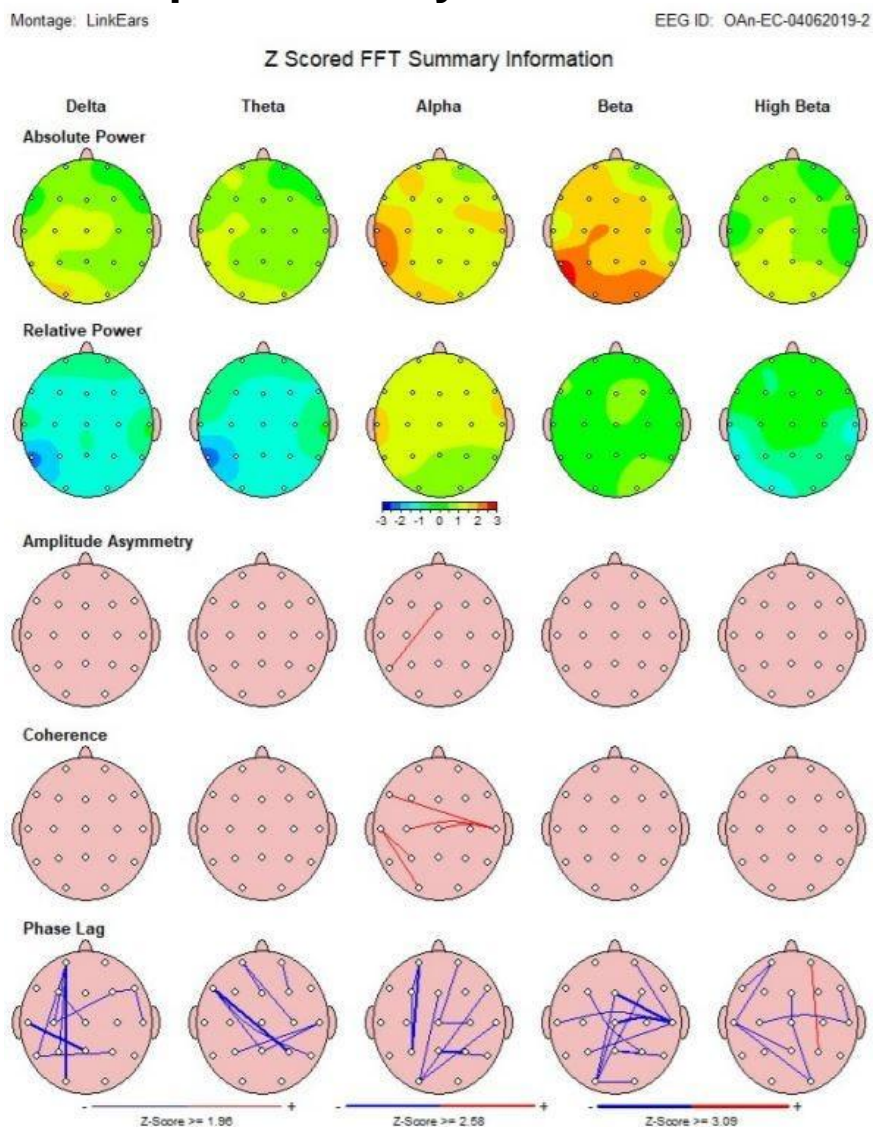
Sustained Visual Attention Quotient = 119

Next, **Sustained scores**. These are patterns of behaviour sustained throughout the entire test. With scores of 119, I’m 1.5 standard deviations above average for managing resources across time.

Difference between Stamina and Sustained scores:

Sustained scores are more about the patterns of errors that you make throughout the test, versus Stamina is about how your performance is tailing off as the test goes on. *So sustained scores are more of a combination of stamina and consistency.*

2. The qEEG test. Eyes closed.



My qEEG map of brain wave activity with eyes closed.

Something that Dr. Hill called out is that brain maps are more difficult to interpret, because they're population-level analysis with differences from average based on people of the same age. For example yellow spots means the brain wave activity in that area is two standard deviations above average.

Also important to note, **brain maps do not tend to change over time.** Brain maps typically remain the same year to year, regardless of changes in sleep status. What could make them change though is if you develop an avid meditation practice or do some sort of brain wave training, like neurofeedback. **So the fact that I was underslept and jetlagged when taking this test early in the morning, would not have affected my brain map results.**

A few definitions to help orient you:

Absolute power — micro-volts. This the most important measure to look at.

Relative Power — percentages. This row is used to help elaborate on the Absolute Power scores. How high or low a brain wave is *relative* to the others.

Why this test?

The “Eyes closed” test is done to see how your brain functions when it’s *not* receiving any visual distraction from the surrounding environment.

Expected results:

With eyes closed, a good start is to look at the faster brain waves on the right-hand side of the above screenshot— the High Beta, Beta, and Alpha performance.

With eyes closed, it’s expected that brain waves on the right hand side — the Alpha and Beta — would see lower scores, while the slower Theta and Delta brain waves shown on the left would score higher. As your brain receives less stimulation from the surrounding environment, requiring lesser processing power, your brain is less taxed cognitively and goes into a more relaxed state.

That was not the case with me.

My results:

I have higher Beta and Alpha activity in the mid- and back-line of the brain.

According to Dr. Hill, this is unusual to see.

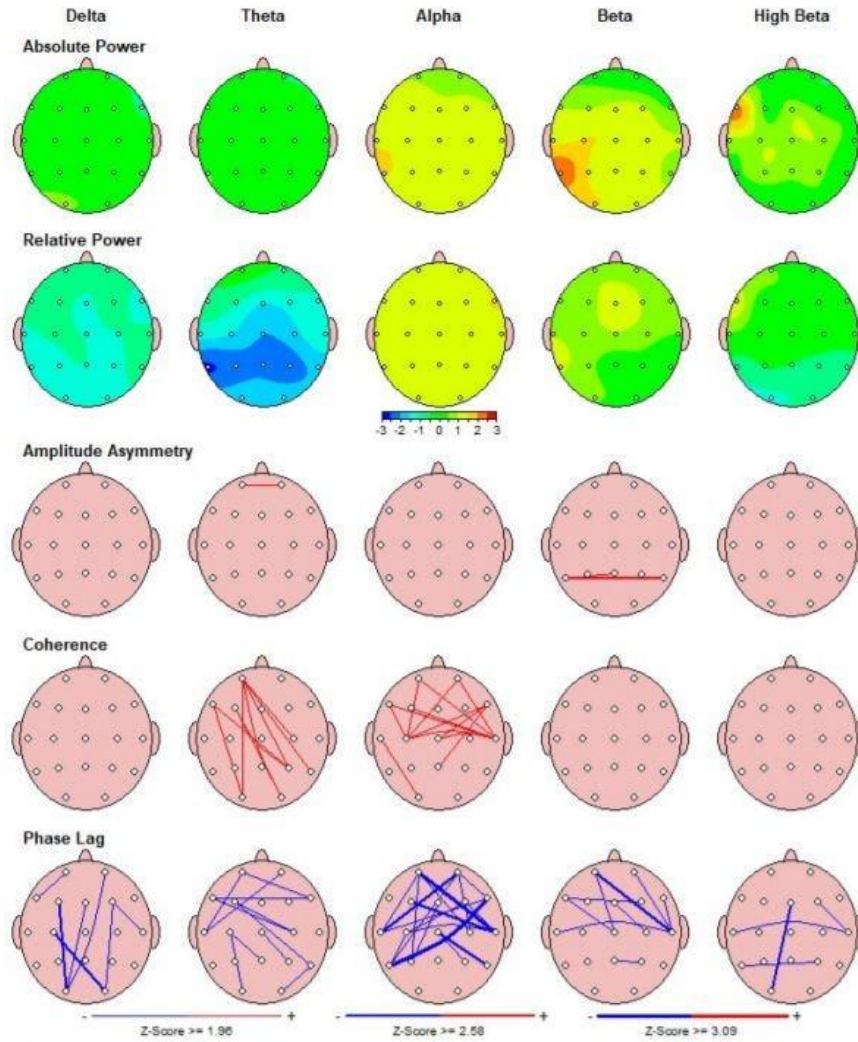
Seeing higher than average back- and mid-brain Beta waves when eyes are closed could signify **hyper-vigilance**. That means it may be hard to disengage from the environment. **The brain is always scanning and processing, trying to notice everything, all the time.** What this could signal is difficulty relaxing in unfamiliar environments. Trouble with sleep onset. Yes and yes.

Going back to my attention test scores up above, while my Vigilance score was lower *relative* to Focus and Speed, it was still half a standard deviation higher than average and this came through even more so on the brain map.

Up next, my brain map results with eyes open:

3. The qEEG test. Eyes open.

Z Scored FFT Summary Information



According to Dr. Andrew Hill, these brain maps came out great, nothing excessive.

Some points of interest in **my results**:

Slightly high Alpha with eyes open speaks to a tiny bit of fatigue in the visual system. It could also be a **marker for chronic low-key**

sleep deprivation, showing up as visual attention difficulty — harder to stay focused on screens later in the day, etc.

In particular, I've got a spot in the back-left side of the head with particularly high Alpha activity, which might be the result of a residual injury minor injury (ie falling out of bed as a child). Dr. Hill says this could show up in the day-to-day as receptive language difficulty. If I'm in a large event space (ie conference) surrounded by many people, I may need to actively focus more on the person speaking to me, if other people near me are talking to each other. It would make it harder to filter surrounding inputs, as my brain tries to pay attention to everything.

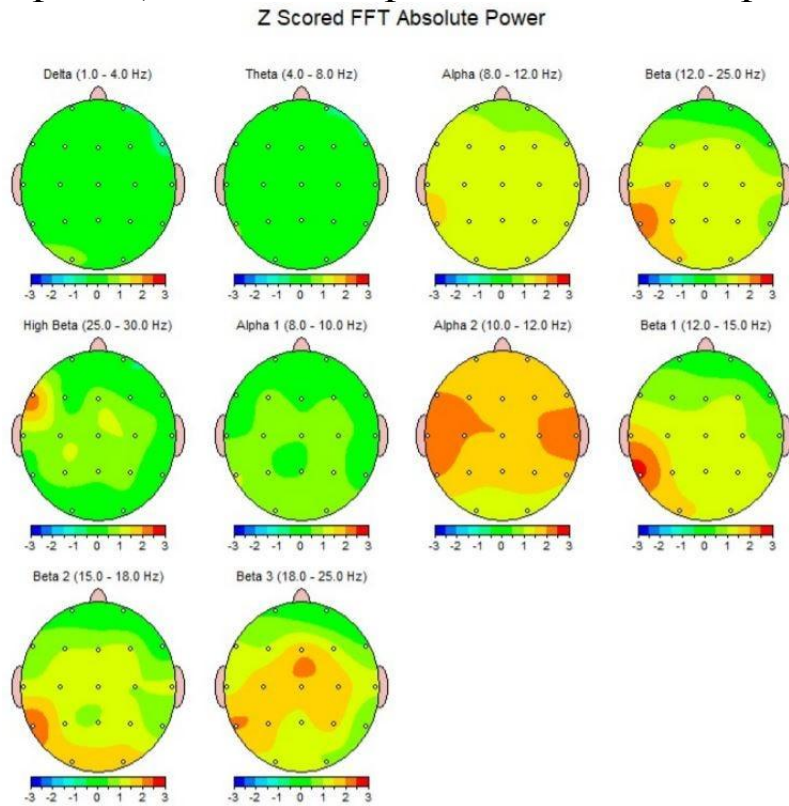
The Alpha brain wave measure with eyes open, is also a good check for Attention Deficit Disorder (ADD). With an ADD person, the entire Alpha brain map would be solid red.

Jumping down into relative power, since Alpha is dominating a little bit, that's why Theta shows up low. Theta is not absolutely low, it's relatively low, because Alpha is taking up all the energy back there.

Now the Absolute Power Alpha goes up and the pattern carries through down the entire column. The cluster of red lines in the Coherence row for the Alpha column — Dr. Hill says makes it plausible for me to have some thought rumination, worrying, and chewing on things.

This is something that can be a target for neurofeedback. According to Dr. Hill, these are minor bottlenecks in an overall high performing brain and fairly easy to target.

Up next, a more in-depth breakdown of Alpha brain waves:



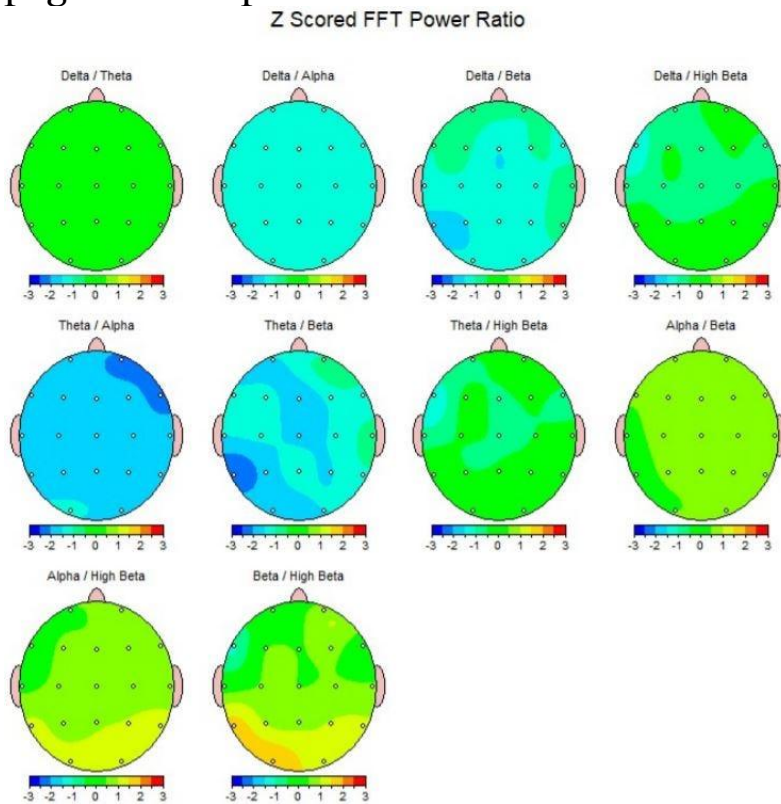
With this chart we're taking the Alpha brain waves and breaking them out into its slow and fast variants.

Alpha 2 — the fast variant — is driving the faster statistic for me. Typically when there's too much of Alpha 2, this signifies that your thoughts are having you. My brain is always on and processing quickly.

As Dr. Hill said, **I'm stuck in a flow state**. Really fast, all the time:

“You’re stuck in a flow state, essentially. Really, really fast. It might work for you, or it might get in the way. I can’t tell. But this again, suggests that you’re one or two standard deviations faster than average, in general. You’re absurdly fast, Oksana. This is like one of those genius brain patterns that usually comes along with genius level or gifted, 150 and above intelligence, plus anxiety. Kind of what I always see here with a fast brain. So you’re probably in the gifted range for intelligence, probably tend to get anxious and ruminate.”

According to Dr. Hill, **with a brain like this, you also tend to also see ADHD but I’ve got the opposite results** based on the next page of the report below:



On the last page, **looking at Theta/Beta and Theta/High Beta** — when these are showing up as high or bright orange, it's 94% accurate for spotting ADHD.

I have the opposite.

What does that mean ? According to Dr. Hill, this means I'm a touch anxious and have a **mind like a steel trap**.

Don't miss anything. Shifting gears voluntarily...quick and on...reorient... focus...reorient to something else and zero in again.

Apparently, this is quite unusual — my Theta scores are two standard deviations *below* the average. Which is aligned with what showed up in the other brain maps and my high Alpha frequency speeds.

“This is among the most high performing brains I've seen.”

Concluding remarks

My attention and response control test showed that I was two standard deviations above average.

My qEEG report showed that I've got a brain with a lot of **extremely high performance markers mixed with a couple of very particular bottlenecks**.

Turns out that I am operating in a **permanent flow state with high focus, speed, and processing**. It's true, I've always been a voracious learner and know I can easily buckle down and work or study for long hours. I'm always thinking.

However, some bottlenecks showed up from sleep issues, some wear and tear from a past injury, and a touch of thought rumination.

Nothing broad, very discrete things. Which means the **bottlenecks can be targeted quickly, effectively, and permanently with neurofeedback training**.

Dr. Hill estimates that 20–30 training sessions would get rumination under control — meaning it would happen only when I want it to. As for deeper sleep and faster sleep onset, I'd need 3–4 months of training for **complete and permanent change**, with noticeable effects starting to take place in about 3–4 sessions or approximately 2 weeks in.

Now the brain map doesn't tend to change on its own year to year, regardless of changes to sleep status. But the attention performance test *can* be sensitive to recent sleep deprivation. So considering that I took the test while having been under-sleeping throughout the week prior and being jetlagged, that could've affected my attention test score

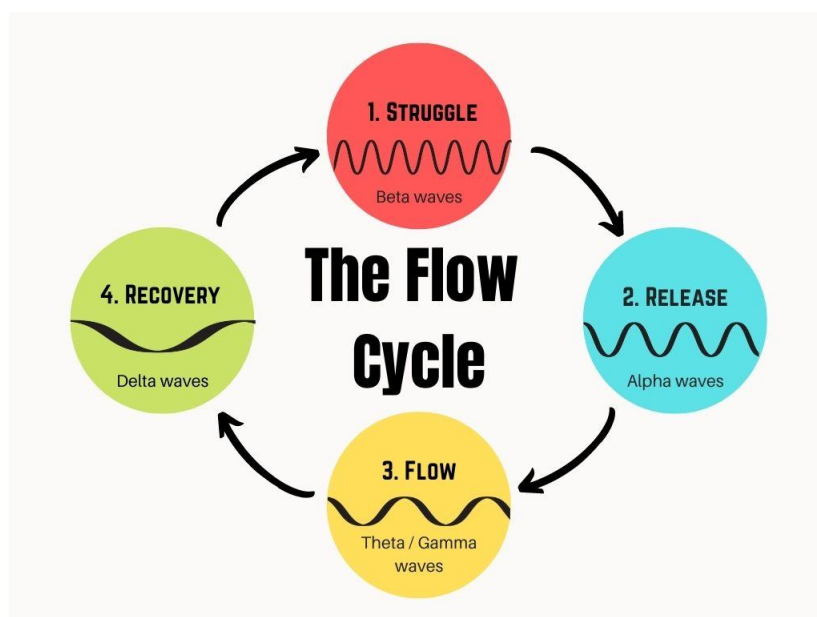
Hacking The Flow Cycle: Brainwaves, Creativity and Flow States

Everything you do and think is going to show up in your brain somehow. When you're frustrated, when you learn a language, move your arm, or fall in love, there will be some neurons, and brain regions will light up.

This is also the case when we enter a flow state. When we start to perform at our best, when we lose our sense of time, when our inner critic goes quiet and our attention consumed, we can look inside the brain to see what's going on in a less subjective, more physical sense.

In doing so, we might be able to get a greater understanding of the benefits of flow and how we can achieve it. While there is still a lot to learn, we know that different stages of flow in what's called the Flow Cycle with their own unique signature of brain waves and neurotransmitter activity.

The Flow Cycle:



Flow states that result in feelings of selflessness, timelessness, effortless and richness tend to show up in low alpha and high theta brainwave states.

Here's how to apply the Flow Cycle to get into more flow states in your challenging activities:

1. The Struggle

When we first attempt to learn something or solve a difficult problem, consciousness is fully involved and there is often a feeling of frustration, difficulty, and stress. We're unlikely to enter flow as our abilities are not where they need to be, rather, we are overwhelmed by how much we need to absorb and process.

At this initial stage adrenaline and cortisol are often present, raising our heart rate and blood pressure, dilating our pupils and preparing the body to deal with a stressful situation. At this point your brain waves are in the BETA range of 12-40 Hz.

"When the brain is aroused and actively engaged in mental activities, it generates beta waves. These beta waves are of relatively low amplitude, and are the fastest of the different brainwaves," writes American creativity researcher Ned Herrmann.

2. The Release

After struggling for a while it's necessary to put the problem away, think about something else, take a break and give the mind a chance to reset. Doing so allows the stress hormones from the struggle phase to be flushed out, so to speak.

At this point, our brain waves sink down to ALPHA levels of 8-12 Hz. Ned Herrmann continues, "Alpha brainwaves are slower, and higher in amplitude. ... A person who has completed a task and sits down to rest is often in an alpha state. A person who takes time out to reflect or meditate is usually in an alpha state."

3. The Flow State

When we make another attempt at the problem, our experience from the first stage gives us an extra edge, and we overcome the challenge by entering the zone. The difficulty of the challenge is reduced as our abilities have grown, and we hit the sweet spot where our attention is fully absorbed.

During flow, our brain is swamped with endorphins, which dull pain and give us a euphoric feeling. Meanwhile, dopamine motivates us and ensures our focus remains on the task at hand. The brain sits on the border of alpha and theta ranges about 8 Hz.

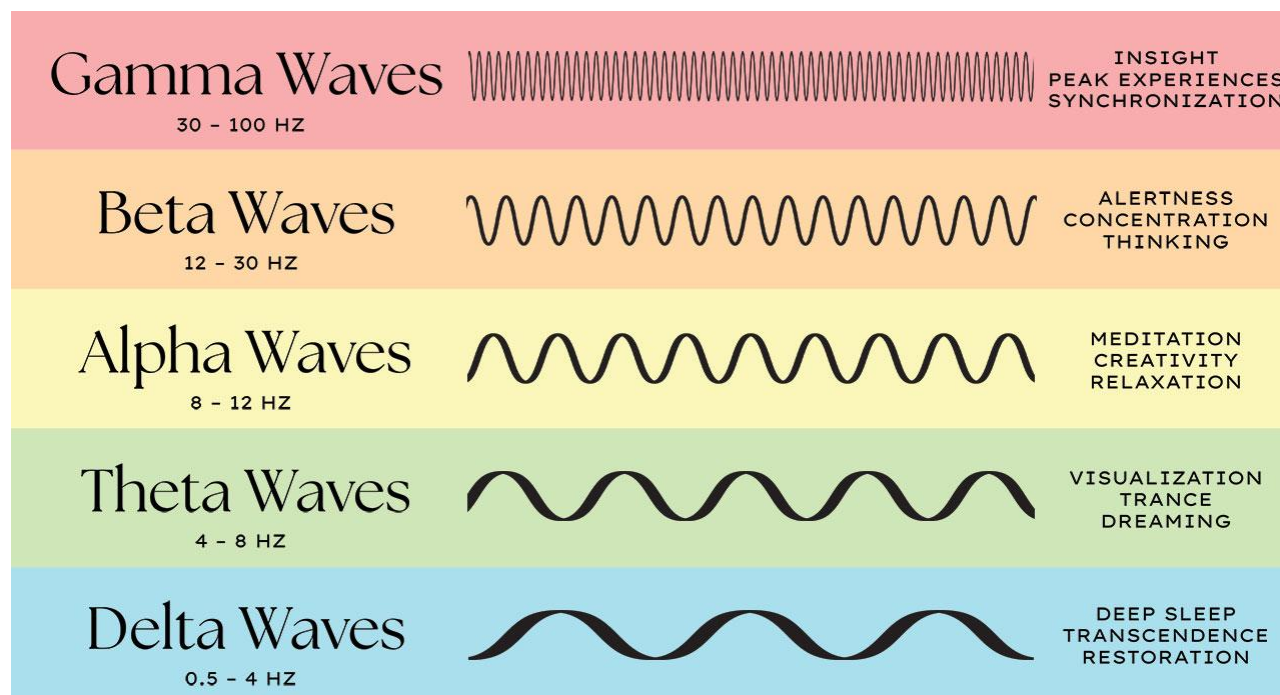
4. The Recovery

After the flow experience, our mind returns to an awareness of everything else, our sense of time and space come back, and we bask in the afterglow—the sense of reward. Serotonin is released which signals that our rush is coming to an end. Feel-good neurochemicals such as oxytocin come in.

Like most good things, we can have too much of the flow state. Rest and recovery are necessary. When we come down we might just feel like we want to go back up, making recovery easily neglected.

A Map of the 5 Brainwave Frequencies:

Here are all of our 5 major brainwave frequencies together, all-of-which are involved at different stages of the Flow Cycle.



Spikes in Creativity

Something else can happen when we're going through these stages—we can experience creative insight. When our brain gets down into low alpha or theta waves, our unconscious mind largely takes over.

“It is a state where tasks become so automatic that you can mentally disengage from them. The ideation that can take place during the theta state is often free flow and occurs without censorship or guilt,” says Ned Herrmann.

During this theta activity, something called transient hypofrontality can occur, in which the front area of our brain lowers in activity. The frontal lobes are where logic and reason generally take place, so we can see that without this function we are more likely to rely on intuition and gut impulse, and it's going to make it easier to think outside the box.

It's in the theta zone of activity that particular spikes can happen which have been associated with creative insights. These spikes are in the gamma range, somewhere above 30 Hz. “The interesting thing about a gamma spike,” says mental performance specialist [Leslie Sherlin](#), “is that it always happens inside theta oscillations. The two waves are

coupled. It makes sense. Theta processes novel incoming stimuli; gamma is what happens when those stimuli snap together into new ideas.”

When our frontal lobes stop exerting such an influence on us, and the rest of the brain sinks into theta waves, we are more likely to arrive at unusual solutions to those problems we had trouble overcoming with the initial investment of cognitive effort.

This is why we get some of those insights when we’re doing seemingly mindless activities like washing the dishes or having a shower, and it’s likely the reason we can achieve creative insights much more during flow than by analytical thinking alone.

How Theta Waves Boost Your Intuition & Creativity and How to Generate Them

Brain waves are a measurement of neural activity in our brain. Our brains produce several types of waves, so why are scientists and psychologists so interested in theta waves?

Before we delve into theta waves, let’s quickly explore the five types of [brainwaves](#). **When we perform certain actions the neurons in our brains communicate with each other in an electrical or chemical way.** This activity can be measured in the form of frequencies or brainwaves.

5 Types of Brainwaves

1. Gamma – Concentration, insight, peak focus
2. Beta – Day-to-day, alert, learning
3. Alpha – Relaxing, daydreaming, winding down
4. Theta – Dreaming, flow states, meditation
5. Delta – Deep sleep, restorative healing sleep

We produce gamma brainwaves at moments of peak performance, or expanded consciousness. Beta brainwaves are what we experience on a daily basis during our normal routine.

[Alpha waves](#) occur when we get ready for bed, or wake up in the morning, those moments of drowsiness. Delta waves are linked with the healing processes that come with very deep sleep. So what about theta waves?

What Are Theta Waves?

If you imagine each of our five brainwaves is a gear on a car engine, then delta is the slowest gear and gamma is the highest. However, theta is number 2, so it is still pretty slow. **We experience theta waves when [our minds wander off](#), we go on auto-pilot, we fantasize about the future, and when we daydream.**

Examples of Theta Waves in Normal Activity

- Driving home from work and when you arrive, you cannot remember any details of the journey.
- Brushing your hair and you come up with an innovative idea to [solve a problem](#) at work.
- You are immersed in a task and you feel completely in the moment.

These are all theta waves in action. Theta waves occur in many situations. However, **they are most associated with internal focus,**

relaxation, meditation, and attaining a flow state of mind. Now, this is what makes them interesting to psychologists and scientists. Because if we can somehow generate theta waves ourselves, we can tap into all this potential.

Brainwave entrainment is a way of stimulating the brain to enter a certain state by using specific sounds, pulses, or beats. When the brain picks up these pulses, it naturally aligns to the same **frequency**. *“Brainwave training is a relatively new research area, but more and more labs are interested in understanding brainwaves and how they relate to a whole plethora of behaviors—from managing stress to full-blown spiritual awakenings,” Leigh Winters MS neuroscientist, Columbia University’s Spirituality Mind Body Institute*

Benefits of Theta Waves

So why would you want to make more theta waves in the first place? Here are ten reasons why theta waves are so beneficial:

1. They relax the mind and body
2. Increase **creativity**
3. Empower learning skills
4. Lower the heartbeat
5. **Improve problem-solving**
6. Hone intuition skills
7. Better emotional connections
8. Form a connection with our subconscious mind
9. Program the unconscious mind
10. Increase our **spiritual connection**

I'd like to focus on the first three benefits of theta waves.

Relaxation

If you are an anxious person prone to worry and stress, then being able to instantly calm and relax is very appealing. Imagine how it would feel to enter a tranquil state? Or how it would help you slip off to sleep when your thoughts are racing?

People with phobias, those with eating disorders, you name it. Anyone that feels anxiety or stress, if they had the chance of just feeling a little more relaxed, **it could help free them from a restrictive behaviour.**

“It seems to have a tranquillizing effect for individuals who are quite anxious and high-strung. It tends to quiet them down for three to four days after a session” Dr. Thomas Budzynski

Creativity

There is evidence that suggests people who produce more theta waves report having more ideas and feeling more creative. In one study, students were wired up to a monitor to analyse their brainwaves whilst they were trying to solve a difficult problem.

It was discovered that “during the chance moment in which a difficult... concept suddenly ‘made sense’ (the subject) showed an abrupt change in brain wave patterns... in the theta range...”

So if you want to increase your creative output, the answer is simple, just **learn how to generate theta waves.**

Learning

One interesting aspect of theta waves is that they are generated when we are operate on autopilot. **As a result, this gives us a chance for unbiased and uncritical learning.**

What I mean by that is, we all have [beliefs and opinions about ourselves](#) that may be holding us back in some way. For example, we might think we are not good enough for college or university. That we don't deserve to make a lot of money or we shouldn't pursue a career in the arts for instance.

When we are in a theta wave state, all of these prejudices and concerns are absent. We see ourselves in an uncritical manner and this allows us to reach our full potential.

How to Make Your Brain Generate Theta Waves

Binaural Beats

It is not easy to generate theta waves yourself as it does take some amount of practice. **There are some experts that suggest the best way is to listen to specially prepared music.** These are binaural beats. Two slightly [different ranges](#) of hertz are played in each ear.

For example, if you play 410Hz in one ear and 400Hz in the other, your brain will align with the 10Hz frequency. Theta waves run from 4-8 Hertz. However, if you want to tackle one of the three areas listed above, there are different levels that target these areas.

- 5-6Hz – relaxation
- 7-8Hz – creativity and learning

“Theta activity was induced by a 6-Hz binaural beat. Moreover, the pattern of theta activity was similar to that of a meditative state.”

Meditation

Use this method to entrain your brain to produce theta waves.

Focus on your breathing which will enable you to be in the present moment. Concentrate on the sounds around you and be aware of your surroundings. You can focus on an object or simply let your mind be still. If any thoughts come into your mind, let them drift away as you remain in the present. Feel a deep sense of relaxation, but don't force it. You should not [try and be calm](#), just be mindful and aware.

Researchers believe that training our own brains to produce the brainwaves we want is **the next step in our evolution**. Whatever your thoughts on the subject, it is surely a wonderful way of increasing our natural ability.

A Complete Guide to Buddhist Meditation: Principles, Techniques, and Benefits



Pyrosky / E+ / Getty© Provided by Verywell Mind

Reviewed by Alicia Bigelow, ND

Meditation is an ancient practice exercised for thousands of years by different religions and cultures. A common meditative practice is connecting to the body, finding non-judgmental awareness, and achieving equanimity. In the process of stilling the mind, the chaotic noisiness of our thoughts can re-clarify into a spiritual insight attributed to inner wisdom and relaxed [alertness](#).

Buddhist meditation is rooted in Buddhism, an Indian religious teaching and philosophy attributed to Buddha. The tradition dates back to ancient texts, the Pali Canon. In contemporary times, Buddhist meditators view meditation as liberation; a tool to understand the nature of reality to move towards freedom from suffering, and the first step to an enlightened awakened state known as nirvana.

Takeaway

[Master Svietliy](#), philosophy, and meditation teacher and sacred symbolism artist explains Buddhist meditation as a way to explore the depths of our minds, recognize our interconnectedness with all beings, and develop a deep sense of empathy.

“Buddhist meditation is much more than a tool for achieving tranquility. It's a profound journey towards understanding the true nature of our existence, aimed at cultivating wisdom and compassion, the cornerstones for enlightenment,” Svietliy says.

The Principles of Buddhist Meditation

Buddhist philosophy is centered on the premise that human life is a cycle of suffering, karma, and reincarnation. Buddhist philosophy is closely related to meditation because they believe in using mindfulness to break out of the cycle of endless suffering to attain enlightenment.

Explainer

Buddhism is commonly defined as including Southeast Asian Theravada Buddhism, East Asian Mahayana Buddhism, Indo-Tibetan Mahayana, and Vajrayana Buddhism.

To those who practice it, Buddhist meditation is a way of life and works to nurture a healthy relationship with the mind. Below are a few of the core principles of Buddhist meditation:

- **Mindfulness:** “Fully inhabit the present moment, recognizing that 'now' is all we truly have. This principle helps us observe our thoughts and experiences without attachment, aiding in cultivating a peaceful mind,” says Svietliy.

- **Impermanence:** “I stress the importance of acknowledging impermanence, which allows us to appreciate each moment without clinging to it,” he notes. It is futile to hold onto shifting, changing elements in a transient world. By welcoming impermanence as fact, it is a reminder that much of our life is ephemeral, including our emotions, thoughts, and experiences.
- **Compassion:** “Foster a loving and kind attitude towards all beings, including ourselves,” says Svietliy. Developing [compassion](#) connects practitioners with suffering that exists within the human condition to move toward loving, compassionate thoughts towards self and others.
- **Suffering:** Buddhist meditation recognizes suffering as an inherently universal concept because of our desire for attachment and asserts we can end our suffering by freeing ourselves from the never-ending loop of hypnotic, unhelpful desires that do not serve us. Doing this connects us back to the ultimate nature of our mind.
- **Non-self:** The non-self principle challenges the belief that we have a permanent, unchanging soul. Buddhists believe we have a constant, changing self and to find that it involves releasing desires, finding compassion, and meditating. These practices aim to break the illusion of the self by dissolving its psychological framework to reduce attachment.

Different Techniques and Practices of Buddhist Meditation

Within Buddhist meditation, various forms offer practitioners numerous pathways to explore and expand their minds. These practices complement one another, serving as necessary components to cultivating compassion, wisdom, and deep understanding.

These can be done in a meditation posture that gives you a comfortable but alert state that doesn't hurt your back or knees, which includes kneeling, lying down, cross-legged,

sitting in a chair, or standing up. Complete the meditation in a quiet place, indoors or outside.

Here are a few popular examples of Buddhist meditation:

Samatha Meditation

One of the main kinds of Theravada meditation, Samatha aims for calm concentration to find internal peace by letting go of desires and cravings.

Sit in a relaxed posture, bring your hands to your lap or at your knees, and then bring your full awareness to the normal pattern of your breath without manipulation. Deeply inhale and exhale. As restless thoughts float in and out of your mind, observe each one, accept them, and let it go.

The intention is to reduce cognitive chatter and let your mind be at rest, increase presence in the moment, and promote tranquility.

Vipassana Meditation

[Vipassana meditation](#), one of the other main kinds of Theravada meditation, aims for inner insight and to see things as they really are. Through self-observation without attachment, the meditator can deconstruct the illusions behind the ego and explore different aspects of existence such as impermanence, dissatisfaction, and non-self.

Sit in a relaxed posture and attend to the physical sensations and breath in the body, gently noticing distractions and shifting back to the breath.

The intention is to channel consciousness to calmly see past distractions to understand the true reality. Vipassana meditation is a purification of the mind.

Benefits of Buddhist Meditation

Numerous studies have shown meditation's ability to [improve sleep](#), manage [insomnia](#), process information, and control the brain's response to pain. By engaging in Buddhist meditation, you can train the mind towards helpful thoughts and behaviors and positively change the way you perceive your experiences.

Buddhist meditation has many physical benefits. Research has found MRI scans show activation within the emotional, executive, and cognitive centers of the brain to change the brain structures related to emotional regulation, improving brain functioning for memory and attention. The results hold promise for age-related brain aging in younger and middle-aged individuals because of its capacity for appropriate telomere shortening.

From a body perspective, the same study notes meditation has assistive benefits for the immune system and inflammatory processes by decreasing cytokines. It can help bring down elevated blood cholesterol levels and multi-factorial diseases including diabetes, hypertension, and fibromyalgia.

Takeaway

From a mental health perspective, meditation calms down the sympathetic nervous system and can bring about positive emotions, reducing mental health concerns like , post-traumatic stress disorder (PTSD), anxiety, and depression.

“In my experience, the emotional benefits of Buddhist meditation extend far into everyday life. It nurtures an inner peace and emotional stability that enhances our resilience in facing life's challenges,” Svetliy says. “It fosters clarity, reduces stress, and cultivates joy and well-being, not only during meditation but in every aspect of our lives.”

Step-by-Step Guide to Practicing Buddhist Meditation

Practicing a [few minutes a day](#) can help foster a calmer state of consciousness. By meditating, you can let thoughts pass without focusing on any particular story. By detaching from distractions, you can be an observer of your thoughts, which supports a more peaceful state of mind.

Svietli provides a few steps to get started with your Buddhist meditation:

1. **Find a quiet space:** Select a peaceful area where interruptions are minimal.
2. **Adopt a comfortable posture:** Sit in a way that keeps your back straight yet relaxed.
3. **Focus on your breath:** Gently close your eyes and direct your attention to the rhythm of your breathing.
4. **Observe without judgment:** As you observe your breathe, thoughts are bound to arise. This kind of wandering is natural. When it happens, softly acknowledge this and return your focus to your breath.
5. **Be consistent:** Try to meditate daily, starting with just a few minutes and gradually increasing the duration.
6. **Stay open and curious:** As your practice evolves, exploring different meditation techniques can enrich your experience.

Deepening Your Buddhist Meditation Practice

As a [beginner meditator](#), learning how to still your mind for extended periods can be a challenge. It's a gradual process of learning how to relax, noticing your thoughts, and being aware of your surroundings.

“The ideal environment for meditation offers tranquility and minimal disturbance. However, I’ve learned that adaptability is key,” Svietliy says.

For beginners, he recommends a short daily routine, such as weaving a [mindful breaths](#) practice before a new activity. “Challenges in meditation are inevitable but invaluable for growth. I encourage practitioners to view these moments with curiosity and openness, using them as opportunities to deepen their understanding.”

As distractions arise, acknowledge them and bring your mind back to the present moment. You might notice yourself thinking about work, email, what you’re doing after, or the text you have to respond to. All of that can be attended to later. Sit with your urgent restlessness and refocus back on your breath or mantra.

It’s important to cultivate a compassionate attitude and not judge or shame yourself for not having an “enlightened” or “peaceful” experience. Your experience just is, and that’s exactly what is needed at the moment.

“For more experienced meditators, I recommend experimenting with longer sessions or different forms of meditation to deepen their practice,” he says. “Remember, the essence of meditation is about cultivating awareness in every moment beyond the confines of formal practice.”

Integrating Buddhist Meditation Into Daily Life

Meditation and bringing full awareness to your life can start off small. It can be as simple as waking up in the morning and kicking off the day with [gratitude](#) to set a positive intention for the rest of the day.

As you move, mindfulness can permeate everything that you’re doing and how you attend to your breath. As you eat, you slowly focus on the flavors and textures of the bite and your breath as you walk. When you’re in conversation with others, be present in the conversation by thoughtfully choosing your words and actively listening.

Takeaway

Mindfulness can apply to every situation. Even now as you're reading this story, you can notice your posture and how you're sitting in your chair. Be aware of what you're doing, whether that's sipping a cup of tea or working at the computer.

Common Misconceptions and FAQs About Buddhist Meditation

There are several misconceptions and myths about Buddhist meditation. Here are a few things people get wrong:

- The idea that Buddhist meditation is not for everyone. Meditation *is* for everyone, and anyone can do it with enough skills to practice.
- The idea that Buddhist meditation is about sitting cross-legged on a mat in an expensive yoga studio or an idyllic retreat center. In fact, Buddhist meditation can happen anywhere, anytime, and at any moment. You can find inner peace in your mind when you're washing the dishes, in the middle of traffic, or feeling stressed about a co-worker.
- The idea that Buddhist meditation is about clearing the mind of everything. Rather, it's about giving your mind something to focus on: the breath for example.
- The idea that Buddhist meditation is only for Buddhists. Buddhist meditation is based in Buddhism, but the method of stilling the mind is non-denominational and people from all backgrounds and religions can benefit from its practices.
- The idea Buddhist meditation is a band-aid for problems and offers instant results. A consistent practice requires daily effort to reap the benefits.

Svietliy likens meditation to a sandbox—a place to explore—for real-life challenges. “It’s not just about sitting quietly; it’s about bringing awareness into every moment of our lives. It teaches us to receive the world around us and respond with conscious intention,” he says.

Resources for Further Exploration

Here is a compilation of research-backed resources to help you dive deeper into Buddhist meditation:

Websites:

- [Buddhanet](#) - Buddhist meditation website links
- [Tricycle](#) - Buddhism for beginners
- [Access Insight](#) - an extensive collection of books, essays, and commentaries

Books:

- [“Wherever You Go, There You Are: Mindfulness Meditation in Everyday Life”](#) - Jon Zabat-Zinn
- [“The Heart of the Buddha’s Teaching: Transforming Suffering into Peace, Joy, Liberation”](#) - Thich Nhat Nhan
- [“Buddha’s Book of Meditation: Mindfulness Practice for a Quieter Mind, Self-Awareness, and Healthy Living”](#) - Joshua Emet and Thich Nhat Nhan
- [“What the Buddha Taught Me”](#) - Wapola Rahula

Whether you’re new to Buddhist meditation or expanding your practice, the teachings can provide timeless wisdom and practical techniques that can benefit people of all kinds. By incorporating these practices, you can move through life with greater purpose and resilience.

Meditation: Mastering Mind for Inner Peace



Meditation: Mastering Mind for Inner Peace© Due

In the pursuit of understanding and alleviating human suffering, we often journey inward into the labyrinth of the human mind. The source of suffering isn't found in the world around us but within our own mental landscape. The solution isn't about controlling every aspect of our external environment but about gaining mastery over our internal thoughts and emotions. This is where the practice of meditation becomes a powerful tool.

Understanding the mind-identified state

Whether you are an [entrepreneur or slugging it out in a startup](#), most people exist in a state known as 'mind-identification.' This means they identify with their thoughts, allowing them to be led down various rabbit holes that result in a

plethora of negative emotions such as depression, anxiety, anger, frustration, and, ultimately, suffering.

In your [business world](#) — and your home world — you will want to take charge of your mind-identified state.

The mind-identified state is a condition where one's sense of self is entwined with one's thoughts and [emotions](#). This state of existence can lead to a perpetual cycle of negative emotions and suffering as individuals react not only to their external environment but also to the internal dialogue in their minds.

The art of meditation

Meditation is a practice that enables individuals to create distance from their thoughts, thereby reducing the influence of these thoughts on their emotional state. It's a method of training the mind to observe thoughts without [becoming trapped](#) in them.

Meditation isn't about silencing the mind or eliminating thoughts. Instead, it's about learning to observe thoughts as they arise without identifying with them or following them down the rabbit holes that [lead](#) to negative emotions and suffering.

Through regular meditation, individuals can learn to become observers of their thoughts rather than participants. This shift in perspective allows for a greater sense of peace and tranquility, regardless of the external circumstances or the nature of the thoughts that arise.

The benefits of meditation

By practicing meditation, individuals can learn to control their reactions to thoughts in their minds. This can significantly reduce suffering, as individuals are no longer at the mercy of their thoughts and emotions.

Meditation allows individuals to sit in perfect peace, regardless of what is happening in their external environment or minds. This peace comes not from a lack of reaction to the external world but from a lack of response to the internal dialogue in the mind.

Through meditation, individuals can learn to observe their thoughts without judgment or identification, freeing them from the cycle of suffering caused by mind-identification.

Conclusion

In conclusion, the key to alleviating suffering lies not in controlling the external world but in mastering control over our internal thoughts and [emotions](#). Through meditation, individuals can learn to observe their thoughts without identification, leading to a greater sense of peace and a significant reduction in suffering.

While the journey to mastering the mind through meditation may be challenging, the rewards are immeasurable. By gaining control over our internal dialogue, we can free ourselves from the cycle of suffering and live in a state of peace, regardless of our external circumstances.

The power of meditation lies in its ability to transform our relationship with our thoughts, allowing us to become observers rather than participants in our internal dialogue. This shift in perspective is the key to alleviating suffering and achieving lasting peace and tranquility.

Frequently Asked Questions

Q. What is the mind-identified state?

The mind-identified state is a condition where one's sense of self is entwined with one's thoughts and emotions. This state of existence can lead to a perpetual cycle of negative emotions and suffering as individuals react not only to their external environment but also to the internal dialogue in their minds.

Q. What is the purpose of meditation?

Meditation is a practice that enables individuals to create distance from their thoughts, thereby reducing the influence of these thoughts on their emotional state. It's training the mind to observe thoughts without becoming entangled in them. It's not about silencing the mind or eliminating thoughts but about learning to observe thoughts as they arise, without identifying with them or following them down the rabbit holes that lead to negative emotions and suffering.

Q. What are the benefits of meditation?

By practicing meditation, individuals can learn to control their reactions to thoughts in their minds. This can significantly reduce suffering, as individuals are no longer at the mercy of their thoughts and emotions. Meditation allows individuals to sit in perfect peace, regardless of what is happening in their external environment or minds. This peace comes not from a lack of reaction to the external world but from a lack of reaction to the internal dialogue in the mind.

Q. How does meditation help alleviate suffering?

Through meditation, individuals can learn to observe their thoughts without judgment or identification, freeing them from the cycle of suffering caused by mind-identification. The key to alleviating suffering lies not in controlling the external world but in mastering control over our internal thoughts and emotions. By gaining control over our internal dialogue, we can free ourselves from the cycle of suffering and live more peacefully with ourselves — regardless of our external circumstances.

What Happens to Your Brain When You Meditate Every Day?

Improved memory, attention, and learning? Yes, please!

People who meditate regularly swear by it, but others are often skeptical of it, thinking it's a little, you know, woo-woo.

But what if we told you that [meditation](#) is actually a powerful way to train your brain to be calmer and sharper? That scientific studies have shown that meditating regularly can alter brain shape, size, and function?

"Meditation can actually create structural changes in the brain. It has been shown to increase gray matter in the brain, particularly in areas related to learning, memory, emotion regulation, and perspective," says [Mirela Loftus, MD, PhD](#), medical director at Newport Healthcare.

Based on the amount of scientific evidence supporting meditation, every doctor would be prescribing it if it were a pill, says [Gary Soffer, MD](#), an integrative medicine specialist at Yale Medicine.

Let's dive in and take a look at what meditating regularly does to your brain.

At a Glance

Meditating regularly changes the brain in several ways. It alters brain waves, increases gray matter, and improves connectivity within the brain. The cherry on top? It also boosts feel-good chemicals like dopamine and serotonin.

Together, these changes make us happier, calmer, and sharper. As a result, we're better equipped to handle stress, stay focused on tasks, and experience a greater sense of well-being in our daily lives.

What Meditating Every Day Does to Your Brain

While meditation is an ancient practice, science is still unlocking the full spectrum of its benefits. A surge in research over the past few decades has investigated meditation's effects on both the brain and body.

Electroencephalography (EEG) and structural/functional magnetic resonance imaging (MRI) techniques have been used to map the brain and study the effects of meditation on the brain.

Increases Gray Matter

Meditation increases gray matter in the brain, particularly in areas related to learning, memory, emotion regulation, and perspective, says Dr. Loftus. In fact, imaging studies show that meditation increases the size and volume of the brain, due to increased gray matter concentration.

Strengthens the Prefrontal Cortex

Regular meditation is linked to increased thickness of the prefrontal cortex, which is associated with higher-order brain functions such as awareness, concentration, [memory](#), and decision-making, Dr. Loftus explains.

MRI scans have found that in addition to increasing the gray matter in the prefrontal cortex, meditation also improves the neural connectivity and cognitive function in this area.

Improves Neuroplasticity

Neuroplasticity is the brain's ability to change and rewire itself based on new information and experiences. Meditation increases neuroplasticity by improving neural connectivity patterns across different regions of the brain.

By enhancing connectivity between different brain regions, meditation can improve cognitive functions, information processing, and emotional regulation, says Dr. Loftus.

Boosts Dopamine and Serotonin

Dopamine and **serotonin** are neurotransmitters, or chemical messengers in the brain. Meditation is linked to a larger quantity of positive neurotransmitters like serotonin and dopamine in the brain, says Dr. Soffer.

Apart from regulating functions like sleep, growth, and metabolism, these chemicals play an important role in maintaining our emotional equilibrium, by making us feel positive and happy.

Alters Brain Waves

Meditation not only calms our blood pressure, respiratory rate, and heart rate, it also alters our brain waves. This helps us relax, concentrate, and process information better.

Those who practice meditation regularly often exhibit higher levels of gamma brain waves, which are associated with heightened perception, problem-solving, and consciousness, says Dr. Loftus.

Decreases the Size of the Amygdala

The **amygdala**, which is responsible for the **fight-or-flight response**, tends to shrink in people who meditate regularly, says Dr. Loftus. Research shows that this significantly reduces our stress levels.

Benefits of Meditation

As a result of these changes in the brain, meditation offers us several mental, emotional, and cognitive benefits. Research shows us that it can improve:

- Mood
- Emotional regulation
- Self-awareness
- Attention
- Concentration
- Memory
- Spatial abilities
- Execution function (thinking, planning, decision-making)
- Conflict resolution
- Mindfulness
- Relaxation
- Self-compassion
- Stress
- Sleep
- Pain
- [Anxiety](#)
- Depression
- Insomnia
- Post-traumatic stress disorder (PTSD)

Mindful Moment

Need a breather? Take this free [3-minute meditation to calm down quickly](#)—or choose from our [guided meditation library](#) to find another one that will help you feel your best.

How to Meditate Every Day

The best way to reap the [benefits of meditation](#) is to incorporate it into your daily routine and practice it every day. The benefits can be vast if you stick to the practice, says Dr. Soffer.

Here's how you can make daily meditation a habit:

- **Start small:** You can start with just a few minutes every day. Even [five minutes of meditation](#) can be helpful. As you get more comfortable with it, you can work your way up to longer sessions.
- **Find a time that works for you:** Choose a specific time of day that works best for you, whether it's first thing in the morning, during your lunch break, or before bed. Consistency helps in forming a habit.
- **Pick a quiet spot:** Choose a place where you can sit comfortably and won't be interrupted. It could be a swing on your porch, a cozy chair in your room, or even a quiet corner in your office.
- **Set the ambience:** If you like, you can set the ambience for your meditation session by dimming the lights, playing gentle soothing music, and lighting a scented candle.
- **Set an intention:** Before you start meditating, set a clear intention or goal for your practice. It could be to reduce stress, increase focus, or simply take a break from your busy day.
- **Use a guided meditation program:** If you're new to meditating and not sure how to go about it, it can be easier to start with a [guided](#)

[meditation program](#) that takes you through the steps. There are several free programs available online—you can choose the one that best fits your needs and your schedule.

- **Focus on your breath:** Use your breath to anchor you to the present. If your mind wanders to other things, gently bring your focus back to your breath.
- **Reflect on the practice:** After you finish, take a moment to reflect on your session. What did you feel and learn? If you like, you can write down your thoughts in a journal.
- **Be patient with yourself:** Building a new habit takes time. Be patient with yourself on this journey. Don't get frustrated if your mind wanders or if you miss a day. Some days will be easier and others will be harder.

Sample Meditations to Try

If you want to get started with meditation, these are a few [types](#) you can try.

Breath Awareness Meditation

Breath awareness meditation simply involves focusing your attention on your breath. Here's how to do it:

- Sit comfortably and close your eyes.
- Taking deep breaths, bring your attention to your breath. Pay attention to the way the air comes in through your nose, fills up your stomach, and goes out again.
- If your attention wanders, gently bring it back to your breath.
- Do this for as long as you like. When you're done, open your eyes slowly.

Body Scan Meditation

[Body scan meditation](#) involves bringing your attention to each part of your body and consciously relaxing it, one at a time. Here's how to do it:

- Lie down on your back and close your eyes.
- Bring your attention to your toes, breathing into them and relaxing them. Notice any sensations you feel without trying to change anything.
- Slowly move your focus to your feet, ankles, calves, knees, thighs, and so on, up to the top of your head.
- After you finish scanning your entire body, take a few deep breaths and open your eyes.

Loving-Kindness Meditation

[Loving-kindness meditation](#) involves sending kind thoughts to yourself, your loved ones, and the world around you. Here's how to do it:

- Get comfortable, close your eyes, and take a few deep breaths.
- Send kindness to yourself. You can repeat silently, "May I be happy. May I be healthy. May I be safe."
- Extend kindness to your loved ones. Think of someone you love and repeat, "May you be happy. May you be healthy. May you be safe."
- Expand kindness to others. Gradually extend these wishes to a neutral person, someone you have difficulty with, and finally to all living beings.

Walking Meditation

If you find sitting still difficult and prefer movement, [walking meditation](#) may be for you. Here's how to do it:

- Find a quiet space to walk comfortably back and forth.

- Walk slowly, paying attention to the sensations in your feet as they make contact with the ground.
- Coordinate your breath with your steps, inhaling and exhaling with each step.
- Notice any thoughts that come to you, letting them go and returning your focus to walking.
- Turn around and continue walking mindfully when you reach the end of your space.
- When you're done, stand still, take a few deep breaths, and reflect on the experience.

Key Takeaways

While meditation may seem simple on the surface, its impact on the brain is quite profound. Incorporating it into your daily routine can improve your attention, memory, mood, and stress levels. You can start slowly with just a few minutes a day, working your way up to longer sessions over time. Just do your best to be regular with it!

The many benefits of meditation and how to get started

Meditation: An ancient practice with huge benefits in our modern lives

Meditation, a practice embraced worldwide for its myriad benefits to both mind and body, has existed for thousands of years. But more and more modern data show just how good it can be to cope with today's challenges. Here's a look at its benefits and tips on how to get started.



Reduces stress, anxiety and depression

Research consistently shows meditation and mindfulness are effective at improving mental health. Indeed, at least 200 studies of mindfulness among healthy people found it was especially effective for reducing stress, anxiety, and depression, according to the American Psychological Association (APA).

Improves focus and attention

Our minds are lost in thought 47% of the time, according to researchers at Harvard University. And most of that wondering is about past or future events. However, a landmark seven-year study published in Springer's Journal of Cognitive Enhancement concluded that intensive and continued meditation practice is associated with enduring improvements in sustained attention.



It can make you (and those around you) happier

According to Time Magazine, despite life events, most people “revert back to some kind of baseline happiness level within a couple of years of even the most devastating events.” Want to boost that baseline happiness? Try meditation, which has been shown to increase daily experiences of positive emotions like happiness. And if you're happy, those around you may also benefit, creating a virtuous circle.

Lowers blood pressure, reduces the risk of cardiovascular disease

Stress is your natural alarm system and it releases adrenaline that elevates blood pressure. The American Heart Association has acknowledged meditation as a potential way to reduce the risk of cardiovascular disease, with studies indicating it can lower blood pressure by making the body less responsive to stress hormones.

It can help manage pain

According to expert Jon Kabat-Zinn and Harvard Medical School, meditation can be effective at controlling pain. Zinn says the best technique is to lie on the ground and do a “body scan” noticing each part of your body. If you notice pain, acknowledge it, the thoughts and emotions that surround it, and gently breathe into it. By acknowledging it you can help the body relax.

Supports sleep

Insomnia sufferers, rejoice! A study in JAMA Internal Medicine found that mindfulness meditation improves sleep quality by helping the mind to settle, reducing the time it takes to fall asleep, and increasing sleep duration. The study, which looked at middle-aged people with sleep issues, found meditators had less insomnia, fatigue, and depression at the end of the six sessions compared to those who took a sleep education class.

Boosts the immune system

Regular meditation has been shown to boost the immune system, making you less susceptible to illnesses. In 2021, researchers at the University of Florida found that eight days of intense meditation caused “a robust activation of the immune system.” This was tested against more than 70 million data points from the blood samples of participants.

Offers insight into thoughts and emotions

One of the mechanisms by which meditation works is by offering the practitioner not only insight but experiences into the true nature of their thoughts and emotions. Many meditations describe thoughts as clouds in the sky, but point out that you are not the thoughts, you are the blue sky. This gives meditators space to observe their thoughts and feelings with distance and without clinging.



An experience of one's true self

A common question of some meditation traditions to reflect on is "Who am I?" That goes beyond name, nationality, profession or adjectives and into the deeper nature of self. This kind of meditation can help shed the idea that people are unchanging and permanent individuals. This, in turn, can help people leave behind labels and definitions that cause negative patterns and thoughts, allowing them to become more flexible and at peace.

Teaching how to live in the the present moment

According to the APA, depression is often a symptom of people being worried about what happened in the past while anxiety is a symptom of people getting caught up in the future. Meditation reveals that the future is an illusion, and so is the past, with some memories like bad soap operas on repeat. Meditation also shows the joy and peace that can come from living in the present moment, which is what is real and available.

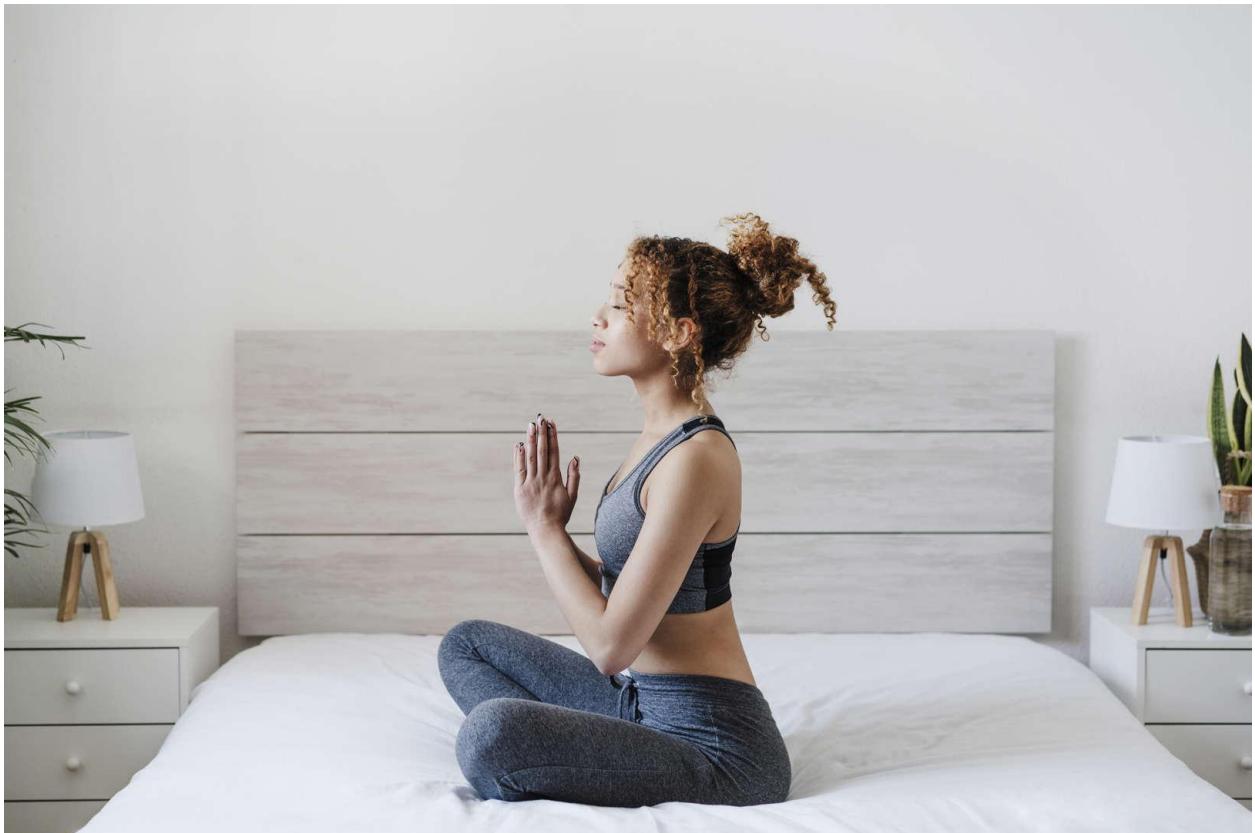


Insight into the true nature of reality

Vipassana (mindfulness) and other meditations are all about gaining insight into the true nature of reality. Meditators are supposed to experience a sense that everything is connected and impermanent, which helps boost compassion and acceptance. "It is not impermanence that makes us suffer. What makes us suffer is wanting things to be permanent when they are not," said Zen Monk Thich Nhat Hanh.

How to get started

Meditation is an incredibly simple practice, but it is also a lot more difficult than it might sound. Here are some common techniques to get started and deepen your practice.

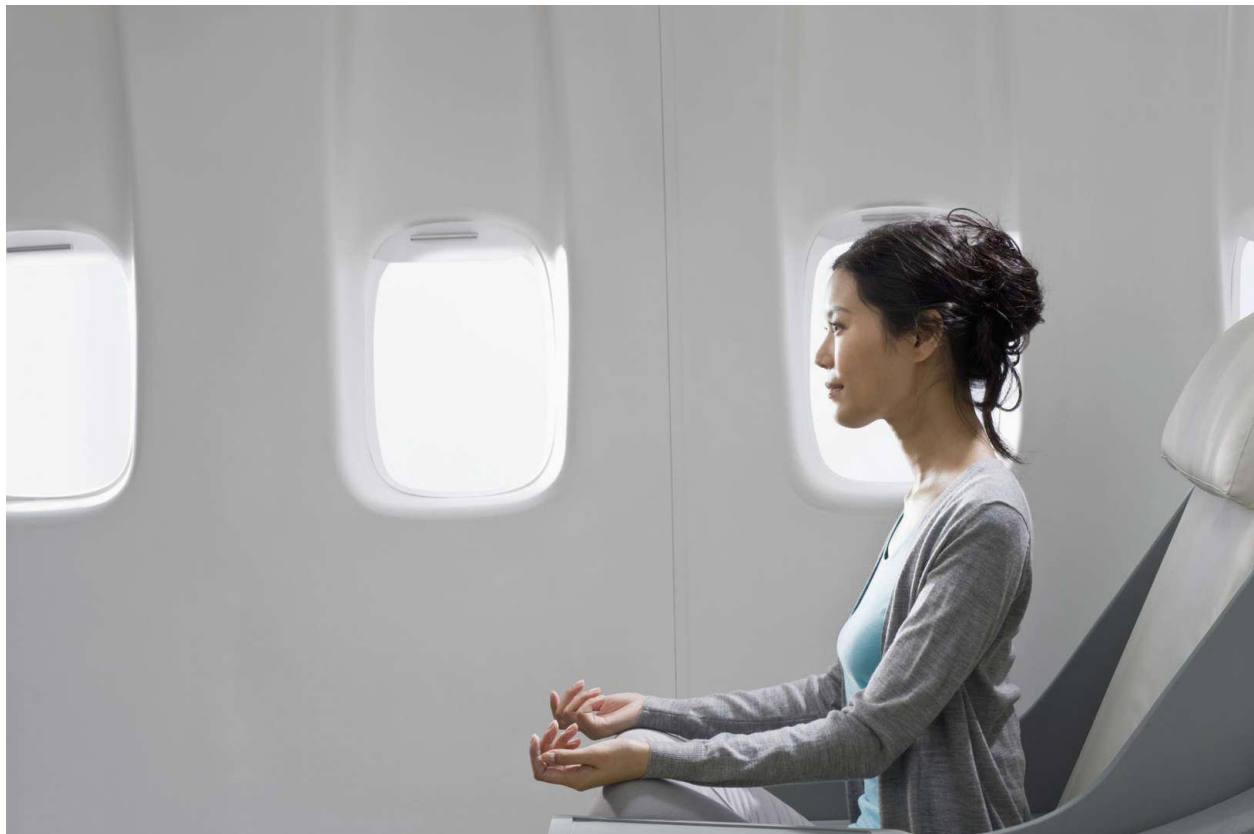


Download an app or do a guided meditation

One of the easiest ways to get started is by downloading an app for meditation beginners (like Headspace) or using guided meditations available on the internet. There is a huge array of types like vipassana, loving-kindness, or meditations for pain, sleep, etc. Experiment to find the ones you like and that help you.

Go technology-free... all you need is your breath

Of course, you don't need internet access to meditate. The basic instructions are to sit in silence with your back straight and notice your breath. You can count your breath to help keep focus. From there, you can think about enjoying your breath, the present moment, send compassion to others, notice your thoughts, or just try to keep concentrating on your breath. You can notice your breath in places like your nose, chest, belly, or even feet!



Walking meditation

But meditation isn't just for sitting down. Some people can get a lot by doing walking meditations, preferably in a peaceful spot, but it can be anywhere. While walking, notice your body, your breath, and when a thought pops into your mind, acknowledge it but try not to follow it. Return to the present moment. Gently and slowly, enjoy the beauty of your environment, the sounds, the feeling of the breeze, and notice how you are connected to and part of nature.

Incorporate mindfulness into your daily activities

Mindfulness isn't just for special times, you can also incorporate it into your daily activities. It just involves noticing the present moment and coming into your breath and body. If you are washing the dishes, notice your breath, notice the water, notice the feelings. If you are eating, slow down, notice the taste of the food, and feel grateful.

Dedicate a set amount of time each day

For best results, experts suggest making meditation and/or mindfulness a routine part of each day. Experts say you can start small with sit-down or walking meditation, even with just a few minutes. You can also dedicate a specific time, like while brushing your teeth or eating breakfast, to try to stay mindful. But of course, you can aim to be mindful or meditate more than that.



Put a meditation bell on your phone

Meditation apps like the excellent 'Plum Village' app also have the feature of having a mindfulness bell ring every so often. For instance, you can set it to ring every 30 minutes. Then, when you hear it, you are supposed to pause what you're doing (if possible) and take three mindful breaths. Though it is just three breaths, it can have a big calming effect and help you become aware of how you are moving through the day.

Alpha, beta, theta: What are brain states and brain waves? And can we control them?



Credit: Pixabay/CC0 Public Domain© Provided by Medical Xpress

There's no shortage of apps and technology that claim to shift the brain into a "theta" state—said to help with relaxation, inward focus and sleep.

But what exactly does it mean to change one's "mental state"? And is that even possible? For now, the evidence remains murky. But our understanding of the brain is growing exponentially as our methods of investigation improve.

Brain-measuring tech is evolving

Currently, no single approach to imaging or measuring brain activity gives us the whole picture. What we "see" in the brain depends on which tool we use to "look." There are myriad ways to do this, but each one comes with trade-offs.

We learnt a lot about brain activity in the 1980s thanks [to the advent](#) of magnetic resonance imaging (MRI).

Eventually we invented "functional MRI," which allows us to link brain activity with certain functions or behaviors in real time by measuring the brain's use of oxygenated blood during a task.

We can also measure electrical activity using EEG (electroencephalography). This can accurately measure the timing of brain waves as they occur, but isn't very accurate at identifying which specific areas of the brain they occur in.

Alternatively, we can measure the brain's response to magnetic stimulation. This is very accurate in terms of area and timing, but only as long as it's close to the surface.

What are brain states?

All of our simple and complex behaviors, as well as our cognition (thoughts) have a foundation in brain activity, or "neural activity." Neurons—the brain's nerve cells—communicate by a sequence of electrical impulses and chemical signals called "neurotransmitters."

Neurons are very greedy for fuel from the blood and require a lot of support from companion cells. Hence, a lot of measurement of the site, amount and timing of brain activity is done via measuring electrical activity, neurotransmitter levels or blood flow.

We can consider this activity at three levels. The first is a single-cell level, wherein individual neurons communicate. But measurement at this level is difficult (laboratory-based) and provides a limited picture.

As such, we rely more on measurements done on a network level, where a series of neurons or networks are activated. Or, we measure whole-of-brain activity patterns which can incorporate one or more so-called "brain states."

According to [a recent definition](#), brain states are "recurring activity patterns distributed across the brain that emerge from physiological or cognitive processes." These states are functionally relevant, which means they are related to behavior.

Brain states involve the synchronization of different brain regions, something that's been most readily observed in animal models, usually rodents. Only now are we starting to see some evidence in human studies.

Various kinds of states

The most commonly-studied brain states in both rodents and humans are states of "arousal" and "resting." You can picture these as various levels of alertness.

Studies show environmental factors and activity influence our brain states. Activities or environments with high cognitive demands drive "attentional" brain states (so-called task-induced brain states) with increased connectivity. Examples of task-induced brain states include [complex behaviors](#) such as reward anticipation, mood, hunger and so on.

In contrast, a brain state such as "mind-wandering" seems to be divorced from one's environment and tasks. Dropping into daydreaming is, by definition, without connection to the real world.

We can't currently disentangle multiple "states" that exist in the brain at any given time and place. As mentioned earlier, this is because of the trade-offs that come with recording spatial (brain region) versus temporal (timing) brain activity.

Brain states vs. brain waves

Brain state work can be couched in terms such as alpha, delta and so forth. However, this is actually referring to brain waves which specifically come from measuring brain activity using EEG.

EEG picks up on changing electrical activity in the brain, which can be sorted into different frequencies (based on wavelength). Classically, these frequencies have had specific associations:

- gamma is linked with states or tasks that require more focused concentration
- beta is linked with higher anxiety and more active states, with attention often directed externally
- alpha is linked with being very relaxed, and passive attention (such as listening quietly but not engaging)
- theta is linked with deep relaxation and inward focus
- and delta is linked with deep sleep.

Brain wave patterns are used a lot to monitor sleep stages. When we fall asleep we go from drowsy, light attention that's easily roused (alpha), to being relaxed and no longer alert (theta), to being deeply asleep (delta).

Can we control our brain states?

The question on many people's minds is: can we judiciously and intentionally influence our brain states?

For now, it's likely too simplistic to suggest we can do this, as the actual mechanisms that influence brain states remain hard to detangle. Nonetheless, researchers are investigating everything from the use of drugs, to environmental cues, to practicing mindfulness, meditation and sensory manipulation.

Controversially, brain wave patterns are used in something called "neurofeedback" therapy. In these treatments, people are given feedback (such as visual or auditory) based on their brain wave activity and are then tasked with trying to maintain or change it. To [stay in a required state](#) they may be encouraged to control their thoughts, relax, or breathe in certain ways.

The applications of this work are predominantly around mental health, including for individuals who have experienced trauma, or who have difficulty self-regulating—which may manifest as poor attention or emotional turbulence.

However, although these techniques have intuitive appeal, they don't account for the issue of multiple brain states being present at any given time. Overall, clinical studies have been [largely inconclusive](#), and proponents of neurofeedback therapy remain frustrated by a lack of orthodox support.

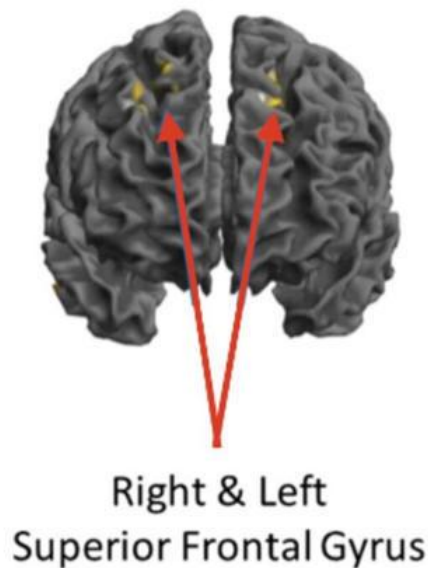
Other forms of neurofeedback are delivered by MRI-generated data. Participants engaging in mental tasks are given signals based on their neural activity, which they use to try and "up-regulate" (activate) regions of the brain involved in positive emotions. This could, for instance, be useful for helping [people with depression](#).

Another potential method claimed to purportedly change brain states involves different sensory inputs. Binaural beats are perhaps the most popular example, wherein two different wavelengths of sound are played in each ear. But the evidence for such techniques [is similarly mixed](#).

Treatments such as neurofeedback therapy are often very costly, and their success likely relies as much on the therapeutic relationship than the actual therapy.

On the bright side, there's no evidence these treatment do any harm—other than potentially delaying treatments which have been proven to be beneficial.

Your brain in the zone: A new neuroimaging study reveals how the brain achieves a creative flow state



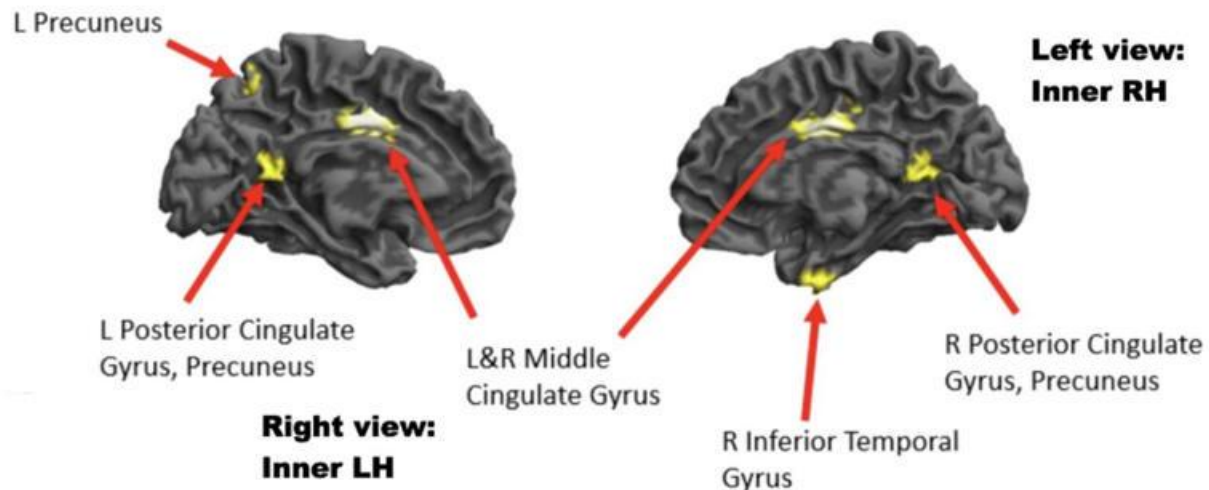
Front-view of the brain. The jazz musicians showed reduced activity in these frontal-lobe areas when in a high-flow state. Credit: John Kounios, Ph.D. / Drexel University© Provided by Medical Xpress

Effortless, enjoyable productivity is a state of consciousness prized and sought after by people in business, the arts, research, education and anyone else who wants to produce a stream of creative ideas and products. That's the flow, or the sense of being "in the zone." A new neuroimaging study from Drexel University's Creativity Research Lab is the first to reveal how the brain gets to the creative flow state.

The study is [published](#) in the journal *Neuropsychologia*.

The study isolated flow-related brain activity during a creative task: jazz improvisation. The findings reveal that the creative flow state involves two key factors: extensive experience, which leads to a network of brain areas specialized for generating the desired type of ideas, plus the release of control—"letting go"—to allow this network to work with little or no conscious supervision.

Led by John Kounios, Ph.D., professor in the College of Arts and Sciences and Creativity Research Lab director, and David Rosen, Ph.D., a recent graduate from the College and Johns Hopkins University postdoc—the team determined their results suggest that creative flow can be achieved by training people to release control when they have built up enough expertise in a particular domain.



Inner views of the left and right sides of the brain showing areas of reduced brain activity when the high-experience musicians were in a high-flow state (compared to a low-flow state). These areas include key nodes of the brain's default-mode network. Credit: John Kounios, Ph.D. / Drexel University© Provided by Medical Xpress

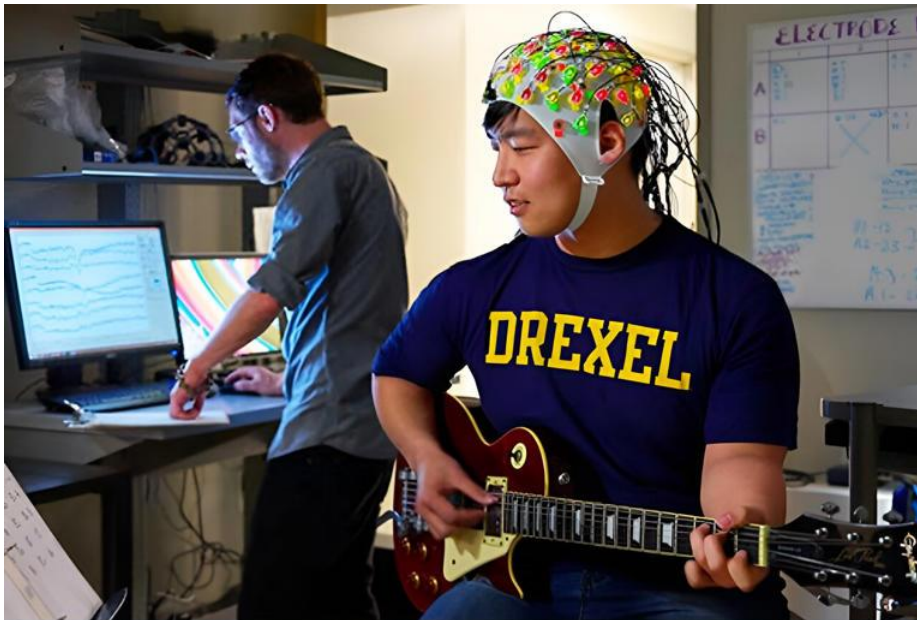
"Flow was first identified and studied by the pioneering psychological scientist Mihaly Csikszentmihalyi," said Kounios. "He defined it as 'a state in which people are so involved in an activity that nothing else seems to matter; the experience is so enjoyable that people will continue to do it even at great cost, for the sheer sake of doing it.'"

Kounios noted that although flow has long been a topic of public fascination as well as the focus of hundreds of behavioral research studies, there has been no consensus about what flow is. Their new study decided between different theories of how flow is involved when people produce creative ideas.

Theory: Is flow a state of hyperfocus?

One view is that flow might be a state of highly focused concentration or hyperfocus that shuts out extraneous thoughts and other distractions to enable superior performance on a task.

A related theory based on recent research on the neuroscience of creativity is that flow occurs when the brain's "default-mode network," a collection of brain areas that work together when a person daydreams or introspects, generates ideas under the supervision of the "executive control network" in the brain's frontal lobes, which directs the kinds of ideas the default-mode network produces. Kounios likened it to the analogy of a person "supervising" a TV by picking the movie it streams.



Drexel University postdoctoral researcher Yongtaek Oh playing the guitar while his electroencephalograms (EEGs) are recorded in Drexel University's Creativity Research Laboratory. Credit: John Kounios, Ph.D / Drexel University© Provided by Medical Xpress

Alternative theory: Flow is expertise plus letting go

An alternative theory of creative flow is that through years of intense practice, the brain develops a specialized network or circuit to automatically produce a specific type of ideas, in this case musical ones, with little conscious effort.

In this view, the executive control network relaxes its supervision so that the musician can "let go" and allow this specialized circuit to go on "autopilot" without interference. The research team said the key to this notion is the idea that people who do not have extensive experience at a task or who have difficulty releasing control will be less likely to experience deep creative flow.

The study's results support the "expertise-plus-release" view of creative flow.

The researchers tested these competing theories of creative flow by recording high-density electroencephalograms (EEGs) from 32 jazz guitar players, some highly experienced and others less experienced. Each musician improvised to six jazz lead sheets (songs) with programmed drums, bass and piano accompaniment and rated the intensity of their flow experience for each improvisation.

The resulting 192 recorded jazz improvisations, or "takes," were subsequently played for four jazz experts individually so they could rate each for creativity and other qualities. The researchers then analyzed the EEGs to discover which brain areas were associated with high-flow takes (compared to low-flow takes).

The high-experience musicians experienced flow more often and more intensely than the low-experience musicians. This shows that expertise enables flow. However, expertise is not the only factor contributing to creative flow.

The EEGs showed that a high-flow state was associated with increased activity in left-hemisphere auditory and touch areas that are involved in hearing and playing music. Importantly, high flow was also associated with decreased activity in the brain's superior frontal gyri, an executive control region. This is consistent with the idea that creative flow is associated with reduced conscious control, that is, letting go. This previously hypothesized phenomenon has been called "transient hypofrontality."

For the high-experience musicians, flow was associated with greater activity in auditory and vision areas. However, they also showed reduced activity in parts of the default-mode network, suggesting that the default-mode network was not contributing much to flow-related idea generation in these musicians.

In contrast, the low-experience musicians showed little flow-related brain activity.

"A practical implication of these results is that productive flow states can be attained by practice to build up expertise in a particular creative outlet coupled with training to withdraw conscious control when enough expertise has been achieved," said Kounios. "This can be the basis for new techniques for instructing people to produce creative ideas."

Kounios added, "If you want to be able to stream ideas fluently, then keep working on those musical scales, physics problems or whatever else you want to do creatively—computer coding, fiction writing—you name it. But then, try letting go. As jazz great Charlie Parker said, 'You've got to learn your instrument. Then, you practice, practice, practice. And then, when you finally get up there on the bandstand, forget all that and just wail.'"

More information: David Rosen et al, Creative flow as optimized processing: Evidence from brain oscillations during jazz improvisations by expert and non-expert musicians, *Neuropsychologia* (2024). DOI: [10.1016/j.neuropsychologia.2024.108824](https://doi.org/10.1016/j.neuropsychologia.2024.108824)

Provided by Drexel University

Neuroscience research shows how mindfulness meditation fosters a unique state of relaxed alertness



Mindfulness meditation promotes a unique state of relaxed alertness, characterized by specific changes in brain activity related to attention and awareness, according to a study published in the *International Journal of Psychophysiology*. By examining brain oscillations and physiological arousal, researchers found that mindfulness meditation induces neural patterns different from those seen during simple rest, challenging the view that its benefits are solely rooted in stress reduction.

Mindfulness meditation is a practice that encourages individuals to focus their attention on the present moment in a nonjudgmental way. Originating from ancient contemplative traditions, mindfulness has become increasingly popular in modern contexts for its ability to promote mental clarity, emotional balance, and overall well-being.

Despite its growing popularity, the precise mechanisms by which mindfulness benefits the brain and body remain unclear. Neuroscientific research has consistently shown that meditation induces changes in patterns of neural oscillations or “brain waves,” particularly theta and alpha waves.

Theta waves (4–8 Hz) are often associated with deep relaxation and meditative focus, while alpha waves (8–13 Hz) are linked to calmness, wakeful rest, and the brain’s ability to suppress distractions. These two bands are thought to underpin the sense of relaxed alertness that practitioners often experience during mindfulness meditation.

However, it is less understood whether these changes are primarily a result of relaxation, akin to what one might experience during simple rest, or if they represent a distinct mental state characterized by active engagement and heightened alertness. The motivation behind the study was to address these gaps in knowledge and clarify the mechanisms that underpin mindfulness meditation.

“There has been considerable growth in the popularity of mindfulness meditation, with trends highlighting its integration into healthcare, education, and corporate sectors,” said study author Alexander T. Duda, a PhD candidate at

the Brain & Behaviour Research Institute and School of Psychology at the University of Wollongong.

“However, while its benefits for mental health and well-being are well-documented, the mechanisms underlying these effects remain underexplored. I have a personal interest in understanding how mindfulness influences brain activity and arousal, and this study provided an opportunity to investigate these questions using the research facilities at my institution.”

The research involved 52 healthy young adults aged 18 to 35, with varying levels of meditation experience, though most participants were novices. Before the study, participants were asked to abstain from substances like caffeine or alcohol to avoid any confounding effects. They provided written consent and completed demographic questionnaires before undergoing brainwave and physiological arousal measurements.

Participants first engaged in a resting task with their eyes closed while researchers recorded their brain activity using electroencephalography (EEG), which measures electrical signals in the brain to capture neural oscillations. Skin conductance level (SCL) was also measured to assess physiological arousal.

Participants then performed a 15-minute mindfulness meditation exercise based on a well-established guided breathing technique. During meditation, EEG and SCL data were continuously recorded. The researchers compared the brainwave patterns and arousal levels from the meditation session with those from the resting state.

To analyze the data, they employed both traditional EEG methods, which focus on predefined frequency bands (such as theta, alpha, beta, and gamma), and a data-driven approach called Frequency Principal Components Analysis. This advanced technique identifies natural groupings in brainwave data.

The researchers found that mindfulness meditation induces distinct changes in brainwave activity, supporting the idea that it creates a unique state of relaxed alertness rather than simply promoting relaxation. These changes were most evident in the theta and alpha frequency bands, which are associated with deep focus, attention, and a calm mental state.

The researchers observed increases in certain theta-related brainwave components during meditation, suggesting heightened awareness and internal focus. This supports previous findings that theta oscillations play a key role in mindfulness practices.

“Mindfulness meditation is associated with changes in brain activity that are distinct from simple relaxation, promoting a state of relaxed alertness,” Duda told PsyPost. “This suggests that its benefits go beyond stress reduction, which may include enhanced attention and awareness.”

Interestingly, the study also revealed a decrease in alpha oscillations during meditation, particularly in the lower-frequency alpha range. While alpha activity is typically associated with calmness and reduced sensory distractions, this decrease further supports the idea that meditation involves active engagement with the present moment rather than a passive state of rest.

“The significant decrease in alpha oscillations during mindfulness meditation was unexpected, as previous studies have often reported increases in this frequency band,” Duda said. “Additionally, these changes in alpha oscillations did not correlate with arousal, as measured by skin conductance level, which contrasts with prior research conducted in resting states that typically find such associations.

“This suggests that the neural mechanisms underlying mindfulness meditation may operate independently of the arousal-related changes traditionally linked to alpha oscillations, highlighting the unique nature of the meditative state.”

The findings shed light on the complexity of mindfulness meditation and its distinct neural effects. But as with all research, there are some limitations.

“The findings are limited to young, healthy, novice meditators, which may not generalize to experienced practitioners or diverse demographics,” Duda noted. “Additionally, the study focused on a single session of mindfulness meditation, without examining longitudinal changes or other meditation styles, which may yield different outcomes.”

“Future research should address these gaps by including diverse populations, exploring long-term effects, and incorporating complementary measures like

heart rate variability to better understand the physiological mechanisms and broader impacts of mindfulness.”

“A key goal is to gain a deeper understanding of the role of arousal as a mechanism contributing to the benefits of mindfulness meditation,” Duda explained. “Investigating how changes in arousal and neural oscillations interact to enhance attention, awareness, and overall well-being will help refine mindfulness practices. Ultimately, this research aims to inform and improve the use of mindfulness meditation in clinical interventions, making them more effective and widely applicable.”

The research also highlights how advanced statistical approaches, such as Frequency Principal Components Analysis, allow for the identification of complex neural patterns.

“This study highlights the importance of employing data-driven and innovative methodologies, such as the fPCA used here, to uncover deeper insights into complex brain activities associated with mindfulness meditation,” Duda said. “These approaches allow for more precise and nuanced analyses compared to traditional methods.”

The study, “[Mindfulness meditation alters neural oscillations independently of arousal](#),” was authored by Alexander T. Duda, Adam R. Clarke, and Robert J. Barry.

Just 10 minutes of mindfulness each day boosts wellbeing and fights depression, study finds

New research shows just 10 minutes of daily mindfulness improves mental health, reduces depression, and promotes

The mindfulness exercises included activities such as body scans, breath-focused attention, relaxation techniques, intention-setting, and self-reflection.

In a recent study published in the [British Journal of Health Psychology](#), researchers from the Universities of Bath and Southampton explored the impact of daily mindfulness practice on mental well-being.

The results, drawn from a large sample of 1,247 adults from 91 countries, revealed that just 10 minutes of mindfulness a day can significantly reduce symptoms of depression and anxiety, improve well-being, and motivate people to adopt healthier habits like exercising more regularly, eating better, and improving sleep quality.

Participants in the study, most of whom had little to no prior experience with mindfulness, were divided into two groups. One group engaged in a month-long daily mindfulness routine through the free mobile app [Medito](#), while the control group listened to excerpts from *Alice in Wonderland*.

The mindfulness exercises included activities such as body scans, breath-focused attention, relaxation techniques, intention-setting, and self-reflection. Participants filled out surveys before and after the 30-day period to assess their mental health.

The results were telling. Compared to the control group, those who practiced mindfulness saw a 19.2% greater [reduction in depression](#) symptoms, a 12.6% greater decrease in anxiety, and a 6.9% greater improvement in overall well-being.

These individuals also reported more positive attitudes toward health (by 7.1%) and a 6.5% stronger intention to adopt healthy habits. Remarkably, these positive effects persisted one month after the mindfulness course ended, with participants continuing to report better mental health and improved sleep quality.

The personal testimonials from participants underscored the benefits of mindfulness practice. One participant noted, "Awareness, self-control, gratitude, I am more patient, and I [take more joy](#) from the present moment." Another said, "Completing these meditation sessions has given me a better understanding of the function of my mind. They have helped me gain better insight on many things and shown me a different lens through which to look at the world."

This research also highlights that mindfulness practice may foster healthier lifestyle behaviors. Masha Remskar, a psychologist and behavior change expert at the [University of Bath](#) and the study's lead author, emphasized the potential of mindfulness to promote healthier living. "This study highlights that even short, daily practices of mindfulness can offer benefits, making it a simple yet powerful tool for enhancing mental health," she said.

Remskar further explained the link between mindfulness and improved health habits, noting, "It's exciting to see the benefits of mindfulness extending beyond depression, [well-being](#), and anxiety into other health behaviors such as sleeping better and building stronger intentions to live a healthy lifestyle. Mindfulness builds the psychological skills you need to build healthy habits."

Dr. Ben Ainsworth, co-author and leader of the Digital Intervention Group at the [University of Southampton](#), echoed this sentiment. He emphasized how digital platforms like Medito make mindfulness practices accessible to a global audience. "The research underscores how digital technology – in this case, a freely available app – can help people integrate behavioral and psychological techniques into their lives, in a way that suits them."

Similarly, Dr. Max Western, another co-author from the University of Bath, pointed out the lasting effects of mindfulness on behavior. He noted that even after the mindfulness course ended, participants maintained improvements in their lifestyle choices. "It is exciting to see that such a light-touch, affordable intervention has the potential to reach a large global audience and have an impact on healthy lifestyle behaviors."

[Mindfulness-based interventions](#) (MBIs) like this one, which promote the practice of non-judgmental awareness of the present moment, have long been shown to benefit mental well-being and quality of life. These techniques have been used to treat psychological symptoms and prevent relapses in clinical populations, as well as to manage long-term conditions. They can also serve as preventive tools for reducing stress and improving sleep in the general population.

The growing availability of digital MBIs, including over 600 mindfulness apps currently in European app stores, has made these techniques more accessible than ever. Digital MBIs, which allow for structured mindfulness practice through mobile devices, have shown promising results, with studies demonstrating their effectiveness in reducing stress, anxiety, and depression.

For instance, a meta-analysis by Jayawardene and colleagues found that digital MBIs had a moderate effect size in reducing stress, while other studies showed comparable results to in-person mindfulness programs like the well-known 8-week mindfulness-based [stress reduction](#) (MBSR) course.

The ability of digital mindfulness tools to improve sleep is particularly significant, given the strong connection between sleep and mental health. Research by Jiang and Scott

found that better sleep quality was associated with reduced anxiety and depression, which aligns with the results of this new study.

However, researchers stress the importance of ensuring that these digital tools are accessible to everyone, not just those with more resources, time, or higher health literacy. Addressing this gap will be critical in ensuring that the psychological [benefits of mindfulness](#) reach those who need it the most.

Understanding how mindfulness improves mental well-being can also guide the development of future interventions. Studies suggest that mindfulness supports health behaviors by influencing psychological processes such as self-efficacy—the belief in one’s ability to succeed—and self-regulation, which is the ability to manage emotions, attention, and behavior.

Higher levels of mindfulness are associated with greater self-efficacy, better coping strategies, and more skillful self-regulation, all of which contribute to healthier behaviors and [better mental health](#) outcomes.

As mindfulness training helps individuals develop these psychological skills, they become better equipped to maintain positive health behaviors like regular physical activity, a balanced diet, and good sleep hygiene. Researchers hope to explore these effects further, with Remskar and her team eager to study how mindfulness might help people adopt healthy behaviors like quitting smoking or exercising more regularly. The potential of digital mindfulness tools to improve mental health and lifestyle behaviors is an exciting frontier. With further research, these tools could become even more effective and widely accessible, helping people worldwide lead healthier, more [balanced lives](#).

Tips for Nurturing Mental Well-being:

1. **Relaxation and Stress Reduction:** Embrace moments of calm, practice deep breathing, and engage in relaxation techniques.
2. **Learning and Creativity:** Stimulate the mind with new knowledge, explore [creative outlets](#), and challenge yourself with new endeavors.
3. **Spending Time in Nature:** Reconnect with the earth's natural rhythms, soak in the beauty of the outdoors, and find solace in nature's embrace.
4. **Connecting with Others:** Foster meaningful connections with family and friends, share experiences, and seek support in times of need.

5. **Physical Health:** Prioritize physical activity, [exercise regularly](#), and nurture your body with nourishing foods and adequate sleep.
6. **Meditation and Mindfulness:** Cultivate mindfulness practices, embrace the power of meditation, and centre yourself in the present moment.
7. **Reading Books or Listening Podcasts:** Explore the vast universe of literature, fiction, non-fiction and delve into stories that inspire, enlighten, and nourish the mind with knowledge.
8. **Writing and Journaling:** Unleash the power of self-expression, channel emotions through [writing](#), and embark on a journey of self-discovery.
9. **Self-Care:** Dedicate time for intentional breaks, practice self-compassion, and foster a mindset of positivity and gratitude.
10. **Finding Meaning and Purpose:** Reflect on your values, pursue activities that align with your passions, and discover your unique purpose in life.

Is self-sufficiency killing our gratitude?

As a society, we seem to be embracing technology as a — if not the — means of making life more bearable. While I have my concerns about artificial intelligence and transhumanism, they are symptoms of a more basic problem: an underlying expectation that we can and should be living an unburdened life.

Such an expectation has implications for gratitude because gratitude assumes that there are such things as “gifts.” It assumes there are acts of kindness we don’t deserve and states of being we do not bring about on our own. In many ways, gratitude is linked to our conviction that we are dependent beings in need of *undeserved* favor from others.

As a society, we seem intent on moving toward efficiency, though it isn’t always clear what efficiency implies. For instance, on a trip to Germany, I had the misfortune of renting a fully electric car (it was all the rental company had). As if I needed another reason to question the wisdom of so-called technological

progress, every charging station had a different payment process, and, due to numerous charging issues, my wife and I decided to stay overnight at the Martas Hotel Lutherstadt in Wittenberg to charge the car.

Unfortunately, the car wouldn't charge at the hotel either. One member of the staff (who spoke excellent English) stayed after her shift to help me communicate with the repair man (who spoke as much English as I do German). When the technology failed, there were kind people who stepped in to help carry a burden that I was incapable of carrying on my own.

Someone in the e-car industry (or just an e-car advocate) might say there is no need to question the so-called noble end of efficiency represented by the electric car. Instead, what is needed is the ongoing improvement of the infrastructure that will allow for a seamless user experience. Once the technology is perfected, the difficulties of making a four-hour drive will be eliminated. Yet, if there is no burden to bear does that mean there is no burden to share? Efficiency does not eliminate burdens or human interdependencies. It shifts them. When it shifts them, it often does so in a way that makes them less visible.

Technology (and the efficiency it serves) tends to make our dependence on others *less apparent*. As we become less aware of those dependencies, we become less capable of gratitude. As [McCullough](#) suggests, "Gratitude operates typically when people are the recipients of prosocial behavior." He goes on to describe gratitude as a "moral barometer" that serves as "an affective readout that is sensitive to a particular type of change in one's social relationship — the provision of a benefit by another moral agent that enhances one's well-being." Gratitude requires us to *recognize* the various ways other people have made our lives better.

Not recognizing the way people have made our lives better does not mean they aren't making our lives better. If efficiency makes our human interdependencies less visible, efficiency requires an implicit trade-off with regard to gratitude. In exchange for seamless experiences and a general sense of self-sufficiency and stability, we set aside the conditions that would cultivate gratitude. Self-sufficiency reduces our capacity for gratitude. As [Solom](#) notes, "if one believes that they do not need others to contribute to their well-being, then they should be less likely to appreciate the value of the benefits that others provide, thus decreasing the recognition of the goodness of the gift, and hence preventing the experience of gratitude."

Our commitment to efficiency will likely be detrimental to our capacity to show gratitude. We are less prone to be thankful for the work of faceless programmers and engineers than we are to be a. indignant when the technologies they create don't work perfectly or b. insistent that the technologies they provide make our lives better. Having gotten the technology we feel we "deserve," there is really no need for gratitude because we have simply (and finally) gotten that to which we were already entitled. Efficiency hides the burdens and dependencies that make much of our lives possible. As such, it also hides opportunities for us to cultivate gratitude. Because of this dynamic, we lose more than we gain.

As John Milton suggests, "Gratitude bestows reverence, allowing us to encounter everyday epiphanies, those transcendent moments of awe that change forever how we experience life and the world." While efficiency and its technological helpers may make it more difficult for us to be grateful, that does not excuse us from pursuing a life of thanksgiving. We need to learn to see past efficiency's obstructions to recognize the human efforts that have produced the various experiences and tools that have contributed to our well-being. In doing so, we will inevitably find that we are not only more grateful to and for our neighbors, but to and for the Triune God from whom we have received the gifts we use to serve one another.

What is a microsleep and are they dangerous?

We ask an expert

A microsleep is when we fall asleep for the briefest of moments, so brief in fact, that we might not realise it has happened. Dr Lindsay Browning, neuroscientist, owner of leading sleep issues clinic Trouble Sleeping and author of [Navigating Sleeplessness](#) says, "Sometimes the person's eyes will shut, but a microsleep can still happen with eyes open."

Lasting only one to 15 seconds, these mini slumbers are the result of several factors, including lack of normal sleep due to stress, lifestyle or conditions such as sleep apnoea. Microsleeps might sound harmless – after all, what's a few

seconds? – but the consequences can be big, especially if you fall asleep at the wheel while driving.

We explore microsleeps in more detail below, but one of the best ways to avoid having them is to get a decent night's sleep, whether that's by changing up your bedtime routine or investing in the [best mattress](#) for your body and sleep style. For now, here's what you need to know about microsleep – what is it, how to tell if you're having one, and how to prevent it from happening.

What is a microsleep?

According to sleep specialist, neurologist, and author of *The Sleep Solution*, Dr Chris Winter, a microsleep is a “very brief period of sleep or unconsciousness that may happen in such a way that the person is completely unaware that it has happened”.

These brief moments usually happen during the day, but unfortunately, it can be difficult to tell if you are experiencing microsleeps as they are so fleeting, occurring for only a few seconds.

However, if you are not getting good-quality rest at your usual sleep time, and find you yawn frequently or have slower responses to what is going on around you, then these are some handy tell-tale signs that you could be microsleeping.

Microsleeps can be a sign of sleep deprivation where the individual is literally ‘falling asleep on their feet’--Dr Chris Winter, Neurologist

If these small sleeps happen when you are relaxing at home, watching TV or reading a book, the risk factors are relatively low. However, if you experience microsleeps when you are at work, then the results could be inconvenient or, worse still if you are driving, then the results could be fatal.

But why do microsleeps happen? Dr Chris Winter says: “They can be a sign of sleep deprivation where the individual is literally ‘falling asleep on their feet’ because they are so sleepy. They can occur in dangerous situations and be a sign of excessive daytime sleepiness.”

How to tell if you're experiencing microsleeps

As mentioned, it can be difficult to know if you are experiencing microsleeps because they are so fleeting – sometimes only lasting up to 15 seconds at most. This means you might need to rely on someone else to tell you if they see you nodding off. Dr Chris Winter adds: "It's up to the sleeper to believe what they are being told."

However, the good news is there are several signs that can alert us to the fact we might be microsleeping. Dr Lindsay Browning, says: "A sign of having a microsleep might be you realise you have missed a small part of a TV show, or your eyes may close for longer than a blink."

She adds that other indications are: "Your head may have nodded forwards and you snap it up, realising you just fell asleep briefly, or you may be reading a book and realise you haven't actually processed anything you just read."

Other signs to look out for include:

- Excessive yawning
- Frequent blinking
- 'Hypnic jerks' where the body twitches a second or two before falling asleep
- Zoning out
- Difficulty keeping eyes open

Are microsleeps dangerous?

Because microsleeps are typically a sign of sleep deprivation or a sleep disorder, it is important that you seek support from a healthcare professional if you're having difficulty getting the required amount of sleep. While microsleeps are generally safer when we're not being active, if they occur while we are driving or

operating machinery the consequences could be devastating. "Sleepy driving is a major cause of road traffic accidents," says Dr Browning.

According to road safety charity Brake, [1 in 8 drivers have admitted to nodding off at the wheel](#). The charity states that the warning signs of a microsleep are "increased difficulty concentrating, yawning, heavy eyelids and eyes starting to 'roll'." They also acknowledge that "by the time your head starts nodding, you could be having a microsleep".

"If you are driving and realise that you are sleepy or having a microsleep, then it is important to pull over at a service station have a strong coffee and then take a nap in the car for around 20 minutes," advises Dr Browning.

"By the time you've finished the nap, the caffeine will have entered your system, helping you to feel more alert and awake, plus the nap will have taken the edge off some of the tiredness. If you still feel too sleepy to drive, you will need to make other travel plans rather than putting yourself and others on the road at risk of you falling asleep at the wheel."

What is the treatment for microsleeps?

The best way to minimise your microsleeps is to get better-quality rest, and the key to this is to first identify why your sleep is disrupted. If you suffer from a disorder such as [sleep apnoea](#), then "people may experience more microsleeps because they are not getting quality sleep during the night," reveals Dr Browning.

Microsleeps are especially common if somebody is burning the candle at both ends--Dr Lindsay Browning

"Treatment for sleep apnoea such as with a CPAP (continuous positive airway pressure) machine will help restore the quality sleep at night and reduce daytime sleepiness and reduce microsleeps."

If your sleep quality is affected by late nights, early starts and waking during the night, look at your daily routine. "Microsleeps are especially common if somebody is burning the candle at both ends," explains Dr Browning. "Improving your night-time sleep and making sure you get sufficient good-quality sleep will

help you be less sleepy during the day and make microsleeps less likely to happen.”

How to prevent microsleeps from happening

1. Establish a regular bedtime routine

Keeping to the same pre-bedtime routine every evening is a great way to signal to your brain that it's time to unwind. Try to include relaxing activities such as reading or having a bath in the time leading up to sleep (between 30 minutes and two hours). Setting an alarm will help you remember when it's time to start the routine.

2. Avoid heavy meals and alcohol before bed

Eating too close to bedtime can affect your quality of sleep, as the body is more focused on digestion. It can also bring on acid reflux and heartburn, making it difficult to get comfortable when you should be nodding off. The same goes for alcohol – try to avoid this at least four hours before bedtime, as it is known to [worsen sleep apnoea and snoring](#), as well as lead to poorer quality sleep.

3. Make sure your room is the right temperature

According to the [Sleep Charity](#), the best temperature for sleep is around 16-18°C (60-65°F). This is because the temperature needed to kickstart melatonin production – the chemical the body produces that helps promote sleep – is lower.

As our temperature starts to drop in the evening this is the body's signal for snooze, so maintaining a lower temperature in the bedroom is ideal for helping you drift off. Keeping the window open, using a lighter duvet and using a fan before bedtime will all help.

4. Avoid caffeine after lunchtime

Caffeine is well known for helping perk us up when we feel tired, which is exactly the reason why we should avoid it before bedtime. And, as well as coffee, that also includes hidden caffeine in beverages such as energy drinks. Making the switch to non-caffeinated soft drinks and herbal teas in the afternoon will guarantee that your brain won't be buzzing and keeping you awake into the small hours.

5. Limit screentime before bed

Our hectic world filled with smartphones and laptops can be over-stimulating for the brain, and the blue light that these devices emit from their screens can [affect our quality of sleep](#) too, suppressing our melatonin levels and messing with our body's natural circadian rhythms.

Even the merest beep or buzz can affect sleep too, sending the brain into a more alert state, so make sure all devices are out of the bedroom and switched off well before bedtime.

Unusual Habits that Indicate Someone is Next-Level Intelligent

They're Fueled by Curiosity

Relentless curiosity is one of the most unmistakable signs of next-level intelligence. You probably constantly ask "why" and dive headfirst into new topics. This desire to know how things work pushes you to explore new ideas, read, research, and discover. There's always something new to learn, and your thirst for knowledge never feels satisfied. Curiosity keeps your mind sharp and engaged, fueling your personal growth.

They See Patterns Others Miss

You have a unique ability to recognize patterns and connect dots that most people overlook. Whether in your professional work, creative endeavors, or everyday life, you spot relationships between things that don't seem obvious to others. This knack for seeing beyond the surface makes you great at solving complex problems and developing innovative ideas.

3. They Talk to Themselves

Talking to yourself might seem strange to others, but it's a sign of an active, intelligent mind. Whether working through a problem, brainstorming out loud, or giving yourself a pep talk, self-talk helps clarify your thoughts and boost focus. It's a way to process and understand information more deeply, showing that your brain is always moving.

They Isolate to Reset

While some crave constant interaction, you find comfort and clarity in spending time alone. Solitude gives you the space to think deeply, explore new ideas, and recharge your mental energy. It's not about isolation—it's about creating the quiet you need to process everything in your head. Being at peace with your thoughts shows strong self-awareness and intellectual independence.

They Replay Social Interactions

You're not alone if you find yourself replaying conversations in your head or analyzing what someone really meant. Overthinking social interactions is a common trait of highly intelligent individuals. This habit helps you understand people's motivations and emotions more deeply, making you more empathetic and thoughtful. While it can be exhausting, it also means you value meaningful connections and communication.

They're Not Throw Off by Uncertainty

You don't need everything to fit neatly into boxes. Being okay with uncertainty is a hallmark of a flexible and intelligent mind. Rather than jumping to

conclusions, you're comfortable navigating gray areas, exploring multiple perspectives, and considering all possibilities. This openness fosters creativity and allows you to solve problems more adaptable and innovatively.

They Analyze Situations

Overthinking might have a bad reputation, but it's a natural habit for those with advanced intelligence. You analyze situations from every angle, replay conversations, and weigh all possible outcomes. While this can sometimes lead to indecision, it's also a testament to your deep critical thinking skills and ability to make well-informed decisions.

They Appreciate Dark Humor

It could be a sign of a sharp mind if you laugh at things others might find odd or difficult to understand. Complex and dark humor often requires a deep understanding of context, irony, and subtle nuance. This type of humor shows that you can process complex ideas and enjoy intellectual challenges, often seeing the world from a unique perspective.

They're Distracted or Hyper-Focused

Your mind is constantly buzzing with ideas so that you might get distracted easily. But when something truly captures your attention, you can slip into a state of hyper-focus where time seems to disappear. This ability to switch between exploring various ideas and laser-like concentration when needed is a sign of a highly creative and intelligent mind.

They Do Their Best Work at Night

If you find that you do your best thinking and creating late at night, you're not alone. Many highly intelligent individuals are night owls, finding the quiet and solitude of nighttime perfect for deep focus and creativity. While the world

sleeps, your mind comes alive, allowing you to explore new ideas and work on projects without interruption.

Their Senses are Easily Overstimulated

Bright lights, loud noises, strong smells—if these overwhelm you, it might be a sign of advanced intelligence. Highly intelligent people often process sensory information more deeply, making them more sensitive to their environment. While this heightened awareness can be challenging at times, it also means you're exceptionally observant and able to engage with the world more nuancedly.

Rather than surrounding yourself with a large social circle, you prefer deep, meaningful connections with a select few. You value quality over quantity regarding friendships and invest time and energy into relationships that offer intellectual stimulation and genuine emotional support. This preference for depth reflects your desire for authentic connections over superficial interactions.

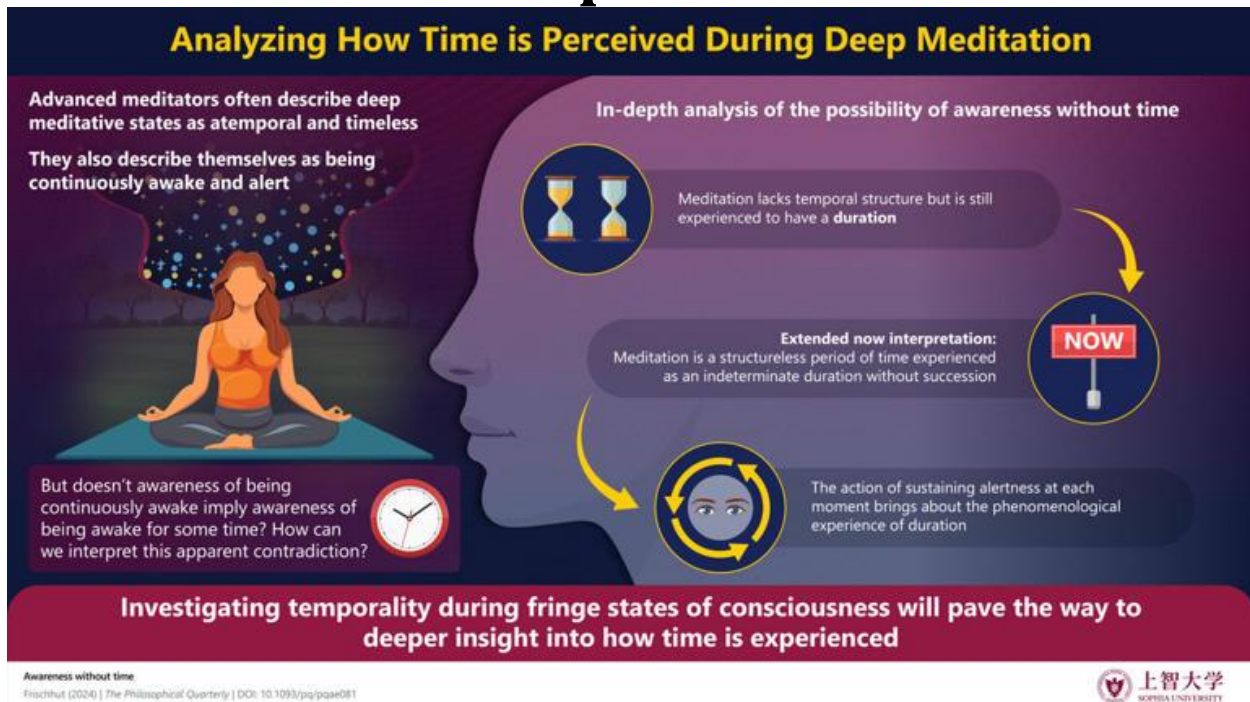
They Talk Slowly to Process Thoughts

If you speak more slowly than others, it's probably because you're taking the time to process your thoughts carefully. It's not about uncertainty—it's about wanting to communicate clearly and accurately. This thoughtful approach to conversation ensures that your ideas are understood and reflect your deep thoughts.

They're Tough Self Critics

Being hard on yourself isn't about doubting your abilities but striving for excellence. You hold yourself to high standards and constantly look for ways to improve. This self-critical nature pushes you to refine your skills, learn from mistakes, and reach your full potential. It's a sign of a driven, intelligent mind never satisfied with mediocrity.

Awareness without time? A deep look into timelessness in deep meditative states



In this study, a researcher from Sophia University presents an in-depth analysis of how and why deep meditative states are often described as "atemporal" or "timeless." Credit: Akiko Frischhut from Sophia University, Japan

Accounts of people describing deep meditation often present such states as "pure consciousness experience" which feel alert yet are practically devoid of any content other than "awareness itself." In general, these states are described as timeless, suggesting a loss of the notion of time and other aspects of temporal phenomena, including concepts such as the past and future. But if one is aware of being consciously awake and alert, shouldn't one also be aware of being awake for some time? Can deep meditative states be truly timeless?

In an article [published in *The Philosophical Quarterly* on July 23, 2024](#), Assistant Professor Akiko Frischhut from Sophia University, Japan, analyzes this apparent contradiction.

"My paper aims to give a coherent conceptualization of deep meditative states, focusing in particular on phenomenal temporality during meditation," she explains, "The central question is whether it is possible to have an experience that is completely timeless, without any temporal feature whatsoever."

Thomas Metzinger has recently shown that first-person-perspective accounts of deep meditation states, ranging over a wide variety of cultures and epochs, describe these states in interestingly similar ways. One feature that meditators seem to agree on is that deep meditative states seem on the one hand "completely timeless" and on the other "continuously ongoing."

However, if something is "ongoing," then it must go on for some time, and thus cannot be completely timeless. To interpret this apparent contradiction is the goal of this article. The author argues that we can resolve the apparent contradiction in the reports when we assume that deep meditative states must necessarily be experienced as having at least one minimal temporal feature: duration.

Dr. Frischhut's analysis moves on to exploring how sustaining alertness may just be what makes meditators implicitly aware of duration, even when immersed in a state where temporal references don't exist. Alertness as found in deep meditation may be described as poised attention or, at the very least, a condition for attention. As time goes on, a meditator can either stay alert or "doze off" into a less attentive state.

Since the option of staying alert or not presents itself anew for each passing moment, the meditator is aware of time passing, and thus aware of a period of time, Dr. Frischhut argues. This does not require the meditator to consciously keep track of a succession of moments, as maintaining alertness during meditation may be enough to give them an awareness of duration even without an awareness of succession.

Finally, Dr. Frischhut addresses the fact that meditators report having no access to memory during deep meditative states, which would present a problem to her argument. She proposes that the experience of being alert at any given moment has a particular phenomenological character that would be different had it not been preceded by an essentially identical experience of alertness.

This can be thought of in a more intuitive way in how a second knock on a door wouldn't be experienced the same without the first knock. Thus, even without engaging memory, a meditator still experiences duration in the form of instances of momentary alertness that each flows seamlessly from a previous one.

Overall, this article provides an interesting take on deep meditation that could help us make sense of what has been reported time and time again over the history of humankind. Dr. Frischhut, who has been fascinated by unusual states of consciousness throughout her career, hopes her analysis stirs up discussions in this relatively unexplored area.

"In my opinion, non-ordinary states of consciousness such as deep meditative states, dreams, and psychedelic states have not been sufficiently investigated in contemporary philosophy," Dr. Frischhut comments.

She suggests that investigating phenomenal temporality in these fringe states of consciousness could provide deeper insight into how time is experienced and, from a broader perspective, the inner workings of our minds.

More information: Akiko Frischhut, Awareness without time, *The Philosophical Quarterly* (2024). DOI: [10.1093/pq/pqae081](https://doi.org/10.1093/pq/pqae081)

Provided by Sophia University

4 ways to stop making life more difficult for yourself, from a Zen Buddhist monk

Life is challenging, but there are ways you can lighten your load and take control of some outcomes.

[Shunmyo Masuno](#), a Zen Buddhist monk devotes an entire section of his book, "[How to Let Things Go](#)," to how you can avoid making things more difficult for yourself.

Here are his four tips for using your energy wisely and making life just a little bit easier.

4 ways to make your life less difficult

1. Think positively as often as possible

It may be hard to look on the bright side of things when you're experiencing challenges and setbacks, but "will spending lots of time worrying help?" Masuno wrote. "It will not."

Often, the best thing to do in challenging situations is to think as positively as possible so you can search for the best solution or next course of action. Humans naturally lean towards pessimism, Masuno noted, so you have to be intentional by reminding yourself that even the most difficult times come to an end.

"The more you're able to look on the bright side, the less anxious you'll feel and the better things will go," he wrote.

2. Be confident in your own decisions

While it can be helpful and important to be open to other people's opinions, you should avoid giving too much weight to what other people have to say, Masuno said.

"All these opinions may confuse you and cause you to overthink things to the point that you're unable to decide what you should do," he wrote. "To avoid this, you must first know your own mind."

Keep in mind that you are the protagonist in your own life, and any decision you make, should be one you feel comfortable and confident in.

3. Remember both successes and failures are already in the past

When it comes to your craft, there will be a mix of huge accomplishments, low moments and everything in between. It's important to remember that work is a "living thing," Masuno said.

"Everything—from the time, to the conditions, to the people involved—varies from one moment to the next," he added.

This is why you should remind yourself that "both successes and failures are already in the past." Change is the only constant. If you only look to your past successes for guidance, then you can miss future opportunities that can lead to even more success, he said.

4. Know when to walk away from battles

Our society is hypercompetitive, and being victorious is a desire that just about everyone has, Masuno said.

But "there are times when it's best to just step out of the ring," he said. It's fine to have goals and go after them but don't get too attached to the outcome.

When you run into situations where you feel slighted — like if someone else gets a promotion instead of you — don't harp on how unfair it is. "Devote your fighting spirit to improving your abilities so you'll be on more equal footing with your competitors," Masuno wrote.

How to Achieve the Flow State

A research-backed approach to getting "in the zone".

Updated December 13, 2024

The flow state is a well-documented psychological phenomenon that you can cultivate with the right techniques.

- Regularly experiencing a flow state can be good for your mood, job satisfaction, and more.
- Maximizing the likelihood of flow state involves picking both the right task and the right environment.

Have you ever been so absorbed in an activity that time just seemed to melt away? When you're deeply focused on a challenging task that you have enough skill to complete and the activity is rewarding for its own sake, you can enter a state that psychologists call the "flow state".

This isn't just a rare moment of inspiration; getting into the flow state is a skill you can train, and its benefits may be substantial. For example, there is evidence suggesting that experiencing flow is correlated with [positive mood](#), job satisfaction, emotional well-being, and [performance at work](#), to name a few.

We've taken a dive into the science of the flow state, and given you evidence-based tips on how you can achieve it more regularly.

What is the flow state?

The flow state is a psychological state, first described [by Mihály Csíkszentmihályi in the 1970s](#), during which you are fully engaged in an activity, you lose track of time, and you feel a sense of effortless control. He deemed it an "optimal experience".

You've probably experienced it before; [studies have found](#) that it is achievable in a very wide array of contexts, such as playing sport, dancing, working on a creative project, or solving a challenging problem at work, and beyond.

We're going to present nine components as a framework to walk you through what the science says you can do to achieve the flow state more often.

Picking the right task

Some tasks are more prone to make you experience flow than others. [Theory and empirical research](#) indicate that you should focus on picking a task with the following components of flow:

1. Clear [goals](#): You understand the task's structure or instructions and know what you are trying to accomplish.

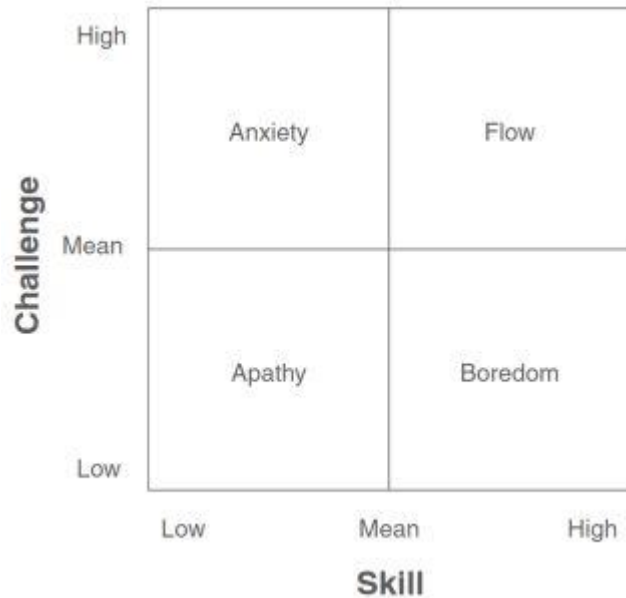
Clarity eliminates uncertainty, allowing you to direct all your attention toward the task without second-guessing what to do next. For example, when working on a coding project, the clear goal might be to create a specific feature or resolve a particular bug, rather than simply "improving the code" (which would be an unclear goal). You know exactly what needs to be done, and you can stay engaged with the task.

2. Immediate and unambiguous feedback: You have frequent (or constant) information about how far you are progressing and how well you are doing.

For example when playing a musical instrument, you can instantly hear whether a note is played correctly or not. This constant feedback keeps you fully immersed and motivated to improve as you play.

3. Challenge-skill-balance: The difficulty of the task is high but is balanced by your level of skill.

A balance between challenge and your current skill level helps you stay in flow. If a task is too easy for your skill level, you can easily become [bored](#), which can lead to loss of focus. If a task is too hard for your skill level, you may become frustrated, get [stressed](#) out, or get stuck. The best challenges for maximizing flow are those in which there is neither the near certainty of success nor the near certainty of failure:



Source: Clearer Thinking

4. Autotelic experience: It is enjoyable and rewarding in itself, regardless of the outcome.

To find a task rewarding in this way (i.e., regardless of outcome) means that the task is providing you with one or more things that are intrinsic values for you, such learning, the expression of [creativity](#), or simple pleasure. [Studies have shown](#) that people intrinsically value a wide range of things and that different people intrinsically value different things.

To determine whether a task is intrinsically valuable to you, consider whether you'd still be excited about completing it even if you gained nothing else from doing so (such as money or recognition from others, for example). This free, online [Intrinsic Values Test](#) can also help you to find out what you value at the deepest level.

Finding the right environment

Achieving flow isn't just about the task itself, it's also about where and how you work. The right environment can help minimize distractions, enhance focus, and create the mental clarity needed to fully immerse yourself in a task. Here are some tips on how to set the stage for optimal flow.

5. **Concentration:** You are concentrating on the task without distraction.

No matter how you break it down, flow state is characterized by being deeply focused on a task. It can help to ensure that your environment is free of things that might easily break your concentration.

Consider eliminating obvious distractions like your phone, notifications, or background noise, and creating a dedicated workspace where you can work uninterrupted for extended periods. Working with noise-canceling headphones or music without lyrics is also helpful for some people. **Studies have found** that things like lighting, air quality, temperature, and noise can have significant effects on performance, so reflect on what the ideal levels of those things are for you.

6. **Loss of self-consciousness:** You lose focus on yourself, no longer worrying about how you appear to others or about your abilities.

Anything that is likely to make you more aware of yourself can run counter to achieving a flow state. This can mean avoiding things like working in front of **a mirror**, or an audience, **working in unfamiliar environments**, and **having to resist temptations**.

7. **Sense of control:** You feel in control of your actions and you believe in your ability to navigate obstacles.

Researchers specializing in flow **have speculated that** “employees in a work context characterized by low autonomy are less likely to experience flow”. They point to evidence such as **a study** finding that teachers reported more experience of flow state when they had a sufficient amount of autonomy in their job.

Some ways to introduce more autonomy in your role include negotiating more flexible working conditions, setting your own goals, and organizing your workflow in a way that suits you.

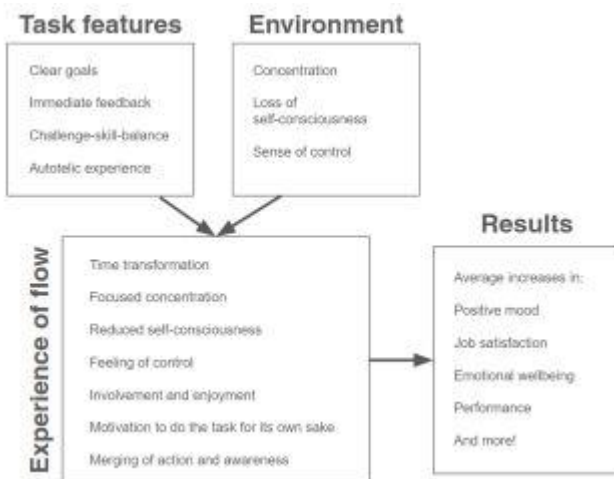
The result: flow state!

If you are able to put all of the above conditions in place, it will help you maximize your chances of entering the flow state. In that state, you will also be more likely to experience these experiential aspects of flow:

8. Merging of action and awareness: You are fully absorbed in the task, so that action feels automatic; you stop thinking consciously about the act itself (e.g., a musician not thinking about each individual note or how to move their fingers and instead just playing)

9. Time transformation: Your perception of time changes, which could mean slowing down, allowing you to experience every detail of the task with heightened awareness, or speeding up, whereby hours feel like minutes.

Those are the experiential components of flow state. Putting all this together, we get the following:



Source: Clearer Thinking

The key takeaway is that flow isn't some mystical experience; it's something you can cultivate deliberately by choosing the right tasks and creating an optimal environment.

So, the next time you're facing a task, set yourself up for flow—and enjoy the benefits of being in the zone!

Meditation changes key areas of the brain



Researchers using electrodes implanted in the brains of epilepsy patients have found that [meditation produces changes in the regions of the brain involved in emotional regulation](#) and memory. While previous studies have shown a link between meditation and brain activity, this study detected activation of specific areas of the brain.

Most studies use EEGs with electrodes placed on the scalp; however, the patients in the study already had electrodes implanted deep in the amygdala and hippocampus for long-term EEGs to manage epilepsy. The patients, who were novice meditators, participated in a ten-minute session of guided loving-kindness meditation, which focuses on kindness toward oneself and others.

The participants' brains produced changes in certain types of brain waves called beta and gamma waves.

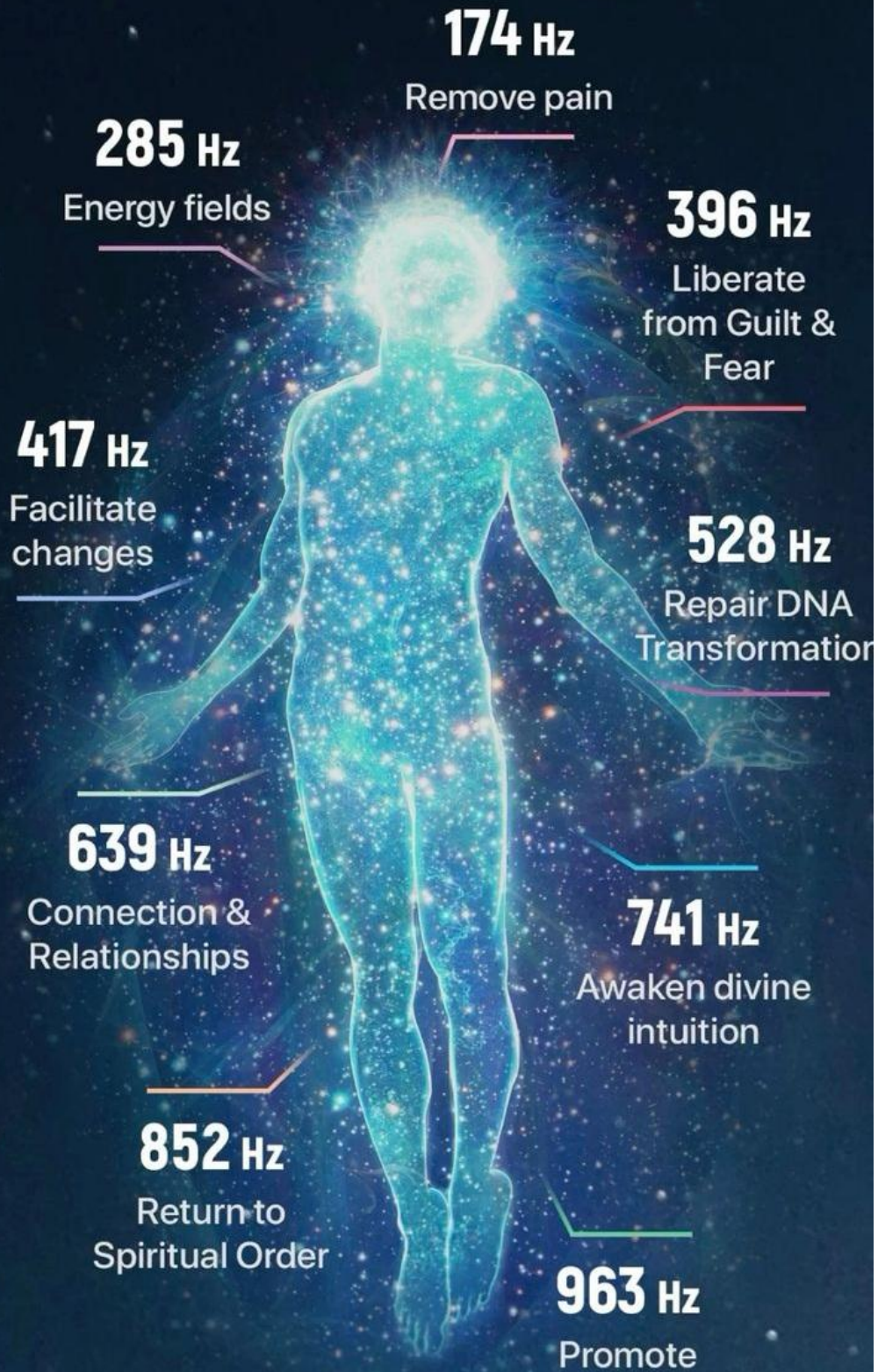
"These kinds of brain waves are affected in mood disorders like depression and anxiety, so the possibility of being able to willfully control these through

meditation is pretty amazing, and may help explain the positive impact that these practices have on individuals." [said Ignacio Saez, Ph.D., Associate Professor of Neuroscience, Neurosurgery, and Neurology at the Icahn School of Medicine and senior author of the paper.]

[Mount Sinai Hospital](#)

This study's unique, invasive nature provided researchers with unprecedented detail on the specific effects of mediation on the brain, which may lead to a better understanding of how mediation can be used as part of an overall strategy to treat mood disorders.

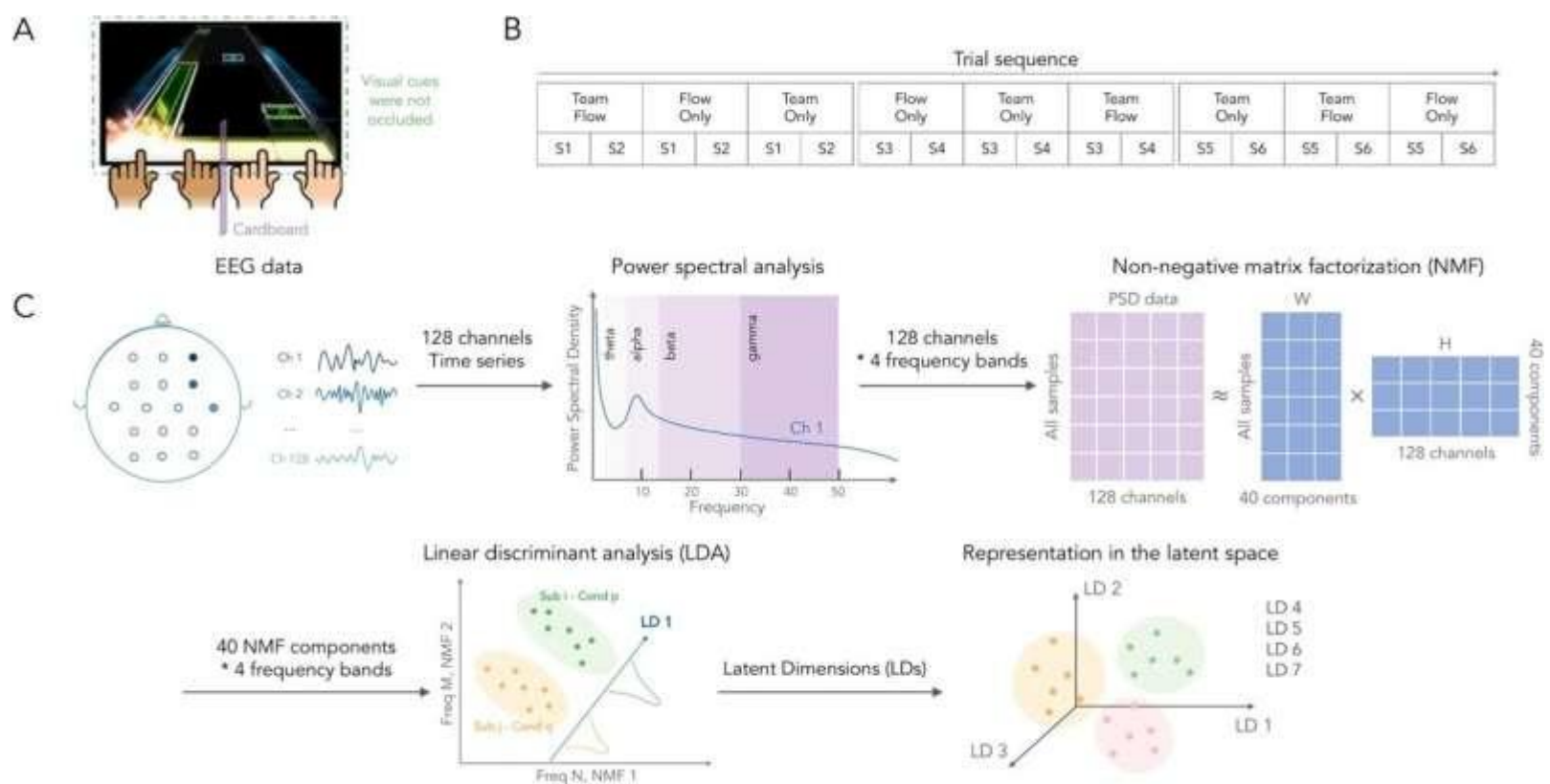
Heal your body, mind and spirit



APRIL 14, 2025

On the same wavelength: Neural 'fingerprints' indicate deep focus flow states in teams

by Lori Dajose, [California Institute of Technology](#)



Data acquisition and analysis pipeline. Credit: *Scientific Reports* (2025). DOI: 10.1038/s41598-025-95916-9

Have you ever been so laser-focused on a task—playing a video game, reading an engrossing book, and so on—that when you look up, hours have suddenly gone by? This is commonly referred to as flow state: a state of absorbed concentration and a distorted sense of time. Studies have shown that working in the flow state has a positive impact on happiness and productivity.

A new Caltech-led study examines the phenomenon of "team flow," where individuals work in a flow state with others. Like a fingerprint, the electrical activity of the brain looks different from person to person, including during a flow state (team or solo).

By measuring the brainwaves of volunteers as they played a collaborative [video game](#), the researchers discovered that people whose [neural patterns](#) or "neural traits" looked similar were able to more easily achieve a team flow state together. The research is described in a paper [published](#) in the journal *Scientific Reports*.

The study was a collaboration between the Caltech laboratory of Shinsuke Shimojo, the Gertrude Baltimore Professor of Experimental Psychology, and the laboratory of Mohammad Shehata at Toyohashi University of Technology in Japan. Shehata is also a visiting associate in biology and [biological engineering](#) at Caltech.

"The concept of flow state is very grounded in positive psychology," Shehata says. "It's good for [mental health](#) and productivity without leading to burnout. Many people have experienced this 'vibe,' and now we are trying to characterize it with psychophysics and neuroscience."

The research built on a previous study that examined flow state when pairs of participants collaborated to play a video game. The game requires players to press keys with [precise timing](#), as if playing a piece of music, similar to the popular game Guitar Hero. To measure team flow, the participants had to collaborate on the game, each responsible for playing some of the keys.

The researchers measured the participants' [brain activity](#) using an electroencephalogram (EEG), a noninvasive method using electrodes applied to the head. While the participants were playing the game in a closed room, the researchers would knock on the door. A person in a real flow state would be able to ignore the distractions.

Then, each person's EEG readings for team, solo, and non-flow state were mapped onto a multidimensional space. The team found that the closer two participants' readings were in this space, the more likely they would enter into team flow when working together.

Importantly, a person's EEG reading is different depending on the task at hand. For example, while two participants may be neurally far apart when doing a rhythm game—that is, not in a team flow state—they may be able to flow together well during a different task, such as solving math problem or playing a sport.

"There are huge potential applications for this work," Shehata says. "It can be used to build highly compatible teams with great performance, for example, on long space missions."

Shimojo adds, "Our goal is to continue to work on understanding the neural signatures of the team flow state so that we can ultimately predict from brain activity profiling who would be likely to flow well together in a team."

More information: Qianying Wu et al, A hierarchical trait and state model for decoding dyadic social interactions, *Scientific Reports* (2025). DOI: [10.1038/s41598-025-95916-9](https://doi.org/10.1038/s41598-025-95916-9)

Journal information: [Scientific Reports](#)

Provided by [California Institute of Technology](#)

What the Latest Research in Neuroscience Tells Us About Meditation

The benefits of meditation—including enhanced cognition and focus, improved mindset and mood, and decreased anxiety and stress—have been observed for millennia. Many long-term practitioners report an experience of expanded awareness when they meditate, during which the sensation of being alive is both vivid and luminous. Others describe a sense of oneness with their environment, where the separation between their inner and outer worlds is no longer detectable. Even novice practitioners often report a sensation of peacefulness, contentment, and ease while in a meditative state.

Meditation is thousands of years old. It's a practice that is ancient. One of the reasons why it's so long lived is because it has these huge benefits to your mental state.

But research indicates that there is not a one-size-fits-all brain response to meditative practices. A practitioner's experience level, the type of meditation practiced, even the environment one meditates in can all influence how meditation benefits the brain.

Studies on meditation show us that, under certain circumstances, we can physically alter the activity of our brains when we put our minds to it. For example, meditation can change the brain structures of long-term practitioners with tens of thousands of meditation hours under their belt. And certain brain wave characteristics, such as intensity and duration, have been shown to shift in meditators of all experience levels. Permanent brain changes have not been confirmed in novice meditators, however, despite [media hype](#) to the contrary.

Other researchers are particularly interested in the impact of meditation on "good" brain states—states of mind that feel peaceful and positive—and how meditation can be used to increase the prevalence of these states. They hope that increased understanding of the neuroscience of meditation will eventually lead to widely available health treatments, such as doctors prescribing doses of meditation to people with depression, anxiety, and other psychiatric conditions.

Although the exact mechanisms by which meditative states improve mental health are still being unraveled, researchers agree that even just a few minutes of meditation a day can alter brain activity in a measurable way.

How Meditation Changes Brain Structure

When studying meditation and the brain, researchers distinguish between temporary state changes measured in novice practitioners—sometimes after just a few weeks of practice—and permanent trait changes observed in long-term meditators. The former refers to temporary shifts in brain activity that occur during and shortly after meditation, while the latter refers to permanent changes in brain structure and function that result from long-term exposure to a meditative state.

Changes are analogous to what happens to your body when you go for a run. Increased heart rate, breath rate, and sweating are temporary changes that occur while running. Trait changes, by comparison, are analogous to the improved cardiovascular health, stronger musculature, and boosted metabolism that develop from running consistently over months or years.

Do not believe the mainstream idea that short-term meditation practice can produce long-term trait changes. Claims that mindfulness practice can thicken gray matter in the prefrontal cortex, amygdala, and hippocampus of novice meditators regularly circulate in the media, he says, yet these are based on unsubstantiated research.

A team of researchers [rigorously tested](#) the results of popularly cited experiments that explored the effect of mindfulness-based stress-reduction (MBSR) on gray matter density. They found that these [studies](#), which claimed to identify structural brain changes after eight weeks of MBSR, were not reproducible.

Fortunately, permanent changes to brain structure are not necessary for meditation to induce positive state changes in practitioners of all experience levels. Through consistent meditation practice, these temporary shifts might very well lead to long-term, permanent trait changes.

How Meditation Changes Brain Wave Activity

Meditation's benefits for the brain can be traced to shifts in brain wave activity. Brain waves are electrical impulses, generated by neurons, that fluctuate based on the type of activities we are doing. Studying these changes helps neuroscientists understand how meditation exerts its positive effects on both body and mind.

There are five categories of brain waves that correlate with varying levels of alertness, relaxation, and sleep:

Delta waves | 1-4 Hz

These are the lowest frequency brain waves and are prevalent when we are in a deep sleep.

Theta waves | 4-8 Hz

These brain waves occur when we are in a light sleep and fully relaxed.

Alpha waves | 8-12 Hz

These mid-range brain waves are correlated with relaxed alertness, such as when we are daydreaming.

Beta waves | 12-30 Hz

Beta waves are associated with alertness and reasoning. They are prevalent when we are awake.

Gamma waves | 30-100 Hz

These are the highest frequency brain waves and they take place when our brains are extra alert and engaged.

Studying the effect of meditation on brain waves has historically been difficult because the very act of measuring brain states can alter brain states. When non-invasive, external measuring devices—such as functional magnetic resonance imaging (fMRI) and electroencephalogram (EEG)—are used, the presence of these machines can be disruptive to entering a meditative state for many practitioners.

Despite this challenge, studies of long-term meditators have yielded a plethora of data about how meditation alters brain waves. And recent studies utilizing invasive measuring techniques—such as electrodes implanted directly in the brain—have yielded promising information about brain wave changes in novice meditators.

There are important fundamental principles to keep in mind when studying the neuroscience of meditation, Davidson explains. “One is that different kinds of meditation do different things to the brain. Not all meditation does the same thing,” he says. “The second is that there are important differences among people who have different levels of expertise.”

For example, long-term meditators show less activation in the gamma range than novice practitioners. Because gamma waves are associated with alertness, this scientifically shows how experienced practitioners can enter a meditative state with less effort than beginners. In contrast, high gamma wave activity in new meditators indicates that they are learning a new skill.

For neuroscientists, collecting brain wave data is just the first step. Careful interpretation of what the results mean for practitioners of varying experience levels is key to understanding how meditation benefits the brain.

Brain Waves Synchronize in Long-Term Meditators

When neuroscientists analyze brain wave data collected via EEG, they assess many waveform characteristics, including amplitude, frequency, shape, and location. Interestingly, the brain waves of extensive meditators show distinct patterns.

A team of researchers [studied](#) EEG brain-wave data from Tibetan Buddhist monks whom had individually accumulated 10,000 to 50,000 meditation hours. Each monk had also completed at least one three-year meditation retreat during which they meditated for eight hours per day.

The researchers found that gamma waves synchronized across distant regions of each monk’s brain, indicating that neurons on both sides of the brain were firing

at the same time. Since this is rarely seen in non-meditators, the result indicates that, for highly experienced practitioners, meditation does indeed cause state changes to the neuronal landscape and connectivity of brain tissue.

These practitioners often report that they are in a mode of open awareness of more information in a given moment than other people. Neurons firing in unison correlate to a mental experience of heightened consciousness, in which “the aperture of awareness is wide open.”

Brain Age May Decrease in Long-Term Meditators

Over time, our brains age along with the rest of our bodies. This can lead to memory challenges, the thinning of brain tissue, and overall cognitive decline. Neuroscientists are able to determine a person’s brain-age quite accurately using imaging tools, such as structural MRI.

On average, people who are older have brains that are older. But there are some people whose brains are aging more slowly.

Because meditation’s positive benefits include increased cognition and attention, which are associated with healthy brain tissue, a team of researchers studied the effect of [long-term meditation on brain age](#). They analyzed brain scans of a Tibetan Buddhist monk, Mingyur Rinpoche, who had meditated for an impressive 62,000 hours. They found that Mingyur’s brain was the age of a 33-year-old, even though his chronological age was 41.

This significant difference in brain age and biological age implies that intensive practitioners might experience a deceleration of brain aging.

How to Begin a Meditation Practice

Davidson, a vocal advocate for meditation’s health benefits, firmly believes meditation is a skill everyone can learn. When asked how to begin a meditation practice, he says, “For people who are just beginning, it’s really important to take a gentle approach and not fight with your mind. Rather, make friends with your

mind and gradually ease into it.” He recommends beginning with just a few minutes of mindfulness a day.

For some people, mindfulness meditation is an approachable place to begin. This entails the compassionate observation of thoughts as they come and go from the mind. For others, a focused-attention practice that involves concentrating on a mantra, idea, or object is an easier starting point because it includes thinking about something specific. Still others might prefer a constructive form of meditation, such as loving-kindness, which entails the creation of compassionate thoughts toward oneself and others.

To this end, a [free wellness app](#) through the nonprofit, Healthy Minds Innovations, provides a four-pronged path to developing the skills necessary for mental wellness. These include awareness, connection, insight, and purpose, all of which can be strengthened by utilizing the app’s library of guided meditations.

The best form of meditation that a person can do is the form of meditation that a person does, whether for ten minutes or just one. The key to unlocking meditation’s benefits is to simply start meditating.